



STATE OF ILLINOIS – DEPARTMENT OF LABOR
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CHICAGO, IL 60601

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IN THE MATTER OF:

STUART DEAN COMPANY,

Petitioner,

vs.

JANE FLANAGAN, DIRECTOR OF THE
ILLINOIS DEPARTMENT OF LABOR, and
the ILLINOIS DEPARTMENT OF LABOR,

Respondents.

State File No.

**WRITTEN OBJECTION AND REQUEST FOR
HEARING UNDER SECTIONS 4 AND 9**

Stuart Dean Company (the “Petitioner”), by and through its undersigned counsel, submits this written objection to the prevailing wage schedule published by the Illinois Department of Labor (“Department”) on July 15, 2026 and requests a hearing pursuant to Sections 4 and 9 of the Prevailing Wage Act (the “Act”), 820 ILCS 130/01 *et seq.*, to establish a prevailing wage rate for the trade classification of metal maintenance and refinishing workers in Cook County.

BACKGROUND

1. Petitioner is an employer that performs various metal maintenance and refinishing services for public and private enterprises in Cook County. For over 20 years, Petitioner has performed these services at Harold Washington Library and for over 6 years at Midway Airport, among other locations.

2. Petitioner is one of five companies who perform similar metal maintenance and refinishing work in the Chicagoland area, and for purposes of collective bargaining, they associate as members of the Chicago Metal Contractors Bargaining Association (the "Association").

3. The employees of the Association members perform "metal refinishing" and were originally represented in collective bargaining by Local Union 8A-28A, Metal Refinishers, Polishers, Painters, Sign & Display, Production and Novelty Workers Union, IUPAT, AFL-CIO ("Local 8A-28A"). Local 8A-28A originated as a separate labor organization around 1940-1948 in New York. As a result of mismanagement and criminal activity committed by the then president of Local 8A-28A, Hector Lopez, it was placed into receivership under the supervision of the United States District Court in the Eastern District of New York. Following Local 8A-28A's receivership, in approximately 2000, Local 8A-28A was assigned to be administered through Painters District Council #14 (the "Union") which then, and now, represent(ed) employees of several companies that comprise the Finishing Contractors Association of Chicago ("FCA"). The Association and FCA, however, have at all times been parties to different, independently bargained agreements with the Union. Specifically, the employees of the Association members are NOT painters, nor laborers as will be shown below.

4. As part of the Association, Petitioner has entered into Collective Bargaining Agreements ("CBA") with the Union. A true and correct copy of the February 1, 2023 to January 31, 2027 CBA between these parties is attached hereto as **Exhibit A**. This CBA covers:

Employees engaged in polishing, buffing, stripping, coloring, lacquering, spraying, cleaning and maintenance of ornamental and architectural metals, iron, bronze, brass, nickel, aluminum and stainless steel and in metal specialty work, various stone and stone finishes, stone specialty work and any other specialty work pertaining to the finishing and refinishing of metals, stones, woods, and any window washing/ cleaning done in

conjunction with this work, excluding clerical and office employees, guards and supervisors.

Ex. A at 1.

5. The minimum rates of pay for these metal maintenance workers for the years covered by the current CBA are listed in Article 25 of the CBA and are as follows:

Table: A

Illinois, Indiana, Wisconsin, and Michigan (Maintenance)					
	February 1*	February 1	February 1	February 1	February 1
Classification	2022	2023	2024	2025	2026
General Foreman (Field Mgr./					
Working Union Supervisor)	\$37.05	\$38.30	\$39.45	\$40.60	\$41.75
FOREMAN	\$35.05	\$36.30	\$37.45	\$38.60	\$39.75
JOURNEYMAN	\$31.30	\$32.55	\$33.70	\$34.85	\$36.00
Assistant Journeyman	\$30.30	\$31.55	\$32.70	\$33.85	\$35.00
The classifications listed above shall receive no less than the per hour rate increases listed in Article 24A for each year of this Agreement.					
Apprentices shall receive raises effective on the date of their Anniversary, the rates shall be those listed in this table.					

* Prior Contract year's rates.

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Classification	2022	2023	2024	2025	2026
Apprentice IV (36 mo. - 48 mo.) .65 for each year plus yr 1 - .70; yr 2 - .70; yr 3 - .72; yr 4 - .73	\$22.07	\$23.42	\$24.77	\$26.14	\$27.52
Apprentice III (24 mo. - 36 mo.) .65 for each year plus yr 1 - .67; yr 2 - .67; yr 3 - .68; yr 4 - .70	\$20.89	\$22.21	\$23.52	\$24.85	\$26.20
Apprentice II (12 mo. - 24 mo.) .65 for each year plus yr 1 - .63; yr 2 - .63; yr 3 - .65; yr 4 - .66	\$19.72	\$21.00	\$22.28	\$23.58	\$24.89
Apprentice I (91 days - 12 mos.) .65 for each year plus yr 1 - .59; yr 2 - .59; yr 3 - .61; yr 4 - .62	\$18.51	\$19.75	\$20.99	\$22.25	\$23.52
Apprentice I (90 days) .65 for each year plus yr 1 - .55; yr 2 - .55; yr 3 - .57; yr 4 - .58	\$17.27	\$18.47	\$19.67	\$20.89	\$22.12

6. As noted in the above chart, there are five main classifications for metal maintenance and refinishing workers: Apprentice (levels 1, 2, 3 and 4), assistant journeyman, journeyman, foreman, and general foreman/field manager. Petitioner maintains an equal ratio of Assistant Journeymen, Journeymen, and Foremen. True and correct copies of the job descriptions for these classifications are attached hereto as **Exhibit B** at 3–6. These job descriptions list the various activities individuals within these classifications perform including preparing surfaces for the refinishing process, cleaning, oxidizing, and polishing metals, removing scratches from various metals, setting up jobsites and scaffolding, and spraying various coatings and finishes.

7. Under the CBA, Petitioner has the right to “decide upon methods, equipment, and procedures to be used in the performance of all work covered by this Agreement.” Ex. A at 5. Petitioner also has the right to “plan, direct and control all its work,” and “direct and assign work to employees.” *Id.* at 4.

Metal Maintenance Training

8. Petitioner provides newly-hired individuals with a Metal Restoration & Maintenance Training Manual (the “Manual”). A true and correct copy of the Metal Restoration & Maintenance New Hire Training Manual is attached hereto as **Exhibit C**¹. This Manual contains five modules focusing on the company, its policies, training and safety protocols, job set up and break down, masking, surface protection, restoration and maintenance basics and techniques, the coating removal process, the cleaning process, washing and waxing, and polishing.

9. Petitioner also maintains a Corporate Health and Safety Plan specifically for metal, stone, wood, and glass restoration. A true and correct copy of this Plan is attached hereto as **Exhibit**

¹ Exhibits C, D, E, & F of this Written Objection and Request for Hearing under Sections 4 and 9 are Petitioner’s confidential materials. As such, each of these exhibits are designated as confidential for this filing, and Petitioner intends to file a motion to seal after this Written Objection is accepted by the Department.

D. This plan contains a site-specific fall protection plan for Petitioners' "employees and subcontractors performing metal, stone, wood, and glass restoration work on facades, roofs, and other elevated surfaces." *Id.* at 34. It also contains a partial inventory list of chemicals used in the metal restoration process. *Id.* at 138. Lastly, this Plan includes Draft Procedures for Petitioner's Safety Plan for Work Inside Elevators which notes that "[t]he elevator cab doors must be kept open at all times when stripping, refinishing, and spraying the returns and any metal inside the cab other than the doors" and otherwise describes safety protocols while conducting refinishing work in elevators. *Id.* at 172.

10. Petitioner also provides specific training documents for architectural metal restoration and maintenance work. A true and correct copy of the Architectural Metal Restoration and Maintenance training guide is attached hereto as **Exhibit E**. This document provides the fundamental principles for restoring and maintaining architectural metal surfaces (such as doors, frames, building facades, and light fixtures) including restoration techniques. Different metal surfaces change with time depending on a variety of factors including the type of metal, local climate, location, and exposure to direct sunlight. *Id.* at 1. The training manual then discusses the three most commonly used architectural metals—brass, aluminum, and stainless steel—including the preparation of the metal, the cleaning process, and the lacquer application.

11. While Petitioner provides its workers with the above-described training manuals, members of the National Association of Architectural Metal Manufacturers (NAAMM) along with the National Ornamental & Miscellaneous Metals Association (NOMMA) have developed a Metal Finishers Manual for Architectural and Metal Products. A true and correct copy of this manual is attached hereto as **Exhibit F**. This 116-page manual discusses the various finishes for aluminum,

copper alloys, stainless steel, carbon steel and iron including the care and maintenance of these finishes.

Scopes of Work

12. In Petitioner's work orders for various projects including the Harold Washington Library, the specific requirements, materials, specifications, and frequency of the work is described. True and correct copies of three of these work orders are combined and attached hereto as **Exhibit G**. In one of these work orders, the work to be performed includes the semiannual metal-cleaning and clear-coat maintenance of bronze exterior components of the Library. *Id.* at 10–13. The work includes cleaning and providing maintenance work for various windows, entrances, doors, and frames. Another work order notes that the various bronze items in the entrances and windows of the Library should be washed and waxed every 1-6 months. *Id.* at 1–9. The scope of services provided by Petitioner's metal maintenance workers is also described in Exhibit A to the Agreement with Service Contractor between Petitioner and CBRE Inc. for the Harold Washington Library. A true and correct copy of this scope of services is attached hereto as **Exhibit H**.

13. Because none of the existing classifications for prevailing wages in Cook County encompass this metal maintenance and refinishing work, and metal maintenance work is separate and unique from any of the existing classifications, as evidenced by the specific training, job duties, and scopes of work outlined above, a new classification is warranted.

ANALYSIS

14. The Illinois Prevailing Wage Act states that:

Not less than the general prevailing rate of hourly wages for work of a similar character on public works in the locality in which the work is performed, and not less than the general prevailing rate of hourly wages for legal holiday and overtime

work, shall be paid to all laborers, workers and mechanics employed by or on behalf of any public body engaged in the construction or demolition of public works.

820 ILS 130/3.

15. The Court in *Illinois Landscape Contractors Ass'n v. Department of Labor* noted that “[f]ew cases analyze the phrase ‘work of a similar character’ in detail, and no case interprets the phrase in the context of determining a new classification.” 372 Ill. App. 3d 912, 922 (2nd Dist. 2007). The court in that case opined that when determining the prevailing hourly wage for work of a similar character under the Prevailing Wage Act, the requisite skills, training, and knowledge may be considered. *Id.* at 923.

16. Here, the skills, training, and knowledge of metal maintenance workers are specifically tailored to the cleaning, refinishing and maintenance of various metals in building fixtures. As such, these workers need to know about the different types of metals, cleaning techniques, how to prepare the surfaces around the metal to protect them from the cleaning process, how to remove existing coatings, and what chemicals and cleaning supplies will not harm the metal surfaces. *See Ex. C* at 42–53.

17. As noted in *Illinois Landscape Contractors Ass'n*, there was crossover in the laborer and landscaper work which ultimately supported the court’s determination that the skills, training, and knowledge for these two categories of work were ‘of a similar character.’ *Id.* at 924.

18. The cleaning, waxing, and polishing process used as part of metal maintenance and refinishing is most similar to janitorial services. For example, in Article IV, Section 2(a) of the CBA between Building Owners and Managers Association of Chicago and Building Service Division, Service Employees International Union, janitorial employees are compensated for work involving “exterior metal refinishing.” A true and correct copy of this CBA is attached hereto as **Exhibit I.**

19. Janitors therefore perform some of the work performed by the metal maintenance workers, and either a similar rate to that of the janitors or the metal maintenance CBA rates is appropriate for a new classification of workers who perform metal maintenance work. At the very least, the rate of pay listed in the existing CBA between the Association and the Union should be applied to a new metal maintenance and refinishing classification.

20. Based on this written objection, Petitioner requests that the Department order an investigatory hearing in accordance with Sections 4 and 9 of the Illinois Prevailing Wage Act, 820 ILCS § 130/4, 9 to add Metal Refinishing and Maintenance to the list of Prevailing Wage Classifications for Cook County.

Date: August 14, 2026

Respectfully submitted,

By: /s/ John M. Riccione
One of Its Attorneys

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NOTICE OF FILING

To: Please see Certificate of Service

PLEASE TAKE NOTICE that on the 14th day of August, 2026 the undersigned filed the attached Written Objection and Request for Hearing Under Sections 4 and 9, a copy of which is hereby served upon you and has been sent via electronic mail and messenger.

Date: August 14, 2026

Respectfully submitted,

By: /s/ John M. Riccione

One of Its Attorneys

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CERTIFICATE OF SERVICE

I, an attorney, hereby certify that I caused to be served the foregoing above Written Objection and Request for Hearing Under Sections 4 and 9 on this 14th day of August, 2026 via messenger and electronic mail to the following:

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/s/ John M. Riccione

EXHIBIT A

COLLECTIVE BARGAINING AGREEMENT
Maintenance

BETWEEN

Painters District Council No. 14
IUPAT, AFL-CIO

AND

The Chicago Metal Contractors Bargaining Association

February 1, 2023 — January 31, 2027

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AGREEMENT ENTERED INTO AS OF February 1, 2023 By and Between The Chicago Metal Contractors Bargaining Association ("the Association") the members which are listed in Attachment "A" hereto shall each be referred to herein the "Company" and Painters District Council No. 14, IUPAT, AFL-CIO, hereinafter called the "Union."

Whereas, the parties hereto desire to provide fair employment conditions and to provide methods for a fair and peaceful adjustment of all disputes that may arise between the Company and the Union, and in consideration of the foregoing and mutual covenants hereinafter set forth, and for other good and valuable considerations, the receipt of which is mutually acknowledged, the parties hereto agree as follows:

ARTICLE 1 RECOGNITION OF UNION

- A. The Company recognizes the Union as the sole and exclusive bargaining agent for all of its employees engaged in polishing, buffing, stripping, coloring, lacquering, spraying, cleaning and maintenance of ornamental and architectural metals, iron, bronze, brass, nickel, aluminum and stainless steel and in metal specialty work, various stone and stone finishes, stone specialty work and any other specialty work pertaining to the finishing and refinishing of metals, stones, woods, and any window washing/ cleaning done in conjunction with this work, excluding clerical and office employees, guards and supervisors.
- B. The Company recognizes the Union as the sole and exclusive bargaining agent of all operations based in the Chicago and its surrounding Metropolitan area and existing facilities traditionally covered by their previous contract.
- C. In the event the Company assigns employees covered by this Agreement to assist in the establishment of a Company office outside the geographical area covered by this Agreement, the Company recognizes the Union as the representative of all employees assigned to, or hired at the facility. The Company and the Union shall apply this Agreement to such new office, with appropriate wages, hours, and working conditions to ensure the Company can maintain a competitive business at the new location. The Company will notify the Union of any such shop(s) location(s). If the parties are unable to agree on appropriate modifications within ninety (90) business days after

initiating negotiations, this Agreement will be deemed to have expired as to the new location.

- D. New construction or remodeling involving painting, decorating, drywall taping and/or finishing shall be performed under the terms of the Painters District Council No. 14 —Finishing Contractors Association Agreement. This shall not apply to metal refinishing, maintenance, polishing or refinishing of stone or woodwork.
- E. The Union without prejudice agrees that any portion of this Agreement pertaining to Washington D.C. does not pertain to the Stuart Dean Company of Virginia or Lee Quigley Company. All other Companies agree with this and show so by the signing of this agreement.

ARTICLE 2 UNION SHOP

- A. Each employee who, or on the effective date of this Agreement, is a member of the Union shall maintain his/her membership in good standing as a condition of employment.
- B. Each employee who, on the effective date of this Agreement, has been employed for thirty or more calendar days, and is not a member of the Union, shall become a member of the Union on or before the tenth (10th) calendar day following the effective date and maintain his/her membership in good standing as a condition of employment.
- C. Each employee hired on or after the effective date of this Agreement shall become a member of the Union on or before the thirtieth (30th) calendar day following the beginning of such employment (or the effective date of this Agreement, whichever is later), and shall maintain his/her membership in good standing as a condition of employment.
- D. The Company shall, within three (3) business days after receipt of notice from the Union, discharge any employee who fails to maintain his/her membership in the Union in good standing is required by this Article. For the purposes of this Article, “failure to maintain membership in good standing” shall be defined as a failure to tender dues required as a condition of membership.
- E. The Union agrees to hold the Employer harmless for any liability arising from the operation of this Article.

- F. The Company agrees to inform the Union when new employment opportunities arise; and shall take the applications of Union referrals.
- G. Neither the Company nor the Union shall discriminate illegally against any employee because of race, creed, color, religion, national origin, sex, for Union affiliation, or any other legally protected/lawful characteristic. Every six (6) months the Employer will provide the Union with a seniority roster of employees which include their name, address, social security number, phone number, date of hire and current classification.
- H. The Company agrees to send the proper paperwork concerning hire notification and separation of service notification along with any other necessary paperwork pertaining to the employment of an employee within five (5) business days of hire. Every six (6) months, the Company will provide the Union with a seniority roster of employees, which includes their name, last known address and telephone number, social security number, date of hire and current classification.

ARTICLE 3 TRIAL PERIOD

- A. All new employees shall be engaged in a trial period for the first ninety (90) days of their employment.
- B. The Company may request to the Union a thirty (30) calendar day extension of the trial/probationary period; said request shall be subject to the consent of the Union and consent shall not be unreasonably withheld. The request and consent may initially be verbal, but shall be reduced to writing not later than the end of the 90 day trial period.
- C. Employees may be laid off or discharged at the Company's sole discretion during the trial period. Such lay-off, discharge or discipline, shall not be subject to the grievance and arbitration provisions of this Agreement.

ARTICLE 4 CHECK OFF

- A. Starting with the first day of employment, the Company shall deduct Union dues from the wages (dues check—off) of each employee covered by this Agreement who authorizes the Company to do so. Such authorization must be in writing and signed by the employee, this will be done through Union initiation forms.

- B. The deduction required by this Article shall be made from the paychecks of each calendar month and shall be remitted to the Financial Secretary of the Union no later than the tenth (10th) day of the following month and every month thereafter.
- C. After 30 calendar days initiation fees will be deducted from wages of each employee weekly for the next eight (8) weeks of pay and remitted to the Union with the Union dues payment after the 30th day of employment. If the employee is terminated for any reason prior to the end of his/her probationary (trial) period the amount previously deducted shall be paid back to the employee by the Union if dues have been remitted by the Company to the Union, and by the Company if dues have not yet been remitted to the Union.
- D. The Company further agrees, upon receipt of written notice from the Union, to deduct the amount(s) of such fines, assessments of any kind, dues/back dues, and initiation fees as may be levied by the Union to its employee members covered by this agreement, so long as the employee has authorized the deduction of such fines, assessments, dues, back dues and initiation fees in a writing which has been signed by the employee. The Company agrees to make the deductions as directed by the Union and remit them no later than once a month on the tenth (10th) of the month for the previous month with a ten (10) day grace period.
- E. In the event the Company deducts dues, fines, initiation fees, assessments or strike funds but fails to remit such by the tenth (10th) of the month with a ten (10) day grace period; the Company shall pay liquidated damages equal to 10% of the member's dues, fines, initiation fees, assessments, or strike funds owed.

ARTICLE 5 MANAGEMENT RIGHTS

- A. Except as limited by this Agreement, the Employer shall have the right to: plan, direct, and control all its work; hire employees; direct the working forces in the field; assign employees to their jobs; direct and assign work to employees; determine the number of employees to be employed; discipline for just cause (just cause for discharge includes but is not necessarily limited to incompetence, insubordination, habitual tardiness or absenteeism, safety violations, and participation in unauthorized work stoppage or slowdown); transfer employees; lay off employees because of lack of work or for other

legitimate reasons; require employees to observe the Employer's and/or contracting entities' rules and regulations that do not conflict with this Agreement; regulate the amount of equipment used and the use of equipment and other property of the Employers; require the observance of applicable government regulations and safety standards; maintain reasonable standards of production and quality of work; and decide upon methods, equipment, and procedures to be used in the performance of all work covered by this Agreement; provided, however, that the Employer will not use its rights for the purpose of discrimination against any employee.

- B. The Employer and the IUPAT recognize the necessity of promoting efficiency and agree that no local rules, customs, or practices shall be permitted that limit production or man-power required to do the work, and that no limitations shall be placed on the amount of work that an employee is performing during the work day. No regulations of tools shall be interpreted or enforced in any way to prevent their use provided that all safety regulations are satisfied.

ARTICLE 6 SAFETY AND TRAINING

The Company is committed to providing every employee not only training and safety which is required by law, but also the training and safety necessary to become productive and knowledgeable about his/her job. An employee will not be required to work alone on scaffolding, in confined spaces or with a ladder over 6 feet except where in a geographical area in which the Company only employs one employee.

ARTICLE 7 NO STRIKE/NO LOCKOUT

- A. The Union agrees that there shall be no strike, work stoppage, slowdown or any similar form of interruption of work for any reason whatsoever, during the entire term of this Agreement. Notwithstanding the foregoing, in the event the Company fails to comply with an arbitration award issued pursuant to Article 31, and fails to file with a court of competent jurisdiction a petition to vacate the award within the time allowed by statute, the Union shall not waive the right to strike during the term of the Agreement solely to compel compliance with such arbitration award.

- B. In the event of an unauthorized strike, the Company shall send notice thereof to the Union by certified letter, telegram, email or facsimile (with prior telephone notice). Immediately upon receipt of such notice, the Union shall endeavor in good faith to bring about a return to work of its members who have stopped work. The Union shall direct the employees in writing to return to work, and shall inform the employees in writing that such a strike is unauthorized and that the employees who participate in a strike in breach of contract shall be subject to discharge or discipline.
- C. The Company guarantees there shall be no lockout during the term of this Agreement.
- D. Notwithstanding the foregoing, in the event the Union fails to comply with an arbitration award issued pursuant to Article 31 and fails to file with a court of competent jurisdiction a petition to vacate the award within the time allowed by statute, the Company shall not waive the right to lockout during the term of the Agreement solely to compel compliance with such arbitration award.

ARTICLE 8 SENIORITY

- A. Seniority for the purpose of this Agreement is defined as length of continuous service with the Company, based on hire date.
- B. The Company shall maintain one list of employees by hire date and job classification.
- C. An employee shall lose his/her seniority for any of the following reasons: (1) voluntary quit; (2) discharge; (3) failure to return to work after a lay-off within ten (10) calendar days after notice of recall is sent to the employee at his/her last known address by telegram or certified mail with a copy to the Union; (4) one year of continuous lay-off.
- D. Notwithstanding anything to the contrary herein contained, with respect to shops having more than eight (8) employees, the shop steward shall have super seniority with respect to lay-off, recall. With respect to shops having eight or less employees, the shop steward will be the next to last (second most senior) in seniority for lay-offs.
- E. Notwithstanding anything to the contrary contained herein when a Union member leaves the employment of the Company and takes employment with

another Company he/she may be given vacation, sick days, etc., based on his/her years of Union seniority if agreed upon by the Company and the Union, or the member. This must be sent to the Union in writing.

ARTICLE 9 LAY-OFFS AND RECALL

- A. Layoffs, which shall be for economic reasons and recalls shall be done by seniority. The Employer may ask for a volunteer(s) for lay off within the affected job classification with the most senior employee having first choice whether to accept layoff, then the next most senior, and so on. If no employee(s) (or not enough employees) volunteer, then the most junior employee(s) within the classification will be laid off. For purposes of layoff and recall within a job classification, seniority shall be based on length of service with the Company (hire date) rather than time within classification.
- B. The Company cannot hire new employees if there are employees on layoff. All trial period/ probationary employees shall be laid off prior to the layoff of any other employee.
- C. The Company agrees to give the Union one week's notice of any layoffs where possible; if not possible the Company shall give as much advance notice as possible under the circumstances. If the Union requests, the Company will meet and discuss the reasons for the layoff.
- D. Layoffs will be distributed among job classifications.
- E. The Company shall consider switching to a four day work week (eight hour days), or inform the Union of a schedule that will meet the Companies needs prior to going into any such lay-off.
- F. In the event of a layoff, the Company may give due consideration to the particular nature of the work to be performed (stonework (marble), metalwork, or woodwork).

ARTICLE 10 PAID SICK LEAVE

- A. Any employee who as of his/her anniversary date has at least three (3) years of service shall be entitled to paid sick leave as set forth below:

YEARS OF SERVICE	PAID SICK LEAVE
At least three (3) but less than four (4)	3 days or 24 hours
At least four (4) but less than six (6)	4 days or 32 hours
At least six or more	5 days or 40 hours

- B. Notwithstanding paragraph (A) above, any employee shall be entitled to paid sick leave, except that any employee shall be entitled to three (3) one-day unpaid sick days per each anniversary of employment.
- C. Sick days are intended to be used when employees have an actual illness which prevents them from working. Employees who are eligible for paid sick days and do not use that leave shall be paid for unused sick time on his/her anniversary date of employment.
- D. Employee(s) who do not show up for work and do not call the Employer to inform them of the absence shall be subject to applicable discipline.
- E. In order to receive sick pay employees who are sick must notify the Employer no later than five (5) hours prior to the start of their scheduled shift.
- F. Paid sick leave will be paid at the rate of the affected employee(s) hourly rate, without premium or differential pay, but shall be no more than the hours stated in paragraph A.
- G. An employee who is absent for more than five (5) consecutive work days shall be required to provide medical proof showing that the employee is fit for duty upon his/her return to work.

ARTICLE 11 MORE FAVORABLE TERMS AND CONDITIONS

In the event the Union grants or intentionally permits any competitively situated employer any more favorable terms, in whole or in part, than those applicable to the Company (including but not limited to wages, hours, working condition and job duties) the Company shall have the right to demand and is entitled to have such more favorable terms and conditions, deemed to be part of this Agreement.

ARTICLE 12 WORK WEEK AND HOURS

The regular workweek shall be 40 hours divided into five consecutive days, Monday through Sunday inclusive. Notwithstanding anything stated herein to the contrary, the terms of this Agreement shall not be governed by the Cook County, Illinois Earned Sick Leave Ordinance (the "Ordinance") and the rights afforded by the Ordinance are hereby expressly waived.

- A. The work day shall be understood to mean the twenty four hour period commencing at the start of the employees first shift of the week. There will be no split shifts, and employees will have a minimum of eight hours off between work shifts, unless he/she waives this requirement. This provision shall not preclude employees from working overtime.
- B. Nothing in the foregoing shall be construed as guaranteeing an employee a minimum number of hours of work per week.
- C. The Company will make every effort to accommodate a Monday through Friday workweek, however business may at times make the following conditions mandatory within the terms and conditions of this Agreement: overtime, out of town work, or a work schedule other than Monday through Friday. When it is required to work Saturday or Sunday, the Employer will give Twenty-Four (24) hours advance notice, except in the case of an emergency the Employer will give as much advance notice as possible.
- D. By mutual agreement between the employee and employer, an employee may work a Flexible Work Week: The Company may design flexible forty (40) hour workweek schedules (not to exceed five (5) days) within the Monday through Sunday workweek, notice of the work week will be given to the Union:
 - Example: Four (4).... Ten (10) hour days
- E. With the consent of the Union, the Company may change the workweek to start at 8:00 PM on Sunday night and may run through Thursday on jobs that require such hours. The Union may not unreasonably withhold its consent, but may require the Company to supply proof that the job cannot be conveniently performed during normal work hours. If the Company does not get the Union's consent, the Company will pay the regular Sunday pay

(DOUBLE TIME). The job will be staffed by volunteers first in order of seniority of competent people and then by reverse seniority.

- F. The Company will endeavor to provide at least twenty four (24) hours advance notice, in the event of any change or more than two (2) hours in the starting time of the employee's regular shift; or in the absence of such notice, the employee shall receive his/her pay at the rate of time and one half/double time on Sunday, for a minimum of the first two (2) hours or the difference in hours the change of the start time is from his/her previous start time, on the first day of the changed shift.
- G. There shall be an unpaid lunch period of thirty (30) minutes per day for all employees.
- H. There will be two paid ten (10) minute breaks in the workday.
- I. The Company agrees to supply the Union with work schedules, indicating the start time and job location(s) of employees upon the request of the Union during the Company's normal business hours.

ARTICLE 13 OVERTIME AND OTHER PREMIUM COMPENSATION

- A. All work performed in excess of forty (40) hours in any work week or in excess of ten (10) hours in any workday, when scheduled for 4, 10 hour days, shall be considered overtime. A workday shall be defined as a 24 hour period commencing at the start of an employee's first shift of the week. All work done on the sixth consecutive day of work after forty (40) hours of work in any work week shall be deemed overtime for which the employee will be paid at the rate of time and one half. Any work performed on the seventh consecutive workday or Sunday in any one workweek shall be deemed overtime work for which the employee shall be paid Double Time.
- B. All overtime work performed on a regularly scheduled work day and on sixth day shall be paid at the rate of one and one half times the employee's straight time hourly rate. All work performed on a contract holiday, the seventh day, and/or Sunday shall be paid for at the rate of two (2) times the employee's straight time hourly rate, but such compensation shall be in addition to holiday pay as hereinafter provided.

- C. When two or more kinds of overtime or premium pay are applicable to the same hours of work, the higher rate shall be paid, but in no event shall overtime or other premium compensation be duplicated or pyramided.
- D. All employees may be required to perform a reasonable amount of overtime work.
- E. An employee who by his/her own choice does not fulfill the forty hour work week requirement to receive the overtime rates for Saturday, Sunday, and Holidays shall be paid at the straight time hourly rate until he/she meets the forty hour requirement, and cannot be asked to work the overtime until all other employees have been asked. If an employee does not meet the forty hour work requirement due to the Company not providing forty (40) hours of work in the week, the Saturday, Sunday, and Holiday premiums will still be paid.
- F. Overtime work on Saturdays, Sundays and holidays shall be distributed by the Company after consultation with the shop steward. The decision to assign overtime will include a consideration of seniority, classification, skill, job requirements, qualifications, the rotation of seniority, and timely consultation with the shop steward. The Company agrees to create and implement a fair overtime procedure/policy with the Union, which will be posted by the Company and tracked by the Union appointed steward(s) and their alternate.

ARTICLE 14 HOLIDAYS

- A. The following holidays shall be paid holidays under this Agreement, provided the parties may by mutual agreement substitute a different holiday for one specified below:

New Year's Day
 Memorial Day
 Independence Day
 Labor Day
 Floating Holiday

Thanksgiving Day
 Day After Thanksgiving
 Christmas Eve Day
 Christmas Day

Only employees who have completed their trial/probationary period shall be eligible for holiday pay.

- B. Holiday pay shall be at the employee's hourly rate of pay for eight (8) hours without premium or differential pay; however, if the employee is regularly assigned to more than an eight (8) hour shift and the holiday falls on one of the employee's regularly scheduled workdays, the employee shall receive the regularly assigned number of hours pay for that holiday without premium or differential pay.
- C. If any employee is absent from work on the last scheduled workday immediately preceding or on the first scheduled work day immediately subsequent to any holiday, such employee shall not be entitled to be paid for such holiday. If the employee's absence is due to proven illness or lay-off that commences on or after the first day of the week prior to the week in which the holiday occurs, the employee will be paid for the holiday. Notwithstanding the foregoing, the Company agrees that it shall not be unreasonable in granting requests for the day off immediately preceding or subsequent to a holiday, without loss of holiday pay if the employee submits a request in writing at least three (3) workdays prior to the requested day off.
- D. If a holiday falls on a Saturday, it will be observed with time off on the preceding Friday. If a holiday falls on a Sunday, it will be observed with time off on the following Monday.

ARTICLE 15 VACATIONS

- A. The Company provides a certain amount of paid vacation time to regular full time employees, which is accrued monthly on a going-forward basis as described below. The Company reserves the right to deny vacation requests when scheduling conflicts arise. All time off must be approved by your immediate supervisor and scheduled according to the convenience and staffing needs of the Company and seniority of the employee. Length of service and the needs of the business will be the determining factors in the cases of conflicts in time off requests.
- B. No employee shall be entitled to vacation time or vacation pay during the first 90 days of employment (the "Probationary Period"). During the first year of employment, the employee shall earn vacation time at the rate of .5555 days per month after completion of the Probationary Period (five days in nine months). During the second year of employment, which begins on the employee's first anniversary date, vacation shall be earned and accrued at the rate of .4166 days per month worked (five days in 12 months). After

two years of employment, but before ten years, the employee will accrue vacation at the rate of .833 days of vacation per month worked (10 days in 12 months). After ten years, but before 16 years of employment, the employee will accrue vacation at the rate of 1.25 days per month worked (15 days in 12 months). After 16 years of employment, the employee will accrue vacation at the rate of 1.67 days per month worked (20 days in 12 months). All vacation time is earned and accrued on a going-forward basis.

- C. Each vacation “day” shall consist of 8 hours at straight time pay.
- D. Vacations may be scheduled by the Employer in the event that the Employer chooses to close his shop and each employee shall be notified at least 45 days in advance of the commencement of any such vacation period. Vacation scheduled in this manner shall count against an employee’s vacation allotment, but shall not exceed ten (10) business days during any one (1) contract year. The employee shall have the choice of whether or not to take this time as paid or unpaid vacation, and/or to use vacation and/or sick days and/or the amount of days he/she would like to be paid.
- E. If an employee quits, is laid off or is discharged for any reason, he/she shall be paid for all accrued, but unused vacation days as of the time of such quit, lay-off or discharge, on a pro rata basis.
- F. As used herein, an employee shall be deemed “regular and full-time” during any period when he/she is actually working or has paid time off, such as holidays, vacation, paid sick leave, leave due to a work-related illness or injury, or bereavement leave.
- G. Hours not worked by employees because of climatic conditions or by reason of a shop closing in any contract year shall be deemed hours worked for purposes of this Article.
- H. Employees must use vacation during the year for which the vacation is accrued, unless a mutually agreeable alternative is reached between the Company and the employee, with written notification sent to the Union and signed off by the employee and the Company. Vacation is expected to be used. Any vacation time accrued but unused in each year shall be taken or forfeited at the employee’s anniversary date. There shall be no payment in lieu of taking vacation time. Exceptions may only be granted at the sole discretion of the Company. Any conflicting past practice is hereby abolished.

- I. For vacation, scheduling an employee shall receive his/her vacation in accordance with seniority (hire date) and in keeping with the normal vacation scheduling of the Company.
- J. No employee will have his/her vacation which had been earned under previous contracts reduced by the operation of this article.

ARTICLE 16 WELFARE FUND

- A. The Company shall contribute to the Chicago Painters and Decorators Welfare Fund (the Fund) per month for each employee employed during that month. For the purpose of this Article an employee "employed during that month" is defined as an individual who has been employed for one business (1) day during the month, and or has not been terminated or laid off. The Company shall pay its contribution for any employee laid off, terminated, or quit in a month that has worked a minimum of one (1) days in that month prior to any such termination, lay-off, or quit.
- B. The Company shall provide, either through an insurance carrier or on a self-funded basis, short term disability coverage to employees covered under this Agreement for illnesses or injuries not subject to workers' compensation insurance which prevent the employee from working (including absence during participation (other than evaluation) in an inpatient program or an outpatient program which prevents the employee from working a regular workweek) by certification of a treating physician for up to twenty-six (26) weeks at the rate of \$175.00 per week. The employee shall have the right to supplement such coverage by paying a premium to be established by the carrier or the Company, based on actuarial calculations.
- C. The Company contribution will be per month, per employee, as set forth under Article 16, paragraph J for the duration of this Agreement and or for any extension of this Agreement. The contribution rate may be changed in the event the Trustees of the Fund determine that an increase is necessary to maintain the level of benefits. In the event an increase is deemed necessary by the Trustees a meeting will be held with the Trustees, the Union and the Company, at which time the Trustees will inform the Company and the Union of the increase amount, a discussion will be held stating the basis for the increase. After said discussion the company shall implement the increase no later than one month after notice of the above determination.

- D. The Company's contributions shall be used for the purpose of insuring the employees covered by this Agreement against hospitalization and medical cost, death or such other hazard as may be determined by the Trustees of the Fund.
- E. The Declaration of Trust and agreement establishing the Fund have been exhibited to the Company and have been approved by it.
- F. The Company shall furnish the Trustees of the Fund with the names, job classifications, social security numbers and wages for all employees covered by this Agreement together with such other information as may be required for the proper and efficient administration of the Fund.
- G. The Monthly Welfare contribution is due on the tenth (10th) of the Month for the previous Month with a ten (10) day grace period. The Company's contribution for each month shall be paid in full by the Company to the Fund by not later than the tenth (10th) of the month. If the contribution is not received by the twentieth (20th) of the month for the previous month's contribution, the Company will pay 10% liquidated damages, and any interest, legal fees, costs, etc., of any collection action commenced according to the Trust Agreement.
- H. After the ninety-first (91st) day of a new probationary employee's tenure with the Company, the Company will pay the monthly contribution per this agreement retroactive to the first day of the employee's employment. For employees that are hired but are already in the Union still covered by the Insurance plan, payment will start with the first (1st) date of employment.
- I. The Members Assistance Program (MAP) shall be financed by Employer's \$3.20 per month contribution paid to the Welfare Fund (Welfare Fund) and a \$4.80 per month contribution paid to the Chicago Painters and Tapers Cooperation Trust Fund, a Management Cooperation Fund for a total contribution of \$8.00 per month for each employee who works one (1) day in that month. Covered employees for the purpose the MAP only shall be: (1) bargaining unit employees, or (2) at the election of the Company, all employees of the Company. In the latter event, contributions shall be made for all participating employees. The MAP shall offer training programs, counseling and other forms of assistance to covered employees for substance abuse problems, marital problems, mental health problems and work related problems in general.

J. The health contribution schedule rate per employee shall be:

Chicago Painters and Decorators Welfare Fund	2/1/2023	6/1/2023	6/1/2024	6/1/2025	6/1/2026
Employer's Contribution	\$1,047	TO	TO	TO	TO
Employees Contribution — Pre Tax — Monthly	\$116.23	BE	BE	BE	BE
Members Assistance Employer Contribution	Included	NEGOTIATED	NEG.	NEGOTIATED	NEGOTIATED
Total Monthly Payment	\$1,163.33				

Apprentices hired prior to the signing of this Agreement whose trade seniority wage increase date is after 6/1 of each year shall pay the welfare contribution increases commencing the date the apprentice receives his/her wage increase. Apprentices hired after the signing of this Collective Bargaining Agreement shall follow the welfare rate increases accordingly.

The parties shall meet at a reasonable time before June 1 of each year to negotiate Health and Welfare rates to become effective as of June 1 of each year of this Agreement. No other terms of the contract other than welfare rates shall be subject to renegotiation.

ARTICLE 17 PENSION FUND

A. The following contributions shall be made into the District Council No. 14 Metal Polishers 401(k) Retirement Fund (Pension Fund) on behalf of each employee in all classifications for all hours worked in any work week. The amount indicated in parenthesis is the "Match" referred to in paragraph G below.

PENSION FUND CONTRIBUTIONS — Maintenance

2/1/2023	2/1/2024	2/1/2025	2/1/2026
\$.95	\$.95	\$.95	\$.95
(\$.30)	(\$.30)	(\$.30)	(\$.30)

- B. The Company's contributions shall be used for the purpose of providing pension benefits for the employees covered by this Agreement.
- C. The Declaration of Trust and Agreement establishing the Pension Fund have been exhibited to the Company and have been approved by it.
- D. The Company shall furnish the Trustees named in said agreement and declaration of trust with the names, job classifications, social security numbers wages and W-2 forms for all employees covered by this Agreement together with such other information as may be required for proper and efficient administration of the Pension Fund.
- E. The Company's contribution for each month is due on the first of the month for the prior month; there is a ten day grace period. The contribution shall be paid in full by the Company to the Pension Fund not later than the tenth (10th) of the following month for the preceding month, If the contribution is not received by the tenth (10th) day of the month the Company will pay 10% liquidated damages to each employee's 401K Fund, plus any interest, legal fees, costs, etc., for any collection action commenced according to the Trust Agreement.
- F. The employer may discontinue its contribution at any time if the Pension Fund is denied tax-exempt status under Federal Law or if the contributions thereto are deemed nondeductible to the Company for any reason whatsoever.
- G. The Company will contribute the "match" on behalf of employees who contribute at least five (5%) percent of their wages each month to this 401(k) pension plan.

ARTICLE 18 UNIFORMS

- A. Uniforms shall be provided to all employees at the Company's expense, and all employees shall be required to wear such uniforms during business hours.
- B. All employees shall be required to wear safe and presentable work shoes, no gym shoes, during working hours. In the event the Company requires employees to wear special safety shoes, such shoes shall be provided at the Company's expense.

- C. Employees shall be responsible for the return of all uniforms and safety shoes provided by the Company in good condition, reasonable wear and tear expected.

ARTICLE 19

NO COMPETING EMPLOYMENT

While in the employ of the Company, no employee may work temporarily for or have any financial interest in any competitively situated company or solicit or work on or for his/her own account on any business which constitutes a business opportunity for the Company. An employee who violates this Article may be dismissed, and if a Company temporarily hires an employee from another Company which is signatory to a contract with the Union, that Company shall pay a fine to the Metal Polishers Union Local 8A-28A Pension Fund equal to double the employee's wages, and shall pay a \$500.00 fine as a donation to the Members Assistance Fund.

ARTICLE 20

SUPERVISORS AND BARGAINING UNIT WORK

Managerial and supervisory personnel may not perform bargaining unit work except for the purpose of experimentation, demonstration and training. In the event Bargaining Unit work is performed by a manager, supervisor or any other management classified person, for other than the aforesaid reason, damages shall be paid to the Union at the amount equal to two (2) times the wages of that management employee or the foreman rate whichever is higher, for the hours worked. The Union will direct the Company how the penalty is to be awarded and to whom.

ARTICLE 21

CALL-IN AND REPORTING PAY

In the event an employee reports for work on his/her regular shift without previously having been notified a minimum of five (5) hours in advance not to report, he/she shall be given at least two (2) hours work or two (2) hours pay; provided however, that this shall not apply unless the employee has previously advised the Company of the employee's current address and telephone number(s).

ARTICLE 22 OUT OF TOWN WORK

- A. "Out of town work" means work which requires the employee to stay away from his/her home overnight. All employees may be required to work out of town as required by the Employers business. The Company shall first seek volunteers for such an assignment by qualifications. If the Employer cannot obtain a volunteer(s) for such assignment, the work will be assigned by the Company at its discretion, but the Company shall select employees who are suitable in terms of qualification and classification while reasonably attempting to equalize opportunities for all qualified employees.
- B. Employees shall be paid at the daily Government Services Administration ("GSA") rate for meals and incidentals in the out of town location in which they are working, including at the rate of 75% of the GSA rate on the dates of travel. In addition, the Employer shall make and pay for room accommodations for its employees. There shall be no more employees in a room than the accommodations allow.
- C. All Employees covered under the Collective Bargaining Agreement shall be paid Port-To-Port in accordance with Paragraph B above.
- D. Employees who are sent out of town and are directed by the Company to stay shall be paid a minimum of four (4) hours pay at straight-time plus per diem referenced in Paragraph B above for every day that he/she is directed to stay away from home if he/she is not allowed to work.

ARTICLE 23 DRIVING

- A. Any employee in the classification of General Foreman, Foreman, or Journeyman, will be required to hold a valid drivers' license and may be required to drive company vehicles without additional compensation; provided, however, that employees in the employ of the Company as of January 31, 2007 and who did not drive Company vehicles or were not required to hold a valid drivers' license prior to that date shall not be subject to this requirement. In the event any employee in the Classification of General Foreman, Foreman, or Journeyman who is required to drive has his license suspended or revoked, such employee may remain in the Company's employ at the minimum rate of pay of the next lowest paid

classification to his own without being required to drive, provided however, that:

- At such time as the employee's license is restored he/she shall resume his/her regular driving duties and the Company shall be required to reinstate the employee to his/her regular rate of pay and classification as long as insurance is obtainable under current Company policy for said employee; and
 - Any such employee whose license has been suspended for the first time shall not be required to drive or to accept a lower rate of pay subject to the limitation that such suspension shall not exceed six (6) months.
- B. All other employees shall be required to hold a valid driver's license upon the request of the Company with notification to the Union; if this requirement is necessary the employee will not receive additional compensation. If the employee's driver's license is revoked or suspended the employee may remain in the Company's employ but cannot be promoted above Assistant Journeyman until the employee has acquired a valid driver's license.
- C. In the event an employee's driver's license is restricted, suspended, or revoked, the employee must notify the Company immediately and, at the latest, before driving a company vehicle. Failure to provide timely notice or operation of a Company vehicle without a valid driver's license will result in discipline up to and including discharge.

ARTICLE 24 WAGES

- A. Wage Adjustment — Employees employed in the classifications of General Foreman, Foreman, Journeyman, and Assistant Journeyman shall receive a \$1.25 per hour increase to their base wage effective February 1, 2023, and \$1.15 per hour increase effective on February 1, 2024, February 1, 2025, and February 1, 2026.
- B. Apprentices: Employees employed in the Apprentice classifications shall each receive the percentage increases received by the General Foreman plus an additional \$.65 per hour to their base wage for each year of this Agreement on their anniversary date as more specifically listed in Table A of Article 25 below.

C. Additional Compensation:

HIGH PAY:

- All employees shall be paid \$2.25 premium per hour, for any time they work on any curtain wall, swing stage, hanging scaffold, or suspended scaffold jobs.
 - All employees involved in the rigging or de-rigging of hanging scaffolds will receive the high pay premium while working on such rigging and/or de-rigging.
 - Any person can refuse to work off a hanging or rolling scaffold above 30 feet on any particular job.
- D. When the Company determines the necessity for an additional foreman, the employee being considered for a foreman position after completing all requirements, will be assigned a crew and will receive the current foreman's wage rate on the first date of his new assignment. Such employee shall be subject to a sixty (60) day probationary period, during which he/she may be relieved of his/her duties for any reason and be returned to his/her former classification.
- E. If at any time during the sixty (60) day trial period the employee is relieved of his/her foreman responsibilities, the employee's wage rate will be reduced accordingly.

**ARTICLE 25
MINIMUM RATES OF PAY**

A. Minimum rates of pay for Metal, Marble and Wood Refinishers:

Employees shall be classified in the following manner:

- Currently classified as a General Foreman shall be classified as General Foreman
- Currently classified as a Foreman shall be classified as Foreman
- Currently classified as Journeyman shall be classified as a Journeyman

- Has worked in the trade for 48 months and is not classified as any of the above is an Assistant Journeyman
- Has worked in the trade for 36 months and is not classified as any of the above is an Apprentice IV
- Has worked in the trade for 24 months and is not classified as any of the above is an Apprentice III
- Has worked in the trade for 12 months and is not classified as any of the above is an Apprentice II
- Has worked in the trade for less than 12 months but more than ninety (90) days and is not classified as any of the above is an Apprentice I.
- Has worked in the trade for less than ninety days, or is newly entering the trade and is not classified as any of the above is a trial period Apprentice I.
- “Worked” as used herein shall not include lay-off periods and all past practices are hereby abolished.

B. General Foreman: Maintains thorough knowledge of all aspects of running any job that he/she is assigned. Is responsible for training of all lower classifications in all aspects of the work, is responsible for giving proper direction and oversight of all Foreman and the crew(s) assigned to the Foreman. Is responsible for discipline, (excluding the termination of an employee), if the Company assigns this as a duty. This job description only pertains to the Companies who wish to take advantage of this job classification.

Foreman: Required to maintain a thorough knowledge of all aspects of running any job is responsible for training in all lower classifications in all aspects of the work and has the responsibility of running jobs with two or more employees.

Journeyman: Required to maintain a thorough knowledge of all aspects of running any job, is responsible for training of all lower classifications in all aspects of the work and has the responsibility to run a job with one employee in addition to himself.

The Apprenticeship: The employee(s) will work side by side with a Foreman or Journeyman. The Apprenticeship shall be four (4) years with a classification and wage scale progression through the classifications as stated in this section, an employee who has completed forty-eight (48) months in these classifications shall be promoted to "Assistant Journeyman" and thereafter, after taking the applicable journeyman test, seniority prevailing shall be promoted to Journeyman, if there is an opening. The Company shall determine if there is an opening for Journeyman. If there are no openings for Journeyman he/she shall remain in the classification of Assistant Journeyman receiving wage scale progressions as listed until such time vacancy should arise.

- C. General Foreman and Foreman selection: Promotions shall be based on seniority, ability, and qualifications, for the past twelve (12) months, ability, and qualifications, being equal, seniority shall prevail.
- D. Maintenance Wages: The job ratio within a Company will be at least one (1) Foreman for every one (1) Journeyman, except in a geographical area in which the Company only employs one employee.

Minimum Rates of Pay:

Table: A

Illinois, Indiana, Wisconsin, and Michigan (Maintenance)					
	February 1*	February 1	February1	February 1	February 1
Classification	2022	2023	2024	2025	2026
General Foreman (Field Mgr./					
Working Union Supervisor)	\$37.05	\$38.30	\$39.45	\$40.60	\$41.75
FOREMAN	\$35.05	\$36.30	\$37.45	\$38.60	\$39.75
JOURNEYMAN	\$31.30	\$32.55	\$33.70	\$34.85	\$36.00
Assistant Journeyman	\$30.30	\$31.55	\$32.70	\$33.85	\$35.00
The classifications listed above shall receive no less than the per hour rate increases listed in Article 24A for each year of this Agreement.					
Apprentices shall receive raises effective on the date of their Anniversary, the rates shall be those listed in this table.					

* Prior Contract year's rates.

Classification	2022	2023	2024	2025	2026
Apprentice IV (36 mo. - 48 mo.) .65 for each year plus yr 1 - .70; yr 2 - .70; yr 3 - .72; yr 4 - .73	\$22.07	\$23.42	\$24.77	\$26.14	\$27.52
Apprentice III (24 mo. - 36 mo.) .65 for each year plus yr 1 - .67; yr 2 - .67; yr 3 - .68; yr 4 - .70	\$20.89	\$22.21	\$23.52	\$24.85	\$26.20
Apprentice II (12 mo. - 24 mo.) .65 for each year plus yr 1 - .63; yr 2 - .63; yr 3 - .65; yr 4 - .66	\$19.72	\$21.00	\$22.28	\$23.58	\$24.89
Apprentice I (91 days - 12 mos.) .65 for each year plus yr 1 - .59; yr 2 - .59; yr 3 - .61; yr 4 - .62	\$18.51	\$19.75	\$20.99	\$22.25	\$23.52
Apprentice I (90 days) ..65 for each year plus yr 1 - .55; yr 2 - .55; yr 3 - .57; yr 4 - .58	\$17.27	\$18.47	\$19.67	\$20.89	\$22.12

- From the first day of employment in the trade, an employee will be learning and training in all aspects of the trade.
- Acting Foreman: A Journeyman that fills in as the foreman while the foreman is absent, or on vacation will receive .65 cents more per hour for doing the duties of the foreman. If an employee remains assigned to the position of acting foreman for a period of sixty consecutive calendar days, the employee will be compensated at the rate of the Foreman until such foreman returns to duty or he/she is classified as a Foreman. This does not supersede foreman selection and must follow all seniority, and training rules applicable.

- The Union and the Company agree to work together to create a fair and equitable written Journeyman test for progression from Assistant Journeyman to Journeyman. A Union Representative or its designee and a person in management shall be present at, proctor the testing to ensure fairness; they will not be involved in administering the test. The test shall be given to the applicant by two Union Foremen who shall score the test and approve for pass or fail to the Journeyman level. If the employee fails the Journeyman test, he/she will not be allowed to retest for a period of six months.
- After the above-referenced test for progression from Assistant Journeyman to Journeyman is first administered, the Union and the Company agree to work together to create a fair and equitable written Assistant Journeyman test for progression from Apprentice to Assistant Journeyman. It is contemplated that this test will be a combination of written and field examination and may also have apportion that is specific to each Company. It is the intention of the parties that this test be ready for implantation in the next Agreement negotiated and executed by the parties.
- An Assistant Journeyman who fills in as a Journeyman for a period of sixty consecutive days will be automatically promoted to Journeyman. The Assistant Journeyman will receive .65 cents more per hour during the sixty (60) day period.
- An employee who travels to another wage state will receive their current wage rate or the wage rate of the state in which they will be working whichever is higher.
- Employees that are assigned to work in Colorado or Minnesota will receive the rate listed in table A.

ARTICLE 26

NO REDUCTION IN PAY

Each employee in the Company's employ as of February 1, 2023 shall be entitled to a rate of pay determined in accordance with Article 24 or Article 25 above, whichever is the higher rate; provided, however, that an employee promoted to a higher paying classification shall thereafter be entitled only to the minimum rate of pay for that classification. The Company and the Union agree to discuss certain changes in classification on a case by case basis.

ARTICLE 27
BEREAVEMENT PAY

- A. In the event of absence because of death in the immediate family, the employee shall be paid for each straight time hour lost in the regular work week, Monday through Friday, which the employee would otherwise have worked during the period commencing with the date of the death and ending on the sixth calendar day following the date of death, but not in excess of twenty-four (24) hours or three (3) days' pay.
- B. Members of the immediate family shall consist of spouse, parents, children, stepchildren, brothers, sisters, father-in-law, mother-in-law, grandparents and grandchildren. Such days, while unpaid, shall count as time worked for benefit purposes, but not for pension contributions.
- C. The employer may require proof of death and of the relationship between the deceased and the employee.

ARTICLE 28
DURATION OF AGREEMENT

This Agreement shall be effective as of February 1, 2023 and shall continue in full force and effect until January 31, 2027. This Agreement shall be renewed automatically for successive one-year periods unless either party serves written notice upon the other of its desire to terminate or amend this Agreement by registered mail, at least sixty (60) days prior to the expiration date or any renewal thereof.

ARTICLE 29
PICKETING

Notwithstanding anything to the contrary herein contained, the Company will not require any employee to cross any lawful picket line established at a job site where the employee is assigned to work. Refusal to pass (cross) any such picket line shall not constitute grounds for discipline, discharge or lay-off.

ARTICLE 30
UNION REPRESENTATIVES

- A. The Company agrees to recognize such persons as the Union may designate as the official representatives of the Union in all matters, which may arise between the Company and the Union.

- B. A shop steward shall be selected by the Union in the following manner: one shop steward for up to twenty (20) employees, a second shop steward for twenty-one (21) to thirty (30) employees, and a third shop steward for thirty-one (31) or more employees, with a maximum of three shop stewards. The Union has the right to designate one (1) alternate shop steward who shall not be covered by the super seniority clause. The stewards shall be primarily responsible in accordance with the provisions of this Agreement. To the extent necessary, the shop steward(s) shall be relieved of his/her regular duties to perform his/her duties as shop steward (grievance handling and/or contract administration) without loss of pay.
- C. The Company agrees to inform an employee of any disciplinary action that may be taken against him/her, why, and when, allowing the employee to obtain proper Union Representation. Furthermore the Company agrees to inform the Union of all disciplinary action that may arise and agrees to afford the Union a reasonable amount of time to investigate and have the proper representation present for such disciplinary hearings.
- D. A Union Official/steward who is absent from work due to temporary time off for Union business shall not have it held against his/her record, shall not lost any time, or seniority, and shall retain his/her position in the Company.
- E. The Company shall notify and provide the Union with a copy of any written discipline, include any warning, suspension or discharge that may be issued within seven (7) business days. The Company will allow the employee to have Union representation present during any investigatory interview if requested by the employee.
- F. The Company has the responsibility for judicious and proper administration of corrective action. Whatever corrective action is taken must be appropriate to the offense, be consistent with this Agreement, and must be administered with consideration of the relevant work record(s).

ARTICLE 31

GRIEVANCES, DISPUTES, ARBITRATION

- A. Step 1 — Seven Day Dispute Resolution: In the event of any dispute between the Company and the Union as to the meaning, application, performance or operation of this Agreement, or in the event of a disputed discharge, or discipline, the shop steward shall attempt to adjust such dispute with the Company within 7 business days of the incident. If such a

dispute is not satisfactorily settled within seven (7) business days, an official of the Union shall attempt to have such discharge or dispute adjusted by means of a grievance conference with a Company Official who has the authority to settle such disputes. Should settlement not be reached within forty-eight (48) hours, the controversy shall be submitted in writing per the grievance procedure as hereinafter set forth.

- B. Step 2 — Written Grievance: Any and all disputes which may arise between the Company and the Union as to meaning, application, performance or operation of any provisions of this Agreement, any dispute or discharge which the parties are unable to adjust through the grievance conference procedure above shall be reduced to a written grievance and submitted to the Company, by verified method of receipt (i.e. Federal Express or certified mail) within 10 business days after the completion of step one/the Company's response. The grievance must be replied to the Union in writing, within 10 business days from the date the grievance is submitted by the Union. Notwithstanding the foregoing, any discharge not resolved within ten days from the date of discharge, may be submitted to arbitration immediately.
- C. Step — 3 Mediation and Arbitration: Any and all disputes which may give rise between the Company and the Union as to the meaning, application, performance or operation of this Agreement, or disputed discharges which the parties are unable to adjust through the grievance procedure set forth above shall be submitted for arbitration to the office of the Federal Mediation and Conciliation Service (FMCS) pursuant to the rules and regulations in force at the time of such arbitration, and the decision of the arbitrator within the scope of his jurisdiction under the Agreement shall be final and conclusive upon parties hereto. If the dispute is not referred to arbitration within thirty (30) calendar days following the Company's response to step two of the grievance or within 60 calendar days from the date of the incident, or from the date of finding out about such incident, the grievance shall not be arbitral.
- D. No employee covered by this Agreement shall have the right to demand arbitration under the provisions hereof, such right to arbitration being limited to the Union and the Company. No employee covered hereby shall have the right to institute any action based upon this Agreement for wrongful discharge because of any breach of this Agreement, such right of action being limited to the Union and the Company. In the event any claim is made at any time by any employee against the Company under provisions of this

Agreement, any agreement or adjustment made by or between the Union and the Company with respect to such dispute shall be final and binding upon the employee.

- E. The Company and the Union agree to establish an “expedited grievance procedure” to ensure full, prompt and fair hearing on behalf of any employee who claims to have been threatened with immediate discharge for refusal to perform work for which said employees believes he/she is unqualified, except that any assignment may not be contested where the Company is conducting “on-the-job” training, in accordance with past practice. Such expedited grievance procedure shall not be construed as a waiver of any and all rights either party may have pursuant to law or other terms of this Agreement.

ARTICLE 32 ILLEGALITY

- A. If any part of this Agreement shall be declared illegal, it shall not invalidate any other part.
- B. Notwithstanding any provisions contained in this Agreement, neither the Company nor the Union shall be obliged to do any act, or to omit any act, in violation of the federal or state law.

ARTICLE 33 SUBSTANCE TESTING

EMPLOYER and the UNION have a commitment to protect people and property, and to provide a safe working environment. The purpose of the program described in this Article is to establish and maintain a drug free, alcohol free, safe, healthy work environment for all of the employees covered by this Agreement.

- A. The Union has a Members Assistance Program (“MAP”), which allows employees to receive referrals for drug and alcohol problems. Therefore, the Company prohibits all individuals, including employees, contractors, visitors, and others from using, possessing, transporting, distributing, or selling any illegal drug, drug paraphernalia or alcohol while performing work for the Company or while on property which is owned, leased or under the control of the Company or its customer. In addition, no individual shall report for work or remain on duty while impaired by the use of alcohol in excess of .08 or above or while retaining a detectable amount of any unlawful drug in his/her system over the initial drug cutoff levels established

under the Federal Workplace Drug Testing Programs on a 5 or 9 panel screen.

- B. It is agreed that under certain circumstances, an Employee whose work performance and/or behavioral conduct indicates that he or she is not in a physical condition that would permit the Employee to perform a job safely and efficiently will be subject to submitting to a urine or breathalyzer test to determine the presence of alcohol or drugs in the body, provided:
- i) The EMPLOYER has reasonable grounds to believe that the Employee is under the influence of or impaired by the use of Prohibited Substances. Reasonable grounds include abnormal coordination, appearance, behavior, speech, odor or any detectable amount of a Prohibited substance. It can also include work performance.
 - ii) The supervisor's reasonable grounds must be confirmed by another management representative. Immediately thereafter, Employer shall notify the Union of such grounds prior to any testing being directed pursuant to the Reasonable Suspicion form attached hereto by checking or detailing at least two attributes that support their suspicion.
 - iii) If Employer asks Employee questions that might or could lead to discipline, the Employee will be provided with an opportunity to explain his or her conduct at a meeting with the Representatives, including the UNION Representative provided that such 'UNION Representative is reasonably available and provided further that reasonable efforts have been made to attempt to have such UNION Representative present.
 - iv) The Company may upon 45 days advance written notice to the employee require the employee to submit to an annual drug and/or alcohol test.
 - v) If an Owner or customer requires as a condition of bidding a drug policy which is different than the above for all trades performing work on its premises, the Employer shall notify the Union prior to or in connection with the bid or commencement of the work.

- C. The Company shall require any employee involved in an accident, in a Company owned vehicle or otherwise, which involves a police report and or an injury to submit to a drug and alcohol test as soon as possible after such an accident occurs. The Company shall also require an employee involved in an accident during working hours which results in a reported injury, or a significant injury to property or person to submit to a drug and alcohol test as soon as practical. Employees involved in such accidents must make themselves available for testing.
- D. An employee who fails to report an accident or to submit to a drug and alcohol test ordered by the Company shall be subject to appropriate disciplinary action, up to and including termination of employment. Where appropriate testing shall be split sample test.
- E. Any employee who tests positive for drugs or alcohol may request a second test within 24 hours of learning of the positive results. If the employee does not request a second test or if the second test confirms the first test's results, the employee shall enroll in a rehabilitation program designated by the MAP within 72 hours.
- F. An employee who does not enroll in such a program as described in (E) shall be subject to discipline up to and including discharge. An employee who fails to successfully complete such program shall be subject to discipline (up to and including discharge) in accordance with the agreement made between MAP, the employee and the Company.
- G. Any employee who has participated in and successfully completed a drug or alcohol rehabilitation program (1) the employee will submit to random testing at the Employer's request for a period of one year following reinstatement, and (2) who, after reinstatement, fails one drug or alcohol test during the one year period shall be subject to termination, or as otherwise agreed upon between Company, and MAP.
- H. The Company will attempt to provide Union Representation to an employee, if requested. If the Union representative cannot be reached or is not available the Company shall allow a steward to be present. The test cannot be delayed for more than four (4) hours from the time of incident.
- I. All respects of this policy and program shall be subject to the grievance procedure of the Collective Bargaining Agreement.
- J. All costs of drug testing shall be paid by the Employer.

ARTICLE 34
SUMMER/TEMPORARY EMPLOYEES

- A. The Employer shall have the right to hire students (under the age of 25) as summer/temporary employees for any 60-day period of time beginning on or after June 1, and ending on or before September 1 plus student holidays. The minimum rate of pay for summer/temporary employees shall be per the wage section of this Agreement. Such employees shall be considered bargaining unit employees but (a) they shall be deemed in a probationary status and without seniority during their entire period of employment; (b) they shall not be entitled to paid time off (vacations, holidays, sick pay, etc); and (c) no contributions shall be on their behalf to, and they shall not be entitled to insurance or pension benefits. In the event that any summer/temporary employee remains in the employ of the Employer after 60 days, he shall be granted seniority and the full protection of this Agreement.
- B. Summer/Temporary employees shall be required to pay a Union initiation fee and dues but shall have no rights under the grievance and arbitration procedures set forth herein.
- C. A student for purposes of this Article must be matriculating in a high school or in a post-high school educational institution.
- D. The Company shall not hire more Summer Temporary Employees ("STE") than that which is equal to 5% of its workforce or one (1) STE whichever is greater.

ARTICLE 35
SALE OR TRANSFER

The Company agrees to provide reasonable notice to the Union in advance of closing, of any sale or transfer of the Company and to notify any buyer of this Collective Bargaining Agreement.

ARTICLE 36
EVASION OF AGREEMENT

The Company shall not directly or indirectly, through any subsidiary, affiliated or related Company, perform work that is both within the scope of this Agreement and with the Union's geographical jurisdiction, unless such work is performed subject to the terms of this Agreement.

Signed as of the date set forth above on behalf of the parties below:

Painters District Council No. 14
IUPAT, AFL-CIO

By: _____
Title: _____
Date: _____

**ARTICLE 35
SALE OR TRANSFER**

The Company agrees to provide reasonable notice to the Union in advance of closing, of any sale or transfer of the Company and to notify any buyer of this Collective Bargaining Agreement.

**ARTICLE 36
EVASION OF AGREEMENT**

The Company shall not directly or indirectly, through any subsidiary, affiliated or related Company, perform work that is both within the scope of this Agreement and with the Union's geographical jurisdiction, unless such work is performed subject to the terms of this Agreement.

Signed as of the date set forth above on behalf of the parties by their duly authorized representatives of The Chicago Metal Contractors Bargaining, Association:

Painters District Council No. 14
IUPAT, AFL-CIO

By: 
Title: Bosques Manager / Sec. Treasurer
Date: 3/15/2023

Ace Metal Refinishers, Inc.

Alumitec, Ltd.

By: *Maury Barnes*
Title: ceo
Date: 3.17.23

By: _____
Title: _____
Date: _____

The Lee Quigley Company

Allied Universal Janitorial Services

By: _____
Title: _____
Date: _____

By: _____
Title: _____
Date: _____

Stuart-Dean Co. Inc.

By: _____
Title: _____
Date: _____

Ace Metal Refinishers, Inc.

Alumitec, Ltd.

By: _____
Title: _____
Date: _____

By: jc mfy
Title: PRESIDENT
Date: 3/14/23

The Lee Quigley Company

Allied Universal Janitorial Services

By: _____
Title: _____
Date: _____

By: _____
Title: _____
Date: _____

Stuart-Dean Co. Inc.

By: _____
Title: _____
Date: _____

Ace Metal Refinishers, Inc.

Alumitec, Ltd.

By: _____
Title: _____
Date: _____

By: _____
Title: _____
Date: _____

The Lee Quigley Company

Allied Universal Janitorial Services

By: Thomas Scott
Title: President
Date: 8/14/23

By: _____
Title: _____
Date: _____

Stuart-Dean Co. Inc.

By: _____
Title: _____
Date: _____

Ace Metal Refinishers, Inc.

Alumitec, Ltd.

By: _____
Title: _____
Date: _____

By: _____
Title: _____
Date: _____

The Lee Quigley Company

Allied Universal Janitorial Services

By: _____
Title: _____
Date: _____

By:  _____
Title: Sr. Vice President
Date: 3-14-23

Stuart-Dean Co. Inc.

By: _____
Title: _____
Date: _____

Ace Metal Refinishers, Inc.

Alumitec, Ltd.

By: _____
Title: _____
Date: _____

By: _____
Title: _____
Date: _____

The Lee Quigley Company

Allied Universal Janitorial Services

By: _____
Title: _____
Date: _____

By: _____
Title: _____
Date: _____

Stuart-Dean Co. Inc.

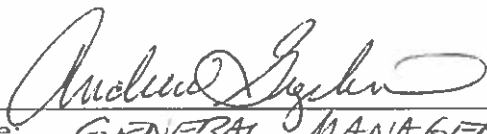
By: 
Title: GENERAL MANAGER
Date: 3/13/2023

EXHIBIT B

Metal Refinisher Job Classifications

DUTIES

The types of substrates that the Metal Refinisher will encounter are as follows:

- A. Stainless steel (satin, brushed, polished)
- B. Bronze (satin, polished)
- C. Oxidized (bronze, stainless steel, steel)
- D. Blackening (bronze, stainless steel, steel)
- E. Aluminum (anodized, mill finish, painted)
- F. High-Performance Coatings
- G. Preventive Maintenance (Wash & Wax, polish only, clean only)

These substrates are components of the following items that a Metal Refinisher would be servicing.

- A. Revolving doors
- B. Swing doors or sliding doors
- C. Window frames
- D. Fascia panels and soffit panels
- E. Exterior handrails, handicap ramps, fire hydrants
- F. Elevator cab entrances (door & frames)
- G. Elevator cab interiors (doors, frames, control panels, handrails_
- H. Exterior signage, plaques
- I. Statues, Monuments,

CLASSIFICATIONS

There are 5 classifications within our CBA with PDC #14

- A. Apprentice (level 1, 2,3,4) – 4 year
- B. Assistant Journeyman – 2-4 years
- C. Journeyman – 2-4 years
- D. Foreman
- E. General Foreman/Field Mgr.)

Stuart Dean maintains an equal ratio of Assistant Journeyman, Journeyman and Foreman.

A. Apprentice/Helper

Employees shall perform semi-skilled duties assisting personnel in charge of job. During this period, the employee will develop skills and perform tasks to acquire knowledge of work processes such as:

- a) Following safety procedures.
- b) Setting up and breaking down the jobsite; safely, efficiently and correctly.
- c) Setting up and breaking down scaffolding; safely, efficiently and correctly.
- d) Preparing surfaces for refinishing process; safely, efficiently and correctly. (masking, stripping)
- e) Training in cleaning, oxidizing, polishing and scratch removal of non-ferrous metals in various finishes; safely, efficiently and correctly.
- f) Reading and understanding SDS sheet.
- g) Being aware of and understanding company policies as enumerated in the Employee Handbook.
- h) Hold a minimum of a OSHA 10 certificate

On entering this category, the helper will have the opportunity to perfect the techniques of Metal Refinishing and demonstrate pride in craftsmanship. There will be increasing responsibility, with high-quality workmanship. The helper will be proficient in all safety rules and regulations and will advance within this category and into other categories by demonstrating higher levels of performance and command of techniques. Apprenticeship program lasts 4 years. Each year within the program, the employees develop and fine tune their skills in each category of a Metal Refinisher. Employees are reviewed annually by the Operations Manager with input from their supervisor and Training Foreman

B. Assistant Journeyman

An Assistant journeyperson must demonstrate all the foregoing and have competency in:

- a) Minimum 4 years of Apprentice training
- b) Working by himself/herself.
- c) Working with other personnel in a responsible capacity
- d) Knowledge of coatings.
- e) Begin learning to spray the highest quality coating, which is acceptable to both the company and customers.
- f) A minimum of three (3) types of metal, copper alloys, stainless steel or aluminum.
- g) Two types of refinishes, i.e., satin, polished, oxidized, painted surfaces or specialty finishes.
- h) Scratch removal.
- i) Responsible for all equipment, tools, vehicles, and materials within his/her custody.
- j) Hold a minimum of a OSHA 10 certificate

He/she must be able to read and comprehend work orders, instructions, written directions as well as oral instructions. Assistant Journeyman program lasts 2-4 years. Each year with the program, the employees develop and fine tune their skills in each category of a Metal Refinisher. Employees are reviewed annually by the Operations Manager with input from their supervisor and Foreman

C. Journeyman

A journeyman must demonstrate all the foregoing and have competency in:

- a) Minimum of 6 years
- b) Working by himself/herself.
- c) Working with other personnel in a responsible capacity
- d) Knowledge of coatings.
- e) Spray the highest quality coating, which is acceptable to both the company and customers.
- f) Running job production, running a 2-person crew.
- g) A minimum of three (3) types of metal, copper alloys, stainless steel or aluminum.
- h) Two types of refinishes, i.e., satin, polished, oxidized, painted surfaces or specialty finishes.
- i) Scratch removal.
- j) Responsible for all equipment, tools, vehicles, and materials within his/her custody.
- k) Basic training or lower tiered classifications.
- l) Hold a minimum of an OSHA 30 certificate

He/she must be able to read and comprehend work orders, instructions, written directions as well as oral instructions and convey these to any employee with which he/she is working. Journeyman program lasts 2-4 years. Each year with the program, the employees continue to fine tune their skills in each category of a Metal Refinisher. Employees are reviewed annually by the Operations Manager with input from their supervisor and Foreman

D. Foreman

A Foreman must demonstrate all the foregoing and have competency in:

- a) Minimum of 8 years of experience
- b) Be considered an **expert** in all the skill sets performed under the Company's work
- c) Must demonstrate a high degree of refinishing skills in multiple areas of the company's work
- d) Must be able to spray finish
- e) Must be competent to complete projects from start to finish.
- f) Be responsible for their work and the work of any other worker assigned to that person.
- g) Following safety procedures
- h) Can set up large and complicated jobs and assist supervisors with coordinating personnel.
- i) Must demonstrate proficiency to deal with on-site clients under the direction of a supervisor.
- j) Must ensure a project is run professionally and safely while meeting the company's expectations of quality and quantity.
- k) Must be able to run two- or three-man crew simultaneously while producing the expected quantity and quality of work.

EXHIBIT C



NEW HIRE TRAINING MANUAL

Company Orientation

Metal Restoration & Maintenance

CONFIDENTIAL

METAL RESTORATION & MAINTENANCE

STUART DEAN COMPANY, INC.

Work Rules and Basic Skill Training

Prepared by:
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Material in this manual is intended only as a guide and an initial training tool.

It does not contain all of the policies, rules or procedures of Stuart Dean Company.



Welcome to Stuart Dean Company

This module will introduce you to Stuart Dean Company and provide you with basic workplace information.

Congratulations and welcome to the beginning of your career with Stuart Dean Company, the premier provider of restoration and maintenance services for metal, stone and wood building facades and surfaces. With 17 offices nationwide, we are the largest, oldest, and best in the industry since our founding by Edward Degan in 1932.

Stuart Dean has succeeded on the principles of teamwork and an unrelenting desire to be the leader in its field. Today, we continue that leadership not only through excellent teamwork, but also through a level of quality and customer satisfaction that is second to none.

This training material is designed to introduce you to methods and procedures you will be expected to follow. Besides classroom discussion, you will also spend hands-on time practicing the skills and techniques necessary to make you a leader in quality work and customer satisfaction. The training will include text manuals, videos, ample time for questions and answers, and some quizzes to test your knowledge.

ICON KEY

	Valuable information
	Classroom handout
	Video to watch
	Test your knowledge
	Hands on practice

Throughout this manual, you will notice certain areas set off by the pictures in the icon key. Use these road marks as guides to important information and practice opportunities to give you a firm understanding of the basics at Stuart Dean Company.

Lesson 1: Introduction to this Training

During your training, you will learn more about Stuart Dean and what will be expected of you on the job. These training sessions will cover corporate policies, safety, an overview of a typical workday, scaffold assembly and use, customer communications, job set-up, pre-work masking, basic work skills, and job site clean-up.

METAL RESTORATION & MAINTENANCE



Examples of the Stuart Dean Company uniforms.

The course material is broken up into lessons. We will cover between two and six lessons per day. At the end of each lesson (or at day's end) there will be a quiz consisting of either a short written test, a session of answering questions verbally, or an opportunity for demonstrating a newly acquired skill. These tests will ensure you have a solid understanding of the material, and also give you confidence when you begin work for a Stuart Dean customer.

Work Hours and Basic Information

Every Stuart Dean location has a similar management structure, though some positions may not be needed or used. If you have any questions or problems, do not hesitate to contact the appropriate person for help. The typical chain of command is: Technician, Foreman, Supervisor, Operations Manager, and finally Division Manager.

Client needs will dictate work shifts and start times. As a general rule, the work day will either be an eight or ten-hour day. The actual start and end times for your shift will vary from week to week. As was explained in your hiring interview, a majority of our work is performed "after normal work hours", meaning at night. All workers are entitled to a thirty (30) minute unpaid lunch which will be scheduled by your Foreman. Full time employees are also provided two paid breaks. Your Foreman or Supervisor will discuss with you the allowed break durations. Break times will be scheduled by your Foreman or Supervisor.

Stuart Dean is a smoke-free workplace, therefore smoking is NOT permitted in the shop, in company vehicles (whether moving or parked), or on the job site. Smoking is only permitted in a designated smoking area, and only during your scheduled break.

Attendance sheets record the number of hours you work every day. In some Divisions, the Foreman is responsible for recording your attendance and in others you

METAL RESTORATION & MAINTENANCE

must record your own time. All completed sheets are turned in at the end of the work week. Your paycheck will be handed out by your supervisor on the following Friday. Direct deposit of your paycheck is available and encouraged. Your instructor has the necessary form.

New employees are hired conditionally. Each office has its own defined length of time for the probationary period. During this period your work habits will be monitored by your superiors to determine if you should be brought on as a permanent member of the Stuart Dean team. If your work is unacceptable, you may be sent for retraining, or asked to leave the company.

Lesson 2: Customer Satisfaction

You, the technician, are the face of Stuart Dean. The general public sees this every time you are seen driving in a company vehicle, every time you are noticed in your uniform, every time you are observed completing work at a job site. More importantly, you are seen by current and future customers!

Your appearance and conduct provide all of these people their only impression of Stuart Dean Company. You may even do superior technical work, however it could all be lost simply by rude behavior. Because of that, you play a key role in retaining customers and in inviting new ones to do business with us.

Many times you will be required to work in a building after it has closed. Because our customers trust us to be at our professional best, it is especially important to treat our customers' work site with respect. Theft of customer or company assets will not be tolerated and stealing will be grounds for immediate dismissal.

As a representative of Stuart Dean, it goes without saying that smoking, swearing, or inappropriate language on the job site must be avoided at all costs. A lot is at stake if we do not provide our customers with exceptional satisfaction. If you encounter a problem on the job site related to any of these situations, you must notify your Foreman or Supervisor immediately.

Treat everyone with courtesy and respect-just like you would like to be treated

Be polite to building staff and passers by

Maintain a neat and clean appearance

Always address customers as "Sir" or "Ma'am"

Never argue with customers or co-workers

Lesson 3: Basic Work Rules

You received a copy of the Stuart Dean Work Rules when you were hired. Some of the key points are again covered in this section.

Uniforms and Personal Appearance

All employees are expected to arrive to work with a neat and clean appearance. At your time of hire, you were informed of the uniform requirements for your location.

METAL RESTORATION & MAINTENANCE

You are expected to keep your uniform clean and wrinkle free, with no tears or stains. If your uniform is ruined while at the job site, contact your Foreman or Supervisor. They will arrange to have it replaced with a new uniform. When you leave Stuart Dean, you are required to return your complete uniform. Failure to do so could result in a deduction from your last paycheck.

For safety reasons, employees cannot wear earrings or jewelry during the course of the workday. Also, pursuant to OSHA Regulations 29 CFR 1910.134, male employees must be clean shaven with the exception of a moustache. This facial hair restriction is due to the occasional need for you to wear an air-filtering respirator. It is also a general policy of the company. Facial hair prevents it from fitting snugly against your face.

Company Vehicles and Driving

Company vehicles are required to safely move you, your equipment, and materials to various work sites. Safe driving practices are essential to not only preventing injury, but also to help keep costs down. There are many basic considerations to safe driving.

Prior to Driving:

Secure all doors and scaffolding

Remove all clutter from dashboard (cups, cans, tools, paperwork, etc...)

Adjust side and rear view mirrors; make sure there are no obstructions

Inspect vehicle to insure it is in safe operational condition

Check that the insurance and registration cards are in the vehicle

Confirm there are no employees are riding in the rear of the van

Make sure everyone fastens their seat belts

The first and foremost rule is that the driver must have a valid driver's license. A photocopy will be kept in your employment file. Because insurance regulations require Stuart Dean to maintain a constant awareness of their drivers, the company will perform a Motor Vehicle Report (MVR) on you at the time of hire and periodically after that. If your license is revoked or suspended, you must immediately notify your Foreman or Supervisor. Driving without a valid driver's license will result in immediate termination.

Only authorized Stuart Dean employees are allowed in company field vehicles.

Employees also are not allowed to drive while under the influence of alcohol or drugs, or when their physical or mental condition is considered hazardous to themselves or others.

At all times, practice defensive driving. That means watch for tailgaters and cars moving erratically. Maintain ample distance between the car or truck in front of you. Do not speed or talk on a cell phone while driving. Keep both hands on the wheels and always use your directional indicators. If you notice any problems with your vehicle, you must report the problem immediately to your Foreman or Supervisor.

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Employees must obey all state and local traffic laws, including but not limited to speed limits, stop signs and seat belt laws. If you should receive a traffic ticket for improper driving, the penalty is yours to pay. The violation will go on your driving record. Also, care must be taken when parking the company vehicle. It is against company policy to leave the vehicle in a No Parking Zone, Handicap Zone or Fire Zone. You may be held responsible for parking tickets issued to your vehicle.

Some Divisions allow employees to take vans home due to being on call or for other business reasons. Where this is allowed, company policy strictly forbids use of the vehicle for personal use. You may not use the vehicle for family reasons. Under no circumstances should any children be allowed inside the vehicle.

Should an accident occur, stop immediately. If someone is injured, call 911 for an ambulance. Do not attempt to move an injured person! Then contact your Operations or Division Manager. Be prepared to let them know:

1. Type of emergency personnel needed (ambulance, fire, police, etc...)
2. Location and type of accident
3. Extent and severity of injuries
4. How the accident occurred
5. Damage to the vehicle and/or other property.

Depending on the nature and severity of the accident, a Stuart Dean superior may be sent to the scene. In any case, avoid making any statements regarding the accident to anyone but authorized Stuart Dean personnel. Obtain the names, addresses, driver's license numbers, and insurance company names of any other drivers involved in the accident. You must also provide this information to your Operations Manager.

Since you are in your vehicle daily, it is your responsibility to report any mechanical problems or safety issues that exist. Never assume that these problems will automatically be corrected. Safe driving practices begin with you!

You are also responsible to insure that company vehicles are kept neat and clean. All materials and equipment must be stored in an orderly and safe manner. When leaving the vehicle unattended, it must be locked at all times. Do not assume that because the vehicle is parked on Stuart Dean property or in a customer's loading dock/garage that it is safe from theft!

Harassment and Discipline

Stuart Dean is committed to a harassment-free work environment and is committed to treating all people with respect, dignity, courtesy and equality. What this means to you is that no employee should be subject to derogatory comments or put-downs. Not only does this apply to work crews of the same sex, it also applies to comments, looks and gestures directed at employees of the opposite sex.

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Further, any harassing comments made towards your coworkers, clients, their employees, their customers, or even passers-by will be grounds for suspension or loss of employment with Stuart Dean.

Disciplined work practices drive quality and efficient work, and they also apply to how people deal with each other on a daily basis. As a rule of thumb, ask yourself if this is how you or your family members wish to be treated?

Typical Personal Protective Equipment:

Dust Masks

Respirator with filters

Safety glasses and/or goggles

Face shields

Rubber gloves

Knee pads and hardhats

Disposable coveralls

Safety harness and lanyard

Typical Vehicle/Shop Safety Equipment:

Fire extinguisher

Material Safety Data Sheets

First aid & eye wash kits

Safety can for towel disposal

Safety can for flammables

Laminated safety posters

If at any time any employee believes he or she has been the object of harassment, he or she should immediately contact the Director of Human Resources at corporate headquarters (1-800-322-3180) or your General Manager to report the incident. This call will be held strictly confidential to the extent necessary to conduct an investigation. Appropriate action will be taken.

Stuart Dean Company policy prohibits any form of retaliation against an employee who reports a complaint under this procedure.

Safety

All employees are expected to be safety conscious and to immediately report unsafe conditions to their Foreman or Supervisor.

Each employee will be issued personal protective equipment as needed, and they are responsible for that equipment. If this equipment is lost or damaged, it must be reported immediately. Under no circumstances may an employee proceed to a work site without the appropriate safety equipment.

Smoking and Safety

As mentioned earlier, Stuart Dean has a No Smoking policy. That means no smoking at the Divisional office, in a company vehicle, or at the job site. We work with flammable chemicals. We work in our clients' locations. We are seen by the public. For all of these reasons, smoking will not be tolerated while at work.

The second training module is completely focused on safety. It is important to remember that Stuart Dean is dedicated to providing a safe work environment and promoting safe work practices.

Substance Abuse

Under no circumstance may an employee possess, use, or dispense a controlled substance without a medical prescription. Reporting to work under the influence of

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alcohol or a controlled substance is strictly prohibited. Any employee found violating these provisions may be terminated immediately.

Change of Status

Employees must report to their Operations Manager any changes in their status. This includes changes in address, telephone number(s), marital status, dependents, and emergency contacts.

Injuries

Your health and safety are very important to Stuart Dean, and if you should be injured on the job, you are required to report the incident immediately to your Foreman or Supervisor, regardless of the severity of the injury. You and your superior together will fill out an injury report form following the accident. Your instructor will hand out an example of the injury report form.

When an employee is injured on the job, the following procedures must be followed:

1. The injury should be reported to a Foreman or Supervisor immediately.
2. The injured employee must obtain medical treatment as soon as possible, either from a doctor of their own choosing or the closest emergency facility. In all cases, the medical facility must be informed that the injury is a Workers' Compensation case handled by Stuart Dean Company's carrier.
3. Accurate information about the cause of the accident must be communicated to the injured employee's Foreman or Supervisor. The names, addresses, and phone numbers of any witnesses must be obtained.
4. An accident report must be completed by their Foreman, Supervisor or Operations Manager.

Attendance

Stuart Dean strives for the highest levels of professionalism. Repeated absenteeism and tardiness (being late to work) will not be tolerated. Our customers depend on you being at work, and on the job site, so that their project is completed on time, and with the high levels of quality they have come to expect. If you are absent from work, or late, your crew members cannot meet those expectations. Call your Foreman or Operations Manager if you will be late to work or absent. Failure to do so will result in disciplinary action.

The following rules govern absenteeism and tardiness:

1. Patterned absences or tardiness will not be tolerated. Patterned absences are those that repeatedly occur before or after a vacation, holiday, or weekend.
2. Employees are expected to call in to work when they are going to be late or absent. There are no exceptions to this requirement.

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3. Failure to call will result in an unexcused absence. Three consecutive unexcused absences will result in disciplinary action up to and including discharge.
4. If an employee is absent for three consecutive days without notification to the company, at the end of the third workday they will be considered as to have abandoned their job.
5. Repeated absences or tardiness (excused or unexcused) can result in disciplinary action up to and including discharge.
6. Employees have the right to appeal any penalties through normal grievance procedures in accordance with their collective bargaining agreements where applicable.

Coming to work under the influence of drugs or alcohol, drinking or using illegal drugs on the job, are grounds for dismissal. Doing so creates an unsafe work environment and creates a very poor image for Stuart Dean and yourself.

From time to time, your Division may have a need for you to work overtime. It is company policy that employees work overtime only with the expressed authorization of their Foreman or Supervisor.

Insubordination

This is a fancy word for employees who mouth off to their boss. It also includes the use of obscene gestures or language, or ignoring a direct order from a superior. Insubordination will not be tolerated from any Stuart Dean employee, and problems in this area could lead to loss of employment.

If problems exist between a technician and a Foreman, and a solution cannot be found, contact your Supervisor or Operations Manager with the concern. Or bring the situation to the attention to your Division Manager. But in no case should you respond to problem situations through insubordination.

On the next page are the major disciplinary actions at Stuart Dean Company. This list is not meant to be complete. It only highlights some of the major areas of concern. The table lists the standard company practices as it relates to disciplinary action. Each Division might have a slight difference.

In all cases where a fourth disciplinary action is required, that action will result in the employee being discharged.

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Improper Activity at Work	1 st Time	2 nd Time	3 rd Time
Theft of property	Discharge		
Drinking alcohol or taking drugs	Discharge		
Falsifying attendance records	Discharge		
Possession of weapons or firearms	Discharge		
Solicitation of Side Jobs	Discharge		
Driving without a license or on a revoked license	Discharge		
3 consecutive unexcused absences	3-day Suspension without pay	Discharge	
Taking a company vehicle home without prior authorization	3-day Suspension without pay	Discharge	
Failure to immediately report an accident	Written Warning	1-day Suspension without pay	Discharge
Harassment	3-day Suspension without pay	Discharge	
Disregard of Safety Rules	Written Warning	3-day Suspension without pay	Discharge
Failure to wear specified personal protective safety gear	Verbal Warning	Written Warning	Discharge
Smoking in unauthorized areas	Verbal Warning	Written Warning	3-day Suspension without pay
Intentionally misusing company or client property	3-day Suspension without pay	Discharge	
Leaving the job site early without authorization	Written Warning	3-day Suspension without pay	5-day Suspension without pay
Stretching Break Times	Written Warning	3-day Suspension without pay	Discharge
Insubordination	Written Warning	3-day Suspension without pay	Discharge
Failure to follow specified job instructions	Written Warning	1-day suspension without pay	3-day suspension without pay
Deliberately restricting productivity	Written Warning	3-day Suspension without pay	Discharge

Module 1: Questions



1. How long is the typical work day?
2. When is payday?
3. Is lunch paid or unpaid, and how long is it?
4. What should you do if you or someone you are working with is injured?
5. If you are involved in a vehicle accident while driving a Stuart Dean truck, what should you do?
6. What does Probationary period mean and how long is it?
7. What should you do if you will be late to work?
8. How should customers be treated at the job site?
9. What is the company policy on smoking?
10. Who should not ride in company vehicles?
11. If you have a problem or question, what should you do?
12. What is the company policy on alcohol and drugs?
13. What is patterned absence?
14. What is insubordination?
15. Can technicians solicit side jobs?



Developing Safe Work Habits

After completing this module you will understand that safety is a fundamental way of life at Stuart Dean Company.

Promoting safe work practices is a fundamental part of everyone's job at Stuart Dean Company. When injuries occur on the job, the impact extends beyond the injured person and their family. Employee morale is affected, productivity can be impacted, customer's can lower their opinion of Stuart Dean Company, and profits can be significantly lowered due to medical costs and increased Workers' Compensation premiums. Sometimes wages can be lost.

In order to avoid this, it is just as important to make sure all employees receive continuous and in-depth safety training. It is just as important as delivering quality work on time and on budget.

A large number of workplace accidents occur during the first several weeks of employment. That statistic alone provides more than enough rationale for making safety training an essential part of the workplace environment.

This training module on safety is the building block for the continuous safety training you will receive throughout your career with Stuart Dean Company. To supplement this initial training, a series of bi-weekly Tailgate Training sessions has been designed for periodic, quick, and on-going training to be conducted by your Foreman throughout the year—usually right in the Division shop. And there are also more comprehensive classes for specific topics that will be held throughout the year.

It is critical that technicians, and all employees for that matter, take safety seriously. And it is essential that they retain this training. Therefore, you will be given tests throughout the safety training to insure you understand safe work habits and practices.

As you go through the various training sessions, you will notice some that are required by law—like the proper use of respirators. However, Stuart Dean Company has gone beyond the minimal requirements. Safe work practices are good for everyone: you, your family, our customers, and the company.

Lesson 4: Safety Video

As a starting point, Stuart Dean Company has produced a safety training video to introduce you to some of the hazards you will encounter at work. You may have already seen it when you were hired. Because of its importance, we will review it together as a group. It will show you ways to avoid these hazards, and to ways to avoid injury to yourself.



A safe work environment is everyone's responsibility. Management must ensure every employee is aware of all hazards they may encounter while at work, and management must provide on-going training to prevent injury or even death. It is the employee's responsibility to pay attention, understand the training, and work safely. Stuart Dean Company sets forth these responsibilities:

1. All employees must participate in all on-going health and safety training, and must pass the periodic testing administered as part of this training.
2. All employees must notify their supervisor of actual or potential hazards when encountered.
3. Safe work practice rules must be followed at all times.
4. Required safety equipment must be used and used properly.
5. Employees must immediately report to their supervisor any and all on-the-job illnesses or injuries.

The video you are about to watch is designed to promote safe work practices. Please watch carefully. There will be a quiz following the video.

Violating safe work practices can lead to disciplinary action, and possibly loss of employment.

Not to mention serious injury.

Lesson 5: Safety Orientation

Because of rising worker injuries, the United States Congress passed into law the Occupational Safety and Health Act (OSHA) of 1970. The Act created a new government agency which is responsible for overseeing employee and employer safety. Since then, the number of workplace fatalities has been cut in half, while occupational illness and injury rates have declined more than 40%. More importantly, these significant safety advances occurred while the American workforce more than doubled!

Part of OSHA's emphasis is the Right-To-Know (RTK) and Hazard Communication (HAZCOM) processes that inform workers about conditions in the work place that could affect their health and safety. Stuart Dean Company is committed to holding annual training on the chemical hazards you face in the workplace, and conducting regular safety training on the essential topics you need to understand to help prevent

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injury. It is essential you ask questions. You can't stay safe if you don't understand the dangers.

Hazard Communications

Right-To-Know and HAZCOM laws have put a common format in place for communicating perils to workers. Employees can learn about the hazards they face through three (3) different written channels. As required by law, each chemical used must have:

1. A Material Safety Data Sheet (MSDS),
2. A Hazardous Material Information System (HMIS) label on the original container,
3. HMIS labels on all cans, spray bottles, or temporary holding containers to help identify the dangers of its contents.

HMIS container labels provide a condensed version of the safety information while the MSDS sheets provide more comprehensive data. These sheets provide you with a great deal of information to understand what you are working with and how it can hurt you. But first, let's review the labels.

All containers, even those used temporarily, must have an HMIS label. This is important because workers walk away from temporary containers all the time and it is easy to forget what chemicals are being used. The label contains four colored sections to identify the four key safety issues.



Each colored section relates to an important aspect of your safety.

1. Blue reflects health impacts (will it hurt you).
2. Red covers flammability (how easy it can catch on fire).
3. Yellow is reactivity (danger when mixed with something else).
4. White relates to PPE (what protective gear you need to wear).

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The color sections use a number system to indicate the level of danger involved. Know that the number zero (0) means minimal or little danger while the number four (4) means extreme or very significant danger.

MSDS sheets must be kept in a binder. One copy of the binder should be kept at the Division Office while another copy must be kept with the crew in the truck.

Typical MSDS and HMIS Information:

Hazardous ingredients

Affects of exposure

Short and long term health implications

First aid measures

Fire and explosion data

Accidental release measures

Handling and storage

Personal Protection Equipment (PPE) needed

Physical characteristics

Stability and reactivity

Exposure level impact

Ecological information

Disposal requirements

How to transport

Regulatory information

The binder should be organized so that employees can easily find information in emergency situations. If a chemical is referred to by a special or shortened name that is different than what appears on the MSDS sheet or HMIS label, that name should be written on the sheet and the container label for easy identification.

If in doubt about the type of chemical being used, read the label or MSDS/HMIS sheet. Never smell or touch the contents of a container! Take the time to always understand the chemicals being used and its affect on you!

Report unlabeled containers to your Foreman!

Emergency Response

No matter how conscientious workers may be, accidents do happen. Some are as small as a spill of non-hazardous chemicals while some can be as life threatening as an explosion. The key is accessing the situation to determine the necessary response. First, always remain calm. Let your training help you contain the problem.

Decide if the problem is easily handled by you, or if you need the assistance of your Foreman, Supervisor, or the Division Office.

Once the problem is under control, even if it is a minor spill, notify your Foreman with the details. It also may be appropriate to notify the customer or building security. Your Foreman will advise you on the appropriate action.

Because accidents are not foreseen, it is important to be prepared on the work site. Based on the location of your work, you should know where all electrical panels are located as well as any gas shut offs. Where are the emergency exits located? Is the MSDS binder readily available? Make sure the appropriate safety and emergency equipment is on

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site. Know where the hazardous material cleanup supplies are located.

Handling Chemicals

Very few work activities at Stuart Dean Company avoid using chemicals; therefore it is essential to understand proper handling techniques to prevent illness, injury, or damage to property. Before using a chemical, review the HMIS label and the MSDS sheet as well as the Product Data Sheet.

As a basic process, ask yourself what problems can occur using this chemical. Does it produce vapor? Can it cause an explosion or fire? Will it harm you if it touches your skin? When in doubt, ask your Foreman or Supervisor for clarification.

Do not bring more chemicals than you will need for the scheduled job. Carry them in the appropriate safety cans or fire containers, and make sure they are clearly labeled. Some of the commonly used chemicals that you need to exercise caution include:

1. Acetone and water-borne strippers
2. Metal oxidizers (used to produce special finishes)
3. Cleaning acids for metal and stone
4. Corrosives (eat anything they contact)
5. Coatings for metal, stone and wood

Because flammable chemicals easily catch fire, and oxidizers are highly combustible, never store the two chemicals together since they can cause an explosion under the wrong conditions.

Whether you are working in a Stuart Dean Company work shop, or at a customer location, make sure you have adequate lighting to help avoid spills or slopping the chemical out of the container. Know where the rags and supplies are located. Also know where the eyewash, first aid kits, and fire extinguishers are located.

All vehicles must be equipped to support chemical usage. Make sure you have waste cans for soiled rags and liquids, spill kits, an ABC fire extinguisher, barricades and warning signs to keep passers by safe, and the appropriate Personal Protection Equipment. Lesson six (6) will cover Personal Protection Equipment in depth.

Use the eye wash kit immediately if chemicals are splashed into your eyes. Flush for at least 30 minutes.

Flammable Chemicals

All flammable chemicals must be stored in a fireproof room at the Stuart Dean Division facility, in fire cabinets, or in red safety containers especially when being transported. These containers are designed to control the accumulation of high concentrations of vapor, which is the prime reason flammables are easily ignited.

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To control vapor accumulation, use small amounts of chemicals and keep all containers closed, including the waste containers. Always keep a fire extinguisher close by during transportation, transfer, and use of flammable chemicals.

Commonly Used Flammable Chemicals

Acetone

Lacquer thinner

Lacquer finishes

You must always wear safety glasses or goggles when refilling or emptying flammable chemicals between larger drums and smaller containers. You must also use an approved pump to transfer the chemicals.

As a further safety precaution, you must use a grounding wire while transferring flammable chemicals between containers. This prevents a spark from setting off an explosion and fire.

Field technicians will use towels with all of these chemicals. Because of that, the towels also must be treated as flammable. Always place the used towels in the red safety trash container when you are done.

Flammable chemicals cannot be used within 50 feet of an ignition source (open flame) and smoking is prohibited within 50 feet. Also, halogen lights must not be used since the high heat output will easily ignite flammable chemicals.

First Aid and Medical Emergencies

Field technicians have only a few simple responsibilities when injuries arise from a work site accident. The first is to either provide simple first aid (using items in the first aid or eye wash kits) or to call 911. The second is to immediately report the incident to their Foreman or Supervisor.



Never allow or instruct an injured employee to transport themselves to a medical facility. Have them driven to a proper location where proper treatment can occur.

Fire Safety

The best way to deal with fires is to prevent them from happening. Always set up your job site with that in mind. Ensure the safety barriers are in place to warn passers by of the potential hazards. Prominently post the no smoking signs. (Remember: flammable chemicals produce vapors and smoking can ignite the vapors!) And always have an ABC fire extinguisher with you!

At least one fire extinguisher should be placed on your working tarp. Multipurpose ABC dry fire extinguishers are recommended for most situations. Where special types are required, your Foreman or Supervisor will advise. To prevent damage to fire extinguishers while driving to a work site, place it in the red box in the van.

If a small fire breaks out, try to put it out with your extinguisher. When using the extinguisher, remember PASS: Pull the pin, Aim the nozzle at the base of the fire, Squeeze the trigger, and Sweep the spray from side to side.

A fire blanket can also be tossed on the fire to smother the flames. This is especially important if a person has caught fire! Sometimes a blanket is not available to help in

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the event someone has caught fire. Do not allow them to run—it will only spread the flames quicker. Instead, remember Stop, Drop, and Roll. Dropping to the ground and rolling will also help smother the flames.

If the fire is too large to be put out with your fire extinguisher, leave the area and immediately call for emergency assistance. Also be sure to call your supervisor as soon as it is safe to do so.

Electrical Safety

Unsafe electrical conditions are a major cause of fires, but they also can lead to minor electrical shocks and electrocutions.

The easiest way to prevent electrical problems is to use a Ground Fault Circuit Interrupter (GFCI) with every extension cord or for each power tool used. GFCI's cut off the flow of electricity if a short circuit occurs. It is designed to protect the user from possible electrocution. (The use of GFCIs are legally required when using all extension cords.) In conjunction with the GFCI, make sure each cord is taped down so no one can trip over it and cause damage to the cord. When done, make sure you remove all tape from the extension cord.

Water conducts electricity. If possible, make sure your hands and feet are always dry. If water intrudes into the work area, immediately stop using electrical equipment.

Frequently inspect cords, their protective insulation, and the plugs on all extension cords and power tools. Do not carry tools by their cords, yank plugs out of electric sockets by their cords or use the cords to prop open doors. Both bad habits lead to electrical accidents.

Be aware of overhead power sources. Always keep away from overhead power lines. Only fiberglass or wooden ladders are approved for use around electrical equipment. If work is done on electrical circuits or equipment with moving parts, special care must be taken to prevent serious injury or death.

Protecting Your Back

Back injuries are a serious danger both at home and at work. They can be very painful, long lasting, and potentially disabling. By using common sense, staying physically fit, and being aware of the inherent dangers in improper lifting, you can protect yourself from injury.

When lifting, don't try to move more than you are able without straining. If a load is too heavy or bulky, ask for assistance. Sometimes it's difficult to judge how heavy a box is by its size. When in doubt, first push the box with your foot, this will help you gauge its weight.



Let's take a moment now to see a demonstration of proper lifting technique, and to practice this technique.

Proper Lifting Techniques

Check the load's weight by pushing it with your foot

Plan your route, checking for trip hazards and obstacles

Keep feet apart, knees bent, and arms close to your body

Don't twist or reach while lifting the load

Tighten stomach muscles and lift with your legs

When turning, move feet first rather than swivel

At the destination, bend at knees to lower load

(Remember, tight stomach and feet apart)

Slowly return to a standing position

Preventing Slips and Falls

Only you can prevent slips and falls. It seems simple and obvious, yet it is very true. While working, it is essential for you to be aware of your surroundings. Keep your work site organized, with tools and supplies neatly positioned on your work tarp. Make sure extension cords are taped down. Note locations where the floor may be uneven or pitted with holes or obstructions. Check for adequate lighting. Either replace burned out bulbs, or bring in appropriate additional lighting.

Messy job sites lead to slips and falls, and these easy-to-prevent accidents can have long-lasting impacts on your health and your ability to work.

Hazardous Spill Cleanup

Your Foreman or Supervisor is responsible for the proper and ultimate clean up of hazardous chemical spills, however, all field technicians must understand what the proper procedures are and follow them throughout the cleanup process.

Spill control materials include shop towels, polysorb, and loose absorbent material as well as other materials we will discuss.

For spills of one (1) gallon or less, surround the area of the spill with absorbent materials and

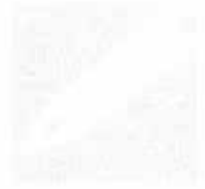
isolate the spill area from all foot traffic. Notify your Foreman or supervisor immediately of the spill. Make sure you are wearing the correct Personal Protective Equipment (PPE).

Collect the used absorbent materials and place into the proper waste container. Upon your return to the Stuart Dean Company shop, take the container immediately to the hazardous waste storage area and inform the Operations Manager of the contents.

Never dispose of spilled materials in a trash receptacle, or into sinks, drains or any sanitary sewer inlet.

If the spill is more than one (1) gallon, you must contact your Foreman or Supervisor immediately.

Mid-Module Questions



1. How often will you receive training on the chemicals used at Stuart Dean?
2. What is MSDS?
3. What do the colors on HMIS labels signify?
4. Explain the purpose of the numbers on HMIS labels.
5. Why are MSDS sheets important?
6. Why is vapor accumulation so important?
7. Why can halogen lights cause a problem with flammable chemicals?
8. What is the most commonly used type of fire extinguisher at Stuart Dean?
9. What is the easiest way to prevent electrical accidents?
10. What is the correct process for lifting?
11. How can you tell an object's weight without lifting it?
12. Where can hazardous chemicals NEVER be disposed?

Lesson 6: Personal Protection

At some point, every technician or field employee will need to use some form of protective gear while working. While it is the responsibility of your Foreman or Supervisor to ensure you have the correct equipment with you when you leave for a job site (or perform work at a Stuart Dean facility), it is your responsibility to understand how the equipment works, and when you should be using it.

Some of the protective equipment is basic, and includes such items as goggles, safety glasses, rubber gloves, leather gloves, first aid kits, eye wash kits, ear plugs, knee pads and hard hats. Other items may be issued as needed, and include such items as respirators, safety harnesses, lanyards, rope grabs, hard hats, and hearing protection.

Uniforms are used to protect skin from chemical or sun exposure, while gloves will prevent blisters or cuts to the hands. Glasses and face shields protect eyes from dust, flying debris and splashed chemicals. Dust masks protect the lungs from large dust particles while respirator cartridges (discussed in Lesson 7) protect from vapors as well as smaller particles-all of which can be absorbed through the lungs. Ear plugs protect hearing while hard hats absorb impacts to the head from bumps or falling objects. Finally, lanyards, harnesses and rope grabs provide safety from falls.

There is no hazard at Stuart Dean Company that cannot be avoided by the proper use of common sense, an awareness of the hazards present, and the use of Personal Protective Equipment (PPE). Common hazards include chemicals, harmful dust, noise, and the sudden impact arising from falls.

The use of PPE is based on two hazards, physical and health. The presence of either condition warrants the use of protective equipment. If you ever are in doubt about using protective equipment, do not hesitate to ask your Foreman or Supervisor to explain the work process and potential hazards.

Physical hazards are defined as any condition where there is scientifically valid evidence that a chemical is:

1. A combustible liquid
2. An explosive compressed gas
3. Flammable
4. Unstable (reactive) or water reactive
5. An oxidizer

Health hazards are defined as chemicals which show statistically significant evidence that acute or chronic health effects may occur in employees due to exposure. Acute effects usually occur rapidly as a result of short-term exposure and usually are of short duration. Chronic effects generally occur because of long-term exposure, and the medical problem is long lasting.

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Caution must be exercised, and protective gear used, when chemicals are defined as being cancer causing agents (carcinogens), toxic, containing reproductive toxins, sensitizers, corrosives, hepatotoxins (causing liver damage), nephrotoxins (causing kidney damage), or neurotoxins (causing brain or nerve damage).

Standard uniforms are issued to all employees for daily use. Disposable suits may be issued to protect against dirt, grease, and small amounts of moisture. Rubber or neoprene rain suits may be issued for power washing work or when solvents, acids and other corrosives are being used.

It is the responsibility of all field technicians to report damaged or non-functioning Personal Protection Equipment to their Foreman or Supervisor.

All Personal Protection Equipment must be inspected and cleaned regularly.

Lesson 7: Respirators

Airborne particles are the most common hazard in the workplace, but they are also the easiest to avoid through the use of respirators. Before you can use a respirator, however, OSHA requires that employees receive a medical evaluation to insure their health will not be adversely affected by the extra effort required to breathe through a respirator. Employees will fill out a short medical questionnaire, and based on the answers, a doctor will determine if a full examination is required.

Once a doctor has approved, employees will be fitted for their respirator. An OSHA-approved fit test will be conducted before you begin using a respirator, and this fit test will be repeated at least annually. Also, before an employee can use a respirator, they must be trained on its use and maintenance.

Respiratory hazards in the Stuart Dean Company workplace are caused by solvent vapors, acid/caustic mists, and dust particles. Solvent vapors can be irritating or toxic to the body's central nervous system, liver and kidneys. These respiratory hazards can also be irritants or toxic to the lungs, causing coughing or even chemical-induced pneumonitis. Short or long term exposure to dust can cause many problems as well, including silicosis.

To protect you, respirators must be worn. Your Foreman or Supervisor will make sure you have the correct respirator for the work you are assigned. Because respirators protect you by filtering the air you breathe, it is essential that there is an air-tight fit around the mask and your face. Because of that, the only permissible facial hair is a moustache. It is essential that respirators are always in good working order and not missing parts or valves.

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Respirators do not protect against every danger. The correctly rated filter must be used so that it prevents the toxic substance from entering your body. Always use a fresh filter cartridge. If stored properly, a typical cartridge can provide approximately eight (8) hours of use. Respirators only protect the lungs, not the skin or eyes. Also, they do not protect you in an oxygen-deficient atmosphere—there is no oxygen being supplied!



Whenever a respirator is put on, it is essential to follow the specific manufacturer's recommendations. In some cases, both a positive and negative pressure fit test is required.

To conduct a positive pressure check: while wearing the respirator, close off the exhalation valve and exhale gently into the faceplate. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage or air at the seal. (The exhalation valve cover may need to be removed to conduct this test.)

To conduct a negative pressure check: while wearing the respirator, close off the inlet opening of the canister by covering it with the palm of your hand. Inhale gently so that the faceplate slightly collapses. Hold your breath for ten (10) seconds. If the faceplate remains in a slightly collapsed condition, and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

Signs of Faulty Air Purifying Respirators

Facepiece:

Dirty, pliable, damaged, cracked, tears or holes

Faceshield:

Cracks, scratches or abrasions

Straps:

Breaks, tears, or loss of elasticity

Valves:

Holes, distortion, cracks or dirt

Filter Cartridges:

Dents, damage, dirt or corrosion

Before using any respirator, always thoroughly check all connections, gaskets and valves for proper fit and tightness. Check the condition of the faceplate and all of its parts as well as all connecting air tubes and head bands. Inspect the rubber or elastomer parts for pliability and signs of wear or deterioration.

When done using a respirator, it is important to thoroughly clean and disinfect the unit. You are responsible for cleaning your respirator after every use. Remove all cartridges, canisters and filters as well as any gaskets or seals not affixed to the gear itself. Dispose of the cartridges when appropriate per manufacturer's specifications.

Then remove the elastic head band, exhalation cover, inhalation valves and the speaking diaphragm (or speaking diaphragm-exhalation assembly). Wash the facepiece and breathing tube in cleaner/sanitizer. Wash all components separately. Remove heavy soil from surfaces with a hand brush.

After cleaning, each respirator must be stored in a sealed plastic bag to protect the unit from dust, excessive moisture, damaging chemicals, and

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direct sunlight. Store the unit away from extreme temperatures. Once sealed in the bag, tag it with the date and your signature attesting to the fact that you cleaned the unit. Unused cartridges and canisters should be stored in its original sealed plastic bags.

Lesson 8: Blood Borne Pathogens

Exposure to blood or other bodily fluids carries many risks, including hepatitis, a disease of the liver. When assisting an injured person, always wear latex gloves for protection. Wash your hands after assisting, even if you wore gloves. Do not rub your eyes or nose because contaminants can enter your body.



We will review the Blood Borne Pathogens pamphlet video on the subject. Afterwards, we will take a quiz on this important life safety issue.

Lesson 9: Ladders

Using ladders may seem straightforward and simple; however significant injuries have resulted from their improper use. For example, any instability at the ground level of the ladder is magnified at the top. What this means to you is a one-inch difference in the level of the ladder's feet can mean more than six-inches of sideways movement at the top.

Remember that ladder stability depends upon it being firmly placed at ground level. Always place it on a firm, even surface, and never place the ladder on boxes, buckets, or other uneven or unstable surfaces. Never lean a ladder against a scaffold or a window pane. If you cannot reach something with the ladder on hand, get a taller one or consider using scaffolding! Or reposition the ladder to get closer.

When working on a ladder, awareness is key. Missing a step on the way down can cause you to fall. Standing up too high at the top, or leaning too far, can have equally disastrous results. (A good rule of thumb is to never let your belt buckle pass the ladder's vertical rail.)



Always inspect the ladder before use. Make sure there are no broken steps or cracks in the steps and rails. Make sure the hinges move freely and the braces lock securely. Never use a painted ladder since the paint could mask serious defects. Loose joints on a ladder can be tightened, however if the ladder is still shaky after this repair, you must remove the ladder from use and red tag it so no one else will try to use it.

Never use metal ladders or metal scaffolding near electric power lines.

A critical safety point to remember on ladders is the Three (3) Point Rule when ascending or descending. At all times you should have three points of contact with the ladder: 2 feet and 1 hand, or 1 foot and 2 hands. You should not hold things as you go up and down a ladder because it prevents you from three points of contact. Instead, have someone hand items up to you, or hand them down first.

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The physical demands of the job and potential hazards (overhead obstructions, electrical hazards, etc...) must be considered when choosing a ladder for a job. Other important considerations and safe work practices for ladders include:

1. The correct load rating (weight it can bear). These ratings are marked on the ladder's side.
2. Does the ladder look well maintained with no damaged or defective components as well as no grease or oil on the rungs?
3. Are the metal bearings of the pulleys, locks and other moving parts lubricated?
4. Ladders must be placed to prevent slippage or secured by lashing. Use ladder levelers on uneven ground.
5. Extension ladders will be placed against a supporting wall with the base of the ladder one foot away from the wall for every four feet of wall height. A 12-foot extension ladder will be 3 feet out from the wall.
6. The overlap of the top and bottom portion of an extension ladder must be at least $1/12^{\text{th}}$ of the total working height. A 12-foot extension ladder will only reach 10 feet since one-foot from the top section will overlap with one-foot from the bottom section.
7. An extension ladder must reach three (3) feet beyond an upper platform or roof if the worker plans to step off the ladder.
8. Employees cannot stand higher than the third step of an extension ladder or the second step of a step ladder. This prevents too much weight at the top causing ladder instability.
9. In high traffic areas, place barricades around the ladder to prevent someone from accidentally bumping it and causing the ladder to tip or fall.
10. Use the three (3) point rule on the ladder, and keep your belt buckle within the ladder's rails.
11. Have someone hand up items or hand them down; never carry anything up or down the ladder.

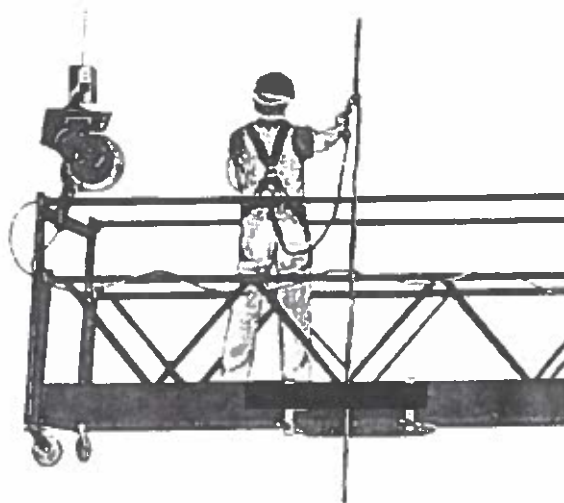
Lesson 10: Scaffolding & Swing Stages

A scaffold is a temporary platform, either supported from below or suspended from above, on which workers sit or stand when performing tasks at heights above the ground. Scaffolds are used when the work area is higher than where an extension ladder can reasonably and safely reach, or to work across a broad section of a building with more mobility than a ladder can provide.

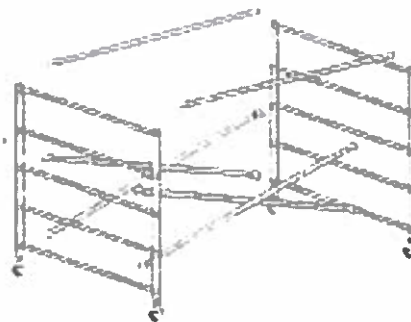
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There are several different types of scaffolding. Whichever type is used, a person fully trained in the proper assembly and use of it must be involved to evaluate the set up rig to insure it is safe to use.

Suspended scaffolds, which is sometimes referred to as a Swing Stage, is suspended from above (usually the roof) by special ropes and pulleys. Swing Stage scaffolds require specialized training. If you are required to work on a Swing Stage, your Operations Manager will arrange for that orientation and training.



Supported scaffolds are placed on the ground on a stable surface that can support the scaffold weight, the workers, and the materials being used. Stuart Dean Company uses aluminum scaffolding in either a folding style or in a frame and crossbar style which requires assembly.



Each scaffold consists of end frames, horizontal support braces, diagonal support braces, toe kicks, and a platform. Whenever the platform height is greater than four (4) feet, a guard rail system is required. You will examine specifics as we practice erecting scaffolds. If people will pass below the scaffold, toe boards must be used to prevent items from being knocked off the edge and injuring someone.

Scaffolds must be inspected every day before being used!

To prevent tip-overs of ground-supported scaffolds, it is important to understand the requirements between the base dimensions of the scaffold and the working platform

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height. We will examine specifics once we practice erecting scaffolds... For scaffolds with greater heights, the scaffold must then have outriggers attached to provide more stability to the rig. Some scaffolds have wheels—make sure they are locked before climbing.



If you are unsure about how to assemble a scaffold, or do not understand the height/base rules, **DO NOT PUT IT UP**. Get a qualified, competent person to handle the work.

We will now demonstrate how to assemble ground-supported scaffolds.

Lesson 11: Working in Elevators

Surprisingly, working inside elevator cars is dangerous.

A closed elevator has the potential of becoming what is classified as “Confined Space” due to the limited ventilation and the restricted ability of people being able to enter and exit. Vapors can quickly build up, causing an explosion and fire, loss of consciousness, or even death. However tragic events like this can be avoided through proper training and employee awareness.

The number one safety action you can take when working inside an elevator cab is to make sure the doors stay open. If you are working on the inside of the doors, never close them completely. Place a safety block between the doors. Never allow the doors to stay closed for more than two (2) minutes.

Because this is a crucial safety issue, we will spend time on the training floor looking at safe working practices in elevators.

The second action you must take is to make sure the door operation is on manual. Either put the elevator into “inspection” mode, or cut the power to the unit. Before you begin work, make sure you can manually open the doors.

When using acetone or other solvents inside an elevator and the doors must be closed, know that this can easily become an explosive situation. The only recourse is to limit the amount of opened chemical being used in the elevator, and regularly open the doors to allow fresh air to circulate. Stuart Dean company regulations require that no more than one (1) acetone towel be inside a closed elevator. No buckets, waste disposal cans, or other chemical containers should ever be inside the elevator.

As an extra safety measure, whenever an acetone towel is brought inside an elevator, a fire extinguisher must also be inside the car. A second fire extinguisher must be directly outside the elevator door.

Halogen lights may never be used in an elevator cab because they become very hot, very quickly, and inside the cab can become a source of ignition for any vapors that can occur. Using halogen lights inside an elevator cab is strictly prohibited by Stuart Dean company policy.

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Whenever possible, Stuart Dean Company is using more costly water-based strippers and lacquers for work inside elevator cabs because they produce less vapors and fumes.

As a further precaution, elevator cab work can never be performed by only one person on the job site. There must always be two employees on site. Further, only one of the two field technicians can be in the elevator cab working unless there is a third employee present.

Other safe work habits while working on elevator cabs include making sure the fire system is working and on, posting no smoking signs, and using the appropriate PPE.

In case of emergencies, and especially if a co-worker becomes trapped, immediately call 911.

Do not enter the elevators where vapors may have built up unless you can safely open the doors. If you are unsure, wait outside the elevator cab for help to arrive.

Only Ways to Use Acetone in Elevators: (Doors must be open!)

- 1. To detail strip around the buttons on the control panel*
- 2. As final wipe on surfaces prior to lacquer application*
- 3. Final wipe on inside of closed doors (minimize time door is closed)*
- 4. Only 1 towel at a time*
- 5. No chemical containers in the elevator cab*

Lesson 12: Safety Responsibilities

Every employee at Stuart Dean Company has a responsibility to safety.

Field Technicians:

1. Follow safe work practices
2. Keep job sites and work areas neat and free of debris
3. Watching for and correcting unsafe work practices
4. Report unsafe conditions and equipment to a Foreman or Supervisor

Foreman and Supervisors:

1. Ongoing employee training
2. Watching for and correcting unsafe work practices
3. Inspection of equipment and tools for unsafe conditions
4. Coordinating use of required PPE based on type of work being done
5. Insuring all scaffolding is erected and used in a safe manner
6. Responsible for any and all safety/quality issues

Final Module Questions



1. What does PPE mean?
2. What is basic PPE?
3. What are the 4 common hazards faced at Stuart Dean Company?
4. Before a new employee can use a respirator, what must occur?
5. What do respirators protect and what do they NOT protect?
6. Why must a ladder be placed on a firm, even surface?
7. What is the 3 Point Rule for ladders?
8. A 12-foot extension ladder should be placed how far from the wall?
9. At what height must a guard rail be used on a supported scaffold?
10. What is a confined space?
11. What is the maximum amount of time an elevator door can be closed when working inside?
12. How many employees can work in an elevator cab?
13. What is the minimum number of employees sent to an elevator cab job?
14. What are the 3 safety responsibilities of all employees?



Work Day Basics and Basic Shop Tour

This module will familiarize you with the daily routine activities important to productive operations at Stuart Dean Company.

For most people, the first day on a new job brings an amount of uncertainty. It's only natural. Some can feel intimidated by the new environment, and some feel off balance simply because they are unfamiliar with the routines of the new job. The purpose of this section is to make new employees, (as well as seasoned veterans), feel as comfortable as possible as they go through their work day, and to help them avoid problems and costly mistakes.

While each Division Office is physically set up different, every facility has the same components. Once back at your own Shop, orient yourself to the surroundings based on our discussions today.

Lesson 13: Work Day Overview

We will take a moment now to tour this facility. Areas you need to be familiar with include: the stockroom and supplies area, the first aid and eye wash stations, the acetone drums, safety cans, and waste disposal areas.

Back at your own location, have your Foreman show you where the employee mail slots are located along with the schedule board and company bulletin boards. Also ask him to show you the location of the restrooms, personnel office, Supervisor's desk, the Operations Manager's desk, and where you will pick up your paycheck, if applicable.



One of the most important parts of your orientation will be when you are introduced to your fellow workers. They will be instrumental in your acclimation to your new job. Our goal is to make you comfortable and confident in a short period of time. You need to become a team member quickly, and your familiarity with the company will expedite this transition.

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Starting the Day

Each Division Office has a different way to start the day. Some call in the night before to find out their work assignments. Some place the workorders in employee work slots. Others have the Foreman or Supervisor personally hand out the day's work. It is your responsibility to know the start time of your shift.



In any case, if you're unfamiliar with the task, or have questions, this is the time to get clarification. Most importantly, ask what tasks are expected to be completed during the shift, and in what order they must be performed.

Arrival at the Job Site

When you arrive at the job site, you will help the Foreman and other technicians properly set up the job. This involves taking materials and equipment from the truck, bringing it into the building, and arranging the items to allow for safe and efficient work flow.

Typically your Foreman will need to meet with Security to gain access to the building where you are working. Don't forget to bring your identification badge since you need to show it when you sign in at the work site. If there is a problem gaining access to the building (like no one shows up to open the door), immediately contact your Supervisor or Operations Manager.

Masking

Almost every work task performed at Stuart Dean Company involves masking the area before work can begin. We will go into much more detail later in Module 4; however it is important that we protect the surrounding work area from damage while we do our restoration work. This applies to all Stuart Dean projects.

Typically we will use masking tape, paper, and sometimes other items, to protect the surrounding area. Be careful to protect such things as wallpaper, carpets and planters from being splashed with chemicals, debris or overspray.



An example of proper masking.

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Restoration and Maintenance

That is the type of work we do at Stuart Dean Company—we restore building facades and building features to their original texture and brilliance, or we provide ongoing maintenance to keep that appearance from fading.

After the masking is completed, you and your team members will perform the refinishing work. We will examine specific techniques in Module 5. You are joining a team that takes great pride in its workmanship, efficiency and customer satisfaction.

Clean Up

After your shift ends, it is essential to clean up the job site—even if the work is not complete. It is our responsibility, not the building's maintenance department. Our customers expect us to leave the building looking neat, clean and orderly.

Pack up all used towels and empty chemical containers. Make sure all unused materials are tightly sealed in their containers. Remove all masking tape and paper as well as any other trash items. Trash is to be taken with you and not left at the building, unless your Foreman directs you to leave it there. Make sure no hazardous materials is left at the work site.

Time Sheets

Most offices require you to punch in and out on a timeclock, however you will also be required to complete a time sheet. Important information captured here includes the date, your job number (located on the workorder) and the number of hours you worked on the project. Time sheets must be updated daily, signed and turned in weekly so your paycheck can be processed. Some Divisions require a daily call-in to convey this information

It is your responsibility to fill in the time sheets correctly. Fill them in daily since it will be easier to remember the right information, especially if you are at multiple job sites during a week.

Return to the Shop

Once the job site is cleaned up, and the truck loaded, it's back to the shop. However, the day is not over with the truck ride. While the Foreman completes paperwork, you will need to unload the truck.

That means removing all of the trash and disposing of it in the proper receptacles. Soiled towels must be placed in the safety cans or designated areas. All chemicals must be returned to storage. Finally, check out the van to make sure it is neat, clean, and ready for use by the next shift.

Lesson 14: Understanding Instructions

Communication is a two-way activity, and therefore it is a two-way responsibility. This concept is important to understand, especially when you are learning a new job. There will be times when instructions may be unclear to you, however the instructor may not realize that.

The problem arises from familiarity. The instructor has become very accustomed to the technical terms and processes, and sometimes makes the assumption that everyone has this background and



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knowledge. While the Foreman and Supervisor need to provide clear instructions, it is your responsibility to ask questions when you do not understand.

Verbal Instructions

Sometimes what you say and what you think you say are two entirely different things. Because of that, it is very important to clarify expectations. The best way to do this is after receiving instructions from your Foreman or Supervisor, repeat back to them the task you have been assigned. A good response can begin with: "So what you want me to do is (repeat instructions), Is that right?"

Remember, if you are unclear of what is expected of you, especially now during your training and probation period, ask for clarification. That way, you can be sure you are doing the right thing, the right way, at the right time.

If language is a problem, find someone who can relate the information to you in your natural language. Never make an assumption on the expectations of a job or activity.

Reviewing the Workorder

A workorder is the authorization to complete a maintenance or restoration activity. It will include the customer's name, address, contact names, and details of the work required. Some workorders are for small jobs that can be completed in a day or less, while others are for projects that could last months.



Your Foreman or Supervisor will review with you each workorder assigned and indicate how much of the work should be completed by the end of your shift. If in doubt about the day's expectations, make sure you ask for clarification.

It is extremely important for you to look on the workorder for a listing of any special equipment or materials specified for the planned work. If so, make sure your truck is correctly loaded with these special items before leaving for the job site.

Let's review a few workorders now to get you familiar with them.

Lesson 15: Truck Set Up

There is no easy way to explain how a truck should be loaded, so let's spend some time in the Shop actually looking at a properly loaded vehicle.

As part of this review, you will be shown all of the commonly used chemicals and tools. You will be able to put a name to each of them as a way to become more familiar with your new position and responsibilities.



Replenishing supplies also has various rules. Some supplies are replaced as needed by using a requisition slip, while others are replaced when the damaged or broken original is turned back in. Some items are replaced daily, weekly, and monthly. We will review this as well.

Finally, where chemicals and equipment are stored in the truck is important-not only for efficiency but also for safety. We will review proper storage and placement.

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Lesson 16: Work Site Set Up

Upon arrival at the work site, report in to the building's security person or point of contact. They will let you know of any special work rules, like where to park, which door to use to enter the building, signing in requirements, etc... Because each work location will have different rules, checking in should always be the first task. This allows you and the rest of your Stuart Dean Company team to minimize disruption to our customer's business.

Once you have located the work area, place down your tarp or drop cloth on the floor near your work area. All chemicals should be placed there, and any transfer of materials from one container to another should also occur on the tarp. This prevents damage to existing flooring and keeps the area neat. The tarp should also be used to place all tools, buckets, and materials related to the work.

Some Division offices use tarps that have markings to indicate where key tools and materials must be located. We will now review an example of such a tarp.



An example of using the tarp for your work site setup.

Smoke Alarms

Before starting to open chemical containers, check the work area for smoke detectors. Many of them will go off if they detect particulate matter or vapor. The smoke alarms may need to be temporarily disabled, so notify site security to the fact that you will be spraying and using chemicals so they can have the alarms disabled.

At the end of your shift, make sure to let security know you are done so they can rearm the detectors.

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Standard operating policy is to require the customer themselves to take the detectors off-line while work is being done. Consult with your Foreman or Supervisor for specifics!

Job Site Hazards

The final step in setting up the job site is to review the area to identify any hazardous conditions which could affect your safety or cause a fire or explosion in the building. Are there other trades working near you? If so, are they using special chemicals? Will their equipment cause a spark to ignite the vapors from your chemicals?

Next examine the work area. Is the floor even or is it full of trip hazards? Watch for water on the floor that could cause electrical shocks. Are the extension cords damaged? Inspect any scaffolding being used. Finally, note where all fire alarms and fire exits are located. The start of an emergency situation is not the time to begin looking for safe harbor.

You must be totally aware of your surroundings and responsible for your work and actions at all times. Remember, safety is everything.

Lesson 17: Work Site Break Down

Believe it or not, the end of the day is a common time to have an accident. Workers are looking forward to getting home, they may be tired, and they may not be fully engaged in thinking about their activities. Enough cannot be said about letting your guard down at this point in the day. Continue to work and be safe!

Evaluation

Before breaking down a work site, take a moment to evaluate the work you have just completed. Check your quality and look for missed areas, inconsistent application, etc. It is easier and more efficient to re-spray part of a job while the masking is in place and the equipment is out than it is to notice it after the job site has been cleaned up.

Break Down

Once you are sure the work meets your high quality standards, remove the masking tape and dispose of it properly. Next clean the equipment to make sure it is ready for the next crew's immediate use. Wrap all extension cords neatly so they can be easily unwound the next day.

Secure the lids to all chemical containers and move all soiled towels into the proper receptacles. Do a final site walk-through, looking for missed tape and paper debris, unnoticed spills, and the general cleanliness of the area.

Reload the work cart, placing items in such a way as to prevent them falling or shifting around. No one likes to discover damaged equipment or tools as they begin a work shift. If damage did occur during the work shift, make sure to notify your Foreman or Supervisor so repairs or replacement can be done back at the shop.

At the truck, make sure all materials and tools are secured into their proper place. If scaffolding or ladders were used, double check to make sure they are safely tied down.

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The only sign of Stuart Dean Company having been at the location should be the quality and appearance of our work. Leave the work site in better condition than what you found it in.

If you notice any damage, report it to your Foreman or Supervisor immediately so they can notify the building's representative. Be proactive here. Problems occur, but hiding problems makes it worse.

When the truck is loaded double check the work-site for cleanliness, fill out the project work-report ticket, and where applicable, have this slip signed by the customer before you leave the work site (either on-duty security personnel or the customer's authorized person). Each Division office has a specific version.

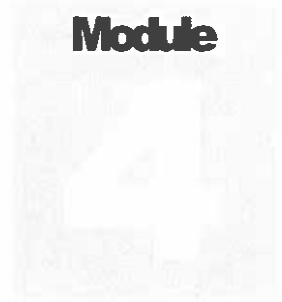
Lesson 18: Back at the Shop

Every Division office has procedures for end of day. All have these basics in common: safely dispose of waste chemicals and soiled towels; replenish used chemicals and repair/replace any damaged equipment or tools; turn in end of project paperwork; again review the condition of the truck so the next crew can use it without delay, and punch out, and fill out a nightly work report.

Module 3: Questions



1. What are some of the different ways an employee will be notified about their next day work assignment?
2. At a job site, how do you gain access to the work area?
3. What does almost every type of job at Stuart Dean Company have in common?
4. What are the two main types of work done by Stuart Dean Company?
5. If instructions are not understood, what should you do?
6. How can you be sure you understood instructions for a job?
7. Before leaving a job site, what should be done?
8. Before leaving the shop at the end of the day, what should be done?



Metal Restoration and Maintenance

This module will introduce you to the different types of metal surfaces worked on at Stuart Dean Company.

Metal finishes come in a variety of types, textures and finishes. Each has different characteristics that affect how it can be cleaned, what chemicals can be used without damaging the finish, and what techniques must be used to achieve spectacular results. In this module, we will look at the telltale signs used to distinguish one piece of metal from another. We will also review the basic maintenance techniques associated with each type.

While this training will provide an initial introduction and some hands-on practice, you will continue to learn through on-the-job exposure to actual work situations. Your Foreman and fellow crew members will become your teachers, and this one-on-one training will help you to become a quality technician with Stuart Dean Company.

Lesson 20: Different Metal Types

Most of the metal surfaces worked on by Stuart Dean Company technicians consist of uniform patterns of scratches, usually referred to as grain. If these scratches are all the same size and going in the same direction, light is reflected evenly off the panel and it will look good. However if the scratches are different in size or go in different directions, light reflects off the panel unevenly and gives the surface light and dark patches.



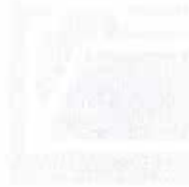
Mirror and satin finishes are almost identical in characteristics except for grain size. Satin's grain is relatively large, while mirror's grain is quite small. As the grain becomes finer, less light is scattered as it is reflected from the surface so the finish appears much darker. Both also reflect light differently depending on point of view. Panels with horizontal grains look lighter than panels with vertical grains.

These characteristics of grain are not very noticeable to the untrained eye, however they have a huge importance to you because it affects cleaning technique and how the finished product will look. Your goal will to end up with uniform grain extending

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perfectly straight from edge to edge. This is impossible to achieve in the field, but you can get close by working carefully.

Also remember that after polishing is completed and the metal receives a protective coating, the grain pattern will be very noticeable.



Even though a sales person will have reviewed the requirements for a job through the creation of a work order, and your Foreman and fellow crew members will have also done the same as they loaded the truck with the necessary tools and chemicals, remember that mistakes do happen.

Always take a few moments on the job site itself to review the metal. Is it the same type as indicated on the workorder? Costly mistakes can be avoided by asking yourself that simple question. Applying the wrong chemicals, or using the wrong tools, can lead to disaster.

What follows is a review of the commonly worked metals and their finishes.

Architectural Brass Alloys

Also known by the names of bronze, Architectural Bronze, brass, or Muntz Metal. These are alloys of copper and tin ranging from a golden yellow to red in color. When exposed to atmospheric conditions and pollution, it oxidizes into a reddish brown, black and/or green color combination.

Bronze is found in various finishes, including satin, mirror, oxidized, patina, and plated.

Copper

This metal is usually found on roofs or as decorative ornamental trim. It is orange/red when clean and turns brown, black and/or green when oxidized. Typically copper is found in satin, oxidized, or patina finishes. Rarely will you find a mirror copper finish.

Monel Metal

Commonly known as nickel, nickel silver, or Alloy 400, monel is a “white” or silver-colored metal that is an alloy of nickel and copper. It’s usually found in older buildings, typically those built between 1900 and 1940, used as a decorative feature of roofs.

Typical finishes found are satin, and occasionally mirror.

Stainless Steel

Iron, carbon and chromium are combined to produce stainless steel, and it is this alloy’s combination (especially the high percentage of chromium) which allows this metal to resist corrosion. Contamination with regular steel or chloride salts cause rust.

Three typical finishes for stainless steel are satin, mirror and non-directional. Rarely will you find an oxidized mirror finish.

Aluminum

This soft, non-magnetic, non-sparking, white metal is also known as Duranodic or anodized aluminum. When used in architectural applications, it is almost always anodized, which means it has a thicker oxide coating that protects the metal from further oxidation. An anodic coating applied which is done by a chemical process.

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This coating adds to the thickness of oxide layer for architectural uses. This thicker oxide coating ranges from 0.000225" to .0007" in total depth. It is an extremely thin but a resilient coating.

Satin Finish

Typically referred to as a #4 or #6 satin finish. (This actually refers to specifications for stainless steel, and bronze finishes are labeled with M-) as a Burnished Finish (or #4), metals with a satin finish will have a uniform pattern of applied parallel scratches between 80 and 220 grit sand paper with #6 finish with a final abrasive application of non-woven nylon pad that softens the appearance.

Mirror Finish

This finish is achieved by placing into the metal a uniform pattern of parallel scratches that are between 1500 and 4000 grit, and is created by repeated sandings with finer and finer abrasives before being polished with compounds using a buffing wheel.

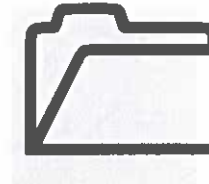
Mirror finishes are sometimes known as Number 8, Super 8, or Number 9. The Super 8 finish is achieved by using polishing machines and shows no visible grain.

Non-Directional Finishes

Differing from a satin finish, non-directional finishes have patterns of non-parallel scratches or marks which scatter light in a multi-directional way. These textures are commonly known as: random grained, angel haired, distressed, anti-graffiti, casted or bead blasted.

Oxidized Finishes

Sometimes this finish is also called Statuary Bronze (light, medium or dark color), US10B (Oil Rubbed), Antique (2-tone), or Patina. In all cases it is a chemically applied finish which gives the surface of the metal an aged appearance. If the oxide coating is thick enough, it is generally called Patina.



Painted Finishes

As the name implies, this is metal which is covered with a pigmented (colored) paint or coating system consisting of a primer and a topcoat. There are multiple types of coating systems, Stuart Dean uses the field applied applications known as Air Dried System (ADS), Catalized or Aromatic (moisture cured) applications.

Electroplated Finishes

Also known as chromed or plated, an electroplated finish is usually found on handrails, signs and sometimes on hardware. It is typically one metal coated with another metal. Usually brass is plated with nickel or chrome, which to the casual eye will look like stainless steel or monel. Door handles and signs are sometimes steel alloy coated with brass plating. (Holding a magnet to the surface is a simple way to detect if the item has been plated; a magnet will not stick to a non-ferrous item.)

Applied Design

This is a combination of finishes applied to surfaces with stencils or masking tape.

Lesson 17: Masking

Masking is the process Stuart Dean Company uses to protect the surfaces surrounding our work area. The solvents, abrasives and coatings used during almost every task done requires masking because all can damage wood, carpets, or most other commonly used building materials. Masking always involves taping paper or plastic next to the surface being refinished.

Depending on the surface being protected, there are a few variations in how we apply the masking tape and the adhesives that are used.

To maximize productive use of your time in actually doing the refinishing or maintenance work, you must learn to mask as efficiently as possible. This requires speed, accuracy, and planning. Look at the area to be protected and determine the number and sequence of operations. Make sure you cut the paper long enough because it is very time consuming to go back and add extra paper and masking into the gaps.

Masking Example: Elevator Entry

To demonstrate the process of masking an area, we will use as an example the need to mask the area around an entryway into an elevator. The walls surrounding it are marble, but the work will be only on the exterior side of the doors. In order to protect this area, we will need four (4) or more pieces of paper and enough masking tape to securely fasten it to the marble.

First, have the security guard or building engineer disable or use the on/off key to shut down the power on the elevator. Place a short ladder in front of the elevator, close enough to the edge you will be masking. Cut a length of paper one to two feet longer than the height of the elevator frame. Take a roll of 3/4-inch masking tape and free up from the roll about 2-inches of tape.

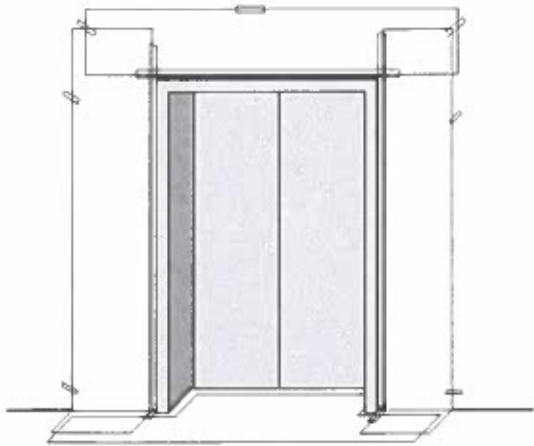
Hold the paper from the top, and with the roll of tape in your other hand, place the paper against the wall and position it so that at least 6-inches extends past the top of the frame. The edge of the paper must be away from the edge of the door approximately half the width of the tape.

Steer the lower part of the paper with the toe of your shoe so the gap between the paper and the frame is even. Now, starting at the top, apply the tape to the edge of the paper making sure the edge of the tape is exactly even with the frame of the door.

Unroll the tape another 2 to 3 feet and steer the tape with your roll hand along the edge of the frame. Use your other hand to press the tape down. When there is only 6-inches of free tape left, unroll another 2 to 3 feet and repeat the process until the entire edge is secured.

Now take a few short pieces of tape, and secure the other edges so the paper is flat against the surface.

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Repeat the process for the other vertical side.

Overhead horizontal areas are best masked with a pre-taped piece of paper. Cut the paper to the correct length (allowing enough overlap) and place it against a piece of glass or on a clean floor. Apply the tape, allowing one-half of its width to affix to the paper.

Gently pull it off the surface and hold it along the tape, sticky side away from you, with one hand at the end and one hand near the middle. Carefully climb your step ladder and place one end into position even with the metal's edge. Press it down and move your hand along the tape, positioning and applying pressure along the edge. Secure the rest of the paper with a few pieces of tape.

For the floor, cut the paper at least 2-feet longer than the frame is wide. Lay it on the floor in front of the elevator and mark where the frame ends. Make two cuts into the paper about 1/2-inch inside the frame marks, to the depth of the frame. Fold the paper outside these cuts and then slide everything forward. Tape down securely.

Now take the 1 1/2-inch tape and retape along the edge by the frame. This will strengthen the paper/tape joint and provide more protection from water, solvents or abrasives.

Masking Other Surfaces

When taping over a painted surface, the biggest problem is keeping the tape from being too tacky. The easiest way to reduce tackiness is to run the tacky side of the masking tape across your pants leg. Place your paper up on the painted surface using some regular tape strips to hold it in place. Then use your "treated" tape along the paper's edge. Doing this reduces the likelihood of pulling off paint when removing the masking tape. Certain surfaces will require the use of a different adhesive-backed masking.

Lacquered surfaces also offer challenges because it can soak through the paper and actually bind the paper to the surface. To prevent this problem, use 1 1/2-inch tape and run several rows of it along the edges to create approximately 4 to 6 inches of tape. This will prevent the gluing problem.

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Window protection requires folded paper. Measure your paper longer than the size of the window frame, place it inside the window sill and tape one corner down. At the other end, fold back the paper to allow 1/2-inch of taping space. Affix the masking tape. Do not try to cut it!

Removing the Masking

Demasking should be done by pulling the paper and tape off together at a sharp angle to the surface as shown below. Pulling away from, and not across, the freshly applied lacquer or paint will help avoid pulling the coating off the surface. Double the tape back on itself as you pull to avoid having it flop back onto a finished surface and damaging your work.

Lesson 21: Basic Cleaning Techniques

No matter what the job is, or the type of metal worked on, almost every metal restoration project consists of similar tricks of the trade. Some of these similar underlying concepts include:

1. Always use the right amount of material and chemicals for the job. Don't waste.
2. Do not over clean or under clean.
3. Each step in the process is the building block for the next one performed. Do not cut corners because a well-done step makes the next one easier!

Basic Metal Restoration Steps

*Protect all adjacent
surfaces*

*Remove any protective
coatings*

*Perform the cleaning or
restorative work*

*Apply a protective
coating*

4. Folding your towel to maximize its usage is an art. Fold it in half three (3) times. This gives you 8 towel surfaces and allows you to clean the largest amount of surface without wasting clean towel.

5. Here's the towel use process. Wipe, flip the towel over and wipe. Refold the towel inside out, wipe, flip the towel over and wipe. Now unfold twice and refold so the four used sides are on the inside. Repeat.

6. Keep your arm motions straight and pressure uniform across the entire surface.

7. Do the edges and corners before the center.

8. Overlap the work areas.

Lesson 22: Removing Coatings

With the exception of simple washing, all metal restoration processes involve first removing the existing coating from the surface. Because of that, chemicals will be necessary and subsequently, all of the safety training from the previous module must

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come into play. Know the characteristics of the chemicals you are using, have the correct Personal Protective Equipment on hand, and use the proper tools to do the work.

It is essential to avoid collateral damage to surrounding surfaces. Acetone and paint removers do a great job of removing finishes from painted surfaces, but it also can damage plastic and other materials. If damage occurs on nearby surfaces, it doesn't matter how well your completed restoration job looks. The customer won't care because of the costly problem carelessness has caused.

Common areas that can get damaged include elevator buttons, plastic screens, lacquered or painted surfaces next to the work area, and waxed or coated floors. To minimize your risk, keep excessive amounts of acetone or paint removers off the masking edge to prevent it from soaking through. Use a slightly drier towel near the edges to prevent solution from wicking under the masking tape. Also, examine the tape before working in a given area to insure it is still firmly affixed to the surface it is protecting.

Removing coatings is a two-step process. First you must break down the coating using solvents, and then you must remove the now liquid coating from the surface. To do this quickly, accurately and efficiently, work the panel as wet as possible without dripping.

Once the coating is loosened, wipe it up using dry towels, turning to a clean surface after each wipe as noted in an earlier lesson. Work from one end of a panel to another to avoid recontamination of the clean panel as you work. Acetone evaporates quickly so work fast and pay attention to the wetness of your towel. Do not rewet towels once they have a lacquer residue since doing this will contaminate the acetone.

Water-based finish removers are less flammable and toxic than traditional solvent based removers. They are slower at breaking down coatings, so a longer dwell time is required. Dwell time is how long a chemical must cover a surface before it breaks down the finish and emulsifies it. (turns into a liquid)

Lesson 23: Cleaning Bronze

Bronze is a metal that tarnishes, with oxidation showing as a slight discoloration at its mildest form all the way up to a thick black or green crust (called patina) at its most severe form. If the oxidation is light, scrubbing with wet towel and pumice or a wet acrylic pad may be all the cleaning required. However, for great amounts of tarnish, acids must be used to remove the oxidation. If acid is used, recleaning is required.



Before beginning to work on bronze, remove all wax and tape residue since this can prevent complete oxidation removal. Repair all scratches before cleaning. Most bronze has a protective coating. This must be removed and restored as part of the process.

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Once the panel has been cleaned, confirm the scratches have been removed and that the grain is parallel if a #6 finish. Go over metal with a dry acrylic pad to brighten and smooth the grain. Use long, straight strokes. Follow this work with a wipe down with a towel slightly damp with either water or acetone to remove any remaining dust. Do not touch the panel with bare hands after cleaning since this will oxidize the cleaner.

Typically you will encounter three (3) types of bronze: mirror-finish, satin, and oxidized. Each is cleaned using the same techniques, however the chemicals used differs. You will practice cleaning all three types of bronze as part of your training.

Mirror-finished bronze is cleaned first by the application of a polishing compound and then by either mechanical or hand polishing. Satin-finish bronze is cleaned using either water and pumice (for lightly oxidized conditions) or an acid bath (for heavily oxidized conditions where black and green crusts exist) and an acrylic pad. Oxidized bronze is cleaned just as satin-finished bronze, however because it will have heavy oxidation (or patina), it will require an acid scrub followed by a neutralizing scrub.

Typical Polishing Errors

Simple technique can dramatically affect polishing results, with the most common being not polishing in straight lines. This is caused by curves or angled arm movements while polishing. Remember to keep your arms straight!

Stop marks occur when there is any side-to-side movement or change of angle at the end of a stroke. This results in a visible line that will change reflective light.

Lack of concentration on a polishing project can cause uneven pressure. This results in larger scratches from heavier pressure or smaller scratches from lighter pressure. This difference in scratch size will cause poor quality workmanship.

Poorly spread polish will show up as darker shades of yellow on the metal. This occurs because oxidation has not been fully removed.

Typical Polishing Errors

*Not polishing
in straight lines*

Stop marks

Uneven pressure

Poorly spread polish

*Machine marks
not polished out*

While machine polishing can be an efficient way to complete a large polishing project, it also has the ability to do just the opposite if your technique is poor and machine marks are created. These often take more than a simple hand polish to remove. Even pressure and proper movements will prevent this problem.

Good Polishing Techniques

When doing any refinishing, the best advice is to carefully control how you move over the surface. For vertical surfaces, keep your wrist, elbow and shoulder in a single plane perpendicular to the surface as much as possible because this forces your hand to move in a straight line.

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Work to maintain a perfectly straight stroke as you move up. On the downward movement, lighten up slightly as you move the pad over a little bit during the entire down stroke. This results in the most even, straight appearance.

To minimize stop marks, lighten up pressure at the top and bottom of your strokes.

When working on horizontal panels, move your body side-to-side to help keep your hand moving in a straight line. Do not over-reach. Work from one edge of the panel to the other so there is no break in the grain lines.

Polishing corners and inside edges can be challenging. In most cases you will work these areas by wrapping a towel around a scraper. However, this technique concentrates a large amount of force into a much smaller area, so extra care must be taken. Lighten up on the pressure to avoid heavier grain marks. Use a flexible scraper and polish with the flat face of the tool, not just the front edge. When pulling the scraper and towel away from the surface, lighten up on the pressure as you pull away from the corner. This helps avoid stop marks.

To avoid finger marks, do not press too hard, make sure the polishing pad is thick enough, and hold your fingers at an angle as you polish.

Always polish the edges before the center. This allows for any stop marks created from the short-stroke edge work to be removed by the longer strokes usually performed in the middle of the panel.

When polishing overhead panels, it is often necessary to use a towel-wrapped board that extends from one end of the panel to the other. This is important because overhead panels easily and clearly show every variation of grain.

Lesson 24: Cleaning Stainless-Steel

Stainless steel will be encountered in varieties, satin-finish, non-directional and mirror-finish.

Satin-finish stainless steel is similar in characteristics to satin bronze, however instead of being coated with lacquer, it is usually coated with oil. A solvent wipe is a good idea before cleaning starts. The entire cleaning process will be quicker for stainless steel than bronze because it rarely oxidizes. If staining exists, oxalic acid in the cleaning water will brighten the shine.



Mirror-finish stainless steel also shares similar characteristics with mirrored-bronze. The major difference is to avoid using abrasive cleaners on mirror-finish stainless steel. Instead use parrot powder or other non-abrasive polishes. Polishes like Noxon or Bright Boy are very abrasive and can cause visible damage to mirror-finish stainless steel.

Mirror-finish stainless steel is rarely coated. Only a final solvent wipe is needed.

Lesson 25: Cleaning Anodized Aluminum

Working on anodized aluminum is similar metals as satin bronze or steel because the techniques used are very similar. The main difference, though, is the need to preserve the coating.



to working on such materials and difference, though, is

Anodizing is an electrical process that applies a protective film to aluminum. Heavy scrubbing will ruin that protection, therefore light surface scrubbing to remove dirt is all that can be done. Or it can be painted with a pigmented coating. Many aluminum projects can also receive a wipe-on clear lacquer coating.

Aluminum is grained and then anodized.

Sometimes aluminum may have white, powdery oxide present on the surface. This is due to the anodizing process and can be cleaned with a wet towel and pumice or a wet towel. Never use pumice and an acrylic pad together, sometimes sandpaper is needed but should only be used with extreme caution, since both processes are too aggressive and will create scratches and marks.

Do a final clean with acetone and clean towel.

Once clean, the wipe-on clear lacquer will be applied. Wet a towel with wipe-on and wring out the excess. If the towel is too dry, you will not get full coverage in one wipe. If the towel is too wet, you will get runs or sags in the coating. Proceed in a logical manner, wiping inside corners and sides first, and front faces last to insure the faces have the smoothest coat.

For narrow frames, wipe the ends of the frame first. Then start at one end and wipe the entire length in a smooth, unbroken motion. As you approach the end where you already coated, pull the towel off the surface quickly without stopping, like an airplane taking off.

Large panels require the use of wands or boards covered with towels to cover the entire width in one pass.

Lesson 26: Cleaning Painted Surfaces



Two reasons exist to clean painted surfaces. The first is simply to improve its appearance by removing as much dirt as possible while the second is to prepare the surface for repainting. The difference between the two reasons determines the method and degree of cleaning performed.

In either case, the paint must be checked for lead content before any work is done. A qualified outside evaluator will conduct a test for lead.

When cleaning painted surfaces, use non-abrasive materials and a solvent that will not strip the paint. Your goal is to remove the dirt without affecting the finish by removing as little paint as possible. Wet the surface enough to emulsify the dirt and

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oxidation (allowing the dirt to loosen and become suspended in the liquid cleaning agent). Gently scrub off stubborn areas. Wipe down with clean water. A more accurate way to clean the metal is to wash in the direction of the longest dimension. This will lessen the possibility of enhancing possible surface scratches. On larger panels that cannot be cleaned seam-to-seam or difficult to access, use a circular motion to prevent streaking.

If the cleaning is being done in preparation for repainting, use an abrasive pad with the cleaning solution. This will roughen up the surface of the paint to allow the new coating a better surface that will give a better adhesion upon application. Be careful not to scrub through the primer. Any areas of loose or flaking paint must be removed with a scraper. Rinse. Again, abrading the surface in the direction of the longest surface dimension for mullions and frames, and the use of a random orbital sander on panels and larger surfaces.

Once dry, you may need to do a final wipe with a solvent to prepare the surface for the finish to be applied. Your Foreman will advise if this last step is required.

Lesson 27: Wash and Wax



Wax is designed to protect a surface's finish from dirt and scratches. It helps keep a surface looking good for longer periods of time. Clean the surface with cleaners appropriate to the surface. Once dry, you will be working to apply a thin coat of wax to the entire surface. Thin is significantly better than thick!

Place small amounts of wax on a towel, and spread it evenly across the surface. As you work, notice how the surface sheen becomes dull. This is normal and that change in appearance will help you gauge how well you are applying the wax.

Once the wax dries, use a towel to buff it out. Wash and wax in the direction of the metals grain. Notice the dull changes to a nice sheen!

Module 4: Questions



1. What do most metal surfaces contain?
2. What is the major difference between a mirror finish and satin finish?
3. Explain the difference in appearance between panels with horizontal grain versus those with vertical grain.
4. How many times should a towel be folded to allow for maximum use?
5. When removing coatings, what are some of the common items that could be damaged during the process?
6. What is dwell time?
7. What are the three (3) types of bronze metal finishes usually encountered for cleaning?
8. Which type of bronze is cleaned with water and pumice?
9. Why must polishing be done in straight lines?
10. How many varieties of stainless steel finishes are there and what are they?
11. What is anodized aluminum?
12. What are two reasons to wash a painted surface?

EXHIBIT D



STUART DEAN COMPANY, INC.

CORPORATE HEALTH AND SAFETY PLAN

**SITE SPECIFIC FOR
METAL, STONE, WOOD and GLASS
RESTORATION**



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SECTION ONE – GENERAL INFORMATION

1.0 PROGRAM POLICY STATEMENT:

Stuart Dean Company is dedicated to a pro-active and behavior-based approach to health and safety. We care about our employees' well-being and that of others working around us. It is Stuart Dean's policy to provide our employees with a safe working environment through training and reinforced supervision.

Our safety policy consists of the following points:

- Management is responsible and accountable for safety.
- Employees will be trained to work safely.
- Audits by management (both site and senior) will be continuously performed to assure safe work habits and practices.
- Corporate objectives will be developed to measure the degree of success and hold management accountable for these results.
- An incentive program will be developed to encourage and promote positive safety attitudes throughout the company.

Stuart Dean's Safety Management Philosophy is one that recognizes both the financial and moral costs associated with safe work practices and the resultant impact due to injuries and accidents. Our goal is to continuously improve safe work practices and reduce workplace physical and chemical hazards. We have established and promoted the concept that safety is a well thought out cost- effective program woven into a total management system. In order to achieve any level of success, we demand participation from every employee within the company.

The strength of our program is that all employees are charged with ensuring the workplace is safe and understand that we have a **ZERO TOLERANCE** to unsafe practices and shortcuts. The previously mentioned program policy statement is a mandate at every project and at every level. Safety management within the company not only provides resources and tools to achieve success but management at the highest level perpetuates the program and "*takes ownership*" to ensure that safety is an equal part of production, quality and schedule.

Stuart Dean's safety policies and procedures will, as always, meet or exceed the **Occupational Safety and Health Administration-OSHA 29 CFR 1910 General Industry Standards / Regulation and the 29 CFR 1926 Construction Industry Standards / Regulations**, as well as local, state, and federal Environmental Standards/Regulation requirements.



1.1 Employer Responsibilities:

At the Stuart Dean Company; we believe that our employees are the source of our strength. We strive to provide a workplace free from recognized hazards or to eliminate any hazard that is likely to cause death or serious physical harm.

The safety and well-being of our employees is vital to the continuous process of improvement. Therefore, we will provide continuous training programs, both in-house and in conjunction with our clients and vendors, as well as incentive and recognition programs, to assure that Stuart Dean continues to set a standard of excellence.

Stuart Dean will- at-all times, provide a work force that is fully trained in state-of-the-art Restoration Practices and be sensitive to environmental and hazardous material handling concerns. Teamwork is a hallmark of the Stuart Dean family, and each employee will be respectful of each other, the clients, and the public with whom they come in contact.

1.2 Employee Responsibilities:

Stuart Dean Company, Employees must always be mindful of the welfare of our clients and facilities, the public at large, co-workers and, of course, themselves. What this means; all employees must have strict adherence to the OSHA regulations and state and local codes that govern our discipline.

Employees are expected to comply with the requirements of this Health and Safety Plan, report all accidents immediately to their supervisors, read the Federal OSHA poster at their facility, follow company policies regarding the use and handling of chemicals, adhere to the company respiratory protection and personal protective equipment (PPE) programs, and report hazardous conditions to their supervisor.

1.3 Disciplinary Action Policy:

Stuart Dean reserves the right to impose a **ZERO TOLERANCE** policy towards accidents and harmful incidents which may be caused by employee negligence and/or disregard for the directives of this **Health and Safety Plan /HASP** and/or **OSHA** regulations, and blatant safety and health violations. The Site Supervisor is responsible for enforcing the disciplinary policy.

Accordingly, a ZERO TOLERANCE policy is in effect and violators will be subject to the following disciplinary actions:

- **First offense, a verbal warning**
- **Second offense, a written warning**
- **Third offense, three (3) days suspension from work without pay**
- **Fourth offense, termination**



An employee may be terminated at any time if, through blatant disregard of safety & health policies, he/she creates an IDLH (Immediately Dangerous to Life and Health) situation, placing his life and/or those of his co-workers and/or members of the public in jeopardy.

Step 1: Supervisor or other party observes unsafe action or behavior

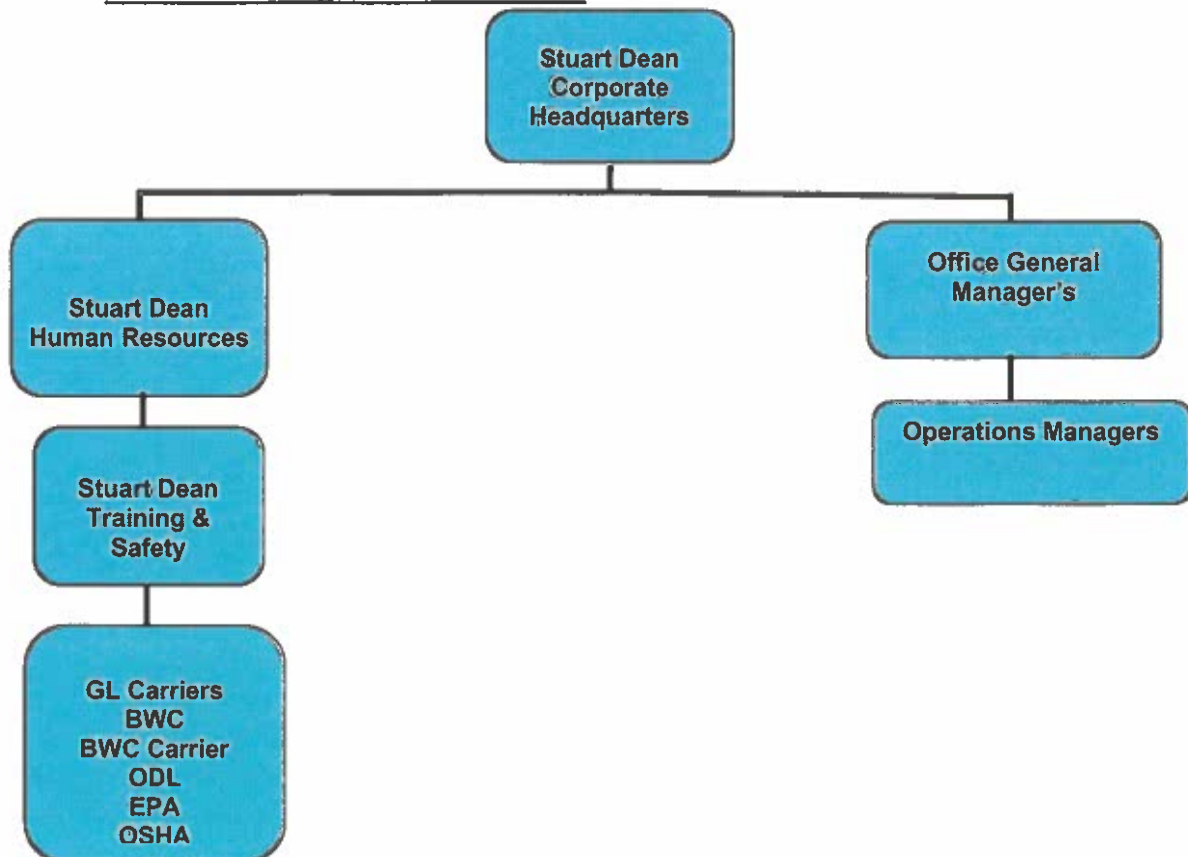
Step 2: Supervisor confronts employee and explains what was observed

Step 3: Supervisor records event and issues a verbal warning unless a Zero Tolerance Event has occurred.

Step 4: Retraining or possible dismissal depending on the event.

Union Location Note- CBA Language/ Direction will be the guidance for the above Policy, where applicable. Contact Human Resources/ Corporate with any questions.

1.4 Stuart Dean Organizational Chart:





SECTION TWO

2.0 ACCIDENT INVESTIGATION AND RECORD KEEPING:

2.1 Purpose

The purpose of the Accident Reporting and Investigation process is to identify the root causes and contributing factors of work-related injuries and illnesses in order to implement corrective and preventive actions.

2.2 Responsible Persons and Duties:

2.2.1 Employees must immediately notify their foreman or manager of accidental injury or occupational disease and if needed, request medical services. They must also cooperate with management during the investigation of the incident.

2.2.2 Operations Managers are responsible for:

1. Completing the Stuart Dean "**Report of Work-Related Incident/ Accident**" Form within eight (8) hours of occurrence and submitting copies of the report to Claims Email SOP., Stuart Dean HR Director and the Health & Safety Manager/Trainer.
2. Launching an investigation into the cause of the incident.
3. Submitting a follow up report including witness statements and photographs to Claims, Stuart Dean HR Director, the Health & Safety Manager/Trainer and the client, (if necessary) within 24 hours.

2.2.3 The Health and Safety Manager/Trainer is responsible for:

1. Reviewing **ALL** Incident Reports as they are received.
2. Reviewing workers' compensation claims for problems in medical referral, follow-up, and return to work.
3. Ensuring that corrective actions are implemented and documented.
4. Maintaining the OSHA 300 and 301 Logs.
5. Maintaining a record of **ALL** injury and illness reports.
6. Reviewing investigation reports and recommending **Job Hazard Analysis** (JHA), where appropriate.

2.2.4 The Human Resources Director is responsible for:

1. Reviewing accident reports as they are received.
2. Examining accident root causes and actions taken to prevent recurrence.
3. Initiating disciplinary action against employees violating Stuart Dean Company Health & Safety policies and procedures, reinforcing the company **ZERO TOLERANCE** policy.

SECTION THREE**3.0 JOBSITE INSPECTIONS AND CONTROL MEASURES:****3.1 Purpose**

The purpose of the **Jobsite Inspection Process** is to identify potential hazards, to evaluate control measures and to target health and safety compliance efforts. The use of JHA's will be a follow-up to Hazard Mitigation on the work-site.

3.2 Responsible Persons and Duties:**3.2.1 Site Foremen or Supervisors are responsible for**

1. Planning and implementing regular daily inspections of work areas and equipment, as required.
2. Evaluating potentially hazardous conditions with emphasis on conditions that may have changed from the previous workday and reviewing those conditions with all workers.
3. Assuring that all equipment is in good working condition and removing from service any defective units.
4. Protecting the public by delineating the jobsite with adequate signage, barricades and hazard tape.
5. Providing and ensuring that workers are wearing appropriate PPE for the task at hand.
6. Supplying the workers with appropriately labeled heavy-duty metal waste cans with fully-operable spring-top, self-closing lids for flammable waste storage.
7. Supplying the workers with appropriately labeled plunger-type dispensers for flammable liquids, *where applicable*.
8. Assuring that flammable liquid containers at Stuart Dean facilities and on jobsites are stored within secondary containment.
9. Providing fall protection equipment when working at heights and assuring that each worker is familiar with its operation.
10. Providing suitably charged fire extinguishers at each work location and assuring that each worker is familiar with its operation.
11. Daily discussing the work plan and safety plan with the workers, prior to the start of work.
12. Having on hand first aid kits, chemical spill kits and eye wash bottles for emergencies.
13. Ensuring that good housekeeping is maintained throughout the site. Also, ensuring that good personal hygiene is observed, and waste and debris are removed from the worksite and company vehicles daily.
14. Evaluating work conditions and using engineering controls to avoid, potentially exposing workers to IDLH situations.

15. Evaluating work conditions and using administrative controls to avoid exposing workers to heat stress or hypothermia.

3.2.2 Employees are responsible for

1. Participating in jobsite safety inspections.
2. Reporting unsafe conditions and/or equipment to the foreman or supervisor.
3. Immediately reporting chemical spills to the foreman or supervisor.
4. Wearing appropriate PPE.
5. Following the safe work practices outlined by Stuart Dean when working with flammable, combustible and toxic liquids.
6. Using fall protection when working at heights.
7. Immediately reporting all accidents, incidents or near misses.
8. Safeguarding the work site.
9. Utilizing equipment in a safe manner.
10. Keeping the work environment free from drugs, alcohol and illegal weapons.
11. Not working under the influence of drugs or alcohol.
12. Reporting strange or impaired behavior of co-workers to the foreman or supervisor.
13. Observing co-workers for signs and symptoms of heat or cold related illnesses.

3.3 Subcontractor Management

OSHA has clarified their position with respect to multi-employer work sites by identifying four different types of employers.

Exposing Employers – those whose employees are exposed to hazards

Creating Employers – those who actually create hazards

Controlling Employers – those who have the authority to ensure that hazards are corrected

Correcting Employers – those who are specifically responsible for correcting hazards

In order to issue a citation for a worksite hazard to one of these types of employers, OSHA must prove that the employer had knowledge of the hazardous condition or could have had such knowledge with the exercise of reasonable diligence.

As always, prevention is the first step in avoiding OSHA sanctions. It is imperative that contractors understand the rules and potential liabilities related to OSHA's multi-employer worksite clause. General contractors should develop and enforce a stated policy requiring their subcontractors to comply with OSHA standards.



Contractor Injury Records are Reviewed as part of the Stuart Dean screening process.

A post job performance review will be performed of all contractors for future reference.

Orientations will also be provided to all subcontractors upon arriving on Stuart Dean Projects.

Include in contractual agreements with subcontractors that they must provide the following:

1. Certificate of Insurance
2. Hazard Communication Plan
 - a. Chemical Inventory List
 - b. Specific Material Safety Data Sheets
3. Safety Program which must include at a minimum:
 - a. Management Safety Responsibilities
 - b. Foremen/Superintendent Safety Responsibilities
 - c. Employee Responsibilities
 - d. Scope of Work – Description of Project
 - e. Organizational Chart with Contract Numbers
 - f. Disciplinary Policy Procedures
 - g. Job Hazard Analysis for each Work Operation
 - h. Weekly Toolbox Safety Talks
 - i. Weekly Jobsite Safety Checklist
 - j. OSHA 10-Hour Construction Outreach Training Cards



Safety Memorandum

Subcontract Name: _____ **Date:** _____

Safety Violation Description:

General Contractor Signature: _____ Date: _____

Subcontractor Signature: _____ Date: _____



Sample Letter to Subcontractors

Gentlemen/Ladies:

The personal safety and health of each employee and worker on our projects is of primary importance. The prevention of occupationally induced injuries and illnesses is of such consequences that it should be given precedence over operating productivity whenever possible. To the greatest degree possible, Company Management should provide all mechanical and physical facilities required for personal safety and health.

Therefore, if your Company does not comply with our Field Management concerning safety, the following will occur:

First Violation: Written Notice

Second Violation: We will withhold your monthly payments until infraction is corrected and your work operations will be terminated until compliance.

Third Violation: Your company will jeopardize possible future subcontracts with our company.

If you have any questions and/or comments, please contact the undersigned.

Very truly yours,

Safety Director



SECTION FOUR

4.0 HEALTH AND SAFETY TRAINING:

4.1 Purpose

Stuart Dean Co. requires that all its employees involved with Metal, Stone, Wood and Glass Restoration Work have a thorough knowledge of the potential occupational hazards they may encounter.

Employees will receive basic company health & safety orientation when hired, a site orientation when assigned to a particular jobsite, and will be required, as deemed necessary, to attend annual intensive training classes at the Training Center /Stuart Dean University, in Cleveland, Ohio.

SDU shop classes will include hands-on training; utilizing state-of-the-art innovative techniques in Metal, Stone, Wood and Glass Restoration Work, as well as, machine handling, and proper chemical usage, storage and handling.

SDU classroom training will include modules on hazard communication, electrical safety, fall protection, respiratory protection, personal protective equipment, scaffolding safety, ladder safety, accident reporting and investigation, spill response procedures and cleanup, site delineation and control, portable fire extinguisher usage, elevator work procedures and potential hazards, defensive driving, good housekeeping, waste management, confined space entry, using the buddy system, hearing protection, eye protection, working with flammable and toxic materials, proper storage and dispensing of flammable liquids, static electricity, fire prevention, personal hygiene, basic toxicology, heat stress, hypothermia, and the transport of hazardous materials.

4.2 Methods

4.2.1 The Health and Safety Manager/Trainer is responsible for

1. Scheduling training for all employees and supervisors.
2. Maintaining and reviewing all training records.

4.2.2 Operations Managers are responsible for

1. Providing on-the-job training in safe work practices.
2. Recommending additional training for employees.

4.2.3 Employees are responsible for

1. Attending and participating in training programs.
2. Reporting the need for additional training.

4.2.4 The Company provides safety orientation for new hires, weekly tailgate safety meetings and site-specific training, as needed.



SECTION FIVE

5.0 Hazard Communication Program:

In order to comply with the OSHA Hazard Communication Standard 29 CFR1910.1200 and 29 CFR1926.59, Stuart Dean Co., Inc. is obligated to provide employees with information about the hazardous chemicals they may use and how to safely handle them, the physical hazards they may encounter on the jobsite, and the control of these hazards.

Physical Hazards in the Workplace

5.1.1 Electrical Hazards:

Generally, Electricity's primary hazards are shock and possible electrocution, as well as, burns, explosions, and fires. Electric currents travel in closed circuits. You may get a shock when some part of your body becomes part of the electric circuit. An electric current may enter the body at one point and exits the body at another. You will get a shock if you touch both wires of an electric circuit, one wire of an energized circuit and ground, or a metallic part that is "hot" because it is contacting an energized wire and you are in contact with the ground.

An electrical shock's severity depends on the amount of electric current flow through your body (measured in amperes); the path the electric current takes through the body; and how long the body is part of the electric circuit.

The effects of an electric shock can range from a tingle to immediate cardiac arrest. Low voltages can be just as deadly as high voltages, if the body is a part of the circuit.

Water is an excellent conductor of electricity and creates a potentially dangerous situation. If water is present at the worksite, or on your skin, be extra careful around ANY source of electricity.

The rules for working around energized electrical circuits are, as follows:

1. All personnel assigned to work with electrical systems will be qualified by training or experience in safe working techniques.
2. All circuits and switches will be clearly labeled.
3. All electrical circuits used in the field, outdoors, or in wet or damp areas will be equipped with ground fault circuit interrupters.
4. Cords, plugs and general condition of all power tools and equipment will be inspected before use and not used if found to be damaged or malfunctioning.
5. Extension Cords will be placed and protected so that no one can trip over them.

6. Power tools will not be carried by their cords nor should their plugs be yanked out of outlets by the cord; they should always be unplugged by holding onto the end plug nearest to the wall.
7. Only grounded outlets will be used and overloading circuits will be avoided.
8. Unqualified persons will be kept at least 10 feet away from overhead power sources.
9. Only fiberglass or wooden ladders are approved for work around electrical equipment.
10. All contractors performing work on electrical circuits or equipment will have and utilize a lockout/tagout procedure.
11. All high voltage sources will be guarded and labeled.

DOUBLE-INSULATED TOOLS:

1. Double-Insulated Power Tools are approved by the NEC as an alternative to equipment grounding.
2. Double-Insulated Power Tools are constructed with two (2) separate systems of insulation, so that the chances of insulation failure are reduced to the lowest practical minimum.
3. Double-Insulated Power Tools are an effective means of reducing exposure to the hazards of electric current.
4. Double-Insulation does not protect against defects in the cord, plug, and receptacle. Continuous inspection and maintenance are required.
5. **DO NOT USE** Double-Insulated Power Tools or equipment where water and a ground loop are present.
6. Surface Wetness/ Moisture can occur and pose a Potential Hazard, unless they are protected by a GFCI (Ground Fault Circuit Interrupters).

GROUND FAULT CIRCUIT INTERRUPTERS:

A Ground Fault Circuit Interrupter (GFCI) is a device that measures the amount of current flowing to and from an electrical source. When a difference between the two is sensed, indicating a leakage of current, the device very quickly breaks the circuit, preventing the user from experiencing an electric shock.

Without exception, all power tools and extension cords will be connected to a built-in, or external, GFCI.

The rules for working with and following safe work practices as they apply to the use of GFCIs:

1. GFCI's will **ONLY** be used on normal circuits already protected by a fuse or circuit breaker.
2. GFCI's will **ONLY** be used in a dry location.
3. GFCI's **MUST** be used on all extension cords.
4. GFCI Devices will **NOT** be painted or de-faced/ altered.
5. Do **NOT** connect any electrical cord longer than 250 feet to a GFCI.
6. Prior to each use, and while using, test frequently by pushing the test button to ensure correct operation.
7. **NEVER** use a GFCI as an on/off switch.

OVERHEAD POWER LINES:

Contact between large materials handling equipment, or scaffolding, and overhead lines is a major cause of fatal occupational injuries. Any overhead wire must be considered energized unless and until the person owning the line or the electric utility authorities indicate that it is not energized, and has visibly grounded it. When operating or working near power lines, minimum clearance between lines and the equipment, or scaffold, must be:

<u>Voltage</u>	<u>Minimum Clearance</u>
50 kV or less	10 feet
Over 50 kV	10 feet plus 0.4 inch for every 1 kV over 50 kV, or twice the length of the line insulator but never less than 10 feet.

5.1.2 Ladders

1. The physical demands of the job and potential hazards (overhead obstructions, electrical hazards, etc.) will be considered when selecting ladders for the job.
2. All ladders used will have adequate load ratings for the intended use. Duty ratings are marked on the side of the ladder.
3. Ladders will be maintained in good condition, at all times.
4. Damaged or defective ladders will be taken out of service and tagged for repair or destroyed.
5. Ladders will be kept free of grease and oil.
6. Ladders must never be painted, which could mask defects.
7. Ladders should be inspected before each use.
8. All metal bearings of locks, pulleys, and other moving parts will be lubricated frequently.
9. Ladders must be positioned to prevent slippage and secured by lashing.
10. Ladders will be placed on firm, even ground away from obstructions. Extension ladders will be placed against a supporting wall with the base of the ladder one foot away from the wall for every four feet of wall height.
11. Ladders must extend three (3) feet beyond the upper platform or roof to assist the worker as he/she climbs off, as per OSHA regulations.
12. Employees will not stand higher than the third step from the top of an extension ladder or the second step from the top of a stepladder.
13. In high traffic areas, the access to the ladder will be cordoned off.
14. When on a ladder, employees should use the three-point rule where there must be three points of contact with the ladder at any time, i.e., two feet and one hand, or two hands and one foot.
15. Employees should ask for assistance from co-workers, for handing tools up to them, in order to adhere to the three-point rule.
16. Workers should not overreach when on a ladder. The 'belt buckle rule' can help employees remember this: if reaching to the side while standing on a

ladder, your belt buckle (i.e., the midpoint of your body) should never move past the outside rail of the ladder.

5.1.3 Ladder Safety

A. General

1. Use ladders to access various elevations. They will be used only for the purpose for which they are designed.
2. All ladders used will meet ANSI/OSHA Specifications.
3. Provide ladders for safe access to all elevations where permanent or temporary stairways or suitable ramps or runways are not provided.
4. Never use ladders with broken or missing rungs or steps, broken or split side rails, or otherwise faulty or defective condition. When ladders with such defects are discovered, immediately tag and withdraw from service.
5. Place ladder feet on a stable and level footing and keep the area around the top and bottom of the ladder clear.
6. Do not place ladders in passageways, doorways, driveways, or any location where they may be displaced by other work activities, unless protected by barricades or guards.
7. Ensure ladders have uniform step spacing; step spacing should not exceed 12 inches.
8. Ensure the side rails, cleats, and/or rungs of ladders are kept clear and free of lines, hoses, cables, wires, oil, mud, ice, grease, and debris.
9. Employees must face ladders at all times while ascending, descending, or removing the ladder.
 - a. Three points of contact (i.e., two hands + one foot or two feet + one hand) must be maintained at all times when either ascending or descending a ladder.
 - b. Grasp the ladder rungs with hands while climbing and not the side rails.
10. Tie, block, foot, or otherwise secure straight ladders while in use to prevent their being displaced or moved.
11. Never use metal ladders for electrical work or where they or the user may contact electrical conductors.

12. Ladders must be equipped with non-skid safety feet.
13. Ladders must not be loaded beyond the maximum intended load for which they were built, or beyond the manufacturer's rated capacity.
14. When not in use, ladders will be stored under suitable cover and secured against movement. When stored horizontally, both ends and the middle will be supported to prevent sagging and warping of rails.
15. Use only ladders approved by the applicable government or standards organization.
16. Aluminum ladders may not be used in the vicinity of electrical energy sources.

B. Straight and Extension Manufactured Ladders

1. Position straight and extension ladders at such a pitch that the horizontal distance from the top support to the foot of the ladder is about one-quarter of the working length of the ladder 1 foot out for every 4 feet up.
2. Do not use ladders in a horizontal position as platforms, runways, or scaffolds.
3. Extend the side rails at least 3 feet above the landing, except in those instances where such an extension would cause a hazard. When this is not practical, install grab rails at the landing elevation, which provide a secure grip.
4. Ensure the side rails have a secure footing. The resting point for the side rails should be rigid and have ample strength to support the applied load. The top of the ladder should be secured to prevent movement.
5. When using two section wood or metal extension ladders, the two sections must have a minimum overlap of 3 feet for working lengths up to 36 feet, 4 feet for working lengths up to 48 feet, and 5 feet for working lengths up to 60 feet.
6. When using two section fiberglass extension ladders, the two sections must have a minimum overlap of 3 feet for working lengths up to 32 feet, and 4 feet for working lengths up to 36 feet.
7. Do not permit anyone to stand on the top three rungs of a straight or extension ladder.

8. Do not take sections of extension ladders apart and use separately.
9. The lashing of ladders together to increase the length of the ladder is prohibited.
10. Do not paint ladders in a manner that hides the grain structure, deterioration, or defects (suitable transparent preservative materials may be used).

c. Step Ladders

1. Always fully open and lock side braces when using stepladders.
2. Use straight or extension manufactured or job-built ladders for accessing elevations. Stepladders are meant to be used as temporary elevated working platforms only.
3. Do not place planks on the top of or on any steps of stepladders.
4. Never stand on the top two steps of a stepladder.
5. Never climb on the rear side of a stepladder unless specifically designed for that application.
6. Require that all four feet of the ladder have an even, solid footing.

d. Job-Build Ladders

1. Job-built ladders must be constructed for intended use. If a ladder is to provide the only means of access or exit from a working area for 25 or more employees, or simultaneous two-way traffic is expected, a double-cleated ladder shall be installed.
2. Double-cleated ladders must not exceed 24 feet in length.
3. The width of single-cleat ladders will be at least 15 inches, but not more than 20 inches, between rails at the top.
4. Side rails will be parallel or flared top to bottom by not more than ¼ inch for each 2 feet of length.
5. It is preferable that side rails be continuous. If splicing is necessary to attain the required length, however, the splice must develop the full strength of a continuous side rail of the same length.

6. Two-inch by 4-inch lumber will be used for side rails of single cleat ladders up to 16 feet long; 2-inch by 6-inch lumber will be used for single-cleat ladders from 16 feet to 30 feet in length.
7. Two inch by 4-inch lumber will be used for side and middle rails of double-cleat ladders up to 12 feet in length; 2-inch by 6-inch lumber for double-cleat ladders from 12 to 24 feet in length.
8. Wood cleats up to and including 20 inches wide will be $\frac{3}{4}$ inches in thickness and 3 inches in width. Wood cleats over 20 inches wide will be $\frac{3}{4}$ " in thickness and $3\frac{3}{4}$ inches in width.
9. Inset cleats into the edges of the side rails $\frac{1}{2}$ inch, or use filler blocks on the rails between the cleats. Secure the cleats to each rail with three 10d common wire nails or other fasteners of equivalent strength. Uniformly space cleats at 12 inches top-to-top.
10. Additional information on job-built ladders is provided in Supplemental Information A.

E. Training

Train each employee in the safe and proper use of ladders, including the following:

1. Do not carry materials while ascending or descending the ladder; use a hand line or hoisting equipment
2. Face the ladder when ascending or descending
3. Maintain three points of contact at all times when ascending or descending
4. Position the ladder at the proper pitch
5. Secure the top and bottom of the ladder to prevent displacement
6. Require proper extension 3 feet above landing
7. Never overreach; work only within an arm's length of the ladder. Belt buckle must remain between the outside rails
8. Allow only one person on a ladder at a time

F. Inspections

1. Assign a competent person to perform all ladder inspections.
2. Conduct thorough periodic inspections (monthly recommended) of all ladders to identify cracks, broken rungs, and deterioration. Ladders found to be in an unsafe condition must be removed from the workplace immediately. When immediate removal is not possible, the ladder must be conspicuously tagged "DANGER – DO NOT USE" until such time as removal is possible.
3. Inspect each ladder for unsafe conditions before each use. Ensure that the marking system remains legible between inspections. Ladders with illegible marking systems will be considered unsafe and will be removed from service.
4. Inspect ladders for any occurrence that could affect their safe use (e.g., ladder falls, damage by external forces, etc.).

5.2 Lead

5.2.1 Lead is a highly toxic metal that produces a range of adverse health effects, particularly in young children. There are many ways in which humans are exposed to lead – through deteriorating paint and dust, air, drinking water, food, and contaminated soil. Airborne lead enters the body when you breathe or swallow lead particles or dust. Lead can leach into drinking water from certain types of plumbing materials (lead pipes, copper pipes with lead solder, and brass faucets) and can also be found on walls, woodwork, and the outside of buildings in the form of lead-based paint. Lead particles can be deposited on floors, windowsills, eating and playing surfaces, or in the dirt outside the building.

Lead taken internally in any of its forms is highly toxic and the effects are usually felt after it has accumulated in the body over a period of time.

Overexposure to lead may result in severe damage to the body's blood forming system, central nervous system, kidneys, and reproductive system.

The symptoms of lead poisoning include loss of appetite, headache, fatigue, fine tremors, severe abdominal pain, general weakness, metallic taste in mouth, nervous irritability, pallor, insomnia, numbness in the extremities, dizziness, muscle and joint pain.

Fetuses, infants, and children are more vulnerable to lead exposure than adults since lead is more easily absorbed into growing bodies. Also, the tissues of children are more sensitive to the damaging effects of lead.

The OSHA Lead in construction standard, 29 CFR 1926.62, covers the removal, stripping, or disturbance of lead paint during metal refinishing work. The OSHA



Permissible Exposure Limit (PEL), based on an 8-hour TWA, is 50 micrograms per cubic meter and the Action Level is 30 micrograms per cubic meter.

Stuart Dean Co., Inc., subcontracts all work that involves the removal of lead containing paint. Therefore, its workers are not subject to the medical surveillance and monitoring requirements dictated by the OSHA Lead Standard.

5.2.2 Falls

According to OSHA, falls from heights or from the same level are the most common causes of workplace fatalities. Most slips, trips and falls are caused by poor housekeeping habits or negligence. Some of the common causes of falls are:

Stairways:

Running - carrying objects that block view of the steps - failure to use handrail - objects cluttering the stairway - inattention. To avoid these causes of falls, take time, look where you step and use the handrail.

Ladders:

Select a ladder that suits the job - be sure it is in good condition - place it securely, on level ground. Face the ladder and hold on when going up and down; don't carry tools and equipment when climbing; don't reach too far out when working. Do not climb higher than the third rung from the top on straight or extension ladders, or the second tread from the top on stepladders. Tag and remove defective ladders from service. Never paint a ladder. Secure ladders by tying off at the top.

Scaffolds:

Never erect a temporary scaffold. Even if a scaffold is to be used only a short time, it should be as solidly constructed as a permanent structure, with plenty of uprights uniformly spaced, horizontal bracing in both directions, guardrails and toe boards to prevent falls of men and materials, and diagonal bracing to prevent sway. The planking used must be "scaffold grade" and be free of loose knots, splits, or other defects. Post signage and barricades to prevent the public from walking under the scaffolding. Prior to starting the assignment, all employees assigned to work from scaffolds, will be trained in the following:

1. Hazards and controls for fall hazards, falling object hazards, electrical hazards in the area.
2. Proper use of the scaffold and handling of materials and equipment on the scaffold.
3. Maximum intended load of scaffold and intended use.
4. Erecting, disassembling, moving, operating, repairing, maintaining, and inspecting scaffolds.
5. Employees will be retrained whenever new hazards are present, whenever scaffolding, fall protection and related equipment changes, and

when inadequacies in the safety of the employee's work practices are observed.

Housekeeping:

A secure footing is the prime requisite in avoiding falls, and good housekeeping is essential to secure footing. Scrap materials, lumber with protruding nails, and all other debris will be cleared from the work areas. Containers will be provided for the collection and separation of waste, trash, oily and used rags, and other refuse. Containers used for garbage and those used for oily, flammable or hazardous wastes shall be equipped with covers.

Floor Openings:

Floor openings must be covered securely, with a cover big enough and rigid enough to prevent failure. It should be marked with a warning sign and every employee on the job should be warned about it.

5.2.3 Fall Protection**General:**

Each employee on a working/walking surface 6 feet or more above a lower level shall be protected from fall by a guardrail system, a safety net system, or personal fall arrest system. Where a guardrail system is employed, and a controlled access zone has been established for leading edge work, the control line may be used in lieu of a guardrail system along the edge that parallels the leading edge as described in the written and accepted, site specific, fall protection program.

All employees will be provided with Fall Protection Training.

Re-training will be conducted for any non-compliance with the Fall Protection program or when new equipment and tasks are introduced that the workers have not been trained on. Re-Training may also occur at any time at the discretion of the Competent Person.

Guardrails shall be constructed at all floors, wall openings, or roof openings if these openings cannot be discovered. Guardrails shall be constructed at all elevator shafts and stairwells.

Guardrail Systems must be constructed in accordance with OSHA and NYC DOB standards.

- Top rail:
 - Must be at a height between 38 and 45 inches from the working platform
 - Must be able to handle 200 pounds in an outward or downward direction
- Midrail:
 - Must be ½ the distance between the Top rail and the working platform

- Must be able to handle 150 pounds in an outward or downward direction
- Post:
 - The maximum span between posts cannot exceed 8 feet

Cable Systems must be constructed in accordance with OSHA and NYC DOB standards

- Top Cable – must be at a height of 42 inches with maximum slack of 3 inches
- Midrail – must be $\frac{1}{2}$ the distance between the top rail and work platform but one more than 21 inches
- Flags – must not exceed more than 6 feet apart

Covers must be constructed in accordance with OSHA and NYC DOB standards

- Scaffold grade planking, plywood or material capable of supporting at least four times its intended load of all materials, employees, tools and equipment.
- Secured in place to prevent it from being accidentally dislodged
- Warning sign indicating “Danger Hole” or similar wording

Employee will not be permitted to walk through, climb on or work in any area that does not have proper fall protection provided, or is otherwise barricaded off for safety reasons.

Employees must ensure that all floor holes or openings are properly guarded or properly covered and marked “Danger Hole” before leaving them unattended.

Personal Fall Arrest Systems

When employees are exposed to a potential fall of six feet or more and cannot be protected from falling by a guardrail system, safety nets or others means of protection they must be required to wear a personal fall arrest system that consist of:

- Anchorage point: Something structural that can withstand 5,000 pounds of force
- Lifeline: A rope or cable that can withstand 5,000 pounds of force. (Cannot be polypropylene)
- Rope Grab: a device that locks on the lifeline to stop a fall
- Lanyard: no longer than six feet and must have a deceleration device built in
- Body harness: must be a full body harness

Personal Fall Arrest Systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.

Falling Object Protection:

Protection must be provided from falling object when items may either fall or be kicked down on employees working below by:

- Toe boards: must at a minimum be 3 – ½ inch high from the working platform
- Debris Netting
- Head protection
- Catch Platform
- Canopies

All fall protection equipment in use shall be inspected daily before use by a qualified person.

Rescue:

Stuart Dean must provide for prompt rescue of employees in the event of a fall or shall ensure that employees are able to rescue themselves.

Any fall occurrences will be proceeded by a full investigation.

Reference:

29 CFR 1926 Subpart M. Fall Protection

5.2.4 Personal Fall Arrest Systems:

Personal fall arrest equipment arrests a fall but doesn't prevent a fall. In case you do fall, the equipment must be rigged to limit your free fall to no more than 6 feet, to a deceleration distance of no more than 3.5 feet, and to prevent you from striking any lower level. Some requirements for these systems are:

- A horizontal lifeline must be designed, installed, and used under the supervision of a qualified person.
- Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds.
- Only one worker can be attached to a vertical lifeline.
- Protect your lifeline from, and inspect it for, cuts or abrasions before and during work.
- Ropes and straps (webbing) used in full body harnesses must be made from synthetic fibers.
- For a full body harness, the attachment point must be located in the center of your back near your shoulder or above your head.
- Stuart Dean Co. will have a rescue plan and be able to rescue you promptly, or ensure you are capable of rescuing yourself.

- Inspect your fall arrest equipment prior to each use for wear, damage, and other deterioration. Do not use defective components.
- Do not attach your personal fall arrest equipment to:
 1. Anchorages being used to support or suspend platforms or scaffolding.
 2. Guardrails.
 3. Hoists.

5.2.5 Scaffolds

Scaffolding Standard with several key provisions:

Fall protection or fall arrest systems—each employee more than 10 feet above a lower level shall be protected from falls by guardrails or a fall arrest system, except those on single-point and two-point adjustable suspension scaffolds. Each employee on a single-point and two-point adjustable suspended scaffold shall be protected by both a personal fall arrest system and a guardrail. Personal fall arrest systems include harnesses, components of the harness/belt such as Dee-rings, and snap hooks lifelines, and anchorage point.

Use fall arrest systems when working from the boom/basket of an aerial lift and also boatswains, chair, catenary, float, needle beam, ladder, and pump jack.

Falling Object Protection—Protect employees from falling hand tools, debris, and other small objects, install toe boards, screens, guardrail systems, debris nets, catch platforms, canopy structures, or barricades. In addition, employees must wear at all times hard hats.

Guardrail height—The standard requires employers to protect each employee on a scaffold more than 10 feet (3.1m) above a lower level from falling to that lower level. To ensure adequate protection, install guardrails along all open sides and ends before releasing the scaffold for use by employees, other than the installing and removing crews. Guardrails are not required, however, when the front end of all platforms are less than 14 inches (36 centimeters) from the face of the work; when outrigger scaffolds are 3 inches (8 centimeters) or less from the front edge; when employees are plastering and lathing 18 inches (46 centimeters) or less from the front edge.

Stilts may be used on a large area scaffold. When a guardrail system is used, the guardrail height must be increased in height equal to the height of the stilts. Manufacturer must approve any alterations to the stilts. A large area scaffold consists of a pole, tube and coupler systems, or a fabricated frame scaffold erected over substantially the entire work area.

Unacceptable for Guardrails—steel or plastic banding must not be used as a top rail or a Midrail.

Cross bracing—When the Crosspoint of cross bracing is used as a top rail, it must be between 38 inches (0.97m) and 48 inches (1.3 meters) above the work platform.

Midrail—Midrail must be installed approximately halfway between the top rail and the platform surface. When a Crosspoint of cross bracing is used as a Midrail, it must be between 20 inches (0.5 meters) and 30 inches (0.8 m) above the work platform.

Footings—Support scaffold footings shall be level and capable of supporting the loaded scaffold. The legs, poles, frames, and uprights shall bear on base plates and mud sills or adequate firm foundation.

Platforms—Supported scaffold platforms shall be fully planked or decked. Each platform must be planked and decked as fully as possible with the space between the platform and uprights not more than 1 inch (2.5 centimeters) wide. The space must not exceed 9 inches (24.1 centimeter) when side brackets or odd-shaped structures result in a wider opening between the platform and the uprights. The platform must not deflect more than 1/6 of the span when loaded. The requirement standards prohibit work on platforms cluttered with debris. Each scaffold platform and walkway must be at least 18 inches (46 centimeters) wide. When the work area is less than 18 inches (46 centimeters) wide, guardrails and/or personal fall arrest system must be used.

Supported scaffolds are platforms supported by legs, outrigger beams, brackets, poles, uprights posts, frames, or similar rigid support. The structural members, poles, legs, posts, frames, and uprights, must be plumb and braced to prevent swaying and displacement.

Scaffold Access—Ladders, such as portable, hook-on, attachable, and stairway, stair towers, ramps and walkways and integral prefabricated frames.

Prohibits—The use of cross braces as a means of access.

Planking—Scaffold planking must be able to support, without failure, its own weight and at least four times the intended load. Solid sawn wood, fabricated planks, and fabricated platforms may be used as scaffold planks following the recommendations by the manufacturer or a lumber grading association or inspection agency.

Guying ties, and braces—Supported scaffolds with a height to base of more than 4:1 shall be restrained from tipping by guying, tying, bracing, or the equivalent. Install guys, ties, or braces at the closest horizontal member to the 4:1 height and repeat vertically with the top restraint no further than 4:1 height from the top. **Vertically**—every 20 feet (6.1 meters) or less for scaffolds less

than three feet (0.91 meters) wide; every 26 feet (7.9 meters) or less for scaffolds more than three feet (0.91 meters) wide. **Horizontally**—at each end; at intervals not to exceed 30 feet (9.1 meters) from one end.

Capacity—Each scaffold and scaffold component must support without failure its own weight and at least four times the maximum intended load applied or transmitted to it. A qualified person must design the scaffolds, which are loaded in accordance with that design. Scaffolds and scaffold components must not be loaded in excess of their maximum intended loads or rated capacities, whichever is less. Load carrying timber members should be a minimum of 1,500 lb.-f/in² construction grade lumber.

Training—All employees must be trained by a qualified person to recognize the hazards associated with the type of scaffold being used and how to control or minimize those hazards. The training must include fall hazards, falling object hazards, electrical hazards, proper use of the scaffold, and handling of materials.

Re-Training—retraining requires when (1) no employee training has taken place for the worksite changes, scaffold changes, or falling object protection changes; or (2) where the employer believes the employee lacks the necessary skill, understanding, or proficiency to work safely.

Inspections—Before each work shift and after any occurrence that could affect the structural integrity, a competent person must inspect the scaffold and scaffold components for visible defects. Tags will be used to notify staff of the status of the scaffold and when it was inspected.

Installing and Removing—When installing and removing supported scaffolds, a competent person must determine the feasibility of providing a safe means of access and fall protection for these operations.

Suspended Scaffolds—A suspension scaffold contains one or more platforms suspended by ropes or other non-rigid means from an overhead structure, such as the following scaffolds: single-point, multi-point, multi-level, two-point, adjustable, boatswains' chair, catenary, chimney hoist, continuous run, elevator false car, go-devils, interior hung, masons', and stone setters. All suspension scaffolds must be tied or otherwise secured to prevent them from swaying, as determined by a competent person.

When lanyards are connected to horizontal lifelines or structural members on single-point or two-point adjustable scaffolds, the scaffold must have additional independent support lines equal in number and strength to the suspension lines and have automatic locking devices.

Emergency escape and rescue devices must not be used as working platforms, unless designed to function as suspension scaffolds and emergency systems.

Suspension ropes—the suspension ropes must be long enough to allow the scaffold to be lowered to the level below without the rope passing through the hoist, or the end of the rope configured to prevent the end from passing through the hoist. **DO NOT** use repaired wire. Drum hoists must contain no less than four wraps of the rope at the lowest point of scaffold travel. Replace wire rope when the following conditions exist: kinks; six randomly broken wires in one rope lay or three broken wires in one strand in one lay; one third of the original diameter of the outside wires is lost; heat damage; evidence that the secondary brake has engaged the rope; and any other physical damage that impairs the function and strength of the rope.

Suspension ropes supporting adjustable suspension scaffolds must be a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms. Suspension ropes must be shielded from heat-producing processes.

Power-operated hoists used to raise or lower a suspended scaffold must be tested and listed by a qualified testing laboratory. The stall load of any scaffold hoist must not exceed three times its rated load. The stall load is the load at which the prime-mover (motor or engine) of a power-operated hoist stalls or the power to the prime-mover is automatically disconnected. Gasoline power-operated hoists or equipment are **NOT PERMITTED**.

Gears and brakes must be enclosed. An automatic braking and locking device, in addition to the operating brake, must engage when a hoist makes an instantaneous change in momentum or an accelerated overspeed. Ladders, boxes and barrels to increase the working height on a suspended scaffold are prohibited.

Aerial Lift—Vehicle mounted aerial devices used to elevate employees, such as, extensible boom platforms, aerial lifts, articulating boom platforms, and vertical towers are considered aerial lifts.

Only authorized personnel can operate aerial lifts. the insulated portion must not be altered to reduce its insulating value. Lift controls must be tested daily and controls must be clearly marked. Brakes must be set and outriggers used. The Boom and basket load limits must not be exceeded.

Employees must wear personal fall arrest systems, with the lanyard attached to the boom or basket. NO devices to raise the employee above the basket floor can be used.

5.2.6 Fall Protection (Scaffolds)

1. All scaffolds will be erected under the supervision of a competent person in accordance with the manufacturers or rental company's instructions.
2. Each scaffold will be capable of supporting its own weight and at least four times the maximum intended load.
3. Suspension ropes on hanging scaffolds will be capable of supporting six times the maximum intended load.
4. Scaffold platforms will be fully planked on all working levels. The platform front edge will be no more than 14 inches from the face of the work unless guardrails or fall arrest system are used.
5. Planking on ends of platforms will be extended from 6" to 18" or secured to prevent slipping or cantilever effect.
6. Scaffold components will not be interchanged from one manufacturer's product to another.
7. All supported scaffolds with a height to width ratio of more than 4:1 will be secured by guying, tying, or bracing to prevent tip over. Mobile scaffolds will be secured if height to width ratio exceeds 3:1.
8. Scaffold footings will be level, sound, rigid, and capable of holding the intended load without settling or displacement.
9. Scaffolding support structures will be plumb and braced to prevent swaying and displacement.
10. Employees must utilize the expertise of a competent person on the jobsite to assess additional requirements of hazardous conditions when it is unsafe to work on scaffolds (i.e., high winds, wet weather, etc.).

5.2.7 Suspension Scaffolds

1. Suspension scaffold support devices will be designed to support at least 4 times the maximum intended load.
2. Direct connections will be inspected by a competent person before use. Tiebacks will be secured to structurally sound anchorage on the building.
3. The scaffolding components including rigging, ropes, clamps etc. will be inspected with a documented checklist (*Ref 3.3.1.3 - Attachment -Daily Swing Stage Safety Check-off List*) by a competent person before each work shift and after any potentially damaging event, including stage moves.
4. No more than two (2) workers will be present on the scaffold at any one time (unless the scaffold is designed for more personnel) and each one will be equipped with an individual fall arrest system (full body harness, lanyard with double lock clips, rope grab, and safety line) that will be independently tied off to a structurally sound building component above the work area, and are not tied off to the scaffold itself.)
5. Platforms will not be more than 36" wide unless designed by the manufacturer to be wider.
6. Employees must receive equipment-specific training prior to working on suspension scaffolds.

5.2.8 Mobile Scaffolds



1. Scaffolds will be braced, plumb, level, and squared.
2. Casters and wheels will be locked to prevent movement.
3. For adjustment and movement, manual force will be applied near the base of the scaffold and not higher than 5 feet from the ground.
4. Employees will not be allowed to ride on scaffolds.
5. Platforms will not extend beyond the base unless designed as such and outriggers are used.
6. Leveling will be done only by screw jacks.
7. Height to width ratios must be adhered to at all times.
8. Employees must receive equipment-specific training prior to working on mobile scaffolds.

5.2.9 Site-Specific Fall Protection Plan (29 CFR 1926 Subpart M)

Purpose

This section establishes Stuart Dean Company, Inc.'s written fall protection plan in accordance with 29 CFR 1926 Subpart M (Sections 1926.500 through 1926.503). It supplements the general fall protection, personal fall arrest, and scaffold provisions of Sections 5.2.3 through 5.2.8 by defining the hierarchy of fall protection, the requirements for a site-specific plan where conventional fall protection is infeasible, and the training, inspection, and rescue provisions required under the standard. This plan applies to all Stuart Dean employees and subcontractors performing metal, stone, wood, and glass restoration work on facades, roofs, and other elevated surfaces.

Scope and Duty to Have Fall Protection

Each employee on a walking/working surface with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of a guardrail system, safety net system, or personal fall arrest system, as required by 29 CFR 1926.501. This duty applies regardless of the employee's experience level or the duration of the exposure. Where a specific work activity is not addressed elsewhere in this plan, the Competent Person shall select fall protection appropriate to the hazard consistent with the hierarchy below.

Definitions

- **Competent Person:** an individual who is capable of identifying existing and predictable fall hazards and who has the authority to take prompt corrective action to eliminate them.
- **Qualified Person:** an individual with a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has demonstrated the ability to solve or resolve problems relating to fall protection.
- **Anchorage:** a secure point of attachment for lifelines, lanyards, or deceleration devices, independent of any anchorage used to support or

suspend platforms, capable of supporting at least 5,000 pounds per employee attached, or maintained under a factor of safety of at least two when designed, installed, and used under the supervision of a qualified person.

- **Controlled Access Zone (CAZ):** an area in which certain work may take place without the use of guardrail systems, safety net systems, or personal fall arrest systems, and access to the zone is limited to authorized employees.
- **Guardrail System:** a barrier erected to prevent employees from falling to lower levels.
- **Safety Net System:** a net erected to catch employees in the event of a fall from a walking/working surface.
- **Personal Fall Arrest System (PFAS):** a system used to arrest an employee's fall, consisting of an anchorage, connectors, and a body harness, and may include a lanyard, deceleration device, lifeline, or a combination of these.
- **Positioning Device System:** a body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.
- **Warning Line System:** a barrier erected on a roof to warn employees they are approaching an unprotected roof side or edge, used in conjunction with a Controlled Access Zone or Safety Monitoring System on low-slope roofs.
- **Safety Monitoring System:** a fall protection method in which a competent person is responsible for recognizing and warning employees of fall hazards; used only on low-slope roofs 50 feet or less in width when no other feasible protection exists, and never as a standalone system where feasible alternatives exist.
- **Leading Edge:** the edge of a floor, roof, or formwork for a floor or other walking/working surface which changes location as additional sections are added, removed, or altered.
- **Low-Slope Roof / Steep Roof:** a low-slope roof has a slope less than or equal to 4 in 12 (vertical to horizontal); a steep roof has a slope greater than 4 in 12.
- **Unprotected Sides and Edges:** any side or edge of a walking/working surface where there is no wall or guardrail system at least 39 inches high.

Responsibilities

1. **Health & Safety Manager:** reviews and approves site-specific fall protection plans, ensures Competent and Qualified Persons are properly designated and trained, and audits compliance across all branches.
2. **Qualified Person:** prepares the written fall protection plan required under 1926.502(k) for leading edge, precast concrete erection, or residential construction work where conventional fall protection is determined to be infeasible.
3. **Competent Person / Site Supervisor:** identifies fall hazards before work begins, selects and directs installation of fall protection systems, conducts

daily inspections, enforces this plan, and has authority to stop work when a fall hazard is not adequately controlled.

4. **Employees:** use provided fall protection equipment correctly, inspect equipment before each use, report defective equipment or uncontrolled fall hazards immediately, and attend required training.

Fall Hazard Assessment

Before work begins at any location where a fall of 6 feet or more is possible, the Competent Person shall conduct a fall hazard assessment as part of the jobsite Job Hazard Analysis (see Section 3.0). The assessment shall:

1. Identify all walking/working surfaces, edges, holes, openings, and elevated work locations on the site.
2. Determine the vertical distance of potential falls and the nature of the surface or hazard below.
3. Select the fall protection system(s) required using the hierarchy described below.
4. Document the assessment and selected system(s) on the jobsite Job Hazard Analysis or, where conventional protection is infeasible, on the Fall Protection Plan Certification found later in this section.
5. Be repeated whenever the scope of work, work surface, or site conditions change.

Hierarchy of Fall Protection Controls

Stuart Dean selects fall protection in the following order of preference. Lower-preference methods are used only when higher methods are demonstrated to be infeasible or to create a greater hazard, and only by determination of a Qualified Person:

1. **Elimination:** redesign the task, use engineering controls, or perform the work from ground level or an aerial lift to remove the fall hazard entirely.
2. **Guardrail Systems:** top rail 39-45 inches, midrail at approximately half that height, capable of withstanding 200 lbs (top rail) and 150 lbs (midrail) per 1926.502(b). See Section 5.2.3 for full specifications.
3. **Safety Net Systems:** installed as close as practicable under the walking/working surface, never more than 30 feet below, tested and inspected per 1926.502(c).
4. **Personal Fall Arrest Systems (PFAS):** full body harness, shock-absorbing lanyard or self-retracting lifeline, and independent anchorage capable of 5,000 lbs per employee. See Section 5.2.4 for full specifications.
5. **Positioning Device Systems:** used for wall or facade work where the system is rigged so a free fall is limited to 2 feet, per 1926.502(e).
6. **Warning Line System with Controlled Access Zone:** used only on low-slope roofing work, with the warning line erected not less than 6 feet from the roof edge (10 feet where mechanical equipment is used).
7. **Safety Monitoring System:** used only on low-slope roofs 50 feet or less in width, and only when no other feasible option exists; the safety monitor has

no other duties and must be within visual sight line and close enough to communicate verbally with every monitored employee.

Duty to Provide Fall Protection by Work Activity

The following activities, common to Stuart Dean's restoration work, require fall protection whenever the 6-foot trigger height is met, consistent with 1926.501(b):

1. Unprotected sides and edges, and leading edge work (e.g., facade panel removal, edge-of-slab work).
2. Work performed from swing stages, suspension scaffolds, and mobile or supported scaffolds (see Sections 5.2.5 through 5.2.8).
3. Hoist areas, floor holes, wall openings, and skylight openings, which must be guarded or covered per Section 5.2.3.
4. Ramps, runways, and other walkways.
5. Low-slope and steep roofing work.
6. Work near excavations or on ladders (see Sections 5.1.2 and 5.1.3).
7. Protection of employees below from falling objects (tools, debris, materials) via toe boards, debris netting, catch platforms, or canopies per Section 5.2.3.

Written Fall Protection Plan - Leading Edge, Precast Concrete Erection, and Residential Construction (1926.502(k))

Where the Qualified Person determines that it is infeasible, or creates a greater hazard, to use conventional fall protection (guardrails, safety nets, or PFAS) for leading edge work, precast concrete erection, or residential construction work, Stuart Dean will implement a written, site-specific Fall Protection Plan meeting all of the following requirements before work begins. This provision does not apply to any other type of work; conventional fall protection remains the default for all other activities.

1. The plan is prepared by a Qualified Person and developed specifically for the site where the work will occur; it may be amended only by a Qualified Person.
2. The plan documents the reasons conventional fall protection systems are infeasible or would create a greater hazard.
3. The plan discusses other measures that will be taken to reduce or eliminate the fall hazard for employees who cannot be provided with conventional protection.
4. The plan identifies each location on the jobsite where the plan applies, by name, plan, or other means.
5. Where a Controlled Access Zone is implemented, the plan defines its boundaries and the means used to establish and maintain them, consistent with 1926.502(g).
6. The plan names the persons who have authority to correct deficiencies in the fall protection measures being used.
7. The plan describes the process for evaluating alternative fall protection measures for feasibility, including consideration of installing scaffolds, ladders, or vertical pole systems and using safety net systems.
8. Failures of the plan's provisions are investigated to determine if changes are necessary and such changes are implemented promptly.

9. A copy of the plan, with all approved changes, is maintained at the jobsite for the duration of the work covered by the plan.
10. The plan is reviewed and approved by the Health & Safety Manager before work begins.

Controlled Access Zones and Safety Monitoring Systems

When a Controlled Access Zone or Safety Monitoring System is used in place of conventional fall protection, the following criteria apply per 1926.502(g) and 1926.502(h):

1. The controlled access zone is flagged or otherwise clearly marked and defined by a control line or by any other means that restricts access.
2. Control lines are connected on each side to a guardrail system or wall and are erected between 6 and 25 feet from the unprotected edge, except that where used for leading edge work the line may be increased to 50 feet.
3. Only authorized employees performing the leading edge, overhand bricklaying, or precast concrete erection work are permitted within the controlled access zone.
4. The safety monitor, if used, is a Competent Person who is on the same walking/working surface, within visual sight line, and close enough to communicate verbally with all monitored employees; the monitor has no other duties and is not exposed to the fall hazard being monitored.
5. No mechanical equipment is used within a controlled access zone protected by a safety monitoring system.
6. Employees are promptly directed to leave the area if the safety monitor identifies unsafe behavior.

Equipment Requirements and Inspection

Guardrail, personal fall arrest, and scaffold-related equipment specifications are detailed in Sections 5.2.3 through 5.2.8. In addition, the following apply to all fall protection equipment used under this plan:

1. Anchorages used for attachment of personal fall arrest equipment are independent of any anchorage used to support or suspend platforms, and are capable of supporting at least 5,000 pounds per attached employee, or are designed, installed, and used as part of a complete system with a factor of safety of at least two, under the supervision of a Qualified Person.
2. All fall protection equipment is inspected by the employee before each use and by a Competent Person on a documented periodic basis; damaged, defective, or worn components are removed from service immediately and tagged out of service.
3. Fall protection equipment is used only for employee fall protection and is never used to hoist materials.
4. Horizontal lifelines are designed, installed, and used only under the supervision of a Qualified Person.
5. Snap hooks, unless a locking type, are not connected to each other, to a webbing/spliced eye, or in a manner that would result in a load being applied to the gate of the snap hook.

Rescue Plan

A worker suspended in a full body harness following a fall arrest is at risk of suspension trauma if left hanging for an extended period. Stuart Dean will provide for prompt rescue of employees in the event of a fall, or ensure employees are able to rescue themselves, consistent with 1926.502(d)(20). Before work begins at height, the Competent Person shall confirm that:

1. A rescue method (self-rescue, assisted rescue, or emergency service response) has been identified for the specific work location and is understood by the crew.
2. Personnel and equipment needed for prompt rescue (such as a descent device, ladder, aerial lift, or trauma relief straps) are available on site.
3. Local emergency services have been identified and, where self-rescue or assisted rescue is not feasible, contact information is confirmed before work begins.
4. Any fall arrest event is treated as a medical emergency; the suspended employee is rescued as quickly as possible and evaluated per Section 13.0, First Aid and Medical Emergencies.

Any fall occurrence, arrested or not, will be followed by a full investigation per Section 2.0, Accident Investigation and Record Keeping.

Training Requirements (29 CFR 1926.503)

Before being exposed to a fall hazard, each employee is trained by a Competent Person in a program that enables the employee to recognize fall hazards and understand the procedures to minimize them. Training covers:

- The nature of fall hazards in the work area, including those specific to Stuart Dean's restoration work on facades, roofs, and elevated surfaces.
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
- The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, controlled access zones, and safety monitoring systems.
- The role of each employee in a safety monitoring system, when used.
- The limitations on the use of mechanical equipment during roofing work on low-slope roofs.
- The correct procedures for equipment and materials handling and storage, and the erection of overhead protection.
- The employee's role in fall protection plans, including the written plan required for leading edge, precast concrete erection, or residential construction work.
- The standards contained in 29 CFR 1926 Subpart M.

Retraining is required whenever changes in the workplace, fall protection systems, or equipment render previous training obsolete, when inadequacies in an employee's knowledge or use of fall protection are observed, or at the discretion of the Competent Person. Training is documented and certified in writing, including the employee's name, training date(s), and the signature of the

trainer; certification records are maintained by the Health & Safety Manager per Section 4.0.

Plan Implementation, Monitoring, and Recordkeeping

- The Competent Person conducts a documented inspection of all fall protection systems in use at the start of each shift and after any event that could affect their integrity.
- Deficiencies are corrected immediately; work is stopped in any area where fall protection cannot be brought into compliance before employees are exposed.
- This plan and any site-specific Fall Protection Plan prepared under 1926.502(k) are reviewed and updated whenever site conditions, scope of work, or applicable regulations change.
- Training certifications, equipment inspection records, and site-specific Fall Protection Plans are retained by the Health & Safety Manager for the duration of the project and as required by company recordkeeping policy.

Site-Specific Fall Protection Plan Certification

To be completed by the Qualified Person for any location where conventional fall protection (guardrails, safety nets, or personal fall arrest systems) is determined to be infeasible for leading edge, precast concrete erection, or residential construction work. For all other work, conventional fall protection per Sections 5.2.3 through 5.2.8 applies and this form is not required.

Project / Site Name:	
Site Address:	
Date Plan Prepared:	
Prepared By (Qualified Person):	
Reviewed / Approved By (H&S Manager):	
Description of Work / Fall Hazards Present:	
Fall Protection System(s) Selected:	
Conventional Fall Protection Infeasibility Justification (leading edge, precast concrete erection, or residential construction only):	
Controlled Access Zone Location / Dimensions (if used):	
Safety Monitor Assigned (if used):	
Rescue Plan Summary:	

Competent Person(s) On-Site:

Competent Person Signature / Date

Site Supervisor / Foreman Signature / Date

29 CFR 1926 Subpart M, Sections 1926.500 - 1926.503. Fall Protection - Scope, Duty to Have Fall Protection, Fall Protection Systems Criteria and Practices, Fall Protection Plan, and Training Requirements

5.3 Fire Prevention, Protection, and Life Safety

5.3.1 Purpose

To ensure that employees are protected by proper facility design, basic life safety procedures and installation of fire detection, suppression and protection equipment.

5.3.2 Fire Protection/ Extinguishers

Implementation

Implementation of this standard at office locations is the responsibility of the Office Manager or designated representative. The Project Manager or designated representative is responsible for directing activities at a facility, site, or project location. At project sites controlled by contractors or building owners, some of these responsibilities may be covered by building/facility owners or owner agents.

Fire Protection

1. A fire protection program will be developed and followed throughout all phases of work.
 - a. Access to available firefighting equipment will be maintained at all times.
 - b. Firefighting equipment will be inspected monthly and maintained in operating condition. Defective equipment will be immediately replaced.
 - c. Fire extinguishers that are out of service or that have been discharged will be immediately tagged, removed from service, and replaced.
 - d. Firefighting equipment will be conspicuously located and not obstructed from view in the workplace.
 - e. Where and when required or necessary, the project manager will provide

a trained and equipped firefighting organization (fire brigade) to assure adequate protection.

2. A temporary or permanent water supply (sufficient volume, duration, and pressure) required to properly operate the firefighting equipment will be made available as soon as combustible materials accumulate.

- a. Where underground water mains are to be provided, they will be installed, completed, and made available for use as soon as practicable.

- b. Fire Hose and Connections

- 1) One hundred feet, or less, of 1.5-inch hose, with a nozzle capable of discharging water at 25 gallons or more per minute, may be substituted for a fire extinguisher rated not more than 2A 20BC in the designated area, provided the hose line can reach all points in the area.
- 2) If fire hose connections are not compatible with local firefighting equipment, the project manager will provide adapters or equivalent to permit connections.
- 3) During demolition involving combustible materials, charged hose lines supplied by hydrants, water trucks with pumps, or equivalent will be made available.

- c. Fixed Fire Fighting Equipment

- 1) Sprinkler Protection

Where Stuart Dean is involved in the construction of a facility in which automatic sprinkler protection is required, the installation of the sprinklers will closely follow the construction, and sprinklers will be placed into service as soon as practicable.

Where Stuart Dean is involved in the demolition or alteration of a facility, existing automatic sprinkler installations should be retained in service as long as reasonable. Only authorized persons will permit the operation of sprinkler control valves. Modification of sprinkler systems to permit alterations or additional demolition should be expedited so that the automatic protection may be returned to service as quickly as possible. Sprinkler control valves will be checked daily, at the close of work/business, to ascertain that the protection is in service.

- 2) Standpipes

In all structures requiring standpipes or where standpipes exist in structures being altered, they will be maintained to always be ready for fire protection use.

Conspicuously marked standpipes will be provided with connections on the outside of the structure (at the street level). Each floor will be equipped with at least one standard hose outlet.

3) Fire Alarm Devices

An alarm system (e.g., telephone system, siren) will be established to alert both the employees on the site and the local fire department of an emergency.

The alarm code and reporting instructions will be conspicuously posted at phones and at all employee entrances.

4) Fire Cutoffs

In new construction, firewalls and exit stairways required for the completed buildings will be given construction priority. Fire doors, with automatic closing devices, will be hung on openings as soon as practicable.

Fire cutoffs will be retained in buildings undergoing alterations or demolition until operations necessitate their removal.

d. Job Site Requirements

- 1) Material storage areas will be equipped with fire extinguishers adequate for their size, construction, and the material stored therein.
- 2) Welding, cutting, grinding, and burning will not be done within 25 feet of any material fuel storage area. Fire extinguishers will be provided at the site of welding operations.
- 3) Flammable materials will be stored as far as possible from the working area, at least 25 feet. Safety cans will be used when handling and transporting fuel, gas, and other flammables.
- 4) Extinguishers are to be adequately maintained.
- 5) The telephone number of the nearest organized firefighting group is to be displayed at jobsite telephones.

Fire Extinguishing Equipment

a. Extinguisher Requirements

Use only UL-listed extinguishers. Mark extinguishers and extinguisher locations, indicating the suitability of each extinguisher for a particular classification of fire.

b. Building and Occupancy Hazard Protection

Requirements for fire extinguisher protection are divided into two categories: building protection and occupancy hazard protection. Provide for extinguishing equipment to protect both the building structure (if it is combustible) and the occupancy hazards inside it.

- 1) For building protection, provide fire extinguishers rated for Class A fires or greater, as required by applicable building codes.
- 2) For protection against occupancy hazards, provide fire extinguishers rated for Class A, B, C, or other fire potential as appropriate. Requirements may vary from section to section within a single building. Determine the occupancy hazards, as well as the proper ratings of necessary fire extinguishers, of each room or section. Classify rooms or sections as light hazard, ordinary hazard, or extra hazard. See Supplemental Information B for additional details and assistance in determining extinguisher requirements.

c. Extinguisher Placement

- 1) Place extinguishers in conspicuous locations, along normal paths of travel, and near exits. If the extinguishers are not readily visible, use wall markings, signs, or lights to identify their locations.
- 2) Ensure that extinguishers are readily accessible. Keep the space in front of and below extinguishers clear at all times. The floor area beneath extinguishers may be marked as a reminder to keep the area clear.
- 3) Hang extinguishers on hangers, brackets, or other equipment furnished by the manufacturer, or place them on shelves. If an extinguisher weighs less than 40 pounds, the top of the extinguisher will not be more than 5 feet above the floor. If an extinguisher weighs equal to or more than 40 pounds, it will not be more than 3.5 feet above the floor. The clearance between the bottom of the extinguisher and the floor will never be less than 4 inches.
- 4) Provide the appropriate number and types of fire extinguishers for

operations being performed. Refer to Supplemental Information A for guidance.

d. Inspection

Properly trained personnel will inspect extinguishers at least monthly. The monthly inspection will include the following items at a minimum:

- 1) Location
- 2) Rating
- 3) Access
- 4) Visibility
- 5) Operating instructions
- 6) Seals
- 7) Tamper indicators
- 8) Fullness
- 9) Physical Condition

Attach inspection tags to each extinguisher indicating the dates of purchase, inspection, testing, and recharging, and the initials of the inspector. In addition to the tag, a colored tape may be used to indicate that an extinguisher has been inspected. Fire extinguishers must be inspected annually by a qualified fire services contactor.

e. Testing and Maintenance

- 1) Establish periodic testing programs to ensure that extinguishers are in proper operating condition. Only properly trained personnel (preferably fire extinguisher vendors) should maintain extinguishers.
- 2) At the conclusion of testing or maintenance work, attach a tag to the extinguisher showing the date and the signature of the person who performed the service.

f. Testing Interval

- 1) Each year, recharge soda acid and foam extinguishers, and weigh others according to the manufacturer's instructions. Inspect the body, hose, and

nozzle of the extinguisher, and examine the dry powder. Note: Testing is not necessary for stored pressure units unless a loss of pressure or other conditions indicates a need; however, units mounted in vehicles or otherwise subject to mechanical packing should have their powder examined.

- 2) Every five years, test the pressure parts of all extinguishers except Halon 1301 extinguishers; dry chemical extinguishers with braised-brass, mild steel, or aluminum shells; and dry-powder extinguishers for metal fires.
- 3) Every six years, empty dry-chemical, stored-pressure extinguishers and examine working parts for operability.
- 4) Every 12 years, test the pressure parts of Halon 1301 extinguishers; dry-chemical extinguishers with braised-brass, mild steel, and aluminum shells; and dry-powder extinguishers for metal fires.

g. Employee Training: Union & Training Expectations

- 1) Where fire extinguishers are provided for employee use, training will be provided on general principles of portable fire extinguishers, including stages of fires and classes of fire extinguisher. The emphasis should be on hazards of fighting a fire during the initial phases of a fire.
- 2) Personnel designated to use firefighting as part of a site Emergency Action Plan must have training in the use of appropriate equipment. Training must be conducted prior to initial assignment and annually thereafter or whenever there is a change in the Emergency Action Plan or new equipment is introduced.

Fire Prevention

1. General

- a. Develop an Emergency Preparedness Plan as outlined in Emergency Preparedness Plan.
- b. Conduct evacuation drills at least annually.
- c. Maintain good housekeeping to reduce fire hazards and to provide safe routes of egress should a fire occur.
- d. Conduct periodic workplace inspections to identify fire hazards such as unnecessary accumulation of combustibles (including paper and boxes), unnecessary storage of flammables, and sources of ignition.

2. Ignition Hazards

- a. Electrical wiring and equipment for light, heat, or power purposes will be properly installed.
- b. Equipment powered by internal combustion will be located with the exhausts positioned away from combustible materials. When the exhausts are piped outside the building under construction, a clearance of at least 6 inches will be maintained between piping and combustible material.
- c. Smoking is prohibited at or in the vicinity of operations that constitute a fire hazard. Such areas will be conspicuously posted as follows: "NO SMOKING OR OPEN FLAME."
- d. Portable, battery-powered lighting equipment, used in connection with the storage, handling, or use of flammable gases or liquids, will be approved for the hazardous locations.
- e. The nozzles of air, inert gas, and steam lines or holes used in the cleaning or ventilation of tanks and vessels containing hazardous concentrations of flammable gases or vapors will be bonded to the tank or vessel shell. Bonding devices will not be attached or detached while hazardous concentrations of flammable gases or vapors exist.

3. Temporary Buildings

- a. Temporary buildings will not be erected where the location adversely affects any means of employee exit.
- b. Temporary buildings, located within another building or structure, will be of noncombustible construction or combustible construction having a fire resistance rating of not less than 1 hour.
- c. Temporary buildings, located other than inside another building and not used for handling and storage of flammable or combustible liquids, flammable gases, explosives, or blasting agents, or similar hazardous occupancies, will be located at a distance of not less than 10 feet from another building or structure. Groups of temporary buildings, not exceeding 2,000 square feet in total, will be considered a single temporary building.

4. Open Yard Storage

- a. Combustible materials will be stored with regard to the stability of piles and in no case higher than 10 feet.

- b. Driveways between and around combustible storage piles will be at least 15 feet wide and maintained free of accumulations of rubbish, equipment, or other articles or materials. Driveways will be spaced to produce a maximum grid system unit of 50 feet by 150 feet.
- c. The entire storage site will be kept free from accumulations of unnecessary combustible materials. Weeds and grass will be maintained, and procedures will be established for periodic cleanup of the entire area.
- d. The method of piling combustible materials will be solid and in orderly regular piles. No combustible material will be stored outdoors within 10 feet of a building or structure.
- e. Portable fire extinguishing equipment, suitable for the fire hazard involved, will be provided at convenient, conspicuously accessible locations in the yard area. Portable fire extinguishers, rated not less than 2A:20BC, will be placed to assure that the maximum travel distance to the nearest unit will not exceed 100 feet.

5. Indoor Storage

- a. Storage will not obstruct, or adversely affect, means of exit.
- b. Materials will be stored, handled, and piled with regard to their fire characteristics.
- c. Non-compatible materials, which may create a fire hazard, will be segregated by a barrier having a fire resistance of at least 1 hour.
- d. Materials will be piled to minimize the spread of fire internally and to permit convenient access for firefighting. Stable piling will be maintained at all times. Aisle space will be maintained to safely accommodate the widest vehicle used within the building for firefighting purposes.
- e. A clearance of at least 36 inches will be maintained between the top level of the stored material and the sprinkler deflectors.
- f. Clearance will be maintained around lights and heating units to prevent ignition of combustible materials.
- g. A clearance of 24 inches will be maintained around the fire door's path of travel, unless a barricade is provided, in which case no clearance is needed. Material will not be stored within 36 inches of a fire door.

Temporary Heating Devices

1. Ventilation

- a. Fresh air will be supplied in sufficient quantities to maintain the health and safety of employees. Where natural means of fresh air supply are inadequate, mechanical ventilation will be provided.
- b. Heaters used in confined spaces necessitate that special care be taken to provide sufficient ventilation to ensure proper combustion, maintain the health and safety of workmen, and limit temperature increase in the area.

2. Clearance and Monitoring

- a. Temporary heating devices will be installed to provide clearance to combustible materials not less than the amount shown in the following table:

Minimum Clearance in Inches			
Heating Appliance	Sides	Rear	Chimney Connector
Room heater, circulating type	12	12	18
Room heater, radiant type	36	36	18

- b. Temporary heating devices that are listed for installation with lesser clearance than specified in the previous table must be installed in accordance with manufacturer's specifications and instructions
- c. Only heaters suitable for use on wood floors will be set directly upon wood floors or upon other combustible materials. When such heaters are used, they will rest on suitable heat-insulating material or concrete at least 1 inch thick or equivalent. The insulating material will extend beyond the heater 2 feet or more in all directions.
- d. Heaters used near combustible tarpaulins, canvas, or similar coverings will be located at least 10 feet from the coverings. The coverings will be securely fastened to prevent ignition or upsetting of the heater due to wind action on the covering or other material.

3. Stability

When in use, heaters will be set horizontally level, unless otherwise permitted by the manufacturer's instructions.

4. Solid Fuel Heater

Solid fuel heaters are prohibited in buildings and on scaffolds.

5. Oil Fired Heaters

- a. Flammable liquid-fired heaters will be equipped with a primary safety control to stop the flow of fuel in the event of flame failure. Barometric or gravity oil feed will not be considered a primary safety control.
- b. Heaters designed for barometric or gravity oil feed will be used only with integral tanks.
- c. Heaters specifically designed and approved for use with separate supply tanks may be directly connected for gravity feed, or an automatic pump, from a supply tank.
- d. Heater will be maintained in accordance with manufacturer's instructions.

5.3.3 The Operations Manager on location is responsible for:

1. Ensuring that all smoke/heat detectors, alarm panels and sprinkler systems are properly installed inspected and maintained including battery replacement within the facility.
2. Initiating system upgrades and any changes in the shop as required by local codes.
3. Maintaining a listing of all fire protection equipment
4. Maintaining all records on drills, fire safety inspections, and fire equipment maintenance and repair.
5. Coordinating fire drills and ensuring that the evacuation plan is posted.

5.3.4 Supervisors are responsible for:

1. Ensuring compliance with no smoking rules and safe work practices in all areas where flammable and combustible materials are used or stored.
2. Reporting all fires immediately to management and the Health and Safety Manager/Trainer.
3. Identifying employees for retraining.
4. Checking fire extinguishers monthly for proper inspection tag, pin and charge. Replacing discharged units.

5.3.5 Employees are responsible for:

1. Following all fire prevention rules.
2. Limiting cigarette smoking to designated areas only.
3. Reporting any unsafe condition or potential fire hazard to their Supervisors.
4. Visually inspecting fire extinguishers in their work zone daily.

5.3.6 Fire Extinguishers

1. Fire extinguishers will be selected according to the type of potential fire hazards and will be provided in visible and readily accessible locations.
2. Extinguishers will be provided in work areas where flammable or combustible materials are in use, in areas with open sources of ignition, and near exits.
3. Multipurpose (ABC/dry chemical) fire extinguishers are recommended, except where operations require specific extinguishing agents.
4. All fire extinguishers used by the company will be inspected and tagged.
5. Fire blankets will be located, in areas where flammable liquids are used. (Only non-asbestos blankets will be used.)
6. On location and in the trucks, employees are advised to keep all fire extinguishers in the red Stuart Dean box to prevent damage.

5.3.7 Fire Protection Inspections

Inspections are used to ensure that all fire protection equipment is in good working condition and that all fire hazards are identified and controlled.

Extinguisher will be inspected monthly by the competent person and annually by a licensed fire protection company.

5.3.8 Fire Safety

This section describes fire prevention methods and procedures to be taken in the event of a fire.

1. Floor plans indicating emergency exits and evacuation route(s) from your work area have been posted. Become familiar with them.
2. The floor plans also indicate the location of fire extinguishers in your area. Know how to use them.
3. Fire drills will be conducted periodically. Practicing evacuation could be the main factor in saving lives in a real emergency and your full cooperation is required during these drills.
4. In poorly lit areas, use a flashlight or non-halogen extension lamps for illumination. Never use matches or an open flame.

NOTE – Each Stuart Dean Company location is responsible for posting accurate floor plans with all means of egress clearly discernible. Also, the location of each fire extinguisher should be accurately marked on the floor plans. A copy of those floor plans should be placed in this manual.

Fire Extinguisher Fact Sheet



If there's a fire, call the Fire Department first **CALL 911**.
Get everyone outside. You should **ONLY ATTEMPT** to fight a small fire.
If the fire gets large, **GET OUT!** Close doors to slow the fire spread.

Remember....

P
A
S
S

Instructions for use of Fire Extinguisher

1. **Pull**
Pull the ring pin.
2. **Aim**
Aim the extinguisher nozzle at the base of the fire and stand 8 feet back.
3. **Squeeze**
Squeeze the lever, holding the extinguisher upright.
4. **Sweep**
Sweep from side to side at the base of the fire. Watch for reflash.
Discharge the contents of the extinguisher.

The Fire Extinguishers used are multi-purpose and are called **A, B, C** extinguishers.

A TYPE (trash, wood, and paper)
B TYPE (flammable liquids)
C TYPE (electrical equipment)

Fire Extinguishers need to be maintained and inspected!

5.4 Aerial Lifts

1. Purpose

This manual outlines the requirements for the operation of aerial lifts and scissor lifts as required by OSHA standards 29 CFR 1926.451-454. The purpose of this manual is to ensure all lifts are operated in a consistent and safe manner according to manufactures guidelines and the procedures outlined.

2. Scope

Stuart Dean Company is committed to providing their employees with the tools necessary to ensure a safe workplace. This policy applies to all Stuart Dean Company employees engaging in work on a lift, operating a lift or who are responsible for maintenance or repairs of a lift.

3. Definitions

Authorized employee - An employee whose job requires him/her to operate or use an aerial lift device.

Aerial Lift Device – Any vehicle-mounted device, telescoping or articulating, or both which is used to position personnel at an elevated worksite.

Aerial Lift – An aerial lift device used to elevate personnel to job sites above ground including extensible boom platforms, aerial ladders, articulating boom platforms and vertical towers.

Competent Person – This person has complete knowledge of lift operations, functions, procedures, rules and regulations.

This person is capable of identifying existing and predictable hazards in the use of aerial and scissor lifts which are hazardous and/or dangerous to employees and has authorization to take prompt corrective measures to eliminate the hazards.

Guardrail System – A vertical barrier, consisting of, but not limited to: top rails, Midrail and posts. Erected to prevent employees from falling off a work platform.

Personal Fall Arrest System – A system used to arrest, or stop an employee's fall.

Qualified Trainer – One who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems related to aerial lifts and/or scissor lifts and the work being performed.

Fall Restraint System – A means of preventing a worker from being exposed to any fall regardless of distance.

Scissor Lift – A mobile supported scaffold which can be powered or unpowered, is portable and caster or wheel- mounted.

4. Objectives

The objectives of this manual are:

- To ensure proper training is provided.
- To ensure lifts are in good, safe operating condition.
- To ensure proper oversight when a lift is in use.
- To ensure all operators know the limitations of the lift in use.
- To ensure operators know how to safely operate the lift.
- To ensure correct procedures are followed.
- Ensure no modifications are made to the equipment. No variation
- No load when considering occupants and other material exceed manufacturer load limit
- Ensure back-up alarms are functioning and audible

5. Responsibilities**a. Safety Department**

Responsible for developing a policy on aerial and scissor lift operations. Must review and revise the policy as needed on at least an annual basis. Provides training of competent personnel, operators and users. Maintains training documentation and other information as needed.

b. Competent Person

This person will generally serve as the worksite supervisor and oversee the lift operation. This person is responsible for ensuring this policy is followed and for the safety of the employees.

c. Area Departments

Each department that possesses or uses a lift is responsible for all aspects of usage as outlined in this manual. The department supervisor must ensure proper training is given, lift inspections are properly made (Appendix A and B), lift usage is supervised by the foreman and necessary maintenance is performed (Appendix C).

Each department must keep accurate records and documentation and provide copies to the Safety Department as needed.

d. Employees

All employees are responsible for operating and working on lifts in a safe and correct manner in accordance to the lift operation's manual, competent person's instructions and this manual. Any employee that does not fully

understand any part of the lift in use, their training or this manual must notify the worksite supervisor immediately.

6. Training

All employees of Stuart Dean Company will receive training for aerial lifts and scissor lifts from a qualified trainer. Safety Manager will provide training via on-site, hands-on training, training videos, classroom meetings, booklets, this policy and any other viable means necessary. Safety Manager shall certify employee training has been accomplished and is being kept up-to-date. No one not certified may operate equipment.

The certification shall contain:

- Names of employees trained, retrained and familiarized;
- Name of the trainer(s);
- Training covered;
- Date of training; and
- Written records of all lift inspections and repairs.

Retraining shall be required when:

- Employees do not demonstrate the skill or understanding needed for safe operating procedures;
- Changes in the worksite present hazards not previously known to the employee;
- Changes in the type of lift, fall protection, falling object protection or other equipment presents a hazard not previously known to the employee; and
- Inadequacies in an employee's work indicate the employee has not retained the requisite proficiency.

Operators and users of lifts will be trained in the following:

- Types of lifts and their uses;
- Operator's manuals for specific lifts;
- Pre-start inspection;
- Worksite inspection;
- Stability factors concerning the lift;
- Safety equipment and devices;
- Safety procedures;
- Operation of the lift;
- Control features of the lift;
- Fall protection; and
- Shutdown procedures.

7. Lift Operations

The safety of all employees is top priority at Stuart Dean Company. It is important for the following guidelines to be administered and adhered to at all times. Foreman must be present to oversee the use of any lift. Each department supervisor must ensure their department has a properly trained Foreman available when work is being performed on a lift. Foreman has many responsibilities and has the authority to take steps necessary to keep all employees safe. This person performs all lift inspections. All lifts must be inspected before use. The inspection of the lift is very important in preventing accidents from damaged or faulty lifts. Foreman physically supervises the work on and around lifts. This person must be trained in fall protection and ensure all employees working in the lift basket or on the lift platform are using the appropriate fall protection as stated in the lift operator's manual.

- a. The pre-start inspection includes the following items:
 - Operational manual present in lift;
 - Operating controls;
 - Inspection of the boom for damage or weakness
 - Inspection of the guardrail or bucket for damage or weakness;
 - Check hydraulic and fuel systems for leaks and proper fluid levels;
 - Outriggers should work properly;
 - Emergency control buttons should work correctly;
 - Tires must be properly inflated and inspected for damage;
 - Safety guards should be checked for malfunctions. Check balance sensors, level sensors/controls, lights, interlock devices, backup alarm and intercom for proper operation;
 - Emergency descent system should be checked by raising the platform a couple of feet and then turning the lift off and using the auxiliary power to lower the lift; and
 - Other items as necessary.
- b. It is necessary to inspect the worksite also. Some items to inspect are listed below.
 - The ground on which the lift will be used needs to be solid and as level as possible.
 - Hazards that may create dangerous driving conditions such as overhead power lines, holes, drop-offs, bumps, lumber, tools and debris must be identified and procedures to avoid any hazards made known to all employees. OSHA requires employees maintain a ten-foot clearance of all power lines with less than 50 kilovolts. Electricians

have different guidelines and should consult with their employers concerning this issue.

- Weather conditions must be considered before using any lift.

c. After the inspections have been conducted, the following procedures must be followed to start using the lift:

- Ensure all employees on the worksite have been properly trained and authorized to work on the lift or to operate the lift;
- Set the outriggers, brakes and any other stabilizing mechanisms;
- Make sure the guardrails are in place;
- Make sure the load capacity is not exceeded and the load is balanced;
- Do not sit or climb on the basket or the guardrails. Keep feet on the floor of the lift.
- All Labor must have PFAS when in the bucket, this applies whether the bucket is extended or not
- Never belt-off to an adjacent pole, structure or equipment while working from the lift;
- De-energize the controls after the lift has been placed into the work position to prevent accidental movement. Never move the lift while employees are in the basket or on the platform;
- Hard hats must be worn by all employees;
- Never use the lift as a crane to lift loads; and
- Scissor lifts can only be used on solid, level ground.

Fall Protection must be utilized at all times while working on a lift platform or in a lift basket.

8. Shutdown Procedures

The first step is to ensure the lift is lowered and safely resting on its supports. If the lift is not on its supports, damage may occur to the lift as well as create a risk for tipping over while being transported. When necessary, secure the lift to its supports to ensure it does not move while transporting it. Raise the outriggers, if the lift has them, and shut off the power supply to the lift and outriggers. Remove pads used for outriggers and wheel chocks. Remove the key from the ignition to prevent any unauthorized use of the lift. Check the operator's manual for any additional procedures.

9. Additional Inspections

- If a lift has not been used in over two months, Foreman should perform a systematic inspection of the lift equivalent to the pre-start inspection.
- An annual inspection of the lift must be performed by a qualified mechanic

authorized to perform maintenance on the lift or by a representative of the lift manufacturer.

10. Fall Protection

Fall protection is required for all employees that perform work on a lift. Stuart Dean Company requires each department to follow the fall protection regulations as provided by the lift manufacturer in the operator's manual.

11. Lift Information

Each lift must have at least the following information displayed on the lift in a place that is easily accessible and easily read:

- Serial Number, make and model;
- Manufacturer's name, number and address;
- Maximum number of occupants; and
- Maximum lift height

12. Records

Training, inspections and maintenance must be documented and kept on file in the appropriate locations.

- Training records will be kept on file for five years in the Safety Department.
- Pre-Start and worksite inspections should be kept on file for a period of five years by the department using the lift.
- Annual and systematic inspections should be kept on file in the department using the lift during the whole time the company owns the lift.



Pre – Start Inspection

Stuart Dean Company

Lift Serial # _____ **Make** _____

Model _____

Item	Pass	Fail	N/A
Operating Controls			
Boom			
Guardrail / Bucket			
Hydraulic System			
Fuel System			
Outriggers			
Emergency Control Buttons			
Tires			
Balance Sensors			
Level Sensors			
Lights			
Backup Alarm			
Intercom			
Emergency Descent System			
Safety & Warning Decals Present			
Structural Damage			
Other			

Comments: _____



Shut Down Checklist

Stuart Dean Company:

Lift Serial # _____ **Make** _____

Model _____

Item	Yes	No
Lift lowered, resting on supports		
Lift secured to supports		
Outriggers raised		
Lift and outriggers power shut off		
Outrigger pads removed		
Wheel chocks removed		
Ignition key removed		
Other:		
Other:		
Other:		
Other:		



Preventative Maintenance Checklist

Stuart Dean Company

Lift Serial _____ Make _____

Model _____

Item	Pass	Fail	Comment
Oil			
Power Steering Fluid			
Coolant			
Windshield Washer Fluid			
Batteries			
Belts and Hoses			
Hydraulic Fluid			
Hydraulic Lines			
Stop Lights			
Tail, Direction, and Head Lights			
Flashers			
Tires and Wheels			
Universal Joints			
Steering			
Brakes			
Exhaust System			
Clutch			
Horn			
Wipers			
Seatbelt			
Gauges			
Decals and Placards			
Bucket/Platform			
Boom			
Coupling Devices			
Tie-Off Point			
Other:			

5.5 Ground Fault Protection (GFCI)

1. This GFCI Program shall be implemented by one or more competent person on site.
2. This procedure applies to all construction sites covering all cord sets, receptacles which are not a part of the building or structure and are not part of the permanent wiring system, equipment connected by cord and plug which are available for use or used by employees.
3. Each cord set, attachment cap, plug and receptacle or cord sets and any equipment connected by cord and plug, except cords sets and receptacles which are fixed and not exposed to damage, will be visually inspected before each day's use for external defects, such as deformed or missing pins or insulation damage and for indications of possible internal damage.

Any equipment found damaged or defective must not be used until properly repaired and tagged as defective or out of service.

4. Only heavy-duty extension cords shall be used and be tagged as UL Approved by a testing laboratory.
5. All 120-volt, single-phase, 15- and 20-ampers receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are used by employees, shall have approved ground-fault circuit interrupters for personnel protection. Receptacles on a two-wire, single-phase portable or vehicle mounted generator rated not more than 5kw, where the circuit conductors of the generator are not insulated from the generator frame and all other grounded surfaces, do not need to be protected with ground-fault circuit interrupters.
6. All generator sets over 5kw must be earth grounded with cables sized to maximum load.

Definitions

Competent Person – A person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has the authorization to take prompt corrective measure to eliminate them.

Ground Fault Circuit Interrupter – A device for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

**5.6 Hand and/or Power Tools
General**

1. Keep hand and power tools in good repair and use them only for the task for which they were designed. Use tools only in accordance with the manufacturer's recommendations.
2. No guards are permitted to be removed.
3. Remove damaged or defective tools from service. Affix a "Do Not Use" tag (or similar) to the tool until repairs are made or the tool is destroyed.
4. Provide employees using hand tools or portable powered equipment with personal protective equipment (PPE) and train employees in the use of PPE required for the operation being undertaken.
5. Keep surfaces and handles clean and free of excess oil and grease to prevent slipping.
6. Do not carry sharp tools in pockets; this practice may cause puncture wounds.
7. Clean tools and return to a suitable toolbox, room, rack, or other storage area upon completion of a job.
8. Before applying pressure, ensure that wrenches have a good bite.
9. Brace yourself by placing your body in the proper position so that you will not fall in case the tool slips.
10. Make sure hands and fingers have sufficient clearance in the event the tool slips.
11. Always pull on a wrench, never push.
12. When working with tools overhead, place tools in a holding receptacle or secure when not in use to prevent them from falling.
13. Do not leave tools in or on passageways, access ways, walkways, ramps, platforms, stairways, or scaffolds where they can create a tripping hazard.
14. Do not throw tools from place to place or from person to person, or drop tools from heights.
15. Use non-sparking tools in atmospheres with fire or explosive characteristics.
16. Inspect all tools prior to start-up or use to identify any defects.
17. Powered hand tools should not be capable of being locked in the ON position, except as noted elsewhere in this standard.

18. Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
19. Ensure that all portable powered tools designed to accommodate guards are equipped with such when in use.
20. Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.
21. Do not use cheaters to increase leverage on tools.
22. Make provisions to prevent machines from automatically restarting upon restoration of power.
23. Where Stuart Dean issues tools to its employees, the supervisor is responsible for the safe condition of tools and equipment.
24. Where workers furnish their own tools, their tools must conform to the requirements demanded for safety and efficiency. The supervisor has the responsibility to regularly inspect these tools for defects.
25. Operating a portable powered equipment while on a ladder is strongly discouraged.

Electrical Power Tools

1. Electric-power-operated tools will be either of the approved double-insulated type or grounded in accordance with the National Electric Code.
2. The use of the electric cord for hoisting or lowering electric tools is an unsafe practice and will not be permitted.
3. All handheld powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders, belt sanders, reciprocating saws, saber saws, and other similar operating powered tools will be equipped with a momentary contact ON/OFF control and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.
4. All other handheld powered tools such as circular saws, chain saws, and percussion tools without positive accessory holding means will be equipped with a constant pressure switch that will shut off the power when the pressure is released (i.e., "dead man" switch).

Grinding Tools

1. Inspect work rests and tongue guards for grinders.
 - a. Work rest gaps should not exceed $\frac{1}{8}$ inch.
 - b. Tongue guard gaps should not exceed $\frac{1}{4}$ inch.
2. Do not adjust work, guards, or tool rests while the grinding wheel is moving.
3. Inspect the grinding wheel for cracks, chips, defects, or excessive wear. Remove from service if any defects are found.
4. Wear goggles when grinding. A clear full-face shield may be worn with the goggles.
5. Do not use the side of a grinding wheel unless the wheel is designed for side grinding.
6. Always stand to the side of the blade, never directly behind it.
7. Use grinding wheels only at their rated speed.
8. Grinding aluminum is prohibited.
9. Ensure the correct guard is installed on the grinder. Select the guard on the basis of the depth and diameter of the abrasive wheel or disc chosen for use. The guard must be positioned to protect a minimum of 50 percent of the wheel or disc between the operator and tool.
10. Workers shall secure the grinder with both hands during its operation.
11. Grinders will be operated only by personnel who have been specifically trained by their supervisor.

Power Saws

1. Require that circular saws are fitted with blade guards.
2. Inspect each day prior to use. Remove damaged, bent, or cracked saw blades from service immediately.
3. Require that table saws are fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.
4. Require guards that cover the blade to the depth of the teeth on hand-held

circular saws. The guard should freely return to the fully closed position when withdrawn from the work surface.

Mechanized Machinery

Stuart Dean's primary fabrication shop will eventually possess several pieces of mechanized machinery that are utilized by authorized personnel for the safe fabrication of steel. Current inventory includes the following machines:

1. Iron Worker – Notching, punching and sheering of plate alloys
2. Band Saw – Cutting plate and formed alloys tubing and piping
3. Drill Press – Boring plate and formed alloys

Mechanized machinery is maintained in accordance with manufacturing recommended preventative maintenance programs. Only trained and authorized personnel are permitted to operate mechanized machinery.

Woodworking Machinery

1. Do not leave woodworking tools running when unattended.
2. Keep the operating table and surrounding area clear of debris.
3. Do not use compressed air to remove dust and chips from woodworking machinery.
4. Locate the ON/OFF switch to prevent accidental start-up. The operator must be able to shut off the machine without leaving the workstation. Safety goggles and kickback aprons should be provided for and worn by operators. Respirators or local exhaust ventilation may also be necessary based on the type of material being cut or sanded.
5. Guard planers and joiners to prevent contact with the blades throughout the full length of the cutting area.
6. Ensure that band saw blades are fully enclosed except at the point of operation.
7. Require that swing cut-off saws have a guard completely covering the upper half of the saw.
8. Require that circular cross-cut and rip saws are provided with a hood guard, splitter, and anti-kickback device. The hood should adjust itself automatically

to the thickness of and remain in contact with the material being cut. All circular saws will be provided with a hood guard.

9. Ensure that exposed parts of the saw blade under the table are properly guarded.
10. Equip all swing cutoff and radial saws that are drawn across a table with limit stops to prevent the saw from traveling beyond the edge of the table.
11. Hold the material being cut firmly against a back guide or fence and cut with a single, steady pass.
12. Cut green or wet material slowly and with caution. Check all material being cut for nails, hard knots, etc.
13. Use a push stick when:
 - a. The cutting operation requires the hands of the operator to come close to the blade
 - b. Small pieces are being machined.
14. When cutting long stock, provide extension tables and a helper to assist the operator.
15. Adjust saw blades so they clear only the top of the cut.
16. Automatic feed devices should be used whenever feasible.
17. When drills are used:
 - a. Take care to prevent clothing from being wound around the drill. Wear sleeves buttoned at the wrist or short-sleeved shirts.
 - b. Clamp or hold down material being drilled to prevent spinning with the drill
 - c. If the bit is long enough to pass through the material, provide against damage and injury
 - d. Secure magnetic drills with a chain or rope to prevent falling. Label cord connections to prevent unplugging.
18. When sanders are used:
 - a. Move sanders away from the body
 - b. Because dust may create an explosion hazard, guard against open flames and sparks

Pneumatic Tools and Equipment

1. Require that pneumatic tools have:
 - a. Tool retainers to prevent the tool from being ejected from the barrel during use
 - b. Safety clips, chains, tie wires, or other retaining devices to secure connections between tool/hose/compressor to prevent whipping in case of disconnection or failure.
2. Do not lay hose in walkways, on ladders, or in any manner that presents a tripping hazard.
3. Never use compressed air to blow dirt from hands, face, or clothing.
4. Do not use compressed air for cleaning purposes unless the pressure is reduced to 30 pounds per square inch (psi) or less. This rule does not apply for concrete form, mill scale, green cutting, and similar cleaning operations. Proper respiratory, hand, eye, and ear protection must be worn.
5. Never raise or lower a tool by the air hose.
6. Shut off the pressure and exhaust from the line before disconnecting the line from any tool or connection.

Power Actuated Fastener Tools

1. Use powder-actuated tools that comply with the requirements of the American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Standard A10.3 – 2006 – Powder-Actuated Fastening Systems.
2. Assess local and state regulations governing the use of these tools to ensure compliance.
3. Use only individuals who have been trained by a manufacturer's representative and possess the proper license to operate, repair, service, and handle powder-actuated tools.
4. With each tool, the manufacturer or supplier should furnish a detailed instruction manual covering the application, operation, and maintenance of the tool. The manufacturer's recommendation for size of charge, stud unit, or pin, and for specific application must be followed explicitly by the operator.
5. Keep cartridges or shells in the original containers, in separate metal containers, or in the carrying case provided with the tool, and then stored in locked containers. Keep cartridges of varied charges or forces segregated from each other.
6. Take precaution, as defined by the manufacturer, in the event of a misfire.
7. Provide information from the manufacturer on the safe use, testing, and maintenance of each type of tool in each tool kit.
8. Never use a powder-actuated tool in a flammable or explosive atmosphere.
9. Require the use of goggles or a full-face shield as well as safety glasses during operation of powder-actuated tools.
10. Use only tools that are provided with a shield or muzzle guard. This shield or guard should be of a size, design, and material that will effectively confine flying particles and prevent escape of ricocheting studs and pins.
11. Ensure that powder-actuated tools are not able to be fired unless the tool is pressed against the work surface.
12. Always handle powder-actuated tools like firearms, with hands clear of the muzzle and barrel pointed away from all persons, especially when the tool is being closed or assembled after loading.
13. Ensure that the tool is not able to fire if the tool is dropped when loaded.

14. Ensure that firing the tool requires two separate operations, with the firing movement being separate from the motion of bringing the tool to the firing position.
15. Provide signs and barricades when shooting into walls or floors with personnel working on the other side.
16. Never fire into easily pierced or soft substrates or into materials of unknown resistance to piercing. In these situations, there is potential for the fastener to penetrate and pass through, creating a flying projectile hazard. If penetration of these materials is required, the material should be backed with a box of wood or sand at least four inches thick and of adequate area.
17. Do not use powder-actuated tools in reinforced concrete if there is the possibility of striking the rebar.
18. Do not use powder-actuated tools on cast iron, high carbon, heat treated steel, or armor plate, thin slate, marble, glass, live rock, glazed brick or tile, terra cotta, or other brittle substances, or where the composition is unknown.
19. Do not fire studs closer than three inches from the edge or corner when being used on brick or concrete. Do not fire studs closer than ½ inch from the edge when being used on steel.
20. Never load and leave a powder-actuated tool unattended. It should be loaded only prior to its intended firing. Use only studs or pins specifically designed for the tool.
21. Test tools each day prior to loading by testing safety devices according to the manufacturer's recommended procedure.
22. Inspect, clean, and store powder-actuated tools in a safe place at the end of each day. No tool will be stored loaded. Store tools with the barrels removed or breech open.
23. At the manufacturer's recommended intervals, the tool will be completely dismantled and carefully inspected for wear on the safety devices by a qualified person familiar with the tool. Worn parts will be replaced before the tool is used again. It is recommended that factory-authorized service representatives be utilized for inspection, repair, and parts replacement, where possible.

Chain Saws

1. Inspect the saw prior to each use and periodically during daily use.

2. Never cut above chest height.
3. Require that the idle is correctly adjusted on the chain saw. The chain should not move when the saw is in the idle mode.
4. Start cutting only after a clear escape path has been made.
5. Shut the saw off when carrying through brush or on slippery surfaces.
6. Require applicable protective gear. This will include, but is not limited to:
 - a. Logger's safety hat
 - b. Safety glasses and face shield
 - c. Steel-toed boots
 - d. Protective leggings
 - e. Hearing protection
 - f. Work gloves
7. Inspect saws to ensure that they are fitted with an inertia break and hand guard.
8. Do not allow others in the area when chain saws are operated.
9. Make sure there are no nails, wire, or other imbedded material that can cause flying particles.
10. Do not operate a chain saw that is damaged or improperly adjusted, or is not completely and securely assembled. Always keep the chain sharp and the chain and teeth tight. Worn chains should be replaced immediately.
11. Keep all parts of your body away from the saw chain when the engine is running.
12. For all operations, only personnel specifically trained and certified as competent by Stuart Dean may operate chain saws.

Hand Operated Pressure Equipment

1. Direct pressure equipment such as grease guns, and paint and garden sprayers away from the body and other personnel in the area. The person operating any equipment such as this, which has a potential for eye injury, must wear protective goggles.
2. The noise produced when using certain types of pressure equipment may

require the use of hearing protection.

3. Never allow the nozzle of a pressurized tool to come in contact with any body parts while operating. There is potential for injection of a chemical directly into the user's body, resulting in severe injury or death.

Gasoline-Powered Tool

1. Never pour gasoline near hot surfaces.
2. Never fuel around an open flame or while smoking.
3. Shut down the engine before fueling.
4. Provide adequate ventilation when using in enclosed spaces.
5. Use only Underwriters Laboratories (UL) - or FM-approved safety cans to transport flammable liquids. The use of unapproved containers for gasoline is strictly prohibited.
6. Label gasoline containers in compliance with Hazard Communication requirements, indicating the chemical and physical hazards of the product.

Inspection

Inspect all hand tools on a regular basis. Immediately remove defective tools from service, and tag or destroy them to prevent further use.

5.7 Lockout/Tagout (LOTO)

1. Purpose and Scope

This procedure establishes requirements for the control or lockout/tagout of hazardous energy and the use of isolating devices used.

The lockout/tagout procedure shall be used to ensure that equipment is isolated from all potentially hazardous energy sources during maintenance or servicing. The purpose of isolating equipment is to prevent injury due to the unexpected start up or energization during maintenance or servicing.

The types of servicing or maintenance that require equipment to be locked or tagged out at this facility are:

2. Responsibility and Training

Only authorized employees shall be permitted to perform maintenance or servicing that requires lockout/tagout. Authorized employees shall be trained in the current lockout/ tagout procedures. Each new employee will be trained on the purpose and use of lockout/ tagout by _____. Re-Training will occur for any new equipment/procedure or if unsafe actions are observed.

Name	Job Title	Date of Training

3. Preparation for Lockout/Tagout

Identify equipment and hardware needed to lock or tag out that equipment. All locks/tags will have the name of the individual on the lock that is in place. Survey your facility to determine which equipment requires lockout/tagout to be used during maintenance or servicing.

Make a survey to locate and identify all energy isolating devices, such as switches, fuses, valves, shunts, blanks, etc., to be locked out, depressurized or neutralized. More than one energy source may be involved (i.e., electric, hydraulic, pneumatic or spring, loading, natural gas, steam or hazardous chemicals).

Determine what hardware is needed to lockout and/or tagout a piece of equipment.

In this facility, the following equipment requires lockout/tagout.

Machine/Equipment	Source and Magnitude of Energy	Means of Isolation
<i>Example: Slitter Machine</i>	<i>220 Volt Electric, Hydraulic Piston</i>	<i>Disconnect main power, bleed hydraulic line</i>

4. Protective Material and Hardware

In this facility, the following hardware is used to lock out equipment.

<i>Examples: Padlock for Switches</i>	<i>Valve Lock for Pipe Valves</i>	<i>Canister – for Cord and Plug Equipment</i>

5. Sequence of Lockout/Tagout Procedure

*****Note:** The following is a general procedure, the principle of which can be applied to specific pieces of equipment. For the lockout/tagout program to be complete, specific lockout/tagout procedures for specific machines at this facility must be defined and followed. ***

- A. Notify all employees affected by the lockout/tagout procedure. This includes the operator for a particular piece of equipment being worked on.
- B. If machine is operating, shut it down by following the "normal" procedure (stop button, toggle switch).
- C. Apply the appropriate device(s) to isolate the equipment from its energy source(s). If lockout is impossible or impractical and tagout only is being used, then tagging out equipment must be as effective as locking it out.
- D. Any stored energy must be dissipated, released or bled off.
- E. After energy isolation was achieved, check to ensure that equipment was completely isolated by operating the "on" switch (Zero Energy). If the equipment does not operate, then it is isolated. Return the switch to the "off" position.

6. Procedures Involving More Than One Person

- A. Use above steps – in addition, each employee working on a piece of equipment must apply his/her personal lock to the lockout device on each control point of the machine.
- B. The personal lockout device can be removed when a specific person has completed their portion of work on a piece of equipment.

7. Cord and Plug Connected Equipment

- A. Remove plug from power source.
- B. Place plug in secured device such as a canister. Affix lock to the canister to lock it shut.
- C. Remove isolating device only when the equipment is ready to be placed back into service.

8. Returning Equipment to Normal Operation

- A. After servicing or maintenance is completed and equipment is read for production, check the area around the machine to ensure that no personnel are exposed to the machine.
- B. Remove all tools from the equipment. Replace all guards. Remove all lockout or tagout devices.

9. Periodic Inspection

Periodic inspection of the energy control procedures shall be conducted at least annually by authorized employees other than those utilizing the procedures to ensure that the correct procedures are being followed. In this facility the inspection will be performed by _____.

The periodic inspection shall be designed to correct any deviation or inadequacies in the application of the lockout/tagout procedure.

The inspection certification shall be in writing and include information such as:

- A. Identification of machinery and equipment
- B. Inspection date
- C. Interview with authorized employees
- D. Name of auditor

10. Enforcement Procedure

Failure to follow the lockout/tagout procedure will result in the following disciplinary action:

APPENDIX A

CERTIFICATION OF INSPECTION

Equipment #	
Equipment Description:	
Make:	
Model:	
Serial #	

The energy control procedures for this equipment are categorized as: (Example: Electrical Lockout, Electrical and Hydraulic Lockout, Lockout of Compressed Air or Gas Steam, Lockout of Stored Mechanical Energy):

_____.

This equipment, its energy isolating devices and applicable lockout/tagout procedures have been inspected and evaluated:

The conclusions are:

	Yes	No
1. Do all involved employees understand their responsibilities?	_____	_____
2. Are energy control procedures followed by all?	_____	_____
3. Are energy control procedures adequate to protect employees from unintended/unexpected start up or energization of equipment?	_____	_____
4. Recommended Improvements:		

5. Recommendations Implemented:

6. The following authorized and affected employees were evaluated:

Authorized Employee	Affect ed Employees

Inspected by: _____

Date: _____

Basic Rules for Using Lockout or Tagout System Procedures

All equipment shall be locked out or tagged out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Do not attempt to operate any switch, valve or other energy isolating device where it is locked out or tagged out.

Lockout or Tagout Procedure

Entry No.	Description
1.	Name of Company
2.	Type(s) and Magnitude of Energy and Hazards
3.	Type(s) and Magnitude of Employees Authorized to Lockout or Tagout
4.	Name(s)/Job Title(s) of Employees and How to Notify
5.	Type(s) and Location of Energy Isolating Means
6.	Type(s) of Stored Energy Methods to dissipate or Restrain
7.	Method(s) Selected i.e., Locks, Tags, Additional Safety Measures, etc.
8.	Type(s) of Equipment Checked to Ensure Disconnections
9.	Name(s)/Job Title(s) of Employees Authorized for Group Lockout or Tagout

SECTION SIX**6.0 CHEMICAL HAZARDS****6.1.0 Hazardous Chemical Exposure**

There are four (4) ways you can become exposed to hazardous chemicals: through Inhalation, Skin Contact or Absorption, Ingestion, and Injection. Understanding these methods of exposure will help you take the necessary steps to avoid exposure.

- **Inhalation** of vapors, gases, mists or particles can result in negative health effects. Once inhaled, chemicals can cause damage through direct contact with respiratory tract tissue, with health effects ranging from simple irritation to severe tissue destruction. Inhaled substances can also be absorbed into the blood and circulated throughout the body into organs that have a particular affinity for the chemical.
- **Skin (dermal) Contact** can cause mild effects, such as redness, or more severe effects such as the destruction of skin tissue. Many chemicals can be absorbed into the bloodstream through the skin. Once absorbed, they can cause damage to internal organs. Rashes, cuts, and abrasions on the skin increase the potential for chemicals to enter the body upon contact. The eyes are particularly sensitive to chemicals. Even a short exposure can cause severe effects to the eyes and the substance can be absorbed through the eyes to internal organs where they cause damage.
- **Ingestion** of chemicals do not generally harm the gastrointestinal tract itself unless the chemicals are irritants or corrosives. Chemicals can be absorbed into the gastrointestinal tract where they can be transported by the blood to other organs where they can cause damage.
- **Injection** of substances can occur if the skin is penetrated or punctured by contaminated objects. Effects can then occur as the substance is circulated in the blood and deposited in the organs.

6.1.1 Physical Hazards of Chemicals

The following terms are used to describe the physical hazards of chemicals:

- **FLAMMABLE AND COMBUSTIBLE LIQUIDS** – are materials which, under standard laboratory conditions, can generate sufficient vapors to cause fire in the presence of an ignition source. Materials which generate sufficient vapors to ignite at temperatures below 100° F (38° C) are “**Flammables**”, whereas materials that require temperatures above 100° F (38° C) to provide sufficient vapors for ignition are “**Combustibles**”. Flammable liquids are classed as 1A, 1B, or 1C, with 1A being the most flammable. Depending on density, vapor trails can rise, sink, or travel horizontally to reach an ignition source, resulting in a flashback fire. Fire can also result from reactions between flammables or combustibles and oxidizers.
- **CORROSIVES** – are materials that corrode metal and generally present a storage hazard as well as health hazards.

- **REACTIVES** - are chemicals that release energy quickly and forcefully, depending on various environmental conditions. In some cases, the release of energy may cause a detonation.
- **OXIDIZERS** – are fire and explosion hazards when in contact with organic material or strong reducing agents.
- **WATER REACTIVES** – react with water to form heat and flammable or explosive gases.
- **PYROPHORICS**- ignites spontaneously in the air.
- **PEROXIDE-FORMING CHEMICALS AND ORGANIC PEROXIDES** – are among the most hazardous substances handled in chemical use areas. They are generally low-power explosives that are sensitive to sparks, shock, or other, accidental ignition. Organic Peroxides have a O-O bond that makes them unstable. Some other organic compounds can form peroxides when exposed to light and air.
- **COMPRESSED GASES IN CYLINDERS** – pose special hazards because of the ability of gas to quickly and widely disperse when released.
- **CRYOGENS** – are super cooled liquids that can damage body parts.

METHYLENE CHLORIDE OSHA standard (Title 29 Code of Federal Regulations, Parts 1910.1052, 1915.1052, and 1926.1152) covers all occupational exposures to Methylene Chloride in all workplaces in general industry, shipyard employment, and construction.

Always Refer to the OSHA Standard and the SDS before using Methylene Chloride Products at ANYTIME.

ALWAYS SEARCH AND SAMPLE THE MANY NON-MC PRODUCTS FOR USE AS A “SAFER ALTERNATIVE” TO METHYLENE CHLORIDE.

6.1.2 Safe Operating Procedures (SOP'S) for Hazardous Chemicals

1. Know the general properties associated with the materials you are using. Always use the Safety Data Sheets-SDS to acquaint yourself with the physical and health hazards of a chemical.
2. Wear appropriate **Personal Protective Equipment (PPE)** including eye protection, outer garment, and gloves.
3. Conduct all processes that may release hazardous vapors or mists inside an adequate containment/ventilation device.
4. Wear appropriate respiratory equipment when airborne concentrations cannot be reduced by engineering controls. The type of respirator **MUST** be approved by your supervisor.
5. Review emergency procedures and ensure that necessary supplies to handle spills are available at the site.

6. Know the location of all safety equipment such as the eyewash; spill kit, fire extinguisher, fire alarm, and evacuation routes. Know emergency telephone numbers and have them posted at the telephone.
7. Do not leave chemical processes unattended.
8. Keep all work areas clean and uncluttered. Make sure all safety equipment is properly labeled and stored. Good Housekeeping prevents accidents.
9. Do not eat, drink, smoke, chew gum, store food, beverages, tobacco, cosmetics or medications in areas where chemicals are used or stored.
10. Confine long hair and loose clothing while working with chemicals. Always wear safety work boots. Do not wear sandals or open toed shoes.
11. Do not smell or taste chemicals.
12. Properly dispose of all empty chemical containers in the appropriate receptacles that are clearly labeled.
13. Always thoroughly wash hands and other exposed skin areas after using chemicals. Thoroughly wash hands before eating or drinking.

6.1.3 Chemical Container Labeling SDS Hazcom-GHS

The Operations Manager or supervisor will verify that all drums, cans, and portable containers of cleaners, strippers, lacquers, coatings, solvents, and other chemical products used on the job site have clear and legible labels that:

- a. Show product name, manufacturer, and mfg. address.
- b. Correspond to the product name on the SDS -MSDS.
- c. Have an appropriate hazard warning.

All containers shall be labeled with the appropriate Information and Warnings, as required by Regulation/ GHS Protocols.

Acetone



DANGER

Highly flammable liquid and vapor. Causes serious eye irritation. May cause drowsiness or dizziness. Repeated exposure may cause skin dryness and cracking.



PREVENTION

Keep away from heat, sparks, and open flames. — No smoking. Keep container tightly closed.

Avoid breathing vapors. Use only outdoors or in a well-ventilated area. Wear eye protection.

RESPONSE

If on skin: Rinse skin with water.

If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a doctor if you feel unwell.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

In case of fire: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide for extinction.

All vans/ trucks shall be equipped with a binder containing copies of Safety Data Sheets SDS for each chemical utilized by the Company.

Each employee will receive specific instruction as to the types of chemicals they are utilizing.

Training will be "Refreshed" whenever a new chemical is introduced into inventory.

The HMIS and NFPA classification systems are color coded as follows:

HAZARDOUS MATERIALS CLASSIFICATION



Blue = Health Hazards

Red = Fire Hazards

Yellow = Reactivity Hazards

White = Specific Hazards or PPE

Specific instructions on what to do if an accident occurs are listed on the SDS under Emergency Procedures.

Trade Secrets - A manufacturer may withhold the specific chemical identity from an SDS if this information constitutes a "trade secret", provided information on the hazardous nature of the chemical is disclosed on the SDS and the information that the specific identity is being withheld because it is a trade secret. However, if a treating physician or nurse determines that an emergency exists, the specific chemical identity must be provided on request from the manufacturer.

It is illegal to remove or cover a manufacturer's label on a product you are using.

When a transferred hazardous chemical or substance is intended for the immediate use (shift) of the employee who performs the transfer, the employee is not required to label these portable containers.

The container must be labeled if another employee (e.g., an assistant or helper) will utilize the container or if there is any confusion as to the container's contents. An

important rule to remember is that all clear, colorless liquids are not water.

The Operations Manager or Supervisor shall ensure that all transfer or secondary containers are labeled according to original manufacturer's labels.

6.1.4 Safety Data Sheets SDS

The Health and Safety Manager/Trainer shall be responsible for obtaining and supplying current safety data sheets for each facility. SDS's will be obtained from suppliers of all chemical products and from our SDS online provider.

6.1.5 HARD COPIES of safety data sheets for all cleaners, strippers, lacquers, coatings, solvents, and other chemical products that employees may be exposed to will be available in the work vehicle at each job site. SDS's will be available at each job site for review by any employee during the work shift. A master file of all safety data sheets will be kept at each office. An electronic copy/resource is accessible on the Stuart Dean Company Shared G-Drive.

6.1.6 No cleaners, strippers, lacquers, coatings, solvents, or any other chemical products will be used on a job site unless the Operations Manager has received an SDS for it.

SECTION SEVEN

7.0 EVALUATING AND CONTROLLING CHEMICAL EXPOSURES

7.1 Purpose

To identify and evaluate potential chemical exposures and to develop hazard control strategies to prevent adverse health effects from chemical exposures.

7.2 Exposure Monitoring

Exposure monitoring is used to measure and document employee exposure to chemical agents in the workplace. Exposure monitoring is also used to assess the effectiveness of existing controls and to determine the need for additional protection and/or additional monitoring.

7.3 Responsible Persons and Duties

7.3.1 Industrial Hygiene Consultant

1. Reviewing chemicals and operations in order to determine the need for exposure monitoring and controls. As part of the review process, potential exposures, specific operations, and groups of exposed workers will be identified.

2. Recommending and scheduling exposure monitoring when indicated by workplace review.
3. Informing exposed employees of air monitoring results within 5 days of receipt of results.
4. Coordinating the implementation of control measures when monitoring results indicate that employee exposures are in excess of applicable OSHA standards or other recommended limits.
5. Inspecting and evaluating control measures in use.

7.3.2 The Human Resources Director is responsible for:

1. Providing approval for exposure monitoring when recommended by the Industrial Hygiene Consultant
2. Approving implementation of control measures.
3. Advising the Health & Safety Manager/Trainer of the recommendation.

7.3.3 Operations Managers are responsible for:

1. Ensuring that control measures are operating properly.

7.3.4 Control Measures

Control measures will be implemented to reduce or eliminate employee exposure to hazardous chemicals. When possible, control measures will be selected in the order of preference listed below:

1. Substitution of less hazardous processes or materials for those currently in use.
2. Implementation of engineering controls, such as modification of operations, enclosure of operations, or installation of ventilation system to reduce exposure.
3. Implementation of administrative controls, such as modification of employee work schedules
4. Use of respirators and other personal protective equipment.

7.3.5 Industrial Hygiene Consultants:

Sources To be Determined- Refer to the Health and Safety Manager

SECTION EIGHT

8.0 CHEMICAL STORAGE AND USE PROCEDURES

8.1 Purpose

To ensure that all chemicals and production products are stored, dispensed, and used with appropriate safety procedures.

8.1.1 Responsible Persons and Duties

The Health and Safety Manager/Trainer is responsible for:

1. Ensuring that SDS sheets are readily available for all chemicals in use.
2. Ensuring that hazard signs for chemical use and storage are readily available from a central supplier.
3. Performing periodic inspections of chemical use and storage areas for safe work practices, storage, and availability of personal protective equipment and spill control materials.
4. Advising on spill cleanup procedures, as needed.

Operations Managers are responsible for:

1. Ensuring program compliance through proper use of chemical products, PPE, and adherence to storage and disposal requirements.
2. Inspecting vehicles and job sites to ensure that basic safety equipment is available and used when necessary.

8.1.2 Chemical Storage Areas

All chemical storage areas will be equipped with the following safety equipment:

1. Adequate lighting
2. Sturdy flammable storage cabinets, shelves and racks
3. Secondary containment
4. Eye wash station
5. Safety shower, if needed
6. ABC fire extinguisher
7. Sprinkler system, if required by local fire code
8. Spill supplies and equipment

8.1.3 Basic Equipment for Typical Crews

All mobile work crews will be equipped with the following safety equipment, at a minimum:

1. RED METAL Waste cans with lids for soiled rags and liquids
2. Spill kit
3. ABC fire extinguisher
4. Personal protective equipment according to the SOP of the Work.
5. First-aid kit including eyewash
6. Barricades
7. Hazard warning signs

SECTION NINE**9.0 RESPIRATORY PROTECTION PROGRAM****9.1 d
SECTION TEN****10.0 Personal Protective Equipment (PPE)
(Eye, Face, Head, Body, Hand and Foot Protection)****10.1 Purpose**

To ensure that the proper personal protective equipment is selected and used, and that all employees are trained in the use, limitations and maintenance of PPE. The Company makes use of various chemicals and products that can be hazardous if the proper safety precautions are not taken when using them. It is your responsibility to obtain and use personal protective equipment to safely perform your duties.

10.2 Responsible Persons and Duties**10.2.1 The Operations Manager Is Responsible For:**

1. Selecting and procuring PPE.
2. Ensuring that employees are trained in safe use of PPE.
3. Assessing use of PPE through regular inspections.
4. Maintaining and regularly updating list of all PPE used.
5. Issuing the correct type of equipment to employees.
6. Ensuring that equipment is used, stored, and maintained properly.
7. Recommending employees for retraining when needed.

10.2.2 Employees Are Responsible For:

1. Using PPE properly and safeguarding equipment from damage.
2. Participating in training to learn proper usage of PPE.
3. Reporting damaged or malfunctioning equipment to Supervisor or Operations Manager.

10.3 Selection of PPE Will Be Based On:

- a. Proper Fit and Size of Individual
- b. A Hazard Assessment.
- c. Type of PPE available for hazard.
- d. Comparing the hazard with the capabilities of the PPE.
- e. Ensuring a level of protection higher than the minimum needed.

10.3.1 Selection Guidelines for Eye and Face Protection

1. Chemical splash: Chemical goggles or combination goggles and face-shields
2. Nuisance Dust: ANSI Approved Safety Glasses

3. All protective eye and face devices purchased after July 5, 1994 will comply with ANSI Z87.1-1989.
4. Equipment purchased before July 5, 1994 will comply with ANSI Z87.1-1968.

10.3.2 Using Safety Glasses, Goggles or Face Shields:

1. Safety glasses, goggles or a face shield must be worn if there is any potential for eye injury.
2. Always wear safety glasses when using hand-held power tools such as sanders, buffing machines, etc.
3. Goggles and/or face shields must be worn when utilizing strippers or any caustics including, but not restricted to, acetone, paint removers, jax, oakite, rust removers, etc.
4. Goggles must be worn when spraying any material including, but not restricted to, lacquers, enamels, paints, etc.
5. Safety glasses, goggles and face shields shall not be left where they can be damaged.
6. Face shields should always be utilized when working with grinders.
7. Always wear safety glasses or goggles when using a face shield.
8. Check to see that safety glasses and goggles fit properly before each use.
9. Clean safety glasses and goggles regularly and thoroughly with soap and water or a disinfectant.
10. Replace if lenses are pitted or scratched.
11. Store safety glasses and goggles in a dust proof case when they are not in use.
12. Make sure that elastic headbands are tight enough.
13. When using goggles or safety glasses, if a respirator is also required, you cannot wear contact lenses.
14. If you wear eyeglasses you will need goggles or safety glasses that properly fit over the eyeglasses.

10.3.3 Selection Guidelines for Head Protection

1. Hard hats will be worn whenever employees are exposed to the risk of overhead falling objects or striking their heads on blunt objects.
2. Class A helmets will be selected for protection from impact, penetration and low voltage (up to 2200 volts) contact.

10.3.4 Selection Guidelines for Footwear

All employees are required to wear heavy-duty work shoes. An employee may choose to buy shoes with steel reinforced toes. Sneakers are forbidden on any work site. Footwear should be tied laces.

10.3.5 Selection Guidelines for Hand Protection

1. Neoprene gloves will be worn when working with solvents.

2. For different chemicals, select the correct gloves according to the instructions on the Material Safety Data Sheets or the labeling on the container.
3. Never wear gloves inside out.
4. Inspect gloves for wear, cuts, and deterioration and replace accordingly.
5. Decontaminate gloves and PPE carefully before removing them so you do not contaminate yourself.

10.3.6 Recommended Glove selections:

1.	Acetone	Butyl rubber
2.	MEK	Butyl rubber
3.	d-Limonene	Nitrile
4.	Toluene	Viton
5.	Muriatic acid	Nitrile, Neoprene

10.3.7 Selection Guidelines for Work Clothing

1. Standard uniforms are issued to all employees for daily use. The Company supplies all uniforms consisting of long-sleeved shirts; sweat shirts, tee shirts, trousers, jackets, hats, etc. All employees are required to wear the proper uniform during their workday.
2. Disposable suits may be issued to protect against dirt, grease, and small amounts of moisture. There are disposable coveralls for jobs requiring spraying of pigmented coating or working with oxidizing materials.
3. Rain Suits made from rubber or neoprene may be used when performing power washing. Suits may protect from solvents, moisture, acids, and other corrosives. Rain gear is supplied for specific jobs that require large amounts of water saturation or jobs that require working outside in inclement weather.

10.3.8 Cleaning and Maintenance

All PPE will be regularly inspected and cleaned. Damaged or contaminated equipment that cannot be repaired or decontaminated will be discarded.

10.4 Other Protective Equipment:

There are other pieces of safety equipment assigned to employees. The specific equipment is issued to each employee or crew and is utilized for the safety of the employee as well as the general public. It is important to note the types of equipment made available to employees by the Company.

DROP CLOTHS:

1. Drop cloths are required on all job sites when using chemicals that do damage to sidewalks or floors including marble, wood, granite, etc. They are used to protect the customer's property.

2. When working with chemicals of any kind around carpeting, plastic sheeting is also required.

FIRE EXTINGUISHERS:

1. Each van/truck is equipped with a fire extinguisher to be used in trucks and at job sites in case of fire.
2. The fire extinguisher must be in plain view at every job site where flammable or combustible materials are being used.
3. Fire extinguishers should be serviced once a year. In New York City servicing is required every 6 months.
4. If you see that service is overdue on the fire extinguisher assigned to you, immediately notify your supervisor.

FIRST AID KIT:

1. Each truck must be equipped with a First Aid Kit, to be used in case of an emergency.
2. If your First Aid Kit is missing or needs to be refilled with certain items, report this to your supervisor immediately.

EYE WASH BOTTLES:

1. Each truck must be equipped with Eye Wash Bottles, to be used as a first response in case of chemical splash or foreign object in either eye. This should only be used until you can reach a permanently installed Eye Wash Station with the capacity of flooding the eye with water for at least **15 minutes** or until you receive emergency assistance at a hospital.
2. If your Eye Wash Bottle is missing, or used, report this to your supervisor immediately.

SOILED TOWEL CONTAINERS:

1. Each truck must be equipped with a safety container for the soiled towels used during the performance of a job. This container, with its lid closed, keeps chemical vapors from permeating the surrounding air. When flammables are used on a job site, i.e., acetone, stripping thinners, MEK, paint removers, lacquers, paints, etc., this closed container prevents the flammable vapors from causing a volatile condition.
2. The safety towel containers may be made of metal or a solvent-resistant plastic material.

SAFETY PLUNGER TYPE CONTAINERS:

1. Each crew that utilizes any type of flammable liquid must be equipped with this plunger type container for flammables. The container limits the concentration of

flammable vapors in the surrounding air and prevents a volatile condition.

2. Dependent on the job being performed a crew may have more than one of these containers. Flammable liquids should never be used or stored in open containers.

KNEE PADS:

1. Every employee that works in a long-term kneeling position should be equipped with a pair of kneepads.
2. These pads will relieve the pressure of kneeling so that the employee can work in comfort and concentrate on the job being performed. These pads also protect the knees against bumps, bruises and other minor injuries.

SDS BINDERS:

1. Each truck will carry with a Safety Data Sheet SDS binder. This binder will contain SDS's for all products the crew utilizes.
2. The SDS for specific products being utilized on a job must be made available at the request of an OSHA inspector, law enforcement officer, or a building manager.
3. When a request for an SDS is made to the Stuart Dean foreman, he must notify his Supervisor or Operations Manager immediately.

SECTION ELEVEN

11.0 SAFETY VIOLATIONS

11.1 Purpose

To ensure that safe working conditions are maintained at work sites and to protect the employees, the public and the environment. The Company, by following the guidelines set forth by the Occupational Safety and Health Act of 1970 and State and Federal Health Regulations, provides job safety and health protection for all its employees. All employees will be expected to comply with the Company's published safety rules.

The safety rules have been formulated not as restrictive measures, but as guides to employees and supervisors in their cooperative effort to prevent injury to employees, damage to buildings, property and equipment, the public and the environment.

11.2.1 Violations of company safety and health policies jeopardizes all the above and will not be tolerated. Stuart Dean Co., Inc. has instituted a ZERO TOLERANCE POLICY towards preventable accidents, incidents, and negligence stemming from violations of this Corporate Health and Safety Plan.

11.2.2 Any employee found to have violated the company Health and Safety Plan will be subject to disciplinary action as follows:

- 1. First offense, a written warning**
- 2. Second offense, five (5) days suspension without pay**
- 3. Third offense, ten (10) days suspension without pay**
- 4. Fourth offense, termination of employment**

SECTION TWELVE

12.0 STANDARD OPERATING PROCEDURES (SOPs):

1. Report immediately to your supervisor any condition or practice you believe may cause damage to buildings and equipment or injury to yourself or other employees.
2. All equipment including vehicles must be operated in a safe manner and in accordance with the Company's rules and procedures.
3. Any employee causing damage to equipment or vehicles must report the damage in accordance with the Company's procedures.
4. Personal protective equipment such as goggles, safety glasses, masks, respirators, hard hats, gloves, etc., which are provided for various types of jobs, must be worn and maintained in accordance with the Company's directives and procedures.
5. All drivers will conform to state and local regulations.
6. Employees must drive their company vehicles safely and within the posted speed limits.
7. Report immediately all injuries, no matter how slight, and seek immediate first-aid.
8. Watch for and report any broken equipment that may cause injury.
9. Do not attempt to lift equipment or any object beyond your capacity.
10. Learn the location of fire extinguishers and exits in your various work assignments
11. Employees are not permitted to operate any machines, including spray guns, compressors, floor machines, etc. until they have been properly trained in the safe method of operation.
12. All employees are forbidden to tamper with or make repairs to equipment, including machinery or vehicles unless experienced and authorized to do so.
13. No employee shall be permitted to remove or make ineffective any safeguard, safety device, or safety warning.
14. Use compressed air only for the job for which it was intended. Do not use it to clean your clothes.
15. Observe smoking regulations. Never smoke around any flammable substances or while spraying or in Shops/ Facilities.
16. Drugs and alcohol will not be tolerated on the job. Violations of this rule can mean immediate dismissal.

12.1 Storage and Handling of Flammable Liquids

12.1.1 Purpose

To control the build-up of flammable vapors and to minimize the possibility of fire and explosions. Many solvents and strippers contain flammable liquids. These materials have flash points that are less than 100°F, evaporate readily, and may be heavier than air. The safe handling and storage of flammable liquids is very important to prevent the build-up of vapors and to reduce fire hazards.

12.1.2 Responsible Persons and Duties

The **Health and Safety Manager/Trainer** is responsible for:

1. Keeping up-to-date with applicable OSHA and NFPA fire code regulations.
2. Informing division Operations Managers of applicable changes to regulations.
3. Conducting an inspection of flammables storage containment areas during safety audits.
4. Interacting with city, state and federal agencies, as needed.

12.1.3 Operations Managers are responsible for:

1. Maintaining storage areas in safe conditions.
2. Assuring that job sites have proper equipment.
3. Assuring that employees follow safe work practices.
4. Conducting a monthly inspection of flammables storage area.
5. Working with The Health and Safety Manager/Trainer to remain current on requirements.

12.1.4 Employees are responsible for:

1. Following safe work practices and using equipment properly.
2. Limiting cigarette smoking to designated areas only.
3. Reporting unsafe conditions and equipment damage to Supervisor or Operations Manager.

12.2 Storage of Flammable Liquids

Storage areas will be selected and constructed to minimize the effects of fire or explosion in case flammable or combustible liquids are ignited.

NOTE: Each location must also check with their local Fire Department to insure state, city and local laws and regulations are being followed.

1. Storage areas will be provided with automatic sprinkler protection, spill containment supplies, adequate ventilation, explosion relief, proper electrical installations, bonding / grounding to prevent static discharge, and signage, in accordance with local fire code regulations.

2. Storage areas will be located at ground level and will be isolated from other parts of the building.
3. At least one portable fire extinguisher must be located within twenty-five (25) feet of any flammable liquid or combustible storage area.
4. Storage of flammables in stairways or next to evacuation routes or exits is prohibited.
5. Approved safety cans will be used to store, handle, and dispense flammable liquids in quantities greater than one gallon.
6. Quantities greater than 25 gallons will be stored in approved fire cabinets.

12.3 Flammable Liquid Storage Cabinets

1. No more than 25 gallons of flammable and or combustible liquids may be stored in a room outside of an approved storage cabinet.
2. No more than 60 gallons of flammable or 120 gallons of combustible liquids may be stored in one storage cabinet.
3. No more than 3 flammable/combustible liquid storage cabinets may be in the same area.
4. Nothing may ever be stored on the top of this type of cabinet.
5. All cabinets must be placed in a cool, dry location.
6. All flammable storage must be segregated from oxidizers, corrosives and other reactive materials.
7. All cabinets must be kept a minimum of fifty (50) feet from any ignition source.
8. All electrical equipment, i.e., switches, lights, etc. in flammable storage areas must meet Hazard Class 1 ratings.
9. Each cabinet must be labeled. E.g., "Flammables – Keep Fire Away"
10. National Fire Protection Code (NFPA-30) and OSHA standards forbid the storage of flammable liquids in basement areas.

12.4 Handling of Flammable Liquids

1. Flammable liquids will not be used within 50 feet of an ignition source.
2. Smoking is prohibited within 50 feet of flammable materials.
3. Mechanical pumps designed for the application or other safe means of transferring liquids will be used.
4. Dispensing containers will be bonded together and grounded.
5. Combustible and flammable wastes will be kept in metal cans and disposed of properly.
6. All containers will be labeled as per OSHA Hazard Communication standard.
7. Multi-use fire extinguishers will be stationed in close proximity to all work locations where flammable liquids are used and on work vehicles that are used in transporting flammable liquids.
8. "No Smoking" signs will be posted at all job sites where flammable or combustible materials are used or stored.

12.5 Waste Management

Spill Prevention

1. This Spill Prevention Program (SPP) is for the prevention of spills of petroleum products, hazardous substances and chemicals utilized by the contractor. All personnel will have awareness training on measures designed to reduce, minimize and eliminate the potential for spills on this project.
2. We will follow sound work practices and implement appropriate measures such as the following to achieve spill prevention:
 - a. Utilize daily or weekly checklists to conduct pre-use inspections of equipment.
 - b. Emphasize materials handling, labeling and container storage inspection practices for all products including hazardous and universal waste.
 - c. Store all petroleum products, hazardous substances, or chemicals in designated areas only and provide secondary containment (with capacity to contain 110% of largest container) for all closed containers with a capacity greater than 5 gallons.
 - d. All open containers of petroleum products, hazardous substances, or chemicals must be stored in secondary containment.
 - e. Use manufacturer recommended Maintenance Procedures (MP's) to develop in-house MPs for certain types of equipment or activities where there is no adequate preventive maintenance schedule in place. If neither exists the contractor shall develop specific MP checklists.
 - f. Use breakaway or quick disconnect hoses and/or drip pads during product or fuel transfer and dispensing activities.
 - g. Ensure the proper labeling of valves and ports transferring or receiving chemical or petroleum products.
 - h. Install secondary containment devices on equipment.
 - i. Schedule replacement of damaged or old equipment.
 - j. Inspect for and purge residual materials in piping, tanks and other equipment prior to disassembly, demolition and disposal.
 - k. Utilize any other appropriate spill prevention measures.
3. Any piece of equipment determined to be leaking, poorly maintained, defective, or otherwise deficient may be prohibited or removed from the job site. At this time the contractor does not anticipate any bulk storage containers of any hazardous chemicals.
4. Stuart Dean will have on site at a minimum of a 30 Gallon Spill Control Kit which include various spill absorbent materials. These materials will be stored in a CONEX box in our chemical storage and use areas. Contractor will have two 55-gallon spill control kits on the barge to remediate worse case spill.

5. Stuart Dean will report any chemical spills as required by USEPA, NYSDEC and local regulations.

Waste Management

It is anticipated that quantities of generated waste during construction are expected to be as follows:

Waste

- Cardboard
- Clean dimensional wood
- Demolition debris
- Concrete
- Asphalt
- Metals from rebar, sheetrock studs, framing, etc.
- Sheeting
- Steel pipe
- Concrete Piping
- Paints, solvents, and other hazardous fluids
- Wood pallets
- Fencing materials
- Recyclable office wastes such as paper, toner, ink cartridges
- Removed equipment

Material Handling

All construction waste materials listed above will be appropriately segregated into their corresponding containment. No mixing of waste materials will be allowed. Where applicable, a metal container will be used to collect said waste (i.e.; asphalt or concrete). Recyclable materials will be site separated and self-hauled to a designated recycling center.

Transportation

All waste that is collected in its appropriate metal container will be carted by the owner of the container. Recyclable office items such as paper and cardboard will be site separated and self-hauled to a designated recycling center.

Hazardous Waste

There is no anticipated hazardous waste from this project. However, in the event that a hazardous waste is encountered, that waste will be properly contained in its own designated storage area, as per applicable regulations. The transporter of that hazardous waste will hold a current NYSDEC Part 364 Waste Transporter Permit, authorizing that transporter to take the hazardous waste to the identified, Transportation, Storage and Disposal Facility. The hazardous waste, if any, will be transported in compliance with USDOT 49 CFR Hazardous Material Transportation Regulations.

Universal Waste

There is no anticipated universal waste for this project. However, in the event that universal waste (e.g., mercury containing batteries) is encountered, that waste will be

properly contained in its own dedicated storage area as per the applicable regulations. The universal waste, if any, will be managed in compliance with 6NYCRR Part 374-3 and with USDOT 49 CFR Hazardous Material Transportation Regulations.

Non-Hazardous Wastes

There is no anticipated non-hazardous (oily rags) waste for this project. However, in the event that non-hazardous waste is encountered, that waste will be properly contained in its own dedicated storage area as per the applicable regulations. The transporter of said waste will hold a current Part NYSDEC 364 Waste Transporter Permit to transport the waste to a Transportation, Storage and Disposal Facility accepting non-hazardous waste.

Recyclable Office Items

Recyclable office items such as paper and cardboard will be site separated and self-hauled to a designated recycling center. Toner cartridges for laser printers, copiers, etc., will be recycled according to manufacturers' instructions.

Product Deliveries

Deliveries will be carefully scheduled to minimize storage time. Deliveries will be unloaded into designated storage areas to minimize the potential for damage to stored materials. Best efforts will be made to return packing materials, (i.e.; wood pallets) to the transporter.

Recycling Methods

At the work site we will dispose of construction and demolition waste by recycling methods in accordance with all relevant State, County and local codes, laws and regulations.

Waste Compliance (per Specification Section 01733, 3.01, D)

If any hazardous waste, universal waste and/or used oil is encountered, it will be managed in compliance with NYCDEC, Hazardous Waste, Universal Waste and Used Oil Regulations, and in accordance with USDOT 49 CFR Hazardous Waste Material Transportation Regulations, and in accordance with NYCDEP Hazardous Waste Management, Universal Waste Management, and Used Oil Policies and Procedures.

All the procedures listed in the section above are communicated to all employees.

SECTION THIRTEEN

13.0 FIRST AID AND MEDICAL EMERGENCIES

CALL 911 Immediately for Medical Emergencies

13.1 Purpose

To prepare for the treatment and protection of employees who suffer injuries, illnesses, and medical emergencies on the job.

13.2 Responsible Persons and Duties

13.2.1 The Health and Safety Manager/Trainer is Responsible For:

1. Selecting approved first aid kits.
2. Ensuring that first aid kits are maintained and replenished as needed.
3. Ensuring that emergency phone numbers are posted in all work locations and on all company vehicles.
4. Reviewing accident and injury reports.
5. Coordinating first aid training for employees.

13.2.2 Supervisors or Operations Managers Are Responsible For:

1. Completing injury and illness forms, if required.
2. Reporting medical emergencies to the Claims department and Health and Safety Manager/Trainer.
3. Ensuring transport of injured employee to emergency medical facility by ambulance, if necessary, or by company vehicle.
4. Posting routes to hospital nearest each job assignment.

13.2.3 Employees Are Responsible For:

1. Reporting injury, illness, or medical emergency to Supervisor or central office immediately.
2. Administering simple first aid to themselves or co-workers, if they know how to do so.

13.3 First Aid

In the event of personal injury, emergency first aid will be implemented on site as deemed necessary. During all on-site field activities, at least one person shall hold current certification in First Aid and CPR licensed provided by the American Red Cross or the National safety Council. If the medical condition allows, decontaminate the individual, if necessary, prior to treatment and/or transport to the hospital. A separate decontamination line for emergency use only shall be set up in the Contamination Reduction Zone in order to reduce risk of exposure.

If medical conditions require the removal of injured person from an excavation, call 911 to have the person moved by the Fire Department rescue personnel.

If any personnel have been exposed to chemicals or contaminants of concern, follow the procedures outlined below:

Skin Contact – Remove contaminated clothing. Use copious amounts of soap and water. Wash and rinse affected area for at least 15 minutes. If necessary, transport to nearest hospital.

Eye Contact – Portable eyewashes are located in the Contamination Reduction Zone. If eyes are exposed to site contaminants, copiously flush the affected area, lifting the upper and lower lids, for at least fifteen minutes. Decontaminate and provide medical attention. If necessary, transport to the hospital.

Inhalation – Remove victim from contaminated atmosphere. Initiate artificial respiration, if necessary. If necessary, transport to the hospital.

Ingestion – Remove victim from contaminated atmosphere. Do not induce vomiting if victim is unconscious, or if exposure to acids, alkalizes or petroleum products suspected. Transport to the hospital, if necessary.

In case of personal injury, emergency first aid will be implemented on site as deemed necessary. During all on site field activities, at least one person shall hold the current certification in First Aid and CPR.

Emergency Equipment

Emergency equipment will be readily accessible and well labeled. All personnel shall be familiar with the location and trained in the use of emergency equipment. The following emergency equipment shall be available on site:

Eye Wash

- Shall be capable of providing 15 minutes of water supply
- Shall meet requirements set in ANSI Z358.1.
- Shall be easily accessible, maintained in a clean condition and properly labeled and inspected monthly.
- Shall be located within work areas where eye injury can occur from splash with corrosive materials, welding or by airborne particles.

First Aid Kit

First aid kits will be available in the gang boxes, pick-up trucks or the trailer/office.

- Will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually sealed packets for each type of item
- Shall be fully equipped before commencing field work activities and will be checked weekly by the Site Superintendent to ensure that the expended items are replaced.
- Shall be easily accessible and properly labeled.

- Contain Anti-bacterial soap, extra pair of plastic gloves, Bloodborne Pathogens kit.

Standard Components of First Aid Kits

- Adhesive and elastic bandages
- Alcohol wipes
- Ammonia inhalant
- Antiseptic
- Burn cream
- Cotton swabs
- CPR mask
- Eyewash and eye pads
- Forceps
- Gauze pads
- Headache and cold relief products
- Instant cold pack
- Iodine
- Latex gloves
- Scissors
- Secondary dressings
- Sting relief ampoule
- Tourniquet

13.4 First Aid and Medical Emergency Procedures

1. Call 911 for ambulance, emergency medical services, and fire.
2. First-Aid Kits are located in all work vehicles and at all work areas in the central facility.
3. Simple First-Aid procedures will be administered at the job site by trained company employees but should be limited to minor injuries.
4. **Emergency Medical Services (EMS)** will be called for ALL medical emergencies and serious injuries, such as falls, burns, bleeding, and chemical overexposures or when the extent of the injury is not known.
5. The Safety Data Sheet –SDS will be consulted for all injuries caused by chemical exposure and will be given to emergency medical personnel.
6. All job sites will be equipped with First-Aid Kits and Eyewash Devices approved by a consulting physician.
7. Never allow or instruct an injured employee to transport him or herself to a medical facility. Have them driven to a location where proper treatment can be rendered.



SECTION FOURTEEN

14.0 Pandemic Procedures

14.1 Infectious Disease/COVID-19 Restart, Preparedness and Response Plan

STUART DEAN COMPANY, INC. INFECTIOUS DISEASE/COVID-19 RESTART, PREPAREDNESS AND RESPONSE PLAN

Stuart Dean Company, Inc. 43-50 10th Street, Long Island City, NY 11101

- Section 1:** Policy Statement
Section 2: Plan Administration Staff
Section 3: Risk Assessment
Section 4: Coronavirus COVID-19 & CDC MEASURES
Section 5: Infectious Disease Plan
- Infectious Prevention Measures
 - Prompt Identification and Isolation of Sick People, if Appropriate
 - Personal Protective Equipment
 - Administrative Controls
- Section 6:** JOBSITE WORKER HEALTH
- Workers Who Are Confirmed to Be Infected or Suspect They Are Infected
 - Workers with a Confirmed or Suspected Infection in Their Household
 - Workers Who Have Been in "Close Contact" with a Person Confirmed to Be Infected

- Workers Who Have Had "Proximate Exposure" to a Person Confirmed to be Infected but Have Not Had "Close Contact."

Section 7: Training

- Training Policy
- Initial Training
- Follow Up Training
- Disciplinary Action and Re-Training
- Topic List
- **Attendance**

Section 8: Re-Start Job Hazard Analysis

Section 9: Health Screening Assessment

Section 10: Infectious Disease Cleaning Log Checklist

Section 11: Plan Resources



SECTION 1: POLICY STATEMENT

The purpose of this plan is to establish procedures and implement existing protocols to effectively mitigate the spread of infectious disease including COVID-19 "Coronavirus" in the work environment. Under the OSHA Act, employers are responsible for providing a safe and healthy workplace free from recognized hazards likely to cause death or serious physical harm.

Many associate infectious diseases as a healthcare exposure and danger, but workplaces and construction sites also have exposure and risk factors. There are many possible chances of exposure due to sharing tools, equipment, working in close contact with others, unsanitary workplace conditions and insufficient worker hygiene can allow the transmission of infectious disease at worksites in our industry. It is for this reason Stuart Dean Company has decided to adopt the existing procedures and protocols of the NYS Department of Health, World Health Organization (WHO), the Center for Disease Control (CDC) and OSHA. In addition to the requirements of this plan, Stuart Dean Company will follow any updates by the agencies above and adjust the site-specific requirements of the Client, GC, CM and Landowner/Developer.

SECTION 2: PLAN ADMINISTRATION STAFF

Chris Hughes	President & CEO Stuart Dean Company Role: Authorize Supplies, Materials and Staffing Phone: (212) 273-6904

Local Operations	Project Manager Stuart Dean Company Role: Plan Administrator in Field Phone: (- -) - - - - -

Jerry Vidana	Health, Safety & Services Officer Stuart Dean Company Role: Plan Administrator Phone: (832)-389-6021

SECTION 3: RISK ASSESSMENT

The first step of the infectious control plan is to assign a workplace infectious disease coordinator and conduct a hazard assessment of the workplace. Based on a risk analysis the follow activities and locations can expose the workers and visitors to infectious disease:

- Workers who are sick that come into work and expose other workers.

- Workers using bathrooms on sites and not washing hands prior to and after using the facilities.
- Workers that are working within 6 feet of one another that are coughing and sneezing.
- Enclosed spaces with poor ventilation.
- Workers and staff not wearing face coverings.
- Workers sharing hand tools and equipment.
- Workers and management that are sharing documents, plans and job drawings.
- Staff and visitors touching door handles, equipment and other frequently used surfaces.

It is for this reason that the workforce in workplaces, jobsites, road construction and building development need to implement the recommendations of this plan.

SECTION 4: CORONAVIRUS COVID-19 & CDC MEASURES

SYMPTOMS OF COVID-19

COVID-19 is a highly infectious disease that is spread from person to person through particles produced when an infected person exhales, talks, vocalizes, sneezes, or coughs. COVID-19 may also be transmitted when people touch a contaminated object and then touch their eyes, nose or mouth, although that is less common. COVID-19 is highly transmissible and can be spread by people who have no symptoms and who do not know they are infected. Particles containing the virus can travel more than 6 feet, especially indoors. The CDC estimates that over fifty percent of the recent spread of the virus is from individuals with no symptoms at the time of spread.

According to the CDC, symptoms of COVID-19 may appear in as few as 2 days or as long as 14 days after exposure.

CDC PREVENTION MEASURES

There are currently 3 vaccines approved for emergency use to prevent coronavirus disease 2019 (COVID-19) and more are on the way. The best way to still prevent illness is to avoid being exposed to this virus. The CDC always recommends everyday preventive actions to help prevent the spread of respiratory diseases, including:

- Wear a face covering
- Get vaccinated as soon as possible
- Avoid close contact with people
- Isolate people who are sick or show symptoms upon arrival or during work shift.
- Avoid touching your eyes, nose, and mouth.
- Stay home when you are sick.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- If you don't have a tissue sneeze into your arm sleeve.
- Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe. At jobsites this includes: Porta Johns, door handles, tool handles, etc.

Wash your Hands often with soap and water for at least 20 seconds, especially after going to the bathroom; before eating; and after blowing your nose, coughing, or sneezing.

- If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are visibly dirty.

HAND WASHING

Handwashing can help prevent illness. It involves five simple and effective steps (Wet, Lather, Scrub, Rinse, Dry) you can take to reduce the spread of diarrheal and respiratory illness so you can stay healthy. Regular handwashing, particularly before and after certain activities, is one of the best ways to remove germs, avoid getting sick, and prevent the spread of germs to others. It's quick, it's simple, and it can keep us all from getting sick. Handwashing is a win for everyone, except the germs.

HAVE YOU RECENTLY TRAVELED OR PLANNING ON TRAVELING?

- i. Avoid contact with sick people.
- ii. Avoid touching your eyes, nose, or mouth with unwashed hands.
- iii. Clean your hands often by washing them with soap and water for at least 20 seconds or using an alcohol-based hand sanitizer that contains at least 60%–95% alcohol. Soap and water should be used if hands are visibly dirty.
 - It is especially important to clean hands after going to the bathroom; before eating; and after coughing, sneezing or blowing your nose.
 - Supplies of hand sanitizer, tissues, and other hygiene products may be limited, so consider bringing them with you.
- iv. Avoid traveling and going to workplaces if you are sick.

If you spent time in areas that have had outbreaks during the past 14 days:

- Stay home for 10 days from the time you left the outbreak area and practice social distancing.
- If you get sick with fever, cough, or have trouble breathing seek medical care and call ahead before you go to a doctor's office or emergency room.
- Do not travel while sick.
- Cover your mouth and nose with a tissue or your sleeve (not your hands) when coughing or sneezing.
- Clean your hands often by washing them with soap and water for at least 20 seconds or using an alcohol-based hand sanitizer that contains at least 60%–95% alcohol immediately after coughing, sneezing or blowing your nose. Soap and water should be used if hands are visibly dirty.

TREATMENT

They are still developing antiviral treatments for COVID-19. There are three FDA approved vaccines with Emergency Use Authorization. Vaccination and face coverings



are recommended. People with COVID-19 should contact their medical providers and receive supportive care to help relieve symptoms. For severe cases, treatment should include care to support vital organ functions. People who think they may have been exposed to COVID-19 should immediately contact their healthcare provider.

SECTION 5: INFECTIOUS DISEASE PLAN

Stuart Dean Company will implement the following control measures to reduce the likelihood of spreading any infectious disease at the worksites. These controls will be carried out by the Infectious Disease Safety Coordinator

INFECTIOUS DISEASE PREPAREDNESS AND RESPONSE PLAN

Stuart Dean Company will stay abreast of guidance from federal, state, local, tribal, and/or territorial health agencies, and consider how to incorporate those recommendations and resources into our workplace-specific plans. This plan will be posted conspicuously throughout the site.

INFECTION PREVENTION MEASURES

Protecting our workers will depend on emphasizing basic infection prevention measures.

Stuart Dean Company will promote frequent and thorough hand washing by providing workers and worksite visitors with a place to wash their hands. Soap and running water stations will be available on site in addition to alcohol-based hand rubs containing at least 60% alcohol.

- Social Distancing will strictly be enforced (**6 feet Minimum**)
- Workers indoors will be required to have at least 250 square feet of space unless they are using face coverings or respirators.
- The use of tightly confined spaces (e.g., elevators, hoists, vehicles) by more than one individual at a time, unless all employees in such space at the same time are wearing acceptable face coverings, should be prohibited. However, even with face coverings in use, occupancy must never exceed 50% of the maximum capacity of the space or vehicle, unless it is designed for use by a single occupant. Ventilation with outdoor air should be increased to the greatest extent possible, while maintaining safety protocols, and additional measures to prevent congregation in elevator waiting areas and limit density in elevators, such as enabling the use of stairs, should be taken.
- Safety Meetings, Job Briefings will be conducted in outside areas not offices and trailers to allow social distancing of at least 6ft.
- Workers will be notified to stay home if they are sick.
- Workers will be trained about respiratory etiquette, including covering coughs and sneezes.
- Workers and the visitors will be provided with tissues and trash

receptacles.

- Workers will not be permitted to share each other's phones, or other work tools and equipment.
- Housekeeping practices, including routine cleaning and disinfecting of surfaces with 60% or more alcohol-based ingredients, equipment, and other elements of the work environment.
- Workers getting dressed at the start or end of their shift will be limited to 2 or 3 people at a time in the sea container/locker room.
- Portable hand wash stations with soap and sanitizer will be available at all times.
- Cleaning of handles, locks, and commonly touched surfaces throughout the day.

VENTILATION

- Ensure ventilation systems operate properly and provide acceptable indoor air quality for the current occupancy level for each space.
- Increase ventilation rates when possible (A minimum of 6 air changes per hour to reduce COVID aerosols in the space)
- When weather conditions allow, increase fresh outdoor air by opening windows and doors. Do not open windows and doors if doing so poses a safety or health risk (e.g., risk of falling, triggering asthma symptoms) to occupants in the building.
- Use fans to increase the effectiveness of open windows. To safely achieve this, fan placement is important. Avoid placing fans in a way that could potentially cause contaminated air to flow directly from one person over another. One helpful strategy is to use a window fan, placed safely and securely in a window, to exhaust room air to the outdoors. This will help draw fresh air into the room via other open windows and doors without generating strong room air currents.
- Disable demand-controlled ventilation (DCV).
- Reduce or eliminate recirculation, for example by opening minimum outdoor air dampers. In mild weather, this will not affect thermal comfort or humidity. However, this may be difficult to do in cold or hot weather.
- Improve central air filtration to the MERV-13 (the grade of filter recommended by ASHRAE) or the highest compatible with the filter rack, and seal edges of the filter to limit bypass.
- Check filters to ensure they are within service life and appropriately installed.
- Keep systems running longer hours, 24/7 if possible, to enhance air exchanges in the building space.
- Ensure restroom exhaust fans are functional and operating at full capacity.
- Inspect and maintain local exhaust ventilation in areas such as kitchens and cooking areas.
- Use portable high-efficiency particulate air (HEPA) fan/filtration systems to help enhance air cleaning (especially in higher-risk areas such as a nurse's office or

areas frequently inhabited by persons with higher likelihood of COVID-19 and/or increased risk of getting COVID-19).

- Generate clean-to-less-clean air movement by re-evaluating the positioning of supply and exhaust air diffusers and/or dampers (especially in higher-risk areas).
- Consider using ultraviolet germicidal irradiation (UVGI) as a supplement to help inactivate SARS-CoV-2, especially if options for increasing room ventilation are limited. Upper-room UVGI systems can be used to provide air cleaning within occupied spaces, and in-duct UVGI systems can help enhance air cleaning inside central ventilation systems.
- If ventilation cannot be increased, reduce occupancy level in the building. This increases the effective dilution ventilation per person.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Face coverings are mandatory
- In addition to face coverings, workers will be required to wear safety glasses, hard hats, gloves and work boots
- Workers will be required to wear additional Personal Protective Equipment if recommendations and alerts from NYC DOB, NYS Department of Health, CDC (Center for Disease Control), World Health Organization and the Empire State Corporation are updated.
- There are times when PPE is not required under OSHA standards or other industry-specific guidance, but some workers may have a legal right to PPE as a "reasonable accommodation" under the Americans with Disabilities Act, or other workers may want to use it if they are still concerned about their personal safety (e.g., if a family member is at higher-risk for severe illness, wearing a face shield in addition to a face covering as an added layer of protection). Encourage and support voluntary use of PPE in these circumstances.

ADMINISTRATIVE CONTROLS

Administrative controls are required in addition to workplace hygiene and Personal Protective Equipment.

Administrative Controls that will be used will be the following:

- Instruct sick workers to stay at home and seek medical attention.
- Minimizing contact among workers, clients, and customers by replacing face-to-face meetings with virtual communications and implementing telework if feasible.
- Establishing alternating days or extra shifts that reduce the total number of employees in a facility at a given time, allowing them to maintain distance from one another while maintaining a full onsite work week.

- Developing emergency communications plans, including a forum for answering workers' concerns and internet-based communications, if feasible.
- Training will be conducted to review the requirements of this Infectious disease plan prior to any work beginning on site and for any new hires.
- Encourage employees to bring their lunch so as to avoid going to stores/restaurants/public spaces.
- Provide additional lunch/break areas.
- Eliminate shared workspaces. Eliminate sharing of phones, tools, and equipment when possible. If tools or equipment are shared disinfect prior to and after use. **No sharing of PPE.**
- For sites that require **workers to be shuttled** to and from the job limit the number of passengers in any shuttle bus to maintain social distancing. Increase the frequency of cleaning.
- Avoid **pool vehicles** (multiple employees in one vehicle). If pool vehicles are unavoidable drive with the windows open and ventilation blowing fresh air.
- Older adults and people of any age who have serious underlying medical conditions are at higher risk for severe illness from COVID-19. Workers with disabilities may be legally entitled to "reasonable accommodations" that protect them from the risk of contracting COVID-19. Where feasible, employers should consider reasonable modifications for workers identified as high-risk who can do some or all of their work at home (part or full-time), or in less densely-occupied, better-ventilated alternate facilities or offices.

JOBSITE CLEANING

- a. **If a worker or visitor with suspected or confirmed COVID-19 infection (an "infected" worker) has been onsite follow the CDC cleaning and disinfection recommendations:**
 - **Closing areas** used by the potentially infected person for enhanced cleaning. The Client/GC/CM or Owner will determine when to re-open the jobsite.
 - The relevant work area, tools, and equipment must be cleaned in accordance with CDC and local health department guidance. Stuart Dean Company will notify the Client, Subcontractor Supervisors where applicable.
 - While the particular circumstances will guide how cleaning oversight and costs are handled, if the infected worker is a Stuart Dean Company subcontractor, the subcontractor will be put on notice that it will bear the cleaning costs.
 - Opening outside doors and windows
 - **Waiting as long as practical** before cleaning or disinfecting (24 hours is optimal).

- Cleaning and disinfecting **all immediate work areas and equipment used by the potentially infected person**, such as offices, bathrooms, shared tools and workplace items, tables or work surfaces, and shared electronic equipment like tablets, touch screens, keyboards, and remote controls.
- **Vacuuming the space if needed.** Use a vacuum equipped with a high-efficiency particulate air (HEPA) filter, if available. Wait until the room or space is unoccupied to vacuum.
- **Providing cleaning workers with disposable gloves.** Additional PPE (e.g., safety glasses, goggles, aprons) might be required based on the cleaning/disinfectant products being used and whether there is a risk of splash.
- After cleaning, **disinfecting the surface with an appropriate EPA-registered disinfectant on List N: Disinfectants for use against SARS-CoV-2.**
- **Following requirements** in OSHA standards 29 CFR 1910.1200 and 1910.132, 133, and 138 for hazard communication and PPE appropriate for exposure to cleaning chemicals.
- Cleaning Logs will be kept and filed by the Infectious Disease Safety Coordinator

Once the area has been **appropriately disinfected**, it can be opened for use. **Workers without close contact** with the potentially infected person can return to the area immediately after disinfection.

If it is **more than 7 days** since the infected person visited or used the facility, additional cleaning and disinfection is not necessary. Continue routine cleaning and disinfection, described below.

b. Perform routine cleaning and disinfection

- Follow the Guidance for Cleaning and Disinfecting to develop, implement, and maintain a plan to perform regular cleanings to reduce the risk of exposure to COVID-19.
- Routinely clean all frequently touched surfaces in the workplace, such as workstations, keyboards, telephones, handrails, and doorknobs.
 - If surfaces are dirty, clean them using a detergent or soap and water before you disinfect them.
 - For disinfection, most common, EPA-registered, household disinfectants should be effective. A list of products that are EPA-approved for use against the virus that causes COVID-19 is available on the EPA website. Follow the manufacturer's instructions for all cleaning and disinfection products (e.g., concentration, application method, and contact time).
- Do not share objects or tools between workers, but if shared tools are required, ensure appropriate cleaning and disinfection is performed between uses.

- Provide disposable disinfecting wipes so that workers can wipe down commonly used surfaces (e.g., doorknobs, keyboards, remote controls, desks, electronic payment terminals, other work tools and equipment) before each use.
- Store and use disinfectants in a responsible and appropriate manner according to the label.
- Do not mix bleach or other cleaning and disinfection products together. This can create toxic vapors.
- Advise workers always to wear gloves appropriate for the chemicals being used when they are cleaning and disinfecting and that they may need additional PPE based on the setting and product.

PROMPT IDENTIFICATION AND ISOLATION OF SICK PEOPLE, IF APPROPRIATE

- Prompt identification of potentially infectious individuals is a critical step in protecting workers, customers, visitors, and others at a worksite. The Supervisor will carry out this function of the plan.
- **Stuart Dean Company** will inform and encourage employees to self-Coordinator for signs and symptoms of if they suspect possible exposure.
- **Stuart Dean Company** workers who have signs and/or symptoms of infectious disease will be sent home immediately and the Client will be notified.
- Workers who appear to have symptoms upon arrival at work or who develop symptoms during their work shift should immediately be separated from other workers, customers, and visitors, sent home, and encouraged to seek medical attention.

Recording and reporting COVID-19 infections and deaths

Employers are responsible for recording work-related cases of COVID-19 illness on their Form 300 logs if the following requirements are met:

- (1) the case is a confirmed case of COVID-19;
- (2) the case is work-related (as defined by 29 CFR 1904.5); and
- (3) the case involves one or more relevant recording criteria (set forth in 29 CFR 1904.7) (e.g., medical treatment, days away from work). Employers must follow the requirements in 29 CFR 1904 when reporting COVID-19 fatalities and hospitalizations to OSHA. More information is available on OSHA's website. Employers should also report outbreaks to health departments as required and support their contact tracing efforts.

SECTION 6:

JOBSITE WORKER HEALTH

JOBSITE WORKER HEALTH CONDITIONS

These protocols apply to Stuart Dean Company Employees

Workers Who Are Confirmed to Be Infected or Suspect They Are Infected

- Workers must leave the jobsite and follow CDC and local health department protocols.

Workers must immediately notify their employer, who must notify their Stuart Dean Company representative, who in turn must notify their Supervisor. The infected party's employer must keep the name of the infected employee confidential, in accordance with HIPPA rules and regulations. The infected party must identify the individuals they may have been in close contact with. The appropriate Stuart Dean Company resource must notify the project team and the GC.

Workers may not return to the jobsite until:

- 10 days have passed since symptoms first appeared and
- They are free of any symptoms without the use of fever-reducing or other symptom-altering medicine for at least 24 hours and potentially longer, depending on local health department protocols; and
- Other symptoms of COVID-19 are improving (loss of taste and smell may persist for weeks or months and need not delay the end of isolation).
- They are cleared by a healthcare provider and secure written confirmation of clearance before returning to work.

a. Workers with a Confirmed or Suspected Infection in Their Household

- i. Workers must leave the jobsite and follow CDC and local health department protocols.
- ii. Workers must immediately notify their employer, who must notify their Stuart Dean Company representative, who in turn must notify their Supervisor. The effected party's employer must keep the name of the effected employee confidential, in accordance with HIPPA rules and regulations. The effected party must identify the individuals they may have been in close contact with. The appropriate Stuart Dean Company resource must also notify the client team and GC.
- iii. Workers may return to the jobsite if a healthcare provider confirms that the suspected infection is not COVID-19.
- iv. If the infection in the household is confirmed, workers may not return to the jobsite until:
 - 10 days have passed since symptoms first appeared and
 - They are free of any symptoms without the use of fever-reducing or other symptom-altering medicine for at least 24 hours and potentially longer, depending on local health department protocols; and
 - Other symptoms of COVID-19 are improving (loss of taste and smell may persist for weeks or months and need not delay the end of isolation).

- They are cleared by a healthcare provider and secure written confirmation of clearance before returning to work.
- b. Workers Who Have Been in “Close Contact” with a Person Confirmed to Be Infected
- i. “Close contact” is defined as having been within approximately six feet of an infected person for a prolonged period of time (For a total of 15 minutes or more within a 24-hour period, starting from 2 days before the illness onset).
 - ii. Workers must leave the jobsite and follow CDC and local health department protocols.
 - iii. Workers must immediately notify their employer, who must notify their Stuart Dean Company representative, who in turn must notify their Supervisor. The effected party's employer must keep the name of the effected employee confidential, in accordance with HIPPA rules and regulations. The effected party must identify the individuals they may have been in close contact with. The appropriate Stuart Dean Company resource must also notify the client team and GC.
 - iv. Workers may not return to the jobsite until 14 days have passed from the last contact with the infected person.
 - v. Watch for fever (100.4°F), cough, shortness of breath, or other symptoms of COVID-19, and
 - vi. To the extent possible, stay away from others, especially people who are at higher risk for getting very sick from COVID-19.
 - vii. If workers show symptoms and are confirmed to have been infected during that 14-day quarantine, the guidance dictated in (7a) above applies.
- c. Workers Who Have Had “Proximate Exposure” to a Person Confirmed to be Infected but Have Not Had “Close Contact.”
- i. “Proximate exposure” is defined as having been in the same indoor environment as an infected person (e.g., in the same room, gathering, or hospital waiting room) for a prolonged period of time, but not having had close contact. “Proximate exposure” does not include being in the same building or in a different room on the same floor as an infected person.
 - ii. Workers must immediately notify their employer, who must notify their Stuart Dean Company representative.
 - iii. Workers who have had proximate exposure to an infected person need to defer to their local health department guidance. But generally:
 - In areas in which there is not “sustained community transmission,” CDC guidance is for workers to self-coordinator, which means they should remain alert for symptoms of infection but are otherwise not restricted.
 - In areas experiencing sustained community transmission, local health department guidance varies, but in certain jurisdictions workers are to be treated as though they had close contact with an infected person and the guidelines (c), above, should apply.

Screening and Testing

Mandatory daily health screening practices will be implemented. Stuart Dean Company employees are screened daily at the work location by our clients, the screening methods below vary, but meet or exceed the state requirements.

Screening practices will be performed remotely (e.g., by telephone or electronic survey), before the employee reports to the work site to the extent possible; or may be performed on site.

At a minimum, these screening involve all workers using a questionnaire that determines whether the worker or visitor has:

- (a) knowingly been in close or proximate contact in the past 14 days with anyone who has tested positive for COVID-19 or who has or had symptoms of COVID-19,
- (b) tested positive for COVID-19 in the past 14 days, or
- (c) has experienced any symptoms of COVID-19 in the past 14 days

According to the CDC guidance on "Symptoms of Coronavirus," the term "symptomatic" includes employees who have the following symptoms or combinations of symptoms: fever, cough, shortness of breath, or at least two of the following symptoms: fever, chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell.

- Employees will be required to immediately disclose if and when their responses to any of the aforementioned questions change, such as if they begin to experience symptoms, both during work hours or outside of work hours.
- Daily temperature checks may also be conducted per Equal Employment Opportunity Commission or DOH guidelines. Keeping records of employee health data (e.g., temperature data) is prohibited.
- Any personnel performing screening activities, including temperature checks, will be appropriately protected from exposure to potentially infectious workers or visitors entering the site. Personnel performing screening activities should be trained by employer-identified individuals who are familiar with CDC, DOH, and OSHA protocols.
- Screeners will be provided and use PPE, including at a minimum, a face mask, and may include gloves, a gown, and/or a face shield.
- An employee who screens positive for COVID-19 symptoms will not be allowed to enter the worksite and should be sent home with instructions to contact their healthcare provider for assessment and testing. The local health department and DOH must be immediately notified about the suspected case. Information on healthcare and testing resources should be provided to the employee.

Tracing and Tracking

The local health department and DOH will be notified immediately upon being informed of any positive COVID-19 test result by a worker at the site.

In the case of a worker or visitor testing positive, cooperation with the local health department is required to trace all contacts in the workplace, and the local health department must be notified of all workers and visitors who entered the site dating back to 48 hours before the worker began experiencing COVID-19 symptoms or tested positive, whichever is earlier, but confidentiality must be maintained as required by federal and state law and regulations.

Local health departments may, under their legal authority, implement, coordinate and movement restrictions of infected or exposed persons including home isolation or quarantine.

Employees who are alerted that they have come into close or proximate contact with a person with COVID-19, and have been alerted via tracing, tracking or other mechanism, are required to self-report to their employer at the time of alert and shall not be permitted to remain or return to the work site.

SECTION 7: TRAINING REQUIREMENTS

Initial Training

In order to assure that the requirements of this plan are comprehended and followed by the project staff, Stuart Dean Company will review the entire plan with the project staff and work force. The review will be conducted by the Client outside of the shanty with proper social distancing observed. This training requirement will be required for any new hires, vendors or visitors to the site. In addition, a re-start JHA in Section 8 of this Program will be reviewed with all workers.

Follow Up Training

In addition to the initial plan review, project staff and the work force will attend documented daily safety briefing to review the highlights of the plan for continual comprehension of the requirements.

Reinforcement & Disciplinary Actions

Daily reinforcement of the requirements of the plan will be communicated during daily briefings and throughout the shift.

Project Staff and the work force that are not following the requirements set forth by the plan will be subject to disciplinary action and Re-Training.

Lessons Learned – A Lessons Learned training will also follow a pandemic event.

What Workers Need to Know about COVID-19 Protections in the Workplace

- How COVID-19 Coronavirus and Infectious Spread
- COVID-19 Virus ability to survive on various surfaces
- Symptoms of the COVID-19

- The best way to protect yourself is to stay far enough away from other people so that you are not breathing in particles produced by an infected person – generally at least 6 feet (about 2 arm lengths), although this is not a guarantee, especially in enclosed spaces or those with poor ventilation.
- Practice good personal hygiene and wash your hands often. Always cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow and do not spit. Monitor your health daily and be alert for COVID-19 symptoms (e.g., fever, cough, shortness of breath, or other symptoms of COVID-19).
- Face coverings are simple barriers to help prevent your respiratory droplets or aerosols from reaching others. Not all face coverings are the same; the CDC recommends that face coverings be made of at least two layers of a tightly woven breathable fabric, such as cotton, and should not have exhalation valves or vents.
- The main function of wearing a face covering is to protect those around you, in case you are infected but not showing symptoms. Studies show that face coverings reduce the spray of droplets when worn over the nose and mouth.
- Although not their primary value, studies also show that face coverings can reduce wearers' risk of infection in certain circumstances, depending upon the face covering.
- You should wear a face covering even if you do not feel sick. This is because people with COVID-19 who never develop symptoms (asymptomatic) and those who are not yet showing symptoms (pre-symptomatic) can still spread the virus to other people.
- It is especially important to wear a face covering when you are unable to stay at least 6 feet apart from others since COVID-19 spreads mainly among people who are in close contact with one another. But wearing a face covering does not eliminate the need for physical distancing or other control measures (e.g., handwashing).
- It is important to wear a face covering and remain physically distant from co-workers and customers even if you have been vaccinated because it is not known at this time how vaccination affects transmissibility.
- ***Instruct workers who are infected or potentially infected to stay home and isolate or quarantine*** to prevent or reduce the risk of transmission of COVID-19.
- What do I do if I notice someone else with symptoms?
- Workplace Hygiene – washing hands properly
- Alcohol Based Sanitizers and Disinfectant Soaps
- Personal Protective Equipment – Gloves, Masks, Eye Protection
- Updates from the Center for Disease Control (CDC), World Health Organization (WHO), NYS Department of Health, Occupational Safety and Health Administration (OSHA) and The Empire State Corporation on COVID-19 will be communicated.
- When and how to seek medical attention.



INFECTIOUS DISEASE AND COVID-19 TRAINING ATTENDANCE ROSTER

I understand the requirements that were communicated to me regarding this plan and the training topics. I have also reviewed the NYS Industry Guidelines for the Interim Covid-19 Health Emergency

PRINT FIRST NAME	SIGNATURE	COMPANY	DATE

Stuart Dean Company is not a licensed or trained health care facility or administrator. The efforts of this plan are to limit the possible spread and transmission of infectious disease.

This plan may be updated when additional information is provided by The Center for Disease Control and The Occupational Safety Health Administration.



SECTION 8:
See next page

RE-START JOB HAZARD ANALYSIS



STUART DEAN COMPANY
Coronavirus COVID-19 Re-Start
Job Hazard Analysis

Description of Activity: Coronavirus COVID-19 Site Precautions		
Prepared by:	Competent Person: TBD	Date: TBD
Work Operation/Function	Potential Hazards	Action to Be Taken
Review of Job Hazard Analysis	Lack of Following Procedures	▪ Job Hazard Analysis will be reviewed with entire work force.
Application & Adjustments of PPE Level	Spread of Virus	▪ Cut Resistant Hand Protection will be required at all times to limit the hand exposure to infectious disease. ▪ Eye Protection – Safety Glasses will be required at all times ▪ Hard Hats, Work Boots and proper work attire at all times ▪ In work areas where required social distance is not possible to achieve, perform a job hazard analysis to determine the applicable level of PPE to supplement the conditions (face masks, Tyvek Suits, N95 Respirators, Gloves, Face Shield – or other face protection in alignment with CDC Recommendations, etc.)
Inspection of Jobsite and Clearance for jobs that are re-starting or have been shut down.	Hazards that may have developed since the jobsite was shutdown	▪ Stuart Dean Company will obtain written notification from CM/GC that the site has been cleaned and sanitized. ▪ Superintendent and Foreman will walk the site prior to the shift for any conditions that may have changed due to the job being shut down or dormant.

		▪ Power Sources, Compressed Air Lines and Electrical sources will be checked in case they have residual energy/pressure. ▪ All scaffolds, formwork, perimeter fall protection, equipment and tools will be re-inspected. ▪ Adequate supplies for first aid and PPE will be verified.
Workplace Hygiene and General Precautions	Spread of Virus	▪ Workers will be instructed throughout the shift to utilize proper workplace hygiene by hand washing and using sanitizers of at least 60% alcohol based as per CDC Guidelines. ▪ Workers will be screened as per the Daily Health Check below. ▪ Hand Washing Supplies and Sanitizers will be maintained by the Competent Person. ▪ Deep disinfectant cleaning will be deployed in/on shanties, wash areas, tools and equipment. ▪ Workers will be reminded of proper 6ft social distancing requirements.
COVID-19 Daily Health Check for each Worker	Spread of Virus	Workers will be visually examined by the Competent Person from a distance of at least six feet away. The following questions will be asked Question: 1 Are you feeling Sick?

		Question: 2 Did you take your temperature before work this morning and was it at or above 100.4 Degrees? Question: 3 Are you having any breathing issues? Question: 4 Have you traveled outside of your local government's current travel restrictions for any reason? Question: 5 Have you been in close contact with anyone that is being tested for COVID-19 because they have symptoms consistent with COVID-19? Question: 6 Have you tested positive or been in close contact (within 6ft, 10 Minutes) with anyone that has tested positive for COVID-19? If the worker answers NO to all and passes the visual inspection below, they will be permitted to work. If the work seems to exhibit symptoms or responds to the items listed below, will not be permitted to work. ▪ Any workers exhibiting COVID-19 Symptoms will be isolated from the group and instructed as described below. ▪ Any workers exhibiting COVID-19 Symptoms are communicating symptoms will be instructed to leave the site and seek

		the treatment from their licensed health care professional. ▪ The worker will not be permitted to return to work unless they have written documentation from their licensed health care professional that they have not tested positive for the COVID-19 Virus. ▪ This protocol will be required for all visitors, deliveries and subcontractors.
Pre-Shift Safety Meetings, New Worker Orientations, Project Coordination and Toolbox Meetings	Virus Spread	▪ Orientations will be conducted outside the trailer/shanty with proper social distancing of at least 6ft per CDC. ▪ Any and all meetings cable of being done via the phone or radio will be the first option. Meeting locations will be held outside as much as possible. ▪ Social distance of 6ft or greater will enforced ▪ The orientation provider will wear gloves, safety glasses and a mask and will place the clipboard down in a location where workers are able to individually able to sign in. The workers in the orientation will also be wearing the same PPE as the provider. Once the workers have signed the document's the provider will disinfect the clipboard, pens and documents.
Shanties	Spread of Virus	▪ Shanties will be thoroughly disinfected on a daily basis per CDC Guidance. ▪ Hand Washing Stations and Sanitizers will be available in the outside of the shanties if possible.

		▪ Social Distancing will be deployed to limit the number of workers in the shanty at one time. ▪ Competent Person will Coordinator that proper hygiene supplies are in place and maintained.
Receiving Deliveries	Spread of Virus	▪ Worker receiving the shipment papers and materials will Have hand protection and safety glasses. At the next break/lunch the worker will thoroughly was their hands as described by the Center Disease Control (CDC)
Breaks	Spread of Virus	▪ Breaks will be controlled by the Competent Person to allow for Social Distancing. ▪ Break areas will be disinfected prior to and after any breaks
Utilizing Aerial Lift Platforms	Spread of Virus	▪ Only one worker will be permitted at a time in the aerial lift platform for social distancing. ▪ The lift will be disinfected prior to the shift and at the end of the shift.



THIS JHA IS A LIVE DOCUMENT THAT WILL BE UPDATED AS ADDITIONAL INFORMATION AND PRECAUTIONS ARE GIVEN BY THE CENTER FOR DISEASE CONTROL (CDC) AND WORLD HEALTH ORGANIZATION (WHO).

PRINT NAME:	SIGNATURE	DATE



SECTION 9: HEALTH SCREENING QUESTIONNAIRE

See next page



HEALTH SCREENING ASSESSMENT QUESTIONNAIRE

Name of Worker: _____ Date: _____

Project: _____ Supervisor: _____

Workers will be visually examined by the Competent Person who will have a face mask on from a distance of at least six feet away.

The following questions will be asked

Question: 1

Are you feeling Sick?

Yes__ No__

Question: 2

Did you take your temperature before work this morning and was it at or above 100.4 Degrees?

Yes __No__

Question: 3

Are you having any breathing issues?

Yes __No__

Question: 4

Have you traveled outside of your local government's current travel restrictions for any reason?

Yes __No__

Question: 5

Have you been in close contact with anyone that is being tested for COVID-19 because they have symptoms consistent with COVID-19?

Yes __No__

Question: 6

Have you tested positive or been in close contact (within 6ft, 10 Minutes) with anyone that has tested positive for COVID-19?

Yes __No__

If the worker answers NO to all and passes the visual inspection below, they will be permitted to work.

If the worker seems to exhibit symptoms or responds to the items listed below, he/she will not be permitted to work.

- Any workers exhibiting COVID-19 Symptoms will be isolated from the group and instructed as described below.
- Any workers exhibiting COVID-19 Symptoms are communicating symptoms will be instructed to leave the site and seek the treatment from their licensed health care professional.
- The worker will not be permitted to return to work unless they have written documentation from their licensed health care professional that they have not tested positive for the COVID-19 Virus.

This protocol will be required for all visitors, deliveries and subcontractors.

This Screening is a requirement of the NYS DOH with guidance from the Center for Disease Control (CDC)



SECTION 10: INFECTIOUS DISEASE CLEANING LOG

See next page



INFECTIOUS DISEASE CLEANING LOG CHECKLIST

Location: _____

A = Acceptable

U = Unacceptable

Date: _____ Performed by: _____

NA = Not Applicable

This Checklist is to be completed by the Competent Person or his/her designee each shift

	Yes	No	N/A
CHECKLIST ITEM			
1. Are Cleaning Supplies available and Non-Expired?			
2. Field Office, Trailers, Shanties & Storage Containers have been cleaned and disinfected?			
3. Where all break room & eating areas cleaned and disinfected?			
4. Have all hand Tools been cleaned and disinfected?			
5. All Bathrooms & Wash Stations have been cleaned and disinfected?			
6. Have all equipment handles, knobs and access locations grips been cleaned and disinfected?			
7. Have all Equipment controls buttons, signals and dashboard items been wiped down and disinfected?			
8. Have all ladders been cleaned and disinfected?			
9. Have all control panels, gates and handles of Aerial Work Platforms been cleaned and disinfected?			
10. Where all touch screens, computer surfaces cleaned and disinfected?			

PLEASE DESCRIBE ANY ADDITIONAL FINDINGS THAT YOU OBSERVED



SECTION 11: PLAN RESOURCES

List of Resources

Below were the resources used to develop this plan.

NYS Interim Guidance for Construction Activities during the COVID-19 Public Health Emergency ("Interim COVID-19 Guidance for Construction.

- The World Health Organization (WHO)
- New York State Health Department
- Occupational Safety and Health Administration website:
www.osha.gov
- Centers for Disease Control and Prevention website:
www.cdc.gov
- National Institute for Occupational Safety and Health website:
www.cdc.gov/niosh

No part of this Health and Safety Program is meant to be a substitute for Authorized Training and/or Certification. All employees will seek COMPETENT PERSON Evaluation and Guidance for situations that they are not familiar with or when they need assistance. The company encourages everyone to ask questions and become involved in ALL aspects of the safety program.

ATTACHMENT A
*THIS IS A TEMPLATE DOCUMENT. A CURRENT VERSION OF THE DOCUMENT IS ON THE
SHARED DRIVE. ALL LOCATIONS ARE TO COMPLETE.

EGL WORK SHOP EVACUATION PLAN

In the event of a fire or other emergency at the Stuart Dean EGL facility, the
employees will be notified by the Fire Department. The Fire Department will notify the
all building occupants. Employees should be notified by dialing 911.
Employees should evacuate the facility, in an orderly manner, and proceeding to the
designated assembly point. Once safely there, occupants should await a head count and
instructions from the Stuart Dean Health & Safety Manager, or General Manager.
The designated assembly point is located at the REFRIGERATION INC. from the EGL office on Saint
Louis Street.

Employees should attempt to remain calm and follow the all-clear from the Fire
Department.

Employees from the various work areas should follow the following:

From the Field:
Employees should exit the Field through the Exit #6 doors, descend
the stairs, cross the street to the designated assembly point.
OR
If the Training Area is completed, employees should cross the Field
Training Area (Exit #7), raise their hands and (carefully) to
the sidewalk and proceed to the designated assembly point. Exit #7 should only be used as a last
resort in an emergency.

From the Field:
Enter the classroom through the doors, descend the stairs, cross the sidewalk and
cross the street to the designated assembly point.
OR
If the Training Classroom is completed, employees should cross the Field
Training Area to the sidewalk and proceed to the designated assembly point. Exit #7 should only be used as a last
resort in an emergency.

From the EGL Work Shop:
Leave the shop through the back door, proceed to the designated parking area and proceed to the designated
assembly point.



OR

If Exit #5 is compromised, proceed to Exit #4, cross the Field Training Area, enter the Training Classroom and leave the building through the rear Exit #6 doors. Descend the stairs to the sidewalk and cross the street to the designated assembly point.

From the EGL offices, Conference Room and Kitchen:

Leave the building through the Saint Clair Exit #1 to the sidewalk, then proceed across the street to the designated assembly point.

OR

Enter the Field Training Area via the Exit #3 door, proceed to the Training Classroom and leave the building via the rear Exit #6 doors. Descend the stairs to the sidewalk and cross the street to the designate assembly point.



STUART DEAN, INC. SUBSTANCE ABUSE POLICY

Substance abuse can result in deteriorating health, injury, family problems, job loss, poverty and social deprivation. According to statistics, drug and alcohol abusers account for:

- Increased absenteeism
- More on-the-job injuries to themselves or others
- Lower productivity

This means higher costs to the company through:

- Sick leave
- Overtime pay
- Insurance claims
- Tardiness
- Workers' compensation
- Damage to equipment
- Poor decisions
- Damage to the company's public image

A number of specific performance problems are common to workers who abuse alcohol and/or drugs. These problems include:

- Inconsistent work quality
- Poor concentration
- Reduced productivity
- Carelessness and mistakes
- Errors in judgement
- Risk taking and disregard for safety

Stuart Dean company has a vital interest in maintaining a safe, healthy and efficient workplace for the benefit of its employees, clients and the public.



Statement of Policy

To ensure a safe and productive work environment, employees are prohibited from:

1. Unlawfully manufacturing, distributing, dispensing, possessing or using controlled substances, or misusing or abusing prescribed or over-the-counter drugs.
2. Having present in their body's detectable levels of illegal drugs during working hours.
3. Violating any federal or state law relating to drugs.
4. The exception to this policy is the authorized possession, use and transportation of drugs prescribed by a physician and used according to prescription instructions, unless such use would pose a safety risk to the employee, other employees, or the public.

Employee Responsibilities

As a condition of employment, each employee must agree to:

1. Abide by this substance abuse policy.
2. Employees who are required to submit to reasonable suspicion or post-accident testing agree to accept, at the company's discretion, transportation to a location where the test will be conducted, and to their residence.

Penalties

Any employee who violates this substance abuse policy will be subject to disciplinary action up to and including termination of employment. At the company's discretion, an employee who requests assistance to treat a drug and/or alcohol addiction will be referred to an Employee Assistance Program (EAP) counselor.

Definitions

DRUG: Any substance that has known mind-or-function altering effects on a person, including psychoactive substances prohibited or controlled by federal or state-controlled substance laws.



PRESCRIBED DRUGS: Any substance prescribed for use by the employee by a licensed medical practitioner.

SAMPLE: Means oral fluid, urine, hair or blood.

Drug Testing Policy

Pre-employment Testing

1. Each applicant for a position in the Stuart Dean company will be subject to the company's substance abuse policy.
2. All offers of employment to applicants will be contingent upon the applicant passing a drug test in accordance with the company's policy.
3. An applicant who refuses to submit to pre-employment testing when requested, or refuses to sign the company's substance abuse policy consent form, will not be employed by the company.
4. If an applicant's test result is positive for any prohibited substance, the applicant will not be employed by the Stuart Dean company.

Random/Periodic Testing

1. The company, at its discretion, may institute a program of random testing of current employees. This program may include testing of all personnel at a jobsite or a random selection program of individuals throughout the year.
2. If selected for a random test, the employee must go immediately to the collection site and submit a sample for drug testing.
3. Refusal to submit a sample or to properly complete documentation for a random test will be considered a refusal to test, which will require disciplinary action up to and including termination of employment.

Post-Accident Testing

1. Employees involved in a work-related injury, regardless of severity, that requires professional medical treatment will be subject to a drug test.
2. Employees involved in an accident or safety-related incident of any kind while in a company vehicle or while on company time or on company property, will be subject to a drug test.
3. The company may require an employee who contributed to an accident be tested if there is a reasonable cause to believe that the accident may have resulted from the use of drugs.

Reasonable-Suspicion Testing

1. When the company has a reasonable belief that an employee may be under the influence of a substance, a drug test may be conducted immediately.
2. Employees suspected of being unfit for duty will be escorted by a supervisor or designated company representative to the authorized testing location. The employee's cooperation with the escort and the collection procedures will be required.



3. Refusal to cooperate in the collection procedure or refusal to take the test will require disciplinary action up to and including termination of employment.

Confidentiality

Only those persons authorized to receive results from the laboratory will be allowed to discuss these results with the supervisor or the employee. Individuals within the company will be notified of the results with the supervisor or the employee. Individuals within the company will be notified of the results on a limited need-to-know basis. No test results shall appear in a personnel folder. Information of this nature will be included in a medical file only. Drug test results will be released to a decision maker in a lawsuit, grievance or other proceeding (such as for a workers' compensation or unemployment insurance claim) initiated by or on behalf of the donor.

Use of Prescription Drugs

In the event an employee is under the care of a physician and is taking prescribed medication that might impair his/her ability to perform a job safely, the employee must notify management before starting work. It is a management's discretion as to whether the employee may continue to perform the normal assigned duties or be designated non-safety-sensitive duties (if available) until the employee provides a physician's release to perform normal duties.

Employee Assistance Program

Participation in an Employee Assistance Program (EAP) will jeopardize job security or promotional opportunities as long as the employee meets the required standards set forth by the EAP and Stuart Dean company. All contract between an employee and the EAP counselor is held strictly confidential.

ATTACHMENT C

***THIS IS A SAMPLE/TYPICAL CHEMICAL INVENTORY LIST. SEE LOCAL OFFICES FOR SPECIFIC CHEMICAL INFORMATION. THESE LISTS ARE NOT EXHAUSTIVE, THEY ARE ONLY A REPRESENTATION.**

CHEMICAL INVENTORY LIST

Partial list of chemicals used in the Stone Restoration process:



Strippers:

- Pro—Strip
- Bravo Power-Foam
- Mister Stripper

Cleaners:

- Stride
- Lithofin—DCC
- Marblate
- Marbletrol
- Bac-2-Nu
- Sure Klean Marble Poultice

Polishing Supplies:

- Stone Medic MPC Marble Polishing Compound
- Oxalic Acid
- Dia-Glo Polishing Compounds
- Prime & Grind 2
- Prime & Grind M

Sealers, Enhancers & Protectants:

- W 50 Paste Wax
- Lithofin ASI
- Lithofin PSI
- Artisan Stone Enhancer

Fillers & Patching Materials:

- Akemi Transparent Knife Grade
- Akemi Transparent Flowing
- Akemi White Knifegrade
- Akemi White Flowing
- Akemi Travertine Spackle
- Akemi Stone Polish Fluid
- Akemi High Speed Hardener

Coatings:

- Stone Sentinel (UV Coating)

CHEMICAL INVENTORY LIST

Partial list of chemicals used in the Wood Restoration process

Cleaners:

- Zep Orange Powder
- Murphy's Oil Soap
- Mineral Spirits
- Butcher's Paste Wax
- Lemon Oil

Strippers:

- Acetone
- Mr. Stripper
- ABR Strip
- Methylene Chloride

Thinners/Reducers:

- General Lacquer Thinner
- Mineral Spirits (Paint Thinner)
- Basic Reducer
- Xylene
- De-Natured Alcohol

Stains:

- Oil Based Stains
- Sherwin Williams Wiping Stains
- Minwax
- Anoline Dyes

Fillers:

- Epoxy Filler
- Wax Crayons
- Hot Fill Sticks
- Color Powders

Sealers:

- Vinyl Sealers
- Nitrocellulose Lacquer Sealers

Top Coats:

- Lacquers (Acrylic, Nitrocellulose, etc.)
- Varnishes
- Polyurethanes
- Waxes
- Oil Rub Finishes
- Linseed Oil, Tung Oil, etc.
- Spar Finishes
- Catalize Finishes

CHEMICAL INVENTORY LIST

Partial list of chemicals used in the Metal Restoration process.

Strippers:

- Brashwash
- Nikolas Gel
- 3M Safety Stripper
- Peel Away 1
- ABR Strip



Cleaners:

- Oxalic Acid
- Navel Jelly
- KRC-7
- CLR
- Bar Keepers
- Muriatic Acid
- Ion 417
- Aluminu
- Kyfo
- Simple Green
- Supercleans
- Tri Clean
- Zep Masonry Cleaner
- Bradford Derustit – SS-3 Cleaner
- Bradford Enustit – Wonder Gel

Thinners/Reducers/Hardeners:

- Acetone
- MEK
- Xylene
- VM&P Naptha
- Mineral Spirits
- ASW 0042
- ASW 0061
- 3602S – DuPont
- 3608S – DuPont
- 3979 – Retarder
- 275 GJ Nikolas Thinner
- Azores Reducer
- Reducer 2513 #7 (Incralac/Syncrylac)
- MAP – Reducer 43270SP
- Keeler & Long KLMST500 – Megaseal Thinner
- TNEMEC – Chembuild Thinner

Oxidizers:

- EPI 311
- EPI 315
- EPI 312
- EPI 316
- JAX
- Yellow (Potash)
- Blue (Copper Sulfate)

- Redox
- Oakite

Primers:

- GJ Nilolas – Epoxy Primer
- Grip Guard Washprimer
- Grip Guard Washprimer Hardener
- XIM – Primer
- KEM Kromic
- 30S – Primer
- 70S – Primer
- 131S – Primer Filler
- 181S – Primer Filler
- Azores Primer
- TNEME-ZINCE-Reddish Gray
- MAP Spraybond Adhesive (74793SP)
- MAP Tie Bond Adhesive (74777SP)
- MAP PT Activator (74766SP)
- MAP PT Filler (74760SP)
- MAP Activator (74735SP)
- MAP Metal Prep (74734SP)

Pigment Coats:

- 6505 Plasticolor
- 6505 Duotone
- 6727 Plasticolor
- 6727 Duotone
- Dupont 99S
- Valspar – Azores High Performance
- Crescent Powders
- Fast Brown – Dye
- Acrolon 218 High solids Polyurethane
- MAP – SVOC
- MAP – SOA
- MAP – NSOA
- MAP – VOC
- Keeler & Long UMS3001050 (Megaflon)
- Keeler & Long – UMB1 – Megaflon Part B
- TNEMEC – Chembuild Gray Epoxy
- TNEMEC – Chembuild Converter
- TNEMEC – Endura-Shield Converter
- TNEMEC – Endura-Shield Hammerhead
- Lacryl – Duranodic (20-313)
- Sherwin Industrial Enamel

Clear Coats:

- Kleer Coat 400
- Excellsior – Water base clear coating
- Century RFU Lacquer
- Syncralac
- Incralac
- BLB Lacquer
- Egyptian Lacquer
- Wipe On – Sodric
- 11240 Waterborne
- 11650 Waterborne
- Flagt Ayd – Acrylic Lacquer Modifier
- Lacryl – Gloss Modifier

Rouge/Polish:

- Red/Tompica/White/Green – Rouge Bars
- Prepolish Rolite
- Rolite Polish
- Midas Touch Polish
- Noxon Metal Polish
- Shiella Shine Stainless Steel Cleaner
- 3M Stainless Steel Polish
- Final Detail Wax
- Carnuba Paste Wax

Miscellaneous Supplies:

- 3M Organic Vapor Cartridges
- Fast Orange – Hand Cleaner
- Eyewash
- 2001 Turtle Wax – Vehicle Wash
- Pumice

ATTACHMENT D

STUART DEAN HEAT STRESS PROGRAM

HOW THE BODY HANDLES HEAT

(Source: National Institute of Occupational Safety & Health, NIOSH)

CAUTION: A MEDICAL CONDITION NOTE

Persons with heart problems or those on a low sodium diet who work in hot environments should consult a physician about what to do under these conditions.

HUMAN BODY:

The human body, being warm blooded, maintains a fairly constant internal temperature, even though it is being exposed to varying environmental temperatures. To keep internal body temperatures within safe limits, the body must get rid of its excess heat, primarily through varying the rate and amount of blood circulation through the skin and the release of fluid onto the skin by the sweat glands. These automatic responses usually occur when the temperature of the blood exceed 98.6°F and are kept in balance and controlled by the brain. In this process of lowering internal body temperature, the heart begins to pump more blood, blood vessels expand to accommodate the increased flow, and the microscopic blood vessels (capillaries) which thread through the upper layers of the skin to begin to fill with blood. The blood circulates closer to the surface of the skin, and the excess heat is lost to the cooler environment.

WHAT HAPPENS?:

If heat loss from increased blood circulation through the skin is not adequate, the brain continues to sense overheating and signals the sweat glands in the skin to shed large quantities of sweat onto the skin surface. Evaporation of sweat cools the skin, eliminating large quantities of heat from the body.

As environmental temperatures approach normal skin temperature, cooling of the body becomes more difficult. If air temperature is as warm as or warmer than the skin, blood brought to the body surface cannot lose its heat. Under these conditions, the heart continues to pump blood to the body surface, the sweat glands pour liquids containing electrolytes onto the surface of the skin and the evaporation of the sweat becomes the principal effective means of maintaining a constant body temperature. Sweating does not cool the body unless the moisture is removed from the skin is decreased and the body's efforts to maintain an acceptable body temperature may be significantly impaired. These conditions adversely affect an individual's ability to work in the hot environment. With so much blood going through the external surface of the body, relatively less goes to the active muscles, the brain, and other internal organs; strength declines; and fatigue occurs sooner than it would otherwise. Alertness and mental capacity also may be affected. Workers who must perform delicate or detailed work may find their accuracy suffering, and others may find their comprehension and retention of information lowered.

SAFETY PROBLEMS:

Certain safety problems are common to hot environments. Heat tends to promote accidents due to the slipperiness of sweaty palms, dizziness, or the fogging of safety

glasses. Wherever there exists a molten metal hot surface, steam, etc., the possibility of burns from accidental contact also exists. Aside from these obvious dangers, the frequency of accidents, in general appears to be higher in hot environments than in more moderate environmental conditions. One reason is that working in a hot environment lowers the mental alertness and physical performance of an individual. Increased body temperature and physical discomfort promote irritability, anger, and other emotional states which sometimes cause workers to overlook safety procedures or to divert attention from hazardous tasks.

HEALTH PROBLEMS:

Excessive exposure to a hot work environment can bring about a variety of heat induced disorders.

Heat Stroke- Heat stroke is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached. A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should be directed to the continuation of the cooling process and the monitoring of complications which often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

Heat Exhaustion- Heat exhaustion includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated. In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

Heat Cramps- Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt, shortly thereafter the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs or abdomen, but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps.

Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth.

Fainting- A worker who is not accustomed to hot environments and who stands erect and immobile in the heat may faint. With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain. Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

Heat Rash- Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not easily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

Transient Heat Fatigue- Transient heat fatigue refers to the temporary state of discomfort and mental or psychologic strain arising from prolonged heat exposure. Workers unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance. The severity of transient heat fatigue will be lessened by a period of gradual adjustment to the hot environment (heat acclimatizing).

WORKING WITH HOT WEATHER:

Preparing for the Heat- One of the best ways to reduce heat stress on workers is to minimize heat in the workplace. However, there are some work environments where heat production is difficult to control, such as when furnaces or sources of steam or water are present in the work area or when the workplace itself is outdoors and exposed to varying warm weather conditions. Humans are, to a large extent, capable of adjusting to the heat. This adjustment to heat, under normal circumstance, usually takes about 5-7 days, during which time the body will undergo a series of changes that will make continue exposure to heat more endurable. On the first day of work in a hot environment, the body temperature, pulse rate, and general discomfort will be higher. With each succeeding daily exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body becomes acclimated to the heat, the worker will find it possible to perform work with less strain and distress. Gradual exposure to heat gives the body time to become accustomed to higher environmental temperatures. Heat disorders in general are more likely to occur among workers who have not been given time to adjust to working in the heat or among workers who have been away from hot environments and who have gotten accustomed to lower temperatures. Hot weather conditions of the summer are likely to affect the worker who is not acclimatized to the heat. Likewise, workers who return to work after a leisurely vacation or extended illness may be affected by the heat in the work environment. Whenever such circumstances occur, the worker should be gradually reacclimatized to the hot environment.

Lessening Stressful Conditions- Many industries have attempted to reduce the hazards of heat stress by introducing engineering controls, training workers in the recognition and prevention of heat stress, and implementing work-rest cycles. Heat stress depends, in part, on the amount of heat the worker's body produces while a job is being performed. The amount of heat

produced during hard, steady work is much higher than that produced during intermittent or light work. Therefore, one way of reducing the potential for heat stress is to make the job easier or lessen its duration by providing adequate rest time. Mechanization of work procedures can often make it possible to isolate workers from the heat sources (perhaps in an air-conditioned booth) and increase overall productivity by decreasing the time needed for rest. Another approach to reducing the level of heat stress is the use of engineering controls which can include ventilation and heat shielding.

Number and Duration of Exposures- Rather than be exposed to heat for extended periods of time during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work-rest cycles. Work-rest cycles give the body an opportunity to get rid of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin. Workers employed outdoors are especially subject to weather changes. A hot spell or a rise in humidity can create overly stressful conditions. The following practices can help to reduce heat stress:

- Postponement of nonessential tasks
- Permit only those workers acclimatized to heat to perform the more strenuous tasks
- Provide additional workers to perform the tasks keeping in mind that all workers should have the physical capacity to perform the tasks and that they should be accustomed to the heat

Thermal Conditions in the Workplace- A variety of engineering controls can be introduced to minimize exposure to heat. For instance, improving the insulation on a furnace we; can reduce its surface temperature and the temperature of the area around it. In a laundry room, exhaust hoods installed over those sources releasing moisture will lower the humidity in the work area. In general, the simplest way and least expensive methods of reducing heat and humidity can be accomplished by:

- Opening windows in hot work areas
- Using fans
- Using other methods of creating airflow such as exhaust ventilation or air blowers

Rest Areas- Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. There is no conclusive information available on the ideal temperature for a rest area. However, a rest area with a temperature near 76°F appears to be adequate and may even feel chilly to a hot, sweating worker, until acclimated to the cooler environment. The rest area should be as close to the workplace as possible. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

Drinking Water- In the course of a day's work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst drive. A worker therefore should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 to 20 minutes to replenish the necessary fluids in the body. There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they

will cool ones. Whatever the temperature of the water, it must be palatable and readily available to the worker. Individual drinking cups should be provided – never use a common drinking cup. Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets *should not* be used.

Protective Clothing- Clothing inhibits the transfer of heat between the body and the surrounding environment. Therefore, in hot jobs where the air temperature is lower than skin temperature, wearing clothing reduces the body's ability to lose heat into the air. When air temperature is higher than skin temperature, clothing helps to prevent the transfer of heat from the air to the body. However, this advantage may be nullified if the clothes interfere with the evaporation of sweat. In dry climates, adequate evaporation of sweat is seldom a problem. In a dry work environment with very high air temperatures, protective clothing could be an advantage to the worker. The proper type of clothing depends on the specific circumstance. Certain work in hot environments may require insulated gloves, insulated suits, reflective clothing, or infrared reflecting face shields. For extremely hot conditions thermally conditioned clothing is available. One such garment carries a self-contained air conditioner in a backpack, while another is connected to a compressed air source which feeds cool air into the jacket or coveralls through a vortex tube. Another type of garment is a plastic jacket which has pockets that can be filled with dry ice or containers of ice.

AWARENESS IS IMPORTANT:

The key to preventing excessive heat stress is educating the employer and worker on the hazards of working in heat and the benefits of implementing proper controls and work practices. The employer should establish a program designed to acclimatize workers who must be exposed to hot environments and provide necessary work-rest cycles and water to minimize heat stress.

SPECIAL CONSIDERATIONS DURING PROLONGED HEAT SPELLS:

During unusually hot weather conditions lasting longer than 2 days, the number of heat illnesses usually increases. This is due to several factors, such as progressive body fluid deficit, loss of appetite (and possible salt deficit), buildup of heat in the living and work areas, and a breakdown of air-conditioning equipment. Therefore, it is advisable to make a special effort to adhere rigorously to the above preventive measures during these extended hot spells and to avoid any unnecessary or unusual stressful activity. Sufficient sleep and good nutrition are important for maintaining a high level of heat tolerance. Workers who may be at a greater risk of heat illnesses are the obese, the chronically ill, and older individuals. When feasible, the most stressful task should be performed during the cooler parts of the day (early morning or at night). Double shifts and overtime should be avoided whenever possible. Rest periods should be extended to alleviate the increase in the body heat load.

ALCOHOL & HEAT:

The consumption of alcoholic beverages during prolonged periods of heat can cause additional dehydration.

Persons taking certain medications (e.g., medications for blood pressure control, diuretics, or water pills) should consult their physicians in order to determine if any side effects could occur during excessive heat exposure. Daily fluid intake must be sufficient to prevent significant weight loss during the workday and over the workweek.

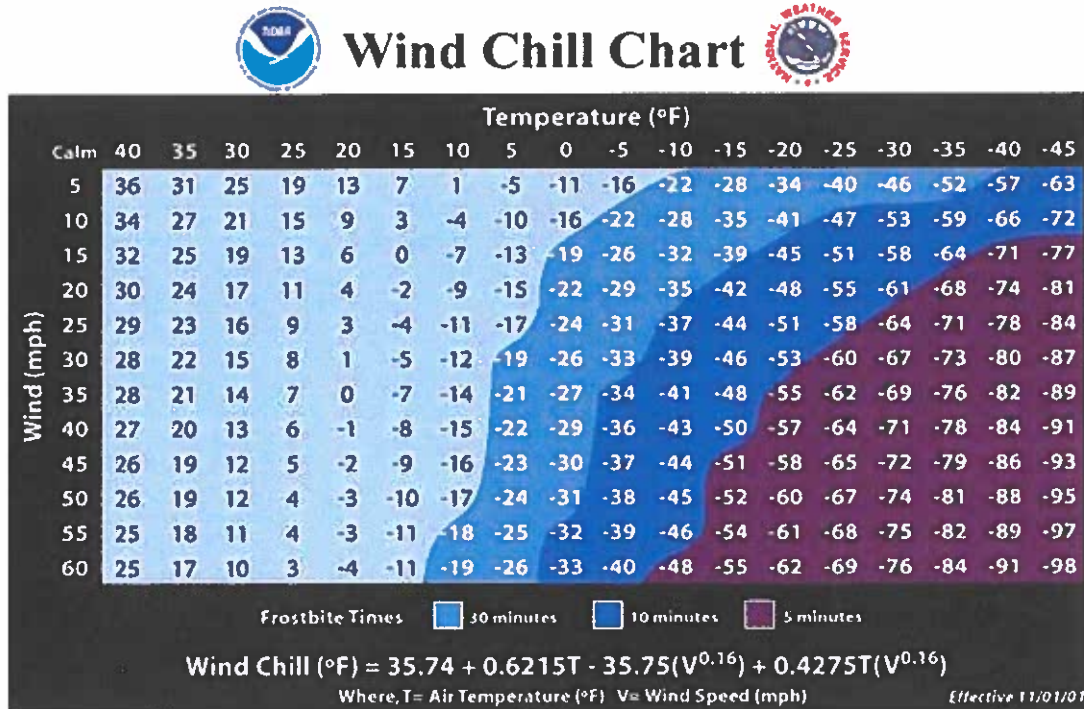
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ATTACHMENT E

NATIONAL WEATHER SERVICE WIND CHILL CHART

*ALWAYS REFER TO LOCAL CONDITIONS FOR EVALAUTION OF WORKING CONDITIONS



The NWS Wind Chill Temperature (WCT) index uses advances in science, technology, and computer modeling to provide an accurate, understandable, and useful formula for calculating the dangers from winter winds and freezing temperatures. The index does the following:

- Calculates wind speed at an average height of 5 feet, the typical height of an adult human face, based on readings from the national standard height of 33 feet, which is the typical height of an anemometer
- Is based on a human face model
- Incorporates heat transfer theory based on heat loss from the body to its surroundings, during cold and breezy/windy days
- Lowers the calm wind threshold to 3 mph
- Uses a consistent standard for skin tissue resistance
- Assumes no impact from the sun, i.e., clear night sky.

ATTACHMENT F

Fire Extinguisher Fact Sheet



If there's a fire, call the Fire Department first **CALL 911**.
Get everyone outside. You should **ONLY ATTEMPT** to fight a small fire.
If the fire gets large, **GET OUT!** Close doors to slow the fire spread.

Remember....

P
A
S
S

Instructions for use of Fire Extinguisher

1. **Pull**
Pull the ring pin.
2. **Aim**
Aim the extinguisher nozzle at the base of the fire and stand 8 feet back.
3. **Squeeze**
Squeeze the lever, holding the extinguisher upright.
4. **Sweep**
Sweep from side to side at the base of the fire. Watch for reflash.
Discharge the contents of the extinguisher.

The Fire Extinguishers used are multi-purpose and are called **A, B, C** extinguishers.

A TYPE (trash, wood, and paper)
B TYPE (flammable liquids)
C TYPE (electrical equipment)

Fire Extinguishers need to be maintained and inspected!



ATTACHMENT G

Stuart Dean Motor Vehicle Fleet Safety

Purpose-

The Stuart Dean Company believes that our employees are our most valuable asset and strives to ensure that company vehicles are operated and maintained in a manner that prevents injuries and accidents.

While safe driving is the responsibility of each fleet participant, we are dedicated to providing policies that promote safe driving.

Fleet participants are entrusted with the care, custody and control of a Company vehicle provided by Stuart Dean or are on a Rental Car/Vehicle. Every fleet participant is required to comply with all policies and procedures in this policy, as well as all motor vehicle laws. For purposes of the policy, "fleet participant" refers to any Stuart Dean employee assigned a Company vehicle or on a Company provided vehicle allowance driving for business. "Company vehicle" refers to any vehicle leased by the Company and assigned to a fleet participant. "Fleet Administrator" refers to the Director of Procurement, who is responsible for fleet administration.

Responsible Persons and Duties:

The Operations Administrator (with guidance and direction from the Fleet Administrator) is responsible for:

1. Ensuring that all vehicles are inspected, serviced, and repaired as required.
2. Maintaining records of all vehicle inspections and service.
3. Instructing employees in safe driving and in safe transportation of hazardous materials.
4. Maintaining copies of driver's licenses and driving records of all employees authorized to drive company vehicles.
5. Ensuring that documentation on hazardous materials is present in each vehicle.

The Fleet Administrator is responsible for:

1. Reviewing vehicle inspection maintenance reports.
2. Reviewing accident reports and developing preventive controls.
Ensuring that all employees receive training in defensive driving and in
3. Conducting annual reviews of driving records of all employees authorized to drive company vehicles.

Employees are responsible for:

1. Complying with all local driving regulations and practicing defensive driving.
2. Wearing seatbelts at all times.
3. Reporting any problem with vehicles to the fleet manager.
4. Obeying local cell phone use driving regulations.

Safe Vehicle Use Practices

1. All drivers will have a valid driver's license.
2. All drivers and passengers will wear seatbelts at all times.
3. All company vans and trucks will be equipped with a complete set of Material Safety Data Sheets (SDS) for the chemical products carried inside the vehicle, a first aid kit, chemical spill kit, eye wash bottles and a fire extinguisher (in the front).
4. All materials and equipment will be labeled, secured and kept in racks. Chemical products will be kept in tightly closed containers.
5. The number of employees that can ride in a company vehicle is limited to that number for which proper seating and restraints are provided.
6. **No Smoking** is allowed in any vehicles that are carrying flammable or combustible materials.
7. Only authorized Stuart Dean employees are allowed to drive or ride in company vehicles. Picking up hitchhikers or giving strangers a ride in a Company vehicle is prohibited.
8. The spouse of the managerial or supervisory fleet participant may drive the Company vehicle provided he/she maintains a valid driver's license as well as meets and follows all the requirements specified in this policy.
 - a. Use of Company vehicles is restricted to the fleet participant assigned to the Company vehicle and the managerial or supervisory fleet participant's spouse. If business circumstances require, a fleet participant may allow another fleet participant to drive his/her assigned Company vehicle.
 - b. An example of an acceptable circumstance would be if two or more fleet participants were on an extended Company-business trip in a Company vehicle (assigned to one of the two or more participants), and elected to share the driving. Under no circumstances may a Company vehicle be loaned to others; the only authorized drivers are the fleet participant, the fleet participant's spouse, and (only under acceptable business circumstances), another fleet participant.



Motor Vehicle Safety

This section describes the procedures to be followed to ensure safe motor vehicle operation.

General:

Of primary concern is the operation of motor vehicles. As the national statistics continue to mount in the area of vehicle operations, we are striving to keep the number of accidents to a minimum. More important than the actual damage to a vehicle are the injuries which could cause discomfort, permanent physical damage or even death.

In order to avoid these hardships and maintain a safe driving record, we will need your full cooperation in following rules, regulations, precautions, guidelines and suggestions contained in this section.

As the daily routine of our field personnel includes a fair amount of driving, we cannot stress enough our concern for your safety and that of others. We will do all we can in this area, but need your assistance in:

1. Reporting any sign of trouble or any malfunction with your vehicle.
2. Offering suggestions which you feel are important in making your job safer.

Driver Selection

1. All employees are required to complete a detailed employment application form.
2. All employees are to be interviewed prior to being hired.
3. References are required.
4. A motor vehicle report (MVR) will be obtained for all employees.
5. All employees who drive will be on driving probation for six months
6. The assignment of drivers and driving responsibilities is at the discretion of management.
7. Insurance companies dictate a constant awareness by their insured of all license revocations and suspensions. As a result, every employee who drives a STUART DEAN vehicle must inform the Company of a license being revoked or suspended.

Driver Qualification and Eligibility

1. All employees must possess a valid driver's license. Each employee will undergo a license check approximately two times a year.
2. Stuart Dean has the right to refuse to let an individual drive a Company vehicle.
3. All drivers will have their driving history (MVR) investigated. As a condition of being assigned and continuing to use a Company vehicle, fleet participants must grant Stuart Dean authorization to conduct Motor Vehicle Record (MVR) checks. Failure to grant authorization will result in denial/revocation of participation in the Company fleet program. The Company may conduct an MVR check at any time for any reason on all fleet participants including spouses. This process reveals any tickets or accidents charged against a driving record. A standardized point system is used to incorporate the MVR information into the Driver Profile.

4. **MVR Checks Administration & Confidentiality** - MVR checks will be conducted semi-annually, at a minimum; more frequent checks may be conducted for drivers in Profile Levels 3 and 4. The Fleet Administrator will coordinate the MVR results with the leasing agent used by the Company, and will provide the results on a confidential basis to the CEO, CFO and Director of Human Resources.

All drivers will be subject to the following guidelines:

1. Applicants accepted for driving related positions within the Company must, at all times, have a valid driver's license in their possession and have a basic knowledge of traffic violations. If a fleet participant's license is revoked or suspended for any reason, the fleet participant must notify their manager and the Fleet Administrator immediately.
2. Fleet participants may not drive a Company vehicle without a valid driver's license.
3. To resume driving a Company vehicle, the fleet participant must provide suitable proof of a reinstated driver's license to both their manager and the Fleet Administrator.
4. A photocopy of the current valid drivers' licenses of such applicants will be attached to the application and will remain on file in their personnel folders.
5. Employees will not drive Company vehicles when under the influence of alcohol, drugs, medication, etc. or when their physical and/or mental condition could be considered hazardous to themselves and others.

6. DUI/DWI

- a. Fleet participants charged or ticketed with a DUI/DWI while driving a Company vehicle must contact their management, the Fleet Administrator and the Director of Human Resources within 5 days of the arrest or charge.
 - b. Fleet participants may not drive a Company vehicle with a suspended license.
 - c. A fleet participant who has been arrested or is currently charged with DUI/DWI and whose driver's license has been suspended or revoked cannot drive a Company vehicle.
 - d. To resume driving a Company vehicle, the fleet participant must provide suitable proof of valid/reinstated driver's license to both their manager and the Fleet Administrator.
 - e. The Company may require an assessment of the fleet participant's ability to return to their role involving driving a Company vehicle, to be conducted by a Company approved health care provider at no time should an employee attempt to flee or elude a police officer.
7. At no time should an employee fail to stop after an accident involving personal injury or property damage.
 8. If an employee has any of the following occurrences during the three years prior to the MVR license check or while driving a Stuart Dean vehicle, the employee may have his driving privileges revoked.

- a. reckless or negligent driving
- b. evading responsibility after an accident
- c. speeding more than 20 mph over limit
- d. failure to obey traffic signs or a signal
- e. careless operation of a vehicle
- f. "at fault" accident

9. **Any employee who does not inform STUART DEAN of a suspended or revoked license will be subject to disciplinary action up to and including termination of employment.**

General Operating Procedures and Responsibilities of Fleet Participants:

1. Drivers must obey all state and local traffic laws.
2. NO handguns in Fleet Vehicles
3. Unauthorized persons are not permitted to operate a Company vehicle.
4. Employees will not carry unauthorized riders.
5. Fleet participants are responsible to drive safely. To accomplish this, fleet participants must:
 - a. Follow all traffic laws and rules of the road
 - b. Maintain fleet participant's Company vehicle in safe operating condition
 - c. Follow the Stuart Dean policies described herein
 - d. Participate actively in required training and special safety initiatives
 - e. Report all driving incidents and traffic violations promptly and accurately
6. Employees shall, at all times, obey all State and local speed limits and shall reduce speed as required when hazardous weather, road or traffic conditions prevail.
7. Prior to starting work, the driver must:
 - a. Check to see that copies of the vehicle registration and insurance card are in the vehicle.
 - b. Check to see that his or her driver's license is being carried.
 - c. Check to see that required safety equipment is in the vehicle.
 - d. Inspect the vehicle to determine that it appears to be in safe operational condition.
 - e. Check to see that all materials are in the correct containers and properly stored.
8. Prior to driving a vehicle, the following precautions must be taken:
 - a. All doors and scaffolding must be secured.
 - b. Remove objects such as radios, bottles, cans, cups, tools, etc. from dashboard.
 - c. Objects must not be hung from the rear-view mirror.
 - d. Seat belts must be worn whenever the vehicle is in motion.
 - e. Check all mirrors to ensure that no person or object is in the path of the vehicle.
9. Employees should exit vehicle from the curb side whenever possible. When this is not practical, use extreme caution and observe the traffic situation before opening doors and exiting.

10. All drivers must maintain a safe distance from other vehicles.
11. Headlights must, at all times, be turned on simultaneously with windshield wipers.
12. The horn of your vehicle is an emergency signal and should be used only as a warning to pedestrians or other drivers.
13. The following precautions must be taken prior to changing lanes or making turns:
 - a. Mechanical and/or manual directional signals must be used at least 100' in advance of the intended move.
 - b. Check all mirrors and/or flow of traffic to ensure that you have clearance.
14. Operators of Company vehicles will, at all times, yield the right-of-way to emergency vehicles, by bearing to the right after having signaled and checked for clearance.

Driver Profile

All fleet participant events (MVR data, incidents, accidents and safety training) will be recorded in a Driver Profile used to monitor fleet participant safety compliance and fleet participant eligibility. Points will be assigned to each event based on its relative severity. The data will consist of the last 3 years (standard MVR reporting timeframe) of reported driving experience on a rolling calendar; however, the actual profiles will be established based on the most recent 21 months, which is the medial level used by members of the National Association of Fleet Administrators. Each fleet participant will be assigned a Driver Profile level; depending on the level assigned, a fleet participant may be subject to remedial action. All planned remedial action will be reported to the Stuart Dean CEO and CFO who reserve the right to evaluate each action on a case-by-case basis. This applies to spouses who operate Company provided vehicles.

Driver Profile Level 1: No points

A fleet participant driver at profile level 1 has accumulated no points over the last 21 months. There will be no remedial action associated with this level.

Driver Profile Level 2: 1- 4 points

A fleet participant at Profile Level 2 has accumulated no more than 4 points over the last 21 months. The fleet participant and the fleet participant's manager will review the "Fleet Safety Policy" together and discuss the remedial action for additional points as described below.

Driver Profile Level 3: 5-10 points

A fleet participant at Profile Level 3 has accumulated between 5 and 10 points over the last 21 months. The fleet participant will be required to complete a 4-hour remedial Fleet Safety training class, to be coordinated by the Fleet Administrator.

Driver Profile Level 4: 11+ points or one critical event

A fleet participant at Profile Level 4 has accumulated 11 or more points or one critical event over the past 21 months. This fleet participant may have fleet privileges revoked and/or be subject to disciplinary action. The fleet participant's manager will work with HR to determine appropriate disciplinary action up to and including separation from the company. A disciplinary recommendation will then be made to the CEO and CFO prior to being implemented. If driving privileges are to continue, this fleet participant will be required to complete an 8-hour remedial Fleet Safety training class, to be coordinated by the Fleet Administrator. A written *Driving Safety Improvement Action Plan* and/or ongoing Fleet Safety training may also be required.

Spouse MVR Checks

1. For spouses at **Profile Level 3**, the fleet participant's manager, in consultation with the Fleet Administrator, and the Director of Procurement will:
 - Discuss driver responsibilities with the fleet participant.
 - Arrange for a 4-hour remedial Fleet Safety training class for the spouse.
 - Assure total cost (training fee and travel expenses) of the 4-hour remedial Fleet Safety training will be paid by the fleet participant, postmarked no later than 15 days after the remedial Fleet Safety training and sent to the Fleet Administrator.
 - Determine if a recommendation is to be made to the CEO and CFO to revoke the spouse's driving privileges.
2. For spouses at **Profile Level 4**, the Fleet Administrator will:
 - Immediately notify the fleet participant, the fleet participant's manager and the Fleet Administrator that the spouse's driving privilege has been revoked.

Summary Chart of Driver Profile Levels & Remedial Actions

The profiles will be developed based on the most recent 21 months of driving history.

0 points	1-4 points	5-10 points	11+ points or 1 Critical Event
None	Fleet participant to discuss LCE "Fleet Safety Policy with manager, and review remedial action that will result if additional points are accumulated.	Mandatory attendance at 4-hour Fleet Safety training class	Potential revocation of fleet privileges. Mandatory attendance at 8-hour Fleet Safety training class

Point Levels

The following chart indicates points associated with various driving experiences.



Non-moving convictions	Moving conviction	1st at-fault accident	2nd at-fault accident
			3rd moving conviction

Critical Events

- Driving while under the influence of alcohol or drugs
- Fleeing the scene of an accident
- Use of a Company vehicle in violation of any criminal law
- Committing a driving-related felony, homicide, or manslaughter
- Falsifying collision / incident facts
- Operating a Company vehicle without a valid driver's license
- Failure to report an accident
- Allowing an unauthorized person to drive a Company vehicle
- Transporting a firearm in the Company vehicle
- 3rd at-fault accident - combined record of fleet participant and spouse

The Fleet Administrator must notify the CEO and CFO of any critical events occurrences. One critical event immediately places a fleet participant in Profile Level 4, as defined in Section 15 of this "Motor Vehicle Safety Policy."

Revoking Fleet Participation Privileges

Stuart Dean may revoke fleet participation privileges, take immediate disciplinary action up to and including separation from the Company and/or seek full reimbursement from a fleet participant for a loss occurring as a result of a critical event, including but not limited to the events described above, whether or not the fleet participant was operating the Company vehicle at the time. Fleet participants must immediately report any critical events to their manager and the Fleet Administrator.

Specific Operating Procedures:

Parking:

1. Employees will park the distances required by law from fire hydrants.
2. Employees will read the signs carefully, noting the days and/or times that it is legal to park or stand.
3. Vehicles must not be parked in a manner that can interfere with traffic, including double parking.
4. If the operator of a vehicle receives a traffic or parking summons, it will be turned in to the office on his or her return to the shop. The proper paper work will be completed and signed, listing the location of the job where the summons was issued. (See Form #1)

The Company will continue to pay for tickets for standing violations. The Company will not pay for moving violations. Employees are expected to avoid unnecessary parking violations to the maximum extent possible.

5. If the operator of a vehicle has his or her vehicle towed, that person is to call Operations or their supervisor immediately so that the necessary arrangements can be made to retrieve the vehicle.
6. The operator of the vehicle will be responsible for the paying of all fines involved in illegal parking.
7. The operator who has been previously authorized to take his/her vehicle home is to take extreme caution when parking that vehicle:
 - a. Do not park the vehicle in an unsafe area.
 - b. Do not park the vehicle illegally.
8. The operator who is authorized to take a vehicle home is solely responsible for maintaining the truck and keeping it in a clean and tidy condition at all times.

State and Local Regulations:

1. Motor Vehicle regulations stipulate that drivers travel at a speed which is appropriate for existing conditions.
2. Vehicles are prohibited from passing school buses in the process of boarding or discharging passengers, or when its emergency warning lights are in operation
3. Before entering a parkway, observe posted signs to determine whether commercial traffic is permitted.
4. Some highways prohibit commercial traffic from traveling in the left lane. Observe and obey posted signs.
5. *"Right turn on red signal"* shall be treated as a stop sign. The driver making the turn does not have the *"right of way"*. The vehicle must come to a complete stop, check oncoming traffic and proceed only when clear.
6. The procedure of turning right on red is only permitted in certain locations and may be prohibited at individual intersections. Obey posted traffic signs.
7. Cell Phone/Pagers/Lap Tops – Portable Electronic Devices - The fleet participant must observe all local laws regarding the use of portable electronic devices such as cell phones, pagers, palm pilots or lap top computers in a Company vehicle. The fleet participant should consider pulling off the road to a safe location and devote their full attention to the task when using any portable electronic device.
8. Fire Arms/ Hazardous Materials - Transporting firearms in a Company vehicle are prohibited.
9. All flammable and hazardous materials must be transported in accordance with state, federal and OSHA guidelines.
10. If an operator of a vehicle receives a summons for a moving violation, i.e., illegal turning, speeding or any other traffic infraction that is the responsibility of the licensed driver and that infraction reflects directly on the operator's license, then it will be his or her sole responsibility to notify STUART DEAN, to pay the fine and/or appear in court.

Defensive Driving:

1. "Watch Out for the Other Guy" - Who is the "other guy?" We would like to believe that it is someone other than ourselves, but remember....to the other guy you are the "other guy." We are all certain that our driving ability is far superior to others and, ironically, accidents are caused by people who, as we, believe that they are safer drivers than most.

There are times when accidents cannot be avoided but, for the most part, this is not true. The majority of all accidents can be prevented by defensive driving, road courtesy, common sense and patience.

2. What is Defensive Driving? - It is watching for road conditions which can present danger and being prepared to effectively avoid and/or handle these hazards by having complete control of the vehicle. The defensive driver does not insist on having the right-of-way and is willing to make other concessions to avoid an accident.
3. Road Courtesy - In the eyes of the public, the employee driving a Company vehicle represents that Company. Therefore, operators should drive in a manner which will create a favorable impression on the public...with courtesy and consideration for other drivers, pedestrians, and property. A Company employee should, when conditions permit, give the right-of-way to others.

Vehicle Inspection:

1. Each driver should fill out the vehicle inspection checklist, once a month, and turn it into the shop manager. (See Form #2) This way all vehicles can be maintained properly.
2. At any other time, if problems occur the vehicle inspection and repair form should be filled out and should be turned into the shop manager. (See Form #3)

15.4.7 Accident Procedures:

In the event of an accident, incident, vandalism or theft (no matter how minor) involving a Company vehicle, the fleet participant is to complete an Incident & Loss Report within 24 hours and forward it to the Fleet Administrator.

1. Stop immediately and stay calm
2. Assess the situation: Are you or anyone else injured? Is it safe to exit the vehicle?
3. Secure your vehicle and its contents
4. Notify your supervisor or the office immediately and supply the following information:
 - a. Type of emergency personnel needed at the scene (police, ambulance, fire equipment)
 - b. Type of accident and the exact location

- c. Any injuries to employee(s) or public
 - d. Any property damage to Company vehicle, public vehicle(s) or property.
 - e. Request supervisor's presence at the scene in instances where injury or extensive vehicle and/or property damage has occurred.
5. Offer assistance to any injured party and/or render assistance in obtaining medical aid.
6. Make use of traffic warning devices if the accident creates a hazard for road or other drivers.
7. When an accident involves another vehicle, document the following information:
 - a) Driver's name, address, and phone numbers
 - b) Name of vehicle owner
 - c) Name of insurance company
 - d) Vehicle license plate
 - e) Make, model, year and registration number of the other vehicle
 - f) Date, time and location of accident
 - g) Weather conditions at the time of the accident
 - h) Names of injured if applicable
 - i) Name and badge number of investigating officers
 - j) Name, address and phone number of any witnesses
 - k) Take photos of the accident scene if possible
8. The employee will provide this same information upon request.
9. Obtain the names, addresses and phone numbers of any witnesses.
10. Refrain from providing any statement regarding the accident to anyone other than authorized Company personnel. Refer any such statements to your department manager or person in charge of filing accident reports. Never express opinion as to fault or liability. Never agree to any settlement or sign any statements other than documents required by the police.

Complete a full report of the accident immediately or at least within 24 hours. (See Form #4, Report of Work-Related Accident or Incident pp. 1-4)
11. A supervisor or manager is to perform a complete investigation of the accident. (See Form #5, Employer's Investigation of Accident/Incident.

Other Areas of Concern:**1. Personal Property Stolen from Vehicle**

Personal property stolen from the Company vehicle is not the responsibility of Stuart Dean.

2. Personal Safety and Security Precautions

Always keep doors locked when you are in the Company vehicle. Briefcases, computers and other equipment should be stored in the trunk, or out of sight of those passing by. Park in well-lit areas as close as possible to the building you are visiting. Park your Company vehicle where security is provided whenever possible.

ATTACHMENT H
INDUSTRIAL AND OFFICE ERGONOMICS
LIFTING RIGHT | HEALTHY BACKS | WARM UPS | STRENGTHEN YOUR BACK |
VIBRATIONS | HAND TOOLS

LIFTING WITH PROPER POSTURE

Lifting is strenuous – it requires proper training and technique. By lifting with your large, strong leg muscles instead of the small muscles of the back, you can prevent back injuries and reduce low back pain.

There are five steps to follow when lifting an object:

1. **GET CLOSE TO THE LOAD** – Get as close to the load as possible – as if you’re hugging the object. Having the object close to your body puts less force on your low back.
2. **MAINTAIN YOUR CURVES** – Keep yourself in an upright position while squatting to pick up.
3. **TIGHTEN YOUR STOMACH MUSCLES** – Tightening the stomach helps support the spine. *Don’t hold your breath while tightening the muscles.*
4. **LIFT WITH YOUR LEGS** – Your legs are the strongest muscles in your body – so use them.
5. **PIVOT DON’T TWIST** – Turn with your feet, not your back. It isn’t built for twisting from side to side.



LARGE OR HEAVY LOADS: If a load is too heavy to lift alone, ask for help. Pick on person to coach the lift – this way you lift and lower at the same time.

OVERHEAD LOADS: If a load is above your shoulders, use a step stool to elevate yourself until the load is at least chest level – preferably waist height. Pull the object close to your body and then lift. Remember to maintain your curves – use your arms and legs to do the work.

MAINTAIN A HEALTHY BACK:

CHECK OUT-

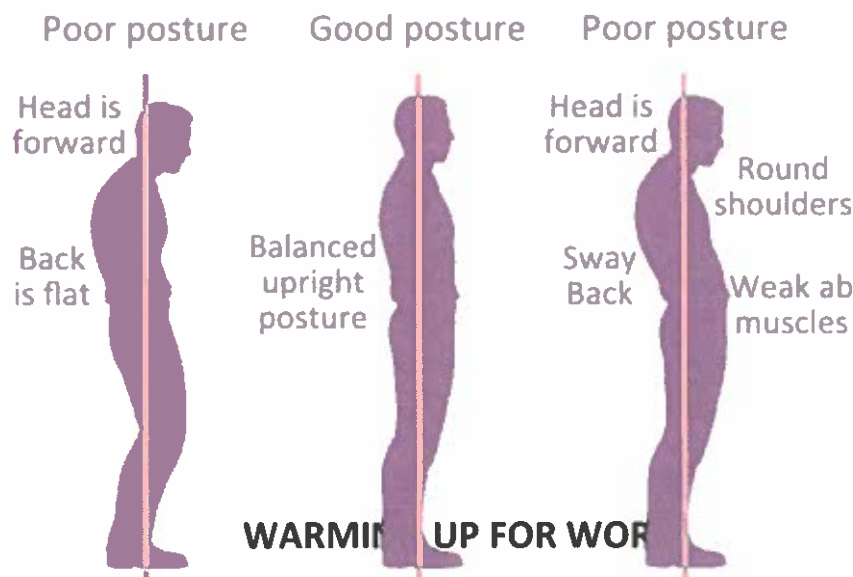
- Proper lifting techniques
- Working in neutral
- Back strengthening techniques

REMEMBER- MAINTAIN YOUR CURVES

The muscles in the back are unlike many other muscles in your body – they are almost always in use. They hold your torso in an upright position throughout your day. They assist you every time you pick something up, whether it's a pen or a concrete block. They support posture while you sit in your chair, and they even work at night when you sleep.

In order for you to understand what is good posture and what is bad posture – let's take a look at how your back is designed:

- **THREE CURVES OF YOUR BACK-** Your back is composed of three natural curves that form an S-shape. When your three natural curves are properly aligned, your ears, shoulders and hips are in a straight line. Without support from strong, flexible muscles, your back loses its three natural curves. Poor posture can lead to pain and serious injury. When you use good posture, your back is aligned in three natural curves supported by strong, flexible muscles. Good posture helps prevent back strain and pain.





Just as an athlete prepares before playing a sport, you too should prepare before work to prevent back injuries. These slow stretches may help prevent injuries and make your muscles more flexible.

MAINTAINING A HEALTHY BACK WITH EXERCISE & REST

It doesn't take much time to improve the strength and flexibility of your back. In just 10 minutes a day, you can perform a few exercises, which can prevent a lifetime of low back pain!

AEROBIC EXERCISE- Aerobic exercise also stretches and strengthens the muscles that support your low back, which combined with healthy eating can also help you maintain your ideal weight. If you're overweight, the extra pounds add to the strain of your low back. Aerobic exercise like walking, can help you lose weight.

PROPER REST- The best position for resting the back muscles is lying on your back on your living room floor with a pillow under your knees and a rolled-up towel under your neck. You can also lie on your side in the fetal position – bend the knees to reduce strain on the low back and put a pillow between your knees, and under your head and neck to keep them level.



Standing hamstring stretch



Cat and camel



Pelvic tilt



Quadruped arm/leg raise



Partial curl



Extension exercise



Side plank



Gluteal stretch

WHOLE-BODY HAND / ARM VIBRATION

Whole-body vibration is experienced in any work condition that involves sitting, standing, or lying on a vibrating surface. Excessive levels and durations of exposure to whole-body vibrations may contribute to back pain and performance problems.

If you spend a considerable amount of your work day on a vibrating seat or floor and experience any of the following signs or symptoms contact your Occupational Safety & Health Specialist:

- Blurred vision
- Decrease in manual coordination
- Drowsiness (even with proper rest)
- Low back pain
- Insomnia
- Headaches
- Upset Stomach

HAND-ARM VIBRATION- Vibrating hand tools or work pieces transmit vibrations to the holder, and depending on the vibration level and duration factors, may contribute to Raynaud's Syndrome or vibration-induced white finger disorders. These disorders show a progression of symptoms beginning with occasional or intermittent numbness or blanching of the tips of a few fingers to more persistent attacks, affecting greater parts of most fingers and reducing tactile discrimination and manual dexterity. If you notice the onset of any of these symptoms, contact your Occupational Safety & Health Specialist.

The following recommendations can help reduce the likelihood of developing hand-arm vibration syndromes:

- Select power tools with anti-vibration properties
- Use handle coatings that suppress vibrations
- Increase coefficient of friction on handles to reduce force requirements
- Keep power tools balanced and lubricated to minimize vibration
- Job rotation – have more than one person perform tasks that involve exposure to hand-arm vibration
- Use vibration attenuation gloves

HAND TOOL USE & SELECTION PRINCIPLES

Implementing the following suggestions for proper selection and usage of hand tools will help reduce the likelihood of developing work-related musculoskeletal disorders (WMSDs) in the hands, wrists and arms:

- Maintain straight wrists- avoid bending or rotating the wrists; a variety of bent-handle tools are commercially available
- Avoid static muscle loading- reduce both the weight and size of the tool, do not raise or extend elbows when working with heavy tools. Provide counter balance support devices for larger, heavier tools.
- Avoid stress on soft tissues – stress concentrations result from poorly designed tools that exert pressure on the palms or fingers. Examples include short-handled pliers and tools with finger grooves that do not fit the worker's hand.

- Reduce grip force requirements – the greater the effort to maintain control of a hand-tool the higher the potential for injury. A compressible gripping surface rather than hard plastic should be used.
- Whenever possible, select tools that use a full-hand power grip rather than a precision finger grip.
- Avoid sharp edges and pinch points – select tools that will not cut or pinch the hands even when gloves are not worn.
- Avoid repetitive trigger-finger actions –select tools with large switches that can be operated with all four fingers.
- Wear gloves that fit – tight-fitting gloves can put pressure on the hands, while loose-fitting gloves reduce grip strength and pose other safety hazards.

If your job involves the frequent use of hand-tools and you frequently experience numbing, blanching, pins-and-needles, or dull pain in the hands or forearms, contact your Occupational Safety & Health Specialist.

ATTACHMENT I BLOODBORNE PATHOGEN

It is the intention of Stuart Dean to provide the safest working environment as possible to all employees and to the other employees they work with. Certain exposures are inevitable in our line of work.

One of these is the existence of Bloodborne Pathogens.

Although it is not a requirement for the type of work, we perform to provide safety initiatives, we as a company believe that it is useful for you to be aware of the hazards associated with this.

Bloodborne Pathogens can be deadly. Simply put, Bloodborne Pathogens are diseases transmitted from human to human via contact with an infected person's blood. However, they may be transmitted by other body fluids as well... **YOU ARE TO ASSUME THAT ANY BODY FLUID CAN BE CONTAMINATED WITH A BLOODBORNE PATHOGEN. YOU SHOULD ACT ACCORDINGLY.**

The most common of these are hepatitis and AIDS. Both are not curable so a great need of care is necessitated from a personal level to prevent transmission. It is recommended that you visit your doctor and have the Hepatitis B vaccine administered. If your job could expose you to Hepatitis B, the company will provide the vaccination be available to the employee at no charge.

ADMINISTRATION

We feel it our responsibility to make you aware of how these pathogens can be transmitted, and what you can do to prevent it. We are not doctors, but pragmatists, so use this as a guideline.

POTENTIAL WORKPLACE EXPOSURE

There may be an occasion where you will be put in a position where you may be exposed to Bloodborne Pathogens. You will be aware of this when you see signs posted in the building indicating the same. The following are examples of signs for you to look for.



If you see one of these signs or one that indicate Bloodborne Pathogens are present- **DO NOT START WORK**. Contact the office and we will arrange (usually through the institution you are working at) to be trained properly in how to deal with this exposure. If you received this training within the past year, notify the office and we will determine if you need to be retrained.

You must attend training on an annual basis.

When we know you will be exposed to Bloodborne Pathogens we will provide an exposure control plan to address the specifics of the workplace and see that you are properly trained prior to commencing work. We ensure you that you will receive a copy of the plan, be properly trained, and provided with the necessary equipment if an exposure develops. Your safety is a concern to us.

EXPOSURE CONTROL PLAN

This plan that you will be provided with will include the methods of training and the engineering practices to be utilized to provide sufficient protection.

We will provide you with the proper PPE to ensure your safety. This equipment will probably consist of proper clothing, gloves, face shields, and possibly respirators. We will handle cleaning and replacement of this equipment. This will be provided at no cost to the employee.

We will determine and implement the appropriate written schedule for cleaning and method of decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area. In the event there is an occurrence that the equipment was contaminated by a Bloodborne Pathogen, the area will be immediately decontaminated using a method appropriate for the event.

If we provide and determine that certain PPE is required, you must use it at all times when exposed. No exceptions will be made.

All sites will have access to handwashing facilities and the company will provide antiseptic solutions (Purell) and towelettes. Please advise the foreman when you use this so we can assure an ample supply is on site.

In the event there is an exposure to Blood-soaked bandages, clothing, or other material, you must handle their disposal as follows.

Latex gloves shall be used to lift the item. Then they shall be placed in a container, which prevents leakage during collection, handling, processing, storage, transport, or shipping. Contact the office for directions as to how to dispose of the leak proof container. **DO NOT THROW IT IN WITH NORMAL TRASH.**

EXPOSURE DETERMINATION

Under normal operating conditions, there are no tasks performed by the company that would indicate an exposure to Bloodborne Pathogens. This can change on occasion depending on the job. We have no long-term contracts with facilities that would expose you to Bloodborne Pathogens. This exposure determination was made without regards to the Personal Protection Equipment required to be used as stated in this plan.

In the event a job develops where you have the potential to be exposed to Hepatitis B, we will provide the vaccination for this. There is no cost to you.

We will keep a record of your exposure to Bloodborne Pathogens. The record will include:

- Dates and Contents of Training,
- Names and Job Titles of persons attending.
- Specific job details including the type of Bloodborne Pathogen potentially present

Upon written notice, we will provide these records to you within five working days.

Per OSHA standards, the training records will be maintained for 3 years from the date of training and medical records shall be maintained for at least the duration of employment plus 30 years. Upon written request, we will provide you a copy of your record. If we cease to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director, at least three months prior to their disposal and transmit them to the Director, if required by the Director to do so, within that three-month period. These records will be available to the Assistant Secretary and Director at any time.

DETERMINATION OF METHOD TO USE

The methods to be used will be determined on a job-by-job basis, customized

to the potential exposure.

If any exposure develops, or first aid equipment is used, advise your Foreman so the appropriate action may be taken.

METHOD IMPLEMENTED

The method implemented is supplying the necessary training (including re-training) and equipment in the event it is required to prevent the transmission of Bloodborne Pathogens.

TRAINING

Please consult your foreman in the event of any questions, as he has training with how to obtain proper training and where any questions can be answered to your satisfaction. All new employees will receive training prior to starting work to ensure he is aware to the potential safety issues. All employees will be retrained on an annual basis along with the other annual training topics.

ENFORCEMENT

Constant awareness of, and respect for this hazard, and compliance with all safety rules, is considered conditions of employment. The crew supervisor or foreman, as well as individuals in the Safety and Personnel Department, reserve the right to issue disciplinary warning to employees, up to and including termination, for failure to follow the guidelines of this plan.

ACCIDENT INVESTIGATIONS

All accidents that result in injury to workers, regardless of their nature, shall be investigated and reported. An integral part of any safety program is that documentation take place as soon as possible so that the cause and means of prevention can be identified to prevent a reoccurrence. In the event that an employee falls or there is some other related, serious incident occurring, this plan shall be reviewed to determine if additional practices, procedures, or training need to be implemented to prevent similar types of incidents from occurring. A record of these investigations is available for any employee review at our offices.

ACCESS TO THE PLAN

A copy of this plan and all other parts of the safety plan will be available for



your review on the jobsite. Contact your foreman if you have any questions. He will direct them to the Safety Officer

CHANGES TO THE PLAN

Any changes to the plan will be approved by The Safety Manager. This plan shall be reviewed by a qualified person as the job progresses to determine if additional practices, procedures or training needs to be implemented by the competent person to improve or provide additional fall protection. Workers shall be notified and trained, if necessary, in the new procedures. A copy of this plan and all approved changes shall be maintained at the jobsite.



ATTACHMENT J
STUART DEAN SAFETY PLAN
WORK INSIDE ELEVATORS
DRAFT PROCEDURE

Responsible Person and Duties

Senior Management is responsible for:

- Overall implementation of these policies and procedures

Supervisors are responsible for:

- Implementation of procedures in the field.
- Ensuring that all equipment and materials required are available.
- Identifying employees for retraining.

Employees are responsible for:

- Following all elevator procedures
- Using required equipment and materials according to procedure
- Reporting all problems immediately to their supervisor

Work Practices

Never is there to be only one employee at a jobsite when elevator cab work is being performed with the doors closed. Never are two employees to work in an elevator cab with the doors closed while stripping or spraying with toxic or flammable materials without a third person standing by just outside the doors (a building guard can serve as the third person provided that they are immediately adjacent to the work area during the time in which the doors are closed and provided that they are aware of the situation).

1. The company **must have** exclusive use of the elevator during the refinishing operation. The cab must be removed from service and may not be allowed to move during the refinishing operation. The elevator must remain out of service until the work is complete.
2. Elevator controls are to be placed in the manual override position.
3. To greatest extent possible, the elevator doors should be set so that they can be opened manually **AND** must be under the control of a company employee.
4. **The building fire detection and alarm systems should stay on.**
5. No smoking signs are to be posted in the work area.
6. The elevator cab doors must be kept open at all times when stripping, refinishing, and spraying the returns and any metal inside the cab other than the doors.
7. When using flammable materials, isolate all sources of ignition such as, including but not limited to, the elevator electrical fixtures supply lines and controls. Assure that all portable equipment, temporary lighting, or other devices are approved and or intrinsically safe for use in a hazardous

atmosphere. Activities that produce open flames such as smoking or the use of torches is prohibited. Assure that all metallic tools are non-spark producing in construction and those containers are bonded and grounded during the transfer of flammable or combustible liquids. Never use torches for burning off old finishes.

8. Limit fire exposure of flammable liquids and the accumulation of combustible/flammable waste inside the work area through the use of heavy-duty metal waste cans with the spring top self-closing lids and the provision of plunger-type dispensers for dispensing flammable liquids. All containers are to be clearly marked to indicate their contents.
9. At a minimum, place a 10 lb. ABC type fire extinguishers (check for positive charge daily) in the red Stuart Dean boxes both immediately outside and inside the cab during the refinishing operation and train employees in the use of portable fire protection.
10. Bring only those materials into the cab needed for each stage of the job. For instance, do not bring in spraying material until stripping is completed.
11. The stripping is to be done using only materials approved by the Corporate Office in writing (specifically, materials low in flammability and toxicity – examples such as Brass wash by Motsenbocker or Clean-Cut Brass Prep or #11838 Gel, formerly known as Nikolas Safety Stripper 11645).
12. Put all used towels and rags in a heavy-duty metal waste can with a spring-top self-closing lid. Put all waste chemicals in a heavy-duty metal 5-gallon waste container with a self-closing lid, which is always kept outside the cab.
13. When stripping the doors, a safety block should be placed between the doors so they are not completely closed. The doors shall never be closed for more than 2 minutes so as to prevent the accumulation of hazardous vapors within the cab.
14. The work area shall be mechanically ventilated at all times when using flammable materials.
15. All personnel will utilize personal protective equipment as specified by the SDS for the specific material being used in each operation.
16. All employees are to be familiar with the location of emergency exits and be trained in emergency response procedures. See section 17 for details on emergency response procedures.
17. The spraying compressor should be left outside of the elevator cab.

IN CASE OF EMERGENCY: WHEN YOUR CO-WORKER IS TRAPPED-
FIRST: IMMEDIATELY CALL 911 (if available) FOR HELP. DO NOT GET INTO
THE ELEVATOR WHERE THE DOORS ARE LOCKED SHUT AND OR THE
VAPORS HAVE BUILT UP. YOU COULD ALSO BE TRAPPED AND KNOCKED



OUT. STAND OUTSIDE THE ELEVATOR AND TELL THE RESCUE TEAM WHAT IS GOING ON.

SECOND: IF YOU CAN GET THE DOORS OPEN AND KNOW IT IS SAFE TO ENTER HELP YOUR CO-WORKER. IF YOU DO NOT KNOW IT IS SAFE TO ENTER WAIT FOR THE RESCUE TEAM.

ATTACHMENT K

MAINTENANCE CLEANING OF BEAD-BLASTED STAINLESS STEEL FOR PROFESSIONAL USE ONLY

- Clean cloth towels and clean water in a clean bucket.
- Use ONLY non-abrasive materials on the non-directional bead blasted stainless steel.
- Primary cleaning method – with non-abrasive cotton towels, apply a dilute solution of calcium carbonate Restore in water, working the solution in overlapping sections. Allow the solution to dry and wipe off the residue with a clean, dry towel.
- If streaking occurs, wipe panel with a damp cotton towel with water only and buff with a clean dry towel before it becomes dry.
- If staining still remains try the secondary cleaning method by cleaning with household strength ammonia or acetone to remove the contamination. Apply a small amount of cleaner directly on a non-abrasive cotton towel. When acetone is used, the containers will be properly labeled and less than a gallon capacity should be on site. The container will be closed at all times to control vapors.
- Properly inspected and maintained Fire Extinguishers shall be brought to the jobsite and available for immediate use at any time acetone is being utilized.
- Used towels will be immediately transferred to a closed temporary storage container. The container will be brought back to the Stuart Dean shop each night where towels are transferred to a large container to be commercially laundered (not disposed of) by a licensed hazardous waste launderer.



ATTACHMENT L

Methylene Chloride

U.S. Department of Labor
Elaine L. Chao, Secretary

Occupational Safety and Health Administration
John L. Henshaw, Assistant Secretary

OSHA 3144-06R
2003

This informational booklet provides a general overview of a particular topic related to OSHA standards. It does not alter or determine compliance responsibilities in OSHA standards or the *Occupational Safety and Health Act of 1970*. Because interpretations and enforcement policy may change over time, you should consult current OSHA administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the Courts for additional guidance on OSHA compliance requirements.

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Introduction

Methylene chloride and its uses



Methylene chloride, also called dichloromethane, is a volatile, colorless liquid with a chloroform-like odor. Methylene chloride is used in various industrial processes in many different industries: paint stripping, pharmaceutical manufacturing, paint remover manufacturing, metal cleaning and degreasing, adhesives manufacturing and use, polyurethane foam production, film base manufacturing, polycarbonate resin production, and solvent distribution and formulation.

Employee exposure and health consequences

The predominant means of exposure to methylene chloride is inhalation and skin exposure.

OSHA considers methylene chloride to be a potential occupational carcinogen. Short-term exposures to high concentrations may cause mental confusion, lightheadedness, nausea, vomiting, and headache. Continued exposure may also cause eye and respiratory tract irritation. Exposure to methylene chloride may make symptoms of angina more severe. Skin exposure to liquid methylene chloride may cause irritation or chemical burns.

OSHA's Methylene Chloride Standard

Industries covered

The OSHA methylene chloride standard (Title 29 *Code of Federal Regulations*, Parts 1910.1052, 1915.1052, and 1926.1152) covers all occupational exposures to methylene chloride in all workplaces in general industry, shipyard employment, and construction.

Exposure limits

The standard sets a permissible exposure limit (PEL) of 25 parts methylene chloride per million parts of air (ppm) as an eight-hour time-weighted average (TWA). This refers to the average exposure during an eight-hour period. Employers must use engineering and work practice controls to limit employee exposures. Respiratory protection must be used in addition if these controls are insufficient to reduce exposures to below the limits.

The action level for airborne methylene chloride is set at a concentration of 12.5 ppm, calculated as an eight-hour TWA. Reaching or exceeding the action level signals that employers must begin compliance activities such as exposure monitoring and medical surveillance. There is also a short-term exposure limit (STEL) of 125 ppm, as measured over a 15-minute period.

Requirements for regulated areas

The standard requires that the employer establish a regulated area where exposure to airborne concentrations of methylene chloride exceeds or can be expected to exceed either the PEL or the STEL. Employers must mark regulated areas to alert employees to the hazard and minimize the number of authorized employees exposed to methylene chloride.

Employers at multi-employer worksites must notify other employers at the workplace of the locations of all regulated areas and access restrictions. The employer must supply appropriate respiratory protection for each person entering a regulated area. In addition, the employer must ensure that employees wearing respirators do not take medication, chew gum or tobacco, drink, smoke, or apply cosmetics in regulated areas. Nor can employees store any products associated with these activities in a regulated area where the items can become contaminated.

Hazard communication requirements

OSHA's methylene chloride standard requires employers to inform employees that they are working with methylene chloride and to ensure that they understand the hazards associated with exposure to



the chemical. Specifically, the rule requires the employer to use labels and material safety data sheets (MSDSs) to let employees know about the health hazards of working with methylene chloride. These include cancer, cardiac effects (including the elevation of carboxyhemoglobin), central nervous system effects, and skin and eye irritation.

These requirements are consistent with those in OSHA's hazard communication standard -- 29 *CFR* 1910.1200, 29 *CFR* 1915.1200, and 29 *CFR* 1926.59.

Exposure Monitoring

Benefits

Through air sampling and monitoring, employers can better determine methylene chloride exposure, identify the source, and select the proper control methods -- resulting in better protection for employees. Exposure monitoring also is key to helping employers determine which other requirements of the standard need to be met.

Measuring employee exposures

To measure an employee's exposure to methylene chloride, the employer must use breathing zone air samples representative of the employee's eight-hour TWA as well as a short-term, 15-minute exposure. To determine eight-hour TWA exposures by representative sampling, employers must take one or more personal breathing zone air samples covering the full-shift exposure for each shift for at least one employee in each job classification in each work area. Employees sampled must be those who are expected to have the highest exposure.

To determine how employee exposures relate to the STEL through representative sampling, employers must take one or more samples covering the highest likely 15-minute exposures associated with those operations for each shift for at least one employee in each job classification in each work area. Employees sampled must be those who are expected to have the highest exposure. When the employer can document comparable exposure levels for similar operations in different work shifts, the employer needs to determine only representative employee exposures for the one shift when the highest exposure is expected.

Initial exposure monitoring

Each employer whose employees are exposed to methylene chloride must perform initial exposure monitoring to accurately determine each affected employee's exposure. However, initial monitoring can be waived when

- Objective data -- representing the highest methylene chloride exposure likely to occur during processing, using, or handling -- demonstrate that methylene chloride cannot be released in airborne concentrations above the action level or the STEL, or
- Employees are exposed to methylene chloride for fewer than 30 days per year (for example, on a construction site) and the employer uses direct-reading instruments such as a detector tube that gives immediate results, providing enough information to determine what control measures are necessary to reduce exposure to acceptable levels.

Requirements for periodic monitoring

The employer must begin an exposure monitoring program for all tasks where initial monitoring shows that employee exposures are above the action level or STEL. (See Table 1 for monitoring requirements in the standard.) If employee exposure is above the action level, but at or below both the PEL and STEL, employers must monitor employees at least every six months. If exposure is above the PEL or STEL, employers must monitor employees at least every three months. For employees with two



consecutive measurements taken at least seven days apart that indicate that exposure has decreased below both the PEL and STEL, employers may change the monitoring schedule from every three months to every six months. When periodic monitoring taken two consecutive times at least seven days apart shows employee exposure is below the action level and the STEL, employers may discontinue monitoring for those employees represented by the monitoring data.

Employers must perform additional monitoring when workplace conditions change -- for example, when there is an indication that employee exposures have increased; changes occur in the production process, control equipment, or work practices that could affect exposure levels; and leaks, ruptures, or other breakdowns occur.¹

Employers must notify employees of all monitoring results, in writing, either individually or by posting the results in an accessible location, within 15 working days after receipt. When monitoring results show exposures above the PEL or STEL, the notification also must describe the corrective action being taken to reduce exposures to or below these limits.

Employers must allow affected employees or their designated representatives to observe any monitoring. The employer also must provide employees with appropriate protective clothing or equipment needed to enter regulated areas where the monitoring is performed. Employees and their designated representatives must wear the protective clothing and equipment provided and must comply with all other applicable safety and health procedures.

Table 1: Monitoring Requirements	
<i>Exposure Scenario</i>	<i>Required Monitoring Activity</i>
Below the action level (12.5 ppm) and at or below the STEL (125 ppm)	No eight-hour TWA or STEL monitoring required
Below the action level (12.5 ppm) and above the STEL (125 ppm)	No eight-hour TWA monitoring required; monitor STEL exposures every three months.
At or above the action level (12.5 ppm), at or below the PEL (25 ppm TWA), and at or below the STEL (125 ppm)	Monitor eight-hour TWA exposures every six months
At or above the action level (12.5 ppm), at or below the PEL (25 ppm TWA), and above the STEL (125 ppm)	Monitor eight-hour TWA exposures every six months and monitor STEL exposures every three months.
Above the PEL (25 ppm TWA), and at or below the STEL (125 ppm)	Monitor eight-hour exposures every three months.
Above the PEL (25 ppm TWA) and above the STEL (125 ppm)	Monitor eight-hour TWA exposures and STEL exposures every three months.

Medical Surveillance

Employer responsibility

Medical surveillance is a comprehensive way to determine if exposure to workplace hazards adversely affects employee health. Frequent, required medical exams or tests can lead to early detection of occupational diseases so preventive measures can be taken to curtail overexposure.



Employers must put a medical surveillance program in place for all employees exposed to methylene chloride. The only exception is when affected employees will be exposed to methylene chloride at or above

- The action level for fewer than 30 days per year, and
- The PEL or STEL for fewer than 10 days during the year.

Employers also must provide medical surveillance to

- Any employee exposed above the PEL or STEL whom a physician or other licensed health-care professional has identified as being at risk for cardiac disease or some other serious methylene chloride-related health condition and who requests inclusion, regardless of the duration of methylene chloride exposure; and
- All employees during an emergency.

Employers must provide medical surveillance at no cost to the employee, without loss of pay, and at a reasonable time and place. Medical surveillance must be available

- Before initial work assignment, unless adequate records show an affected employee has received appropriate medical surveillance within the past 12 months.
- Within one year of any initial or subsequent medical surveillance. The frequency of required periodic medical exams varies by age of the employee.²
- At the end of employment or reassignment to an area where methylene chloride exposure is consistently below the action level and STEL, if six months or more have elapsed since the last medical surveillance.
- When recommended in the physician's or other licensed health-care professional's³ written opinion.

For employees working in an atmosphere with methylene chloride concentrations that require them to use a respirator, the examining physician or licensed health-care professional must determine their ability to wear an air-supplied respirator in a negative-pressure mode or a gas mask with an organic vapor canister for emergency escape. The examiner must state this in a written opinion to both the employee and employer.

Requirements for medical surveillance

A physician or licensed health-care professional must perform all medical surveillance procedures. Medical exams⁴ must include at least

- A comprehensive medical and work history;⁵ and
- A physical exam with special emphasis on the lungs, cardiovascular system including blood pressure and pulse, liver, nervous system, and skin.

The extent of laboratory surveillance⁶ is based on the employee's observed health status and medical and work history. The medical surveillance must also include any other information⁷ the examining physician or licensed health-care professional determines necessary to provide an appropriate assessment.

Employers must ensure that medical emergency exams are available in emergency situations and include, at a minimum,

- The appropriate medical treatment and decontamination of the exposed employee;
- A comprehensive physical exam with special emphasis on the nervous system, cardiovascular system including blood pressure and pulse, lungs, liver, and skin;



- An updated medical history as appropriate for the employee's medical condition; and
- Laboratory surveillance as indicated by the employee's health status.

Information for examiners

The employer must provide the examining physician or other licensed health-care professional who is involved in the diagnosis of methylene chloride-induced health effects with

- A copy of the methylene chloride standard and its appendices;
- A description of the affected employee's past, current, and anticipated future duties relating to methylene chloride exposure;
- The employee's former or current methylene chloride exposure levels or anticipated levels, their frequency, and anticipated exposure levels associated with emergencies;
- A description of any personal protective equipment (such as respirators) used or to be used; and
- Information from previous employment-related medical surveillance.

Services employers must arrange

The employer must arrange for the physician or other licensed health-care professional to provide the employer and affected employee a written opinion regarding exam results. This must occur within 15 days of completing the evaluation of the medical and lab findings and not more than 30 days after the exam. The written medical opinion must be limited to

- The physician or licensed health-care professional's opinion whether the employee has any detected medical conditions that would increase the risk of impairment from exposure to methylene chloride;
- Any recommended limitations on employee exposure to methylene chloride and on the use of personal protective clothing or equipment and a respirator;
- A statement that the physician or licensed health-care professional has informed the employee that methylene chloride is a potential carcinogen, of the risk factors for heart disease, and of the potential exacerbation of underlying heart disease from methylene chloride exposure and its metabolism to carbon monoxide; and
- A statement that the physician or licensed health-care professional has informed the employee of medical exam results and any medical conditions resulting from methylene chloride exposure requiring further explanation or treatment.

The examining physician or licensed health-care professional must not reveal to the employer, orally or in writing, any specific records, findings, or diagnoses that have no bearing on occupational exposures to methylene chloride.

Control Measures

How control measures protect employees

Engineering and work practice controls are the primary methods used to reduce workers' exposure to methylene chloride. Employers must use engineering controls and work practices to reduce employee exposure to methylene chloride to or below the PEL and to maintain exposure at these levels. The only exception is when the employer can demonstrate that this is infeasible and that other controls are necessary.

Engineering controls

Examples of engineering controls are local exhaust ventilation, general and special isolation devices,



and enclosures.

These controls reduce employee exposure in the workplace by either removing or isolating the hazard or isolating the worker from it. By reducing or removing contaminants from the air, engineering controls reduce or eliminate exposure hazards.

Work practice controls

Work practice controls reduce the likelihood of exposure by altering the way a task is performed. One example is having a worker keep his or her face out of the methylene chloride vapor zone above a dip tank. Another safe practice is to prohibit employees from eating, drinking, smoking, taking medication, or applying cosmetics inside the work area where methylene chloride is used.

Administrative controls

An administrative control removes the worker from exposure. For example, one method of controlling worker exposure to contaminants involves scheduling operations that pose the highest risk of exposure when the fewest employees are present.

However, employee rotation -- for example, scheduling several employees to perform work in the exposure area for shorter time limits -- is not an effective way to control methylene chloride exposure. That is because, although it may reduce individual exposure, it may increase the number of employees exposed. For this reason, the standard strictly prohibits employee rotation as a means of compliance with the PELs.

Handling methylene chloride leaks

Under the methylene chloride rule, employers must implement procedures to detect methylene chloride leaks. In work areas where spills may occur, provisions must be in place to contain them, clean them up promptly, and dispose of any methylene chloride contaminated waste materials safely. All leaks must be repaired and spills cleaned up by employees who wear appropriate personal protective equipment and are trained in proper cleanup methods.⁸

Employers covered by this standard also may be covered by the provisions of 29 *CFR* 1910.120(q), Emergency Response to Hazardous Substance Releases.

Respiratory Protection

When respiratory protection is required

Employers must institute engineering, work practice, and administrative controls and maintain their effectiveness to reduce employee exposure to or below the PEL. When this combination of controls does not reduce methylene chloride exposure to or below the PEL and STEL, employers must supplement these controls by providing employees respirators that offer the additional protection.

Respirators protect employees individually by extracting methylene chloride from the air as it is about to be inhaled, or by providing an alternate, non-contaminated source of breathable air. The employer must provide respirators at no cost to each affected employee and ensure their use when

- An employee's exposure to methylene chloride is likely to exceed the PEL and STEL;
- Feasible engineering and work practice controls are being installed or implemented;
- The employer demonstrates that engineering and work practices controls are infeasible, such as in some maintenance operations and repair activities;
- Feasible engineering controls and work practices do not sufficiently reduce exposures to or below the PEL; and



- During emergencies.

More specific requirements are provided in 29 *CFR* 1910.1052(g)(2)(i).

Selecting a respirator

Appropriate respiratory protection varies with exposure levels, as specified in Table 2. Employers must choose atmosphere-supplying respirators from among those approved by the National Institute for Occupational Safety and Health (NIOSH). Employers may provide NIOSH-approved gas masks with organic vapor canisters, but only for use in emergency escape. The canisters must be replaced after each use before the respirator is returned to service.

Table 2: Minimum Requirements for Respiratory Protection for Airborne Methylene Chloride	
<i>Methylene Chloride Airborne Concentration (ppm) or Condition of Use</i>	<i>Minimum Respirator Required*</i>
Up to 625 ppm (25 X PEL)	Continuous flow supplied-air respirator, hood, or helmet
Up to 1,250 ppm (50 X PEL)	(1) Full facepiece supplied-air respirator operated in negative-pressure (demand) mode (2) Full facepiece self-contained breathing apparatus (SCBA) operated in negative-pressure (demand) mode
Up to 5,000 ppm (200 X PEL)	(1) Continuous flow supplied-air respirator, full facepiece (2) Pressure demand supplied-air respirator, full facepiece (3) Positive-pressure full facepiece SCBA
Unknown concentration, or above 5,000 ppm (Greater than 200 X PEL)	(1) Positive-pressure full facepiece SCBA (2) Full facepiece pressure (demand) supplied-air respirator with an auxiliary self-contained air supply
Firefighting	Positive-pressure full facepiece SCBA
Emergency Escape	(1) Any continuous flow or pressure-demand SCBA (2) Gas mask with organic vapor canister

*Respirators assigned for higher airborne concentrations may be used at the lower concentrations.

Where respirators are used, the employer must institute a comprehensive respiratory protection program that complies with 29 *CFR* 1910.134, Respiratory Protection.

Each respirator issued must be fitted properly to ensure the least possible facepiece leakage. For negative-pressure respirators used during emergencies, the employer must perform either qualitative or quantitative fit tests at the initial fitting and then, at least annually. The employer must ensure that employees leave the regulated area to wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use, or if they detect changes in breathing resistance or leakage of the respirator facepiece. If an employee leaves the regulated area because the respirator is malfunctioning, the employer must correct the problem before allowing the employee to return to the regulated area.

Hygiene Facilities and Protective Clothing and Equipment

Hygiene facilities employers must provide

In cases where employees could possibly have skin contact with solutions containing 0.1 percent or more methylene chloride through splashes, spills, or improper work practices, the employer must provide conveniently located washing facilities and ensure that employees use them as needed.



Similarly, where there is a potential for eye contact with solutions containing 0.1 percent or more methylene chloride, the employer must provide eyewash facilities within the immediate work area for emergency use and ensure their use when necessary.

Protective clothing and equipment

Employees must use personal protective clothing and equipment where needed to prevent skin or eye irritation due to exposure to methylene chloride. The employer must provide methylene chloride-resistant clothing and equipment at no cost to the employees and ensure that they use it. The employer also must clean, launder, and repair the protective clothing and equipment to keep it effective, and when necessary, replace and dispose of it properly.

Recordkeeping Requirements

Records employers must keep

The employer must establish and keep accurate records for all objective data, exposure monitoring, and medical surveillance in accordance with Access to Employee Exposure and Medical Records, 29 *CFR* 1910.1020. Employee exposure and objective data records must be available for examining and copying by

- Affected employees,
- Former employees,
- Designated employee representatives,
- Anyone who has that employee's written consent,
- The Assistant Secretary of Labor for Occupational Safety and Health, and
- The Director of NIOSH.

Objective data records

If an employer relies on objective data to show that initial monitoring is unnecessary, the record supporting that exemption must include information on

- The methylene chloride-containing material in question;
- The source of the objective data;
- The testing protocol, results, and/or analysis of the material for the release of methylene chloride;
- A description of the exempted operation and how the data support that exemption; and
- Other data relevant to the operations, materials, processing, or employee exposure levels covered by the exemption.

The employer must maintain this record for as long as he or she relies on the objective data.

Exposure measurement records

Employers must keep records of employee exposure measurements for at least 30 years. These records must include the

- Date of measurement for each sample taken;
- Monitored operation involving methylene chloride exposure;
- Sampling and analytical methods used and evidence of their accuracy;
- Number, duration, and results of samples taken;
- Type of personal protective equipment (for example, respirators) worn; and



- Name, social security number, job classification, and exposure monitoring data for all represented employees, indicating which employees were actually monitored.

Medical surveillance records

The employer must keep medical surveillance records for the duration of each affected employee's employment, plus 30 years. These records must include the

- Name and social security number of each affected employee and a description of duties,
- Physician's or other licensed health-care professional's written medical opinions, and
- Employee medical conditions related to methylene chloride exposure.

Information and Training

Information and training employers must provide

The employer must provide information and training to all employees in a manner they understand before or when they are initially assigned to a job in which they could potentially be exposed to methylene chloride. In addition to information required under OSHA's hazard communication standard at 29 *CFR* 1910.1200, 1915.1200, or 1926.59, as appropriate, the employer must inform each affected employee of

- Requirements of the standard, information available in the standard's appendices, and how to access a copy of it in the workplace;
- The quantity, location, manner of use, release, and storage of methylene chloride in cases where exposures could exceed the action level, and the specific nature of operations that could result in such exposure; and
- Where exposures may be above the eight-hour TWA PEL or STEL.

The employer must retrain employees as needed to ensure that each worker exposed at or above the action level or STEL maintains a good understanding of the principles of safe use and handling of methylene chloride in the workplace. Also, when changes in workplace procedures could potentially increase employee exposures so that they might exceed the action level, the employer must update the training to ensure a continued understanding of hazards and control measures. Employers at multi-employer worksites must notify other employers onsite about methylene chloride use in accordance with OSHA's hazard communication standard.

OSHA Assistance

OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, alliances, and training and education. An overall commitment to workplace safety and health can add value to your business, to your workplace, and to your life.

Benefits of a safety and health management system

Working in a safe and healthful environment can stimulate innovation and creativity and result in increased performance and higher productivity. The key to a safe and healthful work environment is a comprehensive safety and health management system.

OSHA has electronic compliance assistance tools, or eTools, on its website that walks users through the steps required to develop a comprehensive safety and health program. The eTools are posted



at www.osha.gov, and are based on guidelines that identify four general elements critical to a successful safety and health management system:

- Management leadership and employee involvement,
- Worksite analysis,
- Hazard prevention and control, and
- Safety and health training.

State programs

The *Occupational Safety and Health Act of 1970 (OSH Act)* encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans and funds up to 50 percent of each program's operating costs. State plans must provide standards and enforcement programs, as well as voluntary compliance activities, that are at least as effective as federal OSHA's.

Currently, 26 states and territories have their own plans. Twenty-three cover both private and public (state and local government) employees and three states, Connecticut, New Jersey, and New York, cover only the public sector. For more information on state plans, see the list at the end of this publication, or visit OSHA's website at www.osha.gov.

Consultation assistance

Consultation assistance is available on request to employers who want help establishing and maintaining a safe and healthful workplace. Funded largely by OSHA, the service is provided at no cost to small employers and is delivered by state authorities through professional safety and health consultants.

Safety and Health Achievement Recognition Program

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and developing an effective safety and health management system.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for 1 year initially, or 2 years upon renewal. For more information about consultation assistance, visit www.osha.gov

Voluntary Protection Programs

Voluntary Protection Programs (VPP) are designed to recognize outstanding achievements by companies that have developed and implemented effective safety and health management programs. There are three VPP programs: Star, Merit, and Demonstration. all are designed to

- Recognize employers who that have successfully developed and implemented effective and comprehensive safety and health management programs;
- Encourage these employers to continuously improve their safety and health management programs;
- Motivate other employers to achieve excellent safety and health results in the same outstanding way; and
- Establish a cooperative relationship between employers, employees, and OSHA.

VPP participation can bring many benefits to employers and employees, including fewer worker fatalities, injuries, and illnesses; lost-workday case rates generally 50 percent below industry averages; and lower workers' compensation and other injury- and illness-related costs. In addition,



many VPP sites report improved employee motivation to work safely, leading to a better quality of life at work; positive community recognition and interaction; further improvement and revitalization of already-good safety and health programs; and a positive relationship with OSHA.

After a site applies for the program, OSHA reviews an employer's VPP application and conducts a VPP onsite evaluation to verify that the site's safety and health management programs are operating effectively. OSHA conducts onsite evaluations on a regular basis.

Sites participating in VPP are not scheduled for regular, programmed inspections. OSHA does, however, handle any employee complaints, serious accidents, or significant chemical releases that may occur at VPP sites according to routine enforcement procedures.

Additional information on VPP is available from OSHA regional offices listed at the end of this booklet and at www.osha.gov.

Cooperative partnerships

OSHA has learned firsthand that voluntary, cooperative partnerships with employers, employees, and unions can be a useful alternative to traditional enforcement and an effective way to reduce worker deaths, injuries, and illnesses. This is especially true when a partnership leads to the development and implementation of a comprehensive workplace safety and health management system.

Alliance program

Alliances enable organizations committed to workplace safety and health to collaborate with OSHA to prevent injuries and illnesses in the workplace. OSHA and its allies work together to reach out to, educate, and lead the nation's employers and their employees in improving and advancing workplace safety and health.

Alliances are open to all, including trade or professional organizations, businesses, labor organizations, educational institutions, and government agencies. In some cases, organizations may be building on existing relationships with OSHA through other cooperative programs.

There are few formal program requirements for alliances, which are less structured than other cooperative agreements, and the agreements do not include an enforcement component. However, OSHA and the participating organizations must define, implement, and meet a set of short- and long-term goals that fall into three categories: training and education; outreach and communication; and promotion of the national dialogue on workplace safety and health.

Strategic Partnership Program

OSHA Strategic Partnerships are agreements among labor, management, and government to improve workplace safety and health. These partnerships encourage, assist, and recognize the efforts of the partners to eliminate serious workplace hazards and achieve a high level of worker safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships build cooperative relationships with groups of employers and employees.

For more information about this program, contact your nearest OSHA office or visit www.osha.gov.

Occupational safety and health training

The OSHA Training Institute in Arlington Heights, Ill., provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and private-sector employers, employees, and their representatives.



Training grants

OSHA awards grants to nonprofit organizations to provide safety and health training and education to employers and workers in the workplace. Grants often focus on high-risk activities or hazards or may help nonprofit organizations in training, education, and outreach.

OSHA expects each grantee to develop a program that addresses a safety and health topic named by OSHA, recruit workers and employers for the training, and conduct the training. Grantees are also expected to follow up with students to find out how they applied the training in their workplaces.

For more information contact OSHA Office of Training and Education, 2020 Arlington Heights Rd., Arlington Heights, IL 60005; or call (847) 297-4810.

Other assistance materials

OSHA has a variety of materials and tools on its website at www.osha.gov. These include eTools such as Expert Advisors and Electronic Compliance Assistance Tools, information on specific health and safety topics, regulations, directives, publications, videos, and other information for employers and employees.

OSHA also has an extensive publications program. For a list of items, visit OSHA's website at www.osha.gov or contact the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, NW, N-3101, Washington, DC 20210. Telephone (202) 6931888 or fax to (202) 693-2498.

In addition, OSHA's CD-ROM includes standards, interpretations, directives, and more. It is available for sale from the U.S. Government Printing Office. To order, write to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or phone (202) 512-1800.

To contact OSHA

To report an emergency, file a complaint, or seek OSHA advice, assistance, or products, call (800) 321-OSHA or contact your nearest OSHA regional office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889-5627.

Employees can also file a complaint online and get more information on OSHA federal and state programs by visiting OSHA's website at www.osha.gov.

OSHA Regional Offices

Region I

(CT,* ME, MA, NH, RI, VT*)
Boston, MA 02203
(617) 565-9860

Region II

(NJ,* NY,* PR,* VI*)
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378

Region III

(DE, DC, MD,* PA,* VA,* WV)
The Curtis Center
170 S. Independence Mall West Suite 740

Region VI

(AR, LA, NM,* OK, TX)
525 Griffin Street, Room 602
Dallas, TX 75202
(214) 767-4731 or 4736 x224

Region VII

(IA,* KS, MO, NE)
City Center Square
1100 Main Street, Suite 800
Kansas City, MO 64105
(816) 426-5861

Region VIII

(CO, MT, ND, SD, UT,* WY*)



West Philadelphia, PA 19106-3309
(215) 861-4900

Region IV

(AL, FL, GA, KY,* MS, NC,* SC,* TN*)
Atlanta Federal Center
61 Forsyth Street SW, Room 6T50
Atlanta, GA 30303
(404) 562-2300

Region V

(IL, IN,* MI,* MN,* OH, WI)
230 South Dearborn Street,
Room 3244
Chicago, IL 60604
(312) 353-2220

1999 Broadway, Suite 1690
PO Box 46550 Denver, CO 80202-5716
(303) 844-1600

Region IX

(American Samoa, AZ,* CA,* HI, NV,* Northern Mariana Islands)
71 Stevenson Street, Room 420
San Francisco, CA 94105
(415) 975-4310

Region X

(AK,* ID, OR,* WA*)
1111 Third Avenue, Suite 715
Seattle, WA 98101-3212
(206) 553-5930

*These states and territories operate their own OSHA-approved job safety and health programs. (Connecticut, New Jersey, and New York plans cover public employees only.) States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.

Note: To get contact information for OSHA area offices, OSHA-approved state plans, and OSHA consultation projects, visit www.osha.gov or call (800) 321-OSHA (6742).

¹ Cleanup of methylene chloride spills and repairs to leaks must be made before performing exposure monitoring.

² Periodic physicals, including appropriate laboratory surveillance, are required as follows: employees 45 years or older -- within 12 months of initial or subsequent medical surveillance; employees younger than 45 years -- within 36 months of initial or subsequent medical surveillance (unless warranted sooner by a physician or other licensed health-care professional, based on employee's annual medical and work history).

³ A person whose legally permitted scope of practice allows him or her to independently perform the required health-care surveillance activities.

⁴ Medical surveillance, such as referrals for consultation or examination, may be provided.

⁵ See Appendix B of the standard for an example of the medical and work history format that satisfies this requirement.

⁶ See Appendix B of the standard for an example of the methylene chloride standard for medical test recommendations.

⁷ When the examining physician or other licensed health-care professional deems it necessary, the scope of the medical exam may be expanded and the appropriate additional medical surveillance provided.

⁸ See Appendix A in the methylene chloride standard for examples of procedures that satisfy this requirement.



ATTACHMENT M

INCIDENT REPORT

Date of this Incident Report _____ - _____ - 2020 Stuart Dean Office _____

Last Name of Individual _____ Stuart Dean Co. Incident Number _____



Type of Claim/ Incident- (Check all that apply)

Work Comp/ Injuries _____ Auto/Fleet _____

GL/ Property Damaged _____

Corporate Office Address:
43-50 10th Street, Long Island City, NY 11101
Phone: 212-273-6900 Fax: 212-273-0855
FEIN: 13-135-4550
SIC: 1799
NAIC: 238990

- ALL INCIDENTS MUST BE REPORTED IMMEDIATELY.
- This Report **MUST** be filled out completely and accurately.
- DO NOT DUPLICATE. Submit only *once* to Online Claim System

REPORT OF WORK-RELATED ACCIDENT OR INCIDENT

This form must be used to report ALL work-related accidents or incidents, regardless of its severity and regardless of whether an employee was directly involved or injured.

*The Supervisor or Operations Manager **MUST** complete this form and attach statements from the affected employee(s) and any witness... NOTE: A separate claim/form **MUST** be filled out for **each** individual employee that is injured.*

*The General Manager or his/her designee (Operations Manager) **MUST** email a copy of this report to claims@stuartdean.com. This form will automatically be routed to ESIS Claims Process Co. with a copy to RISK Strategies, whose representatives will report the accident/incident to our insurance carrier(s) and to the Stuart Dean Human Resources Department, the Finance Department, and the Safety Department.*

Any questions concerning Worker's Compensation claims should be directed to the Human Resources Department. Any questions concerning other types of claims should be directed to Mark Christmas mchristmas@stuartdean.com. Safety or Hazardous Situations or Concerns should be directed to Mark Christmas mchristmas@stuartdean.com

PREPARER INFORMATION

NAME OF PERSON
PREPARING THIS REPORT:

PREPARER'S JOB TITLE:

PREPARER'S WORK
ADDRESS & PHONE NUMBER:

PREPARER'S EMAIL:

DID PREPARER WITNESS THIS
INCIDENT?

☐ YES ☐ NO

DOES INCIDENT INVOLVE
INJURY TO AN EMPLOYEE OR
OTHER PARTY?

EMPLOYEE INJURED ☐ YES ☐ NO (IF YOU CHECKED NO, SKIP TO PAGE 3)

OTHER PARTY INJURED ☐ YES ☐ NO (IF YOU CHECKED NO, SKIP TO PAGE 3)

PROPERTY DAMAGE ☐ YES ☐ NO (IF YOU CHECKED YES, SEE PAGE 6)

REMEMBER TO ATTACH SIGNED STATEMENTS OF WITNESSES-Page 6 Summary



****INCIDENT REPORT****

Date of this Incident Report _____ - _____ - 2020 Stuart Dean Office _____

Last Name of Individual _____ Stuart Dean Co. Incident Number _____



REPORT OF WORK-RELATED ACCIDENT OR INCIDENT

COMPLETE THIS SECTION IF AN EMPLOYEE WAS INJURED (EACH EMPLOYEE)

EMPLOYEE INFORMATION *Be Accurate and Specific!*

NAME:	SOCIAL SECURITY #:
HOME ADDRESS:	DATE OF BIRTH:
CITY, STATE, ZIP CODE:	AGE:
HOME PHONE:	GENDER:
CELL PHONE NUMBER:	
WORK PHONE NUMBER:	
PRIMARY LANGUAGE:	DATE OF HIRE:
JOB TITLE:	STATE:
STUART DEAN OFFICE:	WORK SCHEDULE (Specify days: M-F)
DRIVER'S LICENSE NUMBER:	START TIME:
TOTAL HOURS REGULARLY WORKED PER WEEK:	END TIME:
SUPERVISOR'S NAME:	SUPERVISOR'S PHONE NUMBER:
OPERATIONS MANAGER:	GENERAL MANAGER:



****INCIDENT REPORT****

Date of this Incident Report _____ - _____ - 2020 Stuart Dean Office _____

Last Name of Individual _____ Stuart Dean Co. Incident Number _____



ANSWER ALL APPLICABLE QUESTIONS IN THIS SECTION.

ACCIDENT OR INCIDENT INFORMATION <i>Be Accurate and Specific!</i>	INCIDENT LOCATION:		TIME INCIDENT OCCURRED:
	DATE OF INCIDENT:	DAY OF WEEK:	AM OR PM?
	STUART DEAN CLIENT? ☐ YES ☐ NO		NAV WORK ORDER NUMBER:
	DID INCIDENT OCCUR ON CLIENT'S PREMISES? ☐ YES ☐ NO		
	BUILDING INCIDENT REPORT? ☐ YES ☐ NO (If yes, attach)		
	EXACT ADDRESS, COUNTY, STATE, ZIP CODE, INTERIOR/EXTERIOR LOCATION WHERE INCIDENT OCCURRED:		
	DATE WHEN INCIDENT WAS REPORTED TO SUPERVISOR: _____ FOLLOW-UP: _____		
	TIME REPORTED: _____ AM OR PM?		
	POLICE REPORT? ☐ YES ☐ NO (If filed, attach)		
	TIME EMPLOYEE BEGAN WORK: _____ AM OR PM?		
	DID EMPLOYER BECOME AWARE OF INCIDENT AFTER EMPLOYEE WAS TERMINATED, DURING A STRIKE, OR AFTER THE EMPLOYEE WAS NOTIFIED OF PENDING LAYOFF? ☐ YES ☐ NO		
	WAS EMPLOYEE INJURED? ☐ YES ☐ NO		WAS A NON-EMPLOYEE INJURED? ☐ YES ☐ NO (If YES, give name and address of injured)
DID EMPLOYEE STOP WORK IMMEDIATELY? ☐ YES ☐ NO			
WAS EMPLOYEE OR OTHER INJURED PARTY A PASSENGER OR DRIVER IN A VEHICLE? ☐ YES ☐ NO If YES, Complete page 4.		DID EMPLOYEE OR OTHER PARTY DIE AS A RESULT OF INJURES? ☐ YES ☐ NO	
NAME AND ADDRESS OF DECEASED:		NAME, ADDRESS, PHONE # OF NEAREST RELATIVE:	
DATE OF DEATH:			
OFFICIAL CAUSE OF DEATH:			
NAME/ADDRESS/PHONE # OF INJURED PARTY: Non-Employee			
NAME/ADDRESS/PHONE # OF WITNESS 1:		NAME/ADDRESS/PHONE # OF WITNESS 2:	



****INCIDENT REPORT****

Date of this Incident Report _____ - _____ - 2020 Stuart Dean Office _____



Last Name of Individual _____ Stuart Dean Co. Incident Number _____

Explanation of the Incident-

WAS EMPLOYEE INJURED WHILE PERFORMING REGULARLY ASSIGNED TASK? ☐ YES ☐ NO

WHAT WERE THE CONDITIONS THAT CONTRIBUTED TO THIS INCIDENT?

DID A CHEMICAL SPILL OCCUR? ☐ YES ☐ NO

WAS THE ENVIRONMENT IMPACTED? ☐ YES ☐ NO (If YES, what steps were taken to respond to the spill?)

NATURE OF INJURY AND BODY PARTS AFFECTED (i.e. lacerated middle finger of right hand, burns to left leg, etc.
Be specific.)

WHAT SAFEGUARDS OR SAFETY EQUIPMENT WERE NOT UTILIZED, if any?

ACCIDENT OR INCIDENT INFORMATION

WAS MEDICAL TREATMENT REQUIRED?

FOR EMPLOYEE: ☐ YES ☐ NO

FOR OTHER PARTY: ☐ YES ☐ NO

If YES, please check one of the following: ☐ FIRST AID ☐ EMERGENCY ☐ FIRST AID ☐ EMERGENCY

WHERE WAS TREATMENT ADMINISTERED?

☐ AT WORK SITE ☐ IN HOSPITAL EMERGENCY ROOM ☐ DOCTOR'S OFFICE

First-Aid Only? ☐ YES ☐ NO

WAS EMPLOYEE OR OTHER INJURED PARTY TAKEN BY AIRLIFT OR AMBULANCE TO A HOSPITAL? ☐ YES ☐ NO

WAS HOSPITALIZATION OVERNIGHT REQUIRED?

FOR EMPLOYEE: ☐ YES ☐ NO DATE ADMITTED:

FOR OTHER PARTY: ☐ YES ☐ NO DATE ADMITTED:

DID EMPLOYEE INFORM MEDICAL PROVIDER THAT INCIDENT WAS JOB-RELATED? ☐ YES ☐ NO

NAME, ADDRESS, PHONE NUMBER OF HOSPITAL:

Is there anything else you would like to add to this report? (Not medical information)



****INCIDENT REPORT****

Date of this Incident Report _____ - _____ - 2020 Stuart Dean Office _____

Last Name of Individual _____ Stuart Dean Co. Incident Number _____



TO BE COMPLETED FOR ALL REPORTS INVOLVING STUART DEAN VEHICLES	
NAMES OF EMPLOYEE(S) DRIVING VEHICLE(S): 1)	WHEN AND WHERE CAN VEHICLE(S) BE INSPECTED?
NUMBER OF VEHICLES INVOLVED:	WERE POLICE AT SCENE? ☐ YES ☐ NO
Was ARI Contacted? ☐ YES ☐ NO	POLICE REPORT NUMBER:
Follow instruction from INSURANCE before dropping off at Repair Shop	BADGE NUMBER: OFFICER NAME:
STUART DEAN VEHICLE #1	
DRIVER'S NAME:	ARI VEHICLE NUMBER:
ADDRESS:	
CITY, STATE, ZIP CODE:	MODEL YEAR & MAKE OF AUTO:
DRIVER'S LICENSE NUMBER:	LICENSE PLATE/STATE:
Were photographs taken? ☐ YES ☐ NO	
Where are they stored?	
NAMES OF OCCUPANTS:	
VEHICLE IDENTIFICATION NUMBER (VIN):	REGISTRATION NUMBER:
DAMAGE TO VEHICLE:	WAS VEHICLE TOWED AWAY? ☐ YES ☐ NO
DAMAGE ESTIMATE:	Is vehicle drivable? ☐ YES ☐ NO Usable? ☐ YES ☐ NO
INVOLVED VEHICLE #2	
DRIVER'S NAME:	
ADDRESS:	
CITY, STATE, ZIP CODE:	MODEL YEAR & MAKE OF AUTO:
DRIVER'S LICENSE NUMBER:	LICENSE PLATE/STATE:
Were photographs taken? ☐ YES ☐ NO	
Where are they stored?	
NAMES OF OCCUPANTS:	
VEHICLE IDENTIFICATION NUMBER (VIN):	REGISTRATION NUMBER:
DAMAGE TO VEHICLE:	WAS VEHICLE TOWED AWAY? ☐ YES ☐ NO
DAMAGE ESTIMATE:	Is vehicle drivable? ☐ YES ☐ NO Usable? ☐ YES ☐ NO
Insurance Information: (Insurance Card?) ☐ YES ☐ NO	Photos of License Plate/Driver's License ☐ YES ☐ NO
POLICY HOLDER'S NAME AND ADDRESS (IF NOT VEHICLE OWNER):	POLICY HOLDER'S PHONE:
INSURANCE COMPANY:	POLICY NUMBER:
INSURANCE CARRIER'S ADDRESS AND PHONE:	

CONFIDENTIAL DOCUMENTS/ INFORMATION REPORT OF WORK-RELATED INCIDENT-ACCIDENT
Last modified March 2021, Mark Christmas - Stuart Dean Co.

page 5 of 6



****INCIDENT REPORT****

Date of this Incident Report _____ - _____ - 2020 Stuart Dean Office _____

Last Name of Individual _____ Stuart Dean Co. Incident Number _____



PLEASE PRINT NAME AND/OR SIGN, AS APPLICABLE

"I BELIEVE THIS TO BE AN ACCURATE ACCOUNT
OF WHAT HAPPENED"

DATE

SUPERVISOR or OPERATIONS MANAGER

Name _____

X _____ - _____ - 2020

**"Each Employee Involved MUST make statement and
sign that paperwork"**

Summary- Property Damage Report / Witness Statement

*(Write a detailed report of the extent of property damage and how, when and where the damage or
incident occurred, please be sure to include as much detail as possible and date and sign your account
of what happened)*

ATTACHMENT N Infectious Disease

COVID - OSHA Emergency Temporary Standard

January 5, 2022

[This document to be applied in concert with previous best practices]

Further to the communication that I sent out on December 23rd, given what we currently know about COVID-19 and the Omicron variant, the CDC have since issued updated guidelines on December 27th cutting the recommended isolation and quarantine periods for coronavirus infections. The change is motivated by science demonstrating that the majority of SARS-CoV-2 transmission occurs early in the course of illness, generally in the 1-2 days prior to onset of symptoms and the 2-3 days after. The following is a summary of the changes and the guidelines that are now in place should you test positive for COVID-19 or be exposed to someone with COVID-19;

1. **If you Test Positive for COVID-19: ISOLATE¹** (You **isolate** when you are sick or when you have been infected with the virus, even if you don't have symptoms.)

Everyone, regardless of vaccination status should;

- Stay home for 5 days
- If you have no symptoms or your symptoms are resolving after 5 days, you can leave your house
- Continue to wear a mask around others for 5 additional days
- If you have a fever, continue to stay home until your fever resolves
- If you have tested positive for COVID-19, inform your manager and complete one of the following forms:
 - If contracted at home/outside of work, use the **Home Injury Notice Only Report Form**
 - If contracted at work, use the **Incident Accident Report Form**.

If you were Exposed to Someone with COVID-19: Quarantine² (You **quarantine** when you might have been exposed to the virus and may or may not have been infected;

Quarantine: Scenario 1

If you have had the booster shot, or completed the primary series of Pfizer or Moderna vaccine within the last 6 months, or completed the primary series of J&J vaccine within the last 2 months, you should;

- Wear a mask around others for 10 days
- Test on day 5, if possible

TEL 212.273.6900 TOLL-FREE 800.322.3180

FAX 212.273.0844 WEB www.stuartdean.com

43-50 10th Street, Long Island City, NY 11101

If you develop symptoms get a test. Stay home if you test positive and follow the isolation guidelines.

If you were Exposed to Someone with COVID-19: Quarantine²

Quarantine: Scenario 2

If you had the Pfizer or Moderna vaccine over 6 months ago and are not boosted, or had the J&J vaccine over 2 months ago and are not boosted or you are unvaccinated, you should:

- Stay home and avoid people for 5 days. After that, continue to wear a mask around others for 5 additional days
- If you can't quarantine, you must wear a mask for 10 days
- Test on day 5 if possible

If you develop symptoms get a test. Stay home if you test positive and follow the isolation guidelines

***1- Isolation**

Isolation is used to separate people with confirmed or suspected COVID-19 from those without COVID-19. People who are in isolation should stay home until it's safe for them to be around others. At home, anyone sick or infected should separate from others, or wear a [well-fitting mask](#) when they need to be around others. People in isolation should stay in a specific "sick room" or area and use a separate bathroom if available. Everyone who has presumed or confirmed COVID-19 should stay home and isolate from other people for at least 5 full days (day 0 is the first day of symptoms or the date of the day of the positive viral test for asymptomatic persons). They should wear a mask when around others at home and in public for an additional 5 days. People who are confirmed to have COVID-19 or are showing symptoms of COVID-19 need to isolate regardless of their vaccination status. This includes:

- People who have a [positive viral test](#) for COVID-19, regardless of whether or not they have [symptoms](#).
- People with [symptoms](#) of COVID-19, including people who are awaiting test results or have not been tested. People with symptoms should isolate even if they do not know if they have been in close contact with someone with COVID-19.

What to do for isolation

- Monitor your [symptoms](#). If you have an [emergency warning sign](#) (including trouble breathing), seek emergency medical care immediately.
- Stay in a separate room from other household members, if possible.
- Use a separate bathroom, if possible.
- Take steps to [improve ventilation at home](#), if possible.
- Avoid contact with other members of the household and pets.
- Don't share personal household items, like cups, towels, and utensils.
- Wear a [well-fitting mask](#) when you need to be around other people.

As your employer, Stuart Dean firmly believes that prevention is our best option. The Omicron variant is very infectious so we highly recommend that you get vaccinated, get boosted, wear a mask in public indoor settings in areas of substantial and high community transmission, and take a test before you gather.

If you have any questions whatsoever regarding this communication, please reach out to myself, Grace or Mark Christmas.

Catherine Jones
SVP, Human Resources



GENERATIONS OF EXCELLENCE

From: Catherine Jones <cjones@stuartdean.com>
Date: Thursday, December 23, 2021 at 11:37 AM
To: All Users
Subject: Update on COVID and the OSHA Emergency Temporary Standard

As you know, on November 4, 2021, OSHA issued an Emergency Temporary Standard (ETS) for employers with 100 or more employees. The ETS required those employers to have a program in place to verify vaccination status and to impose certain face covering and testing requirements. The implementation of the ETS was then temporarily suspended by the courts, but that suspension was lifted on Friday, December 17. Some of you have been asking what Stuart Dean is going to be doing in response to the suspension having been lifted.

So, what are the facts?

- The Emergency Temporary Standard (ETS) is in now effect, as the 6th circuit just removed the stay
- The parties have appealed to the U.S. Supreme Court, but it does not appear that the issue will be resolved before the new year
- To account for any uncertainty created by the stay, OSHA is exercising enforcement discretion with respect to the compliance dates of the ETS
- To provide employers with sufficient time to come into compliance, OSHA will not issue citations for noncompliance with any requirements of the ETS before January 10 and will not issue citations for noncompliance with the standard's testing requirements before February 9, so long as an employer is exercising reasonable, good faith efforts to come into compliance with the standard

So, what is Stuart Dean going to do in response to the suspension being lifted?

- We need to begin to prepare to implement the OSHA/ETS bearing in mind the dates referred to above
- HR will be reaching out to all the Offices to ask the Office Managers/Supervisors to update the vaccine tracker so that we know which of our employees are vaccinated and have had the booster, and those that are not. This data will be collated no later than January 6th
- We are currently identifying a supplier to purchase tests from so that those people that are not vaccinated can self administer the tests either at home or in the office
- HR will be drafting a process to support our adherence to the OSHA ETS and this will be communicated before January 7th to all employees and come into effect January 10th
- In the meantime, you and your teams should continue to adhere to the guidelines below

And what should we be doing in the meantime?

While mask wearing by fully vaccinated individuals is not required by the CDC, guidance suggests that wearing a mask in public indoor settings is recommended, particularly if they or someone in their household is immunocompromised or is at increased risk for severe disease, or if someone in their household is

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unvaccinated. And as we know, there are some local ordinances that are now requiring mask wearing in indoor public areas, as well as in the workplace e.g. New York City. Therefore, we urge you to check with your local officials to determine what is being required in your location.

In our continuing effort to help keep you safe and in accordance with the Centers for Disease Control (CDC) guidelines, please note the following:

- We encourage you to get vaccinated and have the booster shot, as that is the best way to avoid getting the virus or becoming seriously ill if you do contract it
- Those who are vaccinated, are not required to wear a mask in the office, unless they prefer to do so
- **For those who are unvaccinated, you are required to wear a mask in the office and maintain social distancing**
- Quarantine for 10 days if you have been in [close contact](#) (within 6 feet of someone for a cumulative total of 15 minutes or more over a 24-hour period) with someone who has COVID-19, unless you have been [fully vaccinated](#). People who are fully vaccinated do NOT need to quarantine after contact with someone who had COVID-19 unless they have [symptoms](#). However, fully vaccinated people should get [tested](#) 5-7 days after their exposure, even if they don't have symptoms and wear a mask indoors in public for 14 days following exposure or until their test result is negative
- If you have tested positive for COVID-19 quarantine for 10 days, inform your manager and complete one of the following forms:
 - o If contracted at home/outside of work, use the [Home Injury Notice Only Report Form](#)
 - o If contracted at work, use the [Incident Accident Report Form](#).

If you have any questions whatsoever regarding this communication, please reach out to myself, Grace or Mark Christmas.

I hope you and your loved ones stay safe during the holidays and the coming weeks ahead.

Catherine



August 3 2021 Update

Subject: COVID-19 - Updated Protocols

Date: Tuesday, August 3, 2021 at 1:36:42 PM Eastern Daylight Time

From: Grace Ben-Ezra

To: All Users

Good afternoon.

Many of you may have seen that the Centers for Disease Control (CDC) has issued new guidelines due to the continuing spread of the Delta variant. While mask wearing by fully vaccinated individuals is not required by the CDC, recent guidance suggests that wearing a mask in public indoor settings is recommended, regardless of the Delta variant transmission level, particularly if they or someone in their household is immunocompromised or is at increased risk for severe disease, or if someone in their household is unvaccinated.

However, there are some local ordinances that are now requiring mask wearing in indoor public areas. As an example, with coronavirus cases among unvaccinated people rising to distressing levels in Los Angeles, L.A. County health officials there are requiring all residents, regardless of their vaccination status, to wear a mask in indoor public spaces. Therefore, we urge you to check with your local officials to determine what is being required in your location.

In our continuing effort to help keep you safe, please note the following:

- We encourage you to get vaccinated as that is the best way to avoid getting the virus or becoming seriously ill if you do contract it
- Those who are vaccinated, are not required to wear a mask in the office, unless they prefer to do so
- For those who are unvaccinated, you are required to wear a mask in the office and maintain social distancing
- If you have been exposed to someone who has the virus or are experiencing symptoms, get tested immediately and if you have tested positive, advise your Manager or HR. Get tested 3-5 days following a known exposure to someone with suspected or confirmed COVID-19 and wear a mask in public indoor settings for 14 days after exposure or until a negative test result.
- Isolate if you have tested positive for COVID-19 in the prior 10 days or are experiencing COVID-19 symptoms.

We have asked each office to maintain a tracker of those people who have been vaccinated and the date of their last vaccination – this data will be sent into the Corporate HR team on the first Monday of each month so that we know our vaccination status for the whole company and can respond accordingly.

As always, stay safe and healthy.

Grace Ben-Ezra | Manager, Human Resources | **Stuart Dean Company**

gbenezra@stuartdean.com

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A MESSAGE FROM HUMAN RESOURCES

June 25, 2021



Catherine Jones
SVP, Human Resources

First, I want to echo what Chris has expressed in his communications regarding his appreciation for the dedication and resiliency all of you have shown during these past 15 months. There is no doubt that the pandemic created unforeseen challenges, anxiety and frustration. However, the professionalism and perseverance you have demonstrated has not gone unnoticed.

While we were able to adopt protocols that allowed some of us to work from home some or most of the time, but given that the country is now opening back up, we're targeting Tuesday, September 7, 2021 (the day after Labor Day) for everyone to be back in the office. I think we'd all agree that we work best when we can be in each other's presence and can work collaboratively and creatively together.

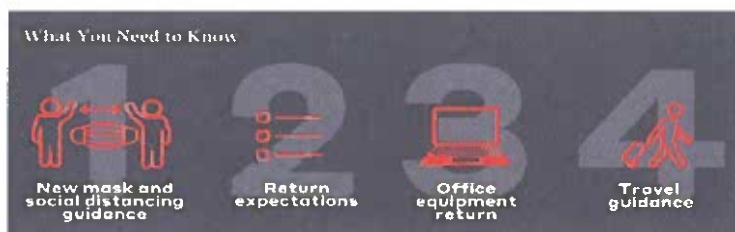
Our goal is to make sure that everyone has time to plan and make our return to offices meaningful - parents to get their children back in school before returning to work; those who have yet to be vaccinated to investigate that opportunity; and to make sure our offices are ready to welcome our teams back.

Attached are guidelines for in-office procedures to help you through this transition. Please read the following information carefully and feel free to reach out to any of your leadership or HR for more information.



RETURN TO WORK GUIDELINES

June 25, 2021



1 NEW MASK AND SOCIAL DISTANCING GUIDELINES

Vaccination Status

To comply with various state and local requirements, all employees are required to provide their vaccination status to their local Office Manager/ Office Administrator. Recorded information will be protected and used to verify vaccination status as we look to reduce COVID-19 restrictions in the offices. Stuart Dean will continue to monitor the [Centers for Disease Control and Prevention](#) (CDC), federal, state and local COVID-19 mandates and adjust our guidelines accordingly.

Masks and Social Distancing for Fully Vaccinated Employees

Employees who are fully vaccinated (two weeks after your second dose in a two-dose series, or two weeks after a single-dose vaccine, i.e., Johnson & Johnson), have no symptoms of COVID-19, and have provided their vaccination status to their Office Manager/ Office Administrator, no longer have to wear a mask or socially distance while working in a Stuart Dean office or outside their home for Stuart Dean, except where required by federal, state, local, tribal, or territorial laws, rules, and regulations, including local business and workplace guidance. Employees who are at-risk or care for someone and need to continue to wear a mask and socially distance are welcomed to do so.

Masks and Social Distancing for Unvaccinated Employees

Employees who are not fully vaccinated are required to wear a mask and practice social distancing while working in the office or outside the home for Stuart Dean. Masks are not required when eating, sitting at your desk or while in a personal office by yourself. Where feasible, Stuart Dean will continue to have workstation space that allows for social distancing.

2. RETURN TO THE OFFICE EXPECTATIONS

The return on September 7 comes with a firm expectation that all employees will be physically working in their offices five (5) days/week. In other words, back to our pre-COVID routine. The only exception to this will be the Corporate office as a result of the office move in February from Manhattan to Long Island City. Due to limited office space and parking, we are physically unable to accommodate everyone being in the office at the same time. We will therefore operate a schedule which enables the Corporate team to be in the office a minimum of 2 days a week out of 5 days starting September 7.



3. RETURN OF OFFICE EQUIPMENT

Any office equipment that was removed to work from home must be returned to the office the week prior to Labor Day so that enough workstations will be available for employees. Equipment includes monitor, keyboard, mouse, docking station and chairs. In addition, please remember to redirect your phones back to your regular office number.

4. TRAVEL GUIDANCE

Below is guidance for domestic and international business or personal travel (approvals are not required for personal travel):

- **Domestic (within the United States)**

Fully vaccinated employees can travel and return to the office immediately after travel. Approval is still required from your General Manager for business travel. The CDC recommends delaying travel if unvaccinated. Unvaccinated employees who travel by plane, bus, train or other forms of public transportation that enter transportation hubs (airports, stations, etc.) and stay overnight must wear a mask while in the office 100% of the time (excluding eating or drinking) for 10 days. Should the employee obtain a negative viral test 3-5 days post travel, the mask requirement will be removed.

- **International**

Currently, the CDC does not recommend travel for unvaccinated employees. Fully vaccinated employees may return to the office directly if symptom-free. Unvaccinated employees traveling to a Level 2 or higher CDC designated country will be required to wear a mask 100% of the time (excluding eating or drinking) while in the office, and obtain a negative viral test between 3 and 5 days after travel. Once a negative viral test is obtained, the mask requirement will be removed.

I will be sending out a separate communication to the Office Managers/Office Administrators regarding the tracking of everyone's vaccination status, and also outlining how we will need to work with Randy/Paul regarding the set up of any office equipment as a result of this return to the offices.

While we may not yet be able to return in full to our pre-pandemic world, this is a first step in trying to get back to some degree of normalcy. If you have any questions whatsoever regarding this communication, please feel free to reach out to any of your leadership or HR for more information.

Catherine Jones
S/P Human Resources





NOTE: "Inactive Policies follow effective Sept 7, 2021 – See September 7th 2021 - Return to Work Guidelines Addendum under June 25 Cover Memo and August 3, 2021 updates above "

To: All Employees
From: Human Resources
March 30, 2021

Subject: COVID-19 – Return to Work Protocol, Workplace Re-Entry Guidelines, Screening and Temperature Protocols and Return to Work for Potentially Exposed Employees Guidelines

Stuart Dean has established the following protocols for employees returning to work who have had signs of COVID-19, have been diagnosed as having COVID-19, tested positive for it or have been in direct contact with someone who has been diagnosed or tested positive for the virus:

- Any symptomatic employee who tested positive for COVID-19 is required to isolate¹ 14 days since symptoms first appeared **and**, 24 hours with no fever without the use of fever-reducing medications **and** Other symptoms of COVID-19 are improving² **and** has been medically cleared for return to work.
- Any symptomatic employee who is believed to have COVID-19 but has not received a test is required to isolate until at least 14 days have passed since symptoms first appeared **and** has been medically cleared for return to work.
- Any asymptomatic employee who has tested positive must isolate for 14 days or receive medical clearance to return to work.
- Employees believed to have had direct contact with an infected individual and remain asymptomatic are required to quarantine³ for 14 days since the last date of contact or provide a negative test taken after day 7 of isolation and continue to wear a face mask.
- If an employee has been fully vaccinated⁴ and had direct contact with an infected individual and remains asymptomatic they do not need to quarantine. However, if they live in a group home they should still quarantine for 14 days if they've had direct contact with an infected individual and provide documentation from their health care provider or proof of a negative test result.
- Regular disinfection protocols should be maintained.
- Stuart Dean is following CDC guidance on mask use. Attached is CDC guidance published March 21, 2021.

If you have any questions regarding the above, please don't hesitate to contact Human Resources.

¹Isolation = keeps someone who is infected with the virus away from others, even in their home.

²Loss of taste and smell may persist for weeks or months after recovery and need not delay the end of isolation

³Quarantine = keeps someone who may have been exposed away from others.

⁴A person is considered to be fully vaccinated 2 weeks after their second dose in a 2-dose series, such as the Pfizer or Moderna vaccines, or 2 weeks after a single-dose vaccine, such as Johnson & Johnson's Janssen vaccine.



Re-entering the Workplace

The COVID-19 pandemic will continue to affect short and long-term conduct in our personal lives and in the way our Company conducts business. As we re-enter the workplace, we cannot over-emphasize the need for continued focus on the safety, security and wellness of our employees, families, customers and all we come in contact with.

As you prepare to gradually re-enter your office, there will be an endless list of questions on safe and best practices. New information is being learned continually. The following guidelines, based upon the information we have to date, will be the basis of a successful re-entry into our office spaces. To ensure compliance, a 'monitor' will be identified for each office. *

Please note that the general managers of local offices may impose stricter restrictions as they see fit.

These guidelines are being adopted to preserve the health and well-being of our Stuart Dean family. Adherence to the guidelines below is not only expected, but mandatory.



The Basics for Office Workplace Safety

- Staggered group scheduling. Designate groups who will be assigned alternating days they should plan on being in the office. This has benefits related to contact tracing and it can mitigate business risk if an infection occurs. Hopefully, only one group will have been exposed and the business unit can continue to operate. This may not be applicable to all offices.
- Avoid cross-contaminating groups by using an A-B schedule. If you schedule 1/2 of the administrative staff and 1/2 of the sales staff on alternating days you reduce the risk of mass infection. This schedule will be:
 - Group A reports to the office on Monday, Wednesday & Friday and works from home the other days.
 - Group B reports to the office on Tuesday & Thursday and works from home the other days (this group to include [CDC identified high-risk individuals](#)).
- A temperature check of employees is required upon entry to the office, conducted by the monitor. The monitor is to use disposable gloves and a reusable facemask when performing a temperature check. Dispose of gloves, after testing, in designated trash bins.
- Anyone with a temperature above 100.3° F. will be asked to return home and [self-quarantine as recommended by the CDC](#). The monitor will notify the local General Manager and HR Manager Grace Ben-Ezra by e-mail.

- The wearing of face masks is required by all employees and visitors (unless alone in your own office). If a face mask is needed, please see the monitor for a reusable mask.
- Continue weekly Total Point AVS disinfecting in office/shop and crew vehicles.
- Sanitize your personal work space including office phone, mobile phone, keyboard, etc. at the beginning and end of your work shift.
- Prop office doors open, where feasible, to reduce the handling of touch points.
- Apply TouchPoint Clear Coat to all SD office door handles/touchpoints.
- Practice 6' social distancing.
- Limit in-person meetings. Use video conferencing as much as possible.
- Use separate entrances where available. Control entry points, including deliveries (USPS, UPS, Fed-Ex etc.**)
- Designate and post the direction of foot traffic through the office/shop to enable social distancing, where possible.
- Install signage (social distancing 6 ft, delivery signage, hand wash signs).
- Wash hands for the CDC recommended 20 seconds as frequently as possible. Use hand sanitizer when not able to wash hands in sink.
- Business travel requires prior approval by the CEO or COO. Personal travel by air and non-commuter intrastate travel by train requires a 14-day self-quarantine after travel, before returning to work.
- A GM designated employee (one from each of the A/B schedules if A/B scheduling is in place) should wipe down all doors/handles/touchpoints upon arrival and as they exit the office.



For Field Personnel

- Continue to limit numbers of technicians in the shop at any one time by imposing staggered start times for crews. This must be strictly enforced. There should be no more than 6 technicians in the shop at a given time. Though we are sensitive to scheduling needs, this is mandatory.
- Limit the number of field personnel working on any specific job.
- Schedule crews consistently - i.e., have the same crews work together to minimize contact tracing and reduce potential infection rates. Maintain Foreman/Helper pairings.
- In work vehicles, face masks are required and only the foreman is required to drive the company vehicle to the job-site. Helpers have the option of riding with the foreman to the job, or taking their own transportation to the site.

- A temperature check of technicians is required upon entry to shop/workspace. When performing a temperature check, use disposable gloves and a reusable facemask. Dispose of gloves in designated trash bins.
 - Anyone with a temperature above 100.3° F. will be asked to return home and [self-quarantine as recommended by the CDC](#). The monitor will notify the local General Manager and HR Manager Grace Ben-Ezra by e-mail.
 - Face masks are required in shop and in company vehicles if another employee is present. Always wear a mask when checking in and out with building security. Face coverings should be used at all times except when eating and drinking, being careful to observe social distancing.
 - Keep hand sanitizer in fleet vehicles as available.
 - Continue weekly Total⊕Point AVS disinfection of the office, shop and crew vehicles.
 - Apply Touch⊕Point Clear Coat to all SD office door handles and touchpoints.
 - [Wash hands for the CDC recommended 20 seconds as frequently as possible](#). Use hand sanitizer as available when not able to wash hands in sink.
 - Disinfect door handles and touchpoints as you exit the vehicle.
- * The general manager of each office will designate monitor(s). There will be a need for both office and operational monitors. If the office is employing A/B scheduling, there is a need for monitors in each group.
- **Daily mail should be set aside for 24 hrs. in a designated space.
- **UPS/FedEx packages should be left in one specific area for reception. Set aside for 24hrs or disinfect prior to circulating throughout office.



Administering In-Person Screenings and Temperature Checks at Stuart Dean Locations

Purpose:

- To help reduce the spread of COVID-19, this protocol outlines the required process for daily screening and/or temperature checks.
- No Stuart Dean employee or visitor shall enter a Stuart Dean facility or report to work unless the person is asymptomatic and demonstrates no symptoms commonly associated with COVID-19 (as described below) and maintains a temperature less than 38°C/100.4°F.
- To execute this procedure, locations must administer screening and temperature checks consistently to all employees and visitors who wish to enter the facility.
- In-person screening and temperature check stations shall be set up in a manner that considers the employee's privacy, social distancing, as well as their comfort and safety (i.e., weather conditions, parking lot traffic, etc.).

Preparation for In-Person Screening and/or Temperature Checks and Precautions:

- **Required PPE:** Employees performing screening and/or temperature checks ("Screening Monitors") shall wear required PPE while performing screenings and temperature checks as follows:
 - Barrier face mask or unrated surgical mask¹
 - Gloves

Preparation: Each location shall designate employees to perform the screening and temperature checks. Prior to administering screenings and temperature checks, Screening Monitors shall:

- Thoroughly wash hands with soap and water for at least 20 seconds.
- Wear required PPE.
- Avoid touching eyes, nose and mouth.
- Clean the thermometer by applying a disinfectant wipe to thoroughly wipe down infrared thermal detection thermometer. If a spray disinfectant is being used instead of a wipe, the Screening Monitor shall spray disinfectant on a microfiber wipe and thoroughly wipe down thermometer. **Do not** spray the thermometer directly.
- **Precautions:** If Screening Monitors stop screening activities for any reason or handle non-sanitized equipment, such as phones, between screening, Screening Monitor shall repeat steps outlined above before resuming screening activities.

¹ N95 masks are not required.

- Post-Screening Process and Clean-up:
 - Remove PPE, avoid touching your eyes, nose and mouth.
 - Dispose of disposable PPE into appropriate trash receptacle.
 - Clean and disinfect reusable PPE.
 - Clean and disinfect thermometer.
 - Thoroughly wash hands with soap and water for at least 20 seconds.

Screenings Questions and Temperature Readings

- Screening Questions: Employees and visitors must be able to affirmatively state the following before having their temperature taken:
 - *"I have not travelled internationally in the last 14 days nor have I travelled to states requiring quarantine by my local jurisdiction."*
 NOTE: An employee who has travelled internationally or to states requiring quarantine in the last 14 days must immediately leave facility and be self-quarantined for the remainder of the 14 days since returning from international travel or such state.
 - *"I have not experienced any of the following symptoms in the last 24 hours:*
 - *Fever higher than 38°C/100.4°F*
 - *Cough*
 - *Shortness of breath or difficulty breathing*
 - *Sore throat*
 - *Chills and/or repeated shaking with chills*
 - *A recent loss of taste or smell*
 NOTE: An employee who has experienced any of the symptoms listed above must immediately leave the facility and be self-quarantined until they have been symptom-free for at least 72 hours without the assistance of any fever reducing medicines (e.g., Ibuprofen, acetaminophen, etc.) or they have been given medical clearance to return to work by a physician. ²
 - *"I have not had Direct Contact³ with a person who has been diagnosed with or tested positive for COVID-19 in the last 72 hours."*

² unless a lower temperature specified by a location's jurisdiction

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-in-home-patients.html>

³ <https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-in-home-patients.html>

⁴ Stuart Dean defines **Direct Contact** with a person who has been diagnosed with or tested positive for COVID-19 as (1) working face to face in close proximity (within 6 feet) for a sustained period of time (15 minutes or longer), (2) having Direct Contact with bodily fluids from coughing, sneezing, etc. or (3) handling the same work surfaces, papers, tools, equipment, etc. Working in the same room, walking past the person or having brief interactions are typically insufficient. Factors that should also be considered include whether personal protective

whether the infected person was symptomatic at the time of the Direct Contact (i.e., coughing, sneezing, difficulty breathing, fever, etc.), and whether cleaning/disinfecting protocols may have prevented the virus from surviving on work surfaces. Questions regarding this issue should be directed to Human Resources Director, who will consult with the National Director of Special Services, as needed.

NOTE: If an employee is believed to have had Direct Contact, the Screening Monitor shall immediately contact the employee's supervisor and Human Resources Manager for further guidance.

- Temperature Readings: Employees and visitors who can successfully answer the screening questions shall have their temperature taken through the following procedure:
 - Locations shall administer temperature checks with no-touch infrared thermal detection thermometers. Under no circumstances shall a location utilize an oral thermometer.
 - If a person's temperature is less than 38°C/100.4°F², the person may enter the facility. If person's temperature is equal to or greater than 38°C/100.4°F², then person shall not be permitted to enter the facility and advised to seek medical attention and follow the advice of doctor.
 - An employee should not be permitted to return to work until he or she is symptom free for at least 72 hours and has a temperature that is less than 38°C/100.4°F² or has received medical clearance to return to work by a physician.
 - If any person is **not** permitted to enter or work due to their temperature exceeding 38°C/100.4°F², the Screening Monitor must immediately contact the employee's direct supervisor who will contact Human Resources and the National Director of Special Services.
- b. If an **employee or visitor refuses to submit to a screening** or temperature check, they shall not be permitted to perform any work or enter the facility and must contact Human Resources immediately.

equipment ("PPE") was being worn, such as a facemask, by either person,



ATTACHMENT O

Environmental Policy

It is the policy of **Stuart Dean Company, Inc. (Stuart Dean)** to conduct its operations in a manner that is environmentally responsible and befitting of a good corporate neighbor and citizen. In accordance with this policy, **Stuart Dean** complies with all environmental laws and manages all phases of its business in a manner that minimizes the impact of its operations on the environment. To further this policy, **Stuart Dean** shall:

- Meets or exceeds applicable environmental laws and regulations and voluntary commitments to which the company subscribes.
- Eliminate, or reduce to the maximum practical extent, the release of contaminants into the environment, first through pollution prevention (material substitution and source reduction), then recycling, and finally through treatment and control technologies.
- Effectively communicate with company employees, suppliers, regulators, and customers, as well as the surrounding community, regarding EMS performance.
- Periodically review and demonstrate continuous improvement in the company's environmental performance, including areas not subject to regulations.

APPLICABILITY

This policy applies to all company locations and to work performed by Stuart Dean personnel at non-company locations.

ATTACHMENT P

NY HERO ACT – Model Airborne Infectious Disease Exposure Prevention Plan



The purpose of this plan is to protect employees against exposure and disease during an airborne infectious disease outbreak. This plan goes into effect when an airborne infectious disease is designated by the New York State Commissioner of Health as a highly contagious communicable disease that presents a serious risk of harm to the public health. This plan is subject to any additional or greater requirements arising from a declaration of a state of emergency due to an airborne infectious disease, as well as any applicable federal standards.

Employees should report any questions or concerns with the implementation this plan to the designated contact.

This plan applies to all "employees" as defined by the New York State HERO Act, which means any person providing labor or services for remuneration for a private entity or business within the state, without regard to an individual's immigration status, and shall include part-time workers, independent contractors, domestic workers, home care and personal care workers, day laborers, farmworkers and other temporary and seasonal workers. The term also includes individuals working for digital applications or platforms, staffing agencies, contractors or subcontractors on behalf of the employer at any individual work site, as well as any individual delivering goods or transporting people at, to or from the work site on behalf of the employer, regardless of whether delivery or transport is conducted by an individual or entity that would otherwise be deemed an employer under this chapter. The term does not include employees or independent contractors of the state, any political subdivision of the state, a public authority, or any other governmental agency or instrumentality.

As of the date of the publication of this document, while the State continues to deal with COVID-19 and a risk still exists, no designation is in effect at this time. Please check the websites of Departments of Health and Labor for up to date information on whether a designation has been put into effect, as any such designation will be prominently displayed. No employer is required to put a plan into effect absent such a designation by the Commissioner of Health.

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RESPONSIBILITIES

This plan applies to all employees of Shurtz Dean Company, NY, at the following work site(s)

This plan requires commitment to ensure compliance with all plan elements aimed at preventing the spread of infectious disease. The following supervisory employee(s) are designated to enforce compliance with the plan. Additionally, these supervisory employees will act as the designated contacts unless otherwise noted in this plan.

Name	Title	Location	Phone
			60-5478
			917-731-0877

EXPOSURE CONTROLS DURING A DESIGNATED OUTBREAK

A. MINIMUM CONTROLS DURING AN OUTBREAK

During an airborne infectious disease outbreak, the following minimum controls will be used in all areas of the worksite:

- General Awareness:** Individuals may not be aware that they have the infectious disease and can spread it to others. Employees should remember to:
 - Maintain physical distancing.
 - Exercise coughing/sneezing etiquette.
 - Wear face coverings, gloves, and personal protective equipment (PPE), as appropriate.
 - Individuals limit what they touch.
 - Stop social etiquette behaviors such as hugging and hand shaking, and
 - Wash hands properly and often.
- "Stay at Home Policy":** If an employee develops symptoms of the infectious disease, the employee should not be in the workplace. The employee should inform the designated contact and follow New York State Department of Health (NYSDOH) and Centers for Disease Control and Prevention (CDC) guidance regarding obtaining medical care and isolating.
- Health Screening:** Employees will be screened for symptoms of the infectious disease at the beginning of their shift. Employees are to self-monitor throughout their shift and report any new or emerging signs or symptoms of the infectious disease to the designated contact. An employee showing signs or symptoms of the infectious disease should be removed from the workplace and should contact a healthcare professional for instructions. The health screening elements will follow guidance from NYSDOH and CDC guidance, if available.

4 **Face Coverings:** To protect your coworkers, employees will wear face coverings throughout the workday to the greatest extent possible. Face coverings and physical distancing should be used together whenever possible. The face covering must cover the nose and mouth, and fit snugly, but comfortably, against the face. The face covering itself must not create a hazard, e.g. have features could get caught in machinery or cause severe fogging of eyewear. The face coverings must be kept clean and sanitary and changed when soiled, contaminated, or damaged.

5 **Physical Distancing:** Physical distancing will be followed as much as feasible. Avoid unnecessary gatherings and maintain a distance of at least six feet (or as recommended by the NYSDOH/CDC for the infectious agent) from each other. Use a face covering when physical distance cannot be maintained.

In situations where prolonged close contact with other individuals is likely, use the following control methods. (Note to employer: Check off the controls you intend to use and add any additional controls not listed here.)

- restricting or limiting customer or visitor entry,
- limiting occupancy,
- allowing only one person at a time inside small enclosed spaces with poor ventilation,
- reconfiguring workspaces,
- physical barriers,
- signage,
- floor markings;
- telecommuting,
- remote meetings,
- preventing gatherings;
- restricting travel;
- creating new work shifts and/or staggering work hours,
- adjusting break times and lunch periods;
- delivering services remotely or through curbside pickup.

6 **Hand Hygiene:** To prevent the spread of infection, employees should wash hands with soap and water for at least 20 seconds or use a hand sanitizer with at least 60% alcohol to clean hands BEFORE and AFTER:

- Touching your eyes, nose, or mouth;
- Touching your mask;
- Entering and leaving a public place, and
- Touching an item or surface that may be frequently touched by other people, such as door handles, tables, gas pumps, shopping carts, or electronic cashier registers/screens.

Because hand sanitizers are less effective on soiled hands, wash hands rather than using hand sanitizer when your hands are soiled.

7 **Cleaning and Disinfection:** See Section V of this plan.

8 **"Respiratory Etiquette":** Because infectious diseases can be spread by droplets expelled from the mouth and nose, employees should exercise appropriate respiratory etiquette by covering nose and mouth when sneezing, coughing or yawning.

9 **Special Accommodations for Individuals with Added Risk Factors:** Some employees, due to age, underlying health condition, or other factors, may be at increased risk of severe illness if infected. Please inform your supervisor or the HR department if you fall within this group and need an accommodation.

B ADVANCED CONTROLS DURING AN OUTBREAK

For activities where the Minimum Controls alone will not provide sufficient protection for employees, additional controls from the following hierarchy may be necessary. Employers should determine if the following are necessary:

1. Elimination: Employers should consider the temporary suspension or elimination of risky activities where adequate controls could not provide sufficient protection for employees.
2. Engineering Controls: Employers should consider appropriate controls to contain and/or remove the infectious agent, prevent the agent from being spread, or isolate the worker from the infectious agent. Examples of engineering controls include:
 - i. Mechanical Ventilation, for example:
 - a. Local Exhaust Ventilation, for example:
 - Ventilated booths (fap hoods);
 - Kitchen Vents; and
 - Vented biosafety cabinets
 - b. General Ventilation, for example:
 - Dedicated ventilation systems for cooking areas, malls, atriums, surgical suites, manufacturing, welding, indoor painting, laboratories, negative pressure isolation rooms;
 - Increasing the percentage of fresh air introduced into air handling systems;
 - Avoiding air recirculation;
 - Using higher-efficiency air filters in the air handling system;
 - If fans are used in the facility, arrange them so that air does not blow directly from one worker to another; and
 - ii. Natural Ventilation, for example:
 - Opening outside windows and doors to create natural ventilation, and
 - Opening windows on one side of the room to let fresh air in and installing window exhaust fans on the opposite side of the room so that they exhaust air outdoors. *(Note: This method is appropriate only if you will not blow from one person to another.)*
 - iii. Install automatic disinfection systems (e.g., ultraviolet light disinfection systems)
 - iv. Install cleanable barriers such as partitions and/or clear plastic sneeze/cough guards
 - v. Change layout to avoid points or areas where employees may congregate (e.g., install additional timeclocks)

Subject to changes based on operations and circumstances surrounding the infectious disease, engineering controls that are anticipated to be used are listed in the following table:

Engineering Controls Utilized/Location:
None anticipated

Note to Employer: One of the best ways to reduce exposure to infectious agents is to improve ventilation. The aim is to deliver more "clean air" into unoccupied areas and exhaust the contaminated air to a safe location. In some cases, the air may have to be filtered before it enters the work area or before it is exhausted. Direct the contaminated air away from other individuals and from the building's fresh air intake ports. Consult your ventilation system's manufacturer or service company to determine if improvements are possible for your system.

3 "Administrative Controls" are policies and work rules used to prevent exposure. Examples include:

- Increasing the space between workers.
- Slowing production speed to accommodate fewer workers at a time.
- Disinfecting procedures for specific operations.
- Not shaking out soiled laundry.
- Employee training.
- Identify and prioritize job functions that are essential for continuous operations.
- Cross-train employees to ensure critical operations can continue during worker absence.
- Limit the use of shared workstations.
- Post signs reminding employees of respiratory etiquette, masks, handwashing.
- Rearrange traffic flow to allow for one-way walking paths.
- Provide clearly designated entrance and exits.
- Provide additional short breaks for handwashing and cleaning.
- Establishing pods or cohorts working on same shift.

Subject to changes based on operations and circumstances surrounding the infectious disease, the following specific administrative controls are anticipated to be used:

Administrative Controls Utilized/Location:

All surrounding for office staff

Employee training

Limited number of field employees allow in shop at any given time.

Post signs reminding employees of respiratory etiquette, masks, handwashing:

4. 10. Personal Protective Equipment (PPE) are devices like eye protection, face shields, respirators, and gloves that protect the wearer from infection. PPE will be provided, used and maintained in a sanitary and reliable condition at no cost to the employee. The PPE provided to an employee will be based on a hazard assessment for the workplace.

PPE Required - Activity Involved/Location:

by hazard assessment

1. The use of respiratory protection, e.g., an NIOSH filtering facepiece respirator, requires compliance with the OSHA Respiratory Protection Standard 29 CFR 1910.134 or temporary respiratory protection equipment OSHA allows for during the infectious disease outbreak.

2. Respirators with exhalation valves will release exhaled droplets from the respirator. Respirators are designed to protect the wearer. Surgical masks and face coverings, which are not respirators, are designed to protect others, not the wearer.

C. EXPOSURE CONTROL READINESS, MAINTENANCE AND STORAGE:

The controls we have selected will be obtained, properly stored, and maintained so that they are ready for immediate use in the event of an infectious disease outbreak and any applicable expiration dates will be properly considered.

HOUSEKEEPING DURING A DESIGNATED OUTBREAK

A Disinfection Methods and Schedules

Objects that are touched repeatedly by multiple individuals, such as door handles, light switches, control outions/levers, dials, levers, water faucet handles, computers, phones, or handrails must be cleaned frequently with an appropriate disinfectant. Surfaces that are handled less often, or by fewer individuals, may require less frequent disinfection.

The disinfection methods and schedules selected are based on specific workplace conditions.

The New York State Department of Environmental Conservation (NYSDEC) and the Environmental Protection Agency (EPA) have compiled lists of approved disinfectants that are effective against many infectious agents (see dec.ny.gov and epa.gov/pesticide-registration/selected-epa-registered-disinfectants). Select disinfectants based on NYSDOH and CDC guidance and follow manufacturer guidance for methods, dilution, use, and contact time.

B Adjustments to Normal Housekeeping Procedures

Normal housekeeping duties and schedules should continue to be followed during an infectious disease outbreak, to the extent practicable and appropriate consistent with NYSDOH and/or CDC guidance in effect at the time. However, routine procedures may need to be adjusted and additional cleaning and disinfecting may be required.

Housekeeping staff may be at increased risk because they may be cleaning many potentially contaminated surfaces. Some housekeeping activities, like dry sweeping, vacuuming, and dusting, can resuspend into the air particles that are contaminated with the infectious agent. For that reason, alternative methods and/or increased levels of protection may be needed.

Rather than dusting, for example, the CDC recommends cleaning surfaces with soap and water before disinfecting them. Conducting housekeeping during "off" hours may also reduce other workers' exposures to the infectious agent. Best practice dictates that housekeepers should wear respiratory protection. See cdc.gov for more guidance.

C If an employee develops symptoms of the infectious disease at work, it is ideal to isolate the area in accordance with guidance issued by NYSDOH or the CDC, before cleaning and disinfecting the sick employee's work area. This delay will allow contaminated droplets to settle out of the air and the space to be ventilated.

D As feasible, liners should be used in trash containers. Empty the containers often enough to prevent overflowing. Do not forcefully squeeze the air out of the trash bags before tying them closed. Trash containers may contain soiled tissue or face coverings.

INFECTION RESPONSE DURING A DESIGNATED OUTBREAK

If an actual or suspected infectious disease case occurs at work, take the following actions:

- Instruct the sick individual to wear a face covering and leave the worksite and follow NYSDOH/CDC guidance.
- Follow local and state authority guidance to inform impacted individuals.

TRAINING AND INFORMATION DURING A DESIGNATED OUTBREAK

- A **General Manager Ed Gola** will verbally inform all employees of the existence and location of this Plan, the circumstances it can be activated, the infectious disease standard, employer policies, and employee rights under the HERO Act. (Note: training need not be provided to the following individuals: any individuals working for staffing agencies, contractors or subcontractors on behalf of the employer at any individual work site, as well as any individual delivering goods or transporting people to, to or from the work site on behalf of the employer, where delivery or transport is conducted by an individual or entity that would otherwise be deemed an employer under this chapter.)

VII. RETALIATION PROTECTIONS AND REPORTING OF ANY VIOLATIONS

No employer, or his or her agent, or person, , acting as or on behalf of a hiring entity, or the officer or agent of any entity, business, corporation, partnership, or limited liability company, shall discriminate, threaten, retaliate against, or take adverse action against any employee for exercising their rights under this plan, including reporting conduct the employee reasonably believes in good faith violates the plan or airborne infectious disease concerns to their employer, government agencies or officials or for refusing to work where an employee reasonably believes in good faith that such work exposes him or her, other workers, or the public to an unreasonable risk of exposure, provided the employee, another employee, or representative has notified the employer verbally or in writing, including electronic communication, of the inconsistent working conditions and the employer's failure to cure or if the employer knew or should have known of the consistent working conditions.

Notification of a violation by an employee may be made verbally or in writing, and without limitation to format including electronic communications. To the extent that communications between the employer and employee regarding a potential risk of exposure are in writing, they shall be maintained by the employer for two years after the conclusion of the designation of a high risk disease from the Commissioner of Health, or two years after the conclusion of the Governor's emergency declaration of a high risk disease. Employer should include contact information to report violations of this plan and retaliation during regular business hours and for weekends/other non-regular business hours when employees may be working.





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Attachment Q: Respirable Crystalline Silica Program

PURPOSE

This Respirable Crystalline Silica Program was developed to prevent employee exposure to hazardous levels of Respirable Crystalline Silica that could result through construction activities or nearby construction activities occurring on worksites. Respirable Crystalline Silica exposure at hazardous levels can lead to lung cancer, silicosis, chronic obstructive pulmonary disease, and kidney disease. It is intended to meet the requirements of the Respirable Crystalline Silica Construction Standard (29 CFR 1926.1153) established by the Occupational Safety and Health Administration (OSHA).

All work involving chipping, cutting, drilling, grinding, or similar activities on materials containing Crystalline Silica can lead to the release of respirable-sized particles of Crystalline Silica (i.e. Respirable Crystalline Silica). Crystalline Silica is a basic component of soil, sand, granite and many other minerals. Quartz is the most common form of Crystalline Silica. Many materials found on construction sites include Crystalline Silica; including but not limited to – cement, concrete, asphalt, pre-formed structures (inlets, pipe, etc.) and others. Consequently, this program has been developed to address and control these potential exposures to prevent our employees from experiencing the effects of occupational illnesses related to Respirable Crystalline Silica exposure.

SCOPE

This Respirable Crystalline Silica Program applies to all employees who have the potential to be exposed to Respirable Crystalline Silica when covered by the OSHA Standard. The OSHA Respirable Crystalline Silica Construction Standard applies to all occupational exposures to Respirable Crystalline Silica in construction work, except where employee exposure will remain below 25 micrograms of Respirable Crystalline Silica per cubic meter of air (25 µg/m³) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.

RESPONSIBILITIES

Stuart Dean firmly believes protecting the health and safety of our employees is everyone's responsibility. This responsibility begins with upper management providing the necessary support to properly implement this program. However, all levels of the organization assume some level of responsibility for this program including the following positions.



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Local office Operations Team:

- Conduct job site assessments for Silica containing materials and perform employee Respirable Crystalline Silica hazard assessments in order to determine if an employee's exposure will be above 25 µg/m³ as an 8-hour TWA under any foreseeable conditions
- Select and implement into the project's ECP the appropriate control measures in accordance with the Construction Tasks identified in OSHA's Construction Standard Table 1; and potentially including (but not limited to) - a written Exposure Control Plan (ECP), exposure monitoring, Hazard Communication training, medical surveillance, housekeeping and others.

NOTE: OSHA's Construction Standard Table 1 is a list of 18 common construction tasks along with acceptable exposure control methods and work practices that limit exposure for those tasks.

- Ensure that the materials, tools, equipment, personal protective equipment (PPE), and other resources (such as worker training) required to fully implement and maintain this Respirable Crystalline Silica Program are in place and readily available if needed.
- Ensure that Project Managers, Site Managers, Competent Persons, and employees are educated in the hazards of Silica exposure and trained to work safely with Silica in accordance with OSHA's Respirable Crystalline Silica Construction Standard and OSHA's Hazard Communication Standard. Managers and Competent Persons may receive more advanced training than other employees.
- Maintain written records of training (for example, proper use of respirators), ECPs, inspections (for equipment, PPE, and work methods/practices), medical surveillance (under lock and key), respirator medical clearances (under lock and key) and fit-test results.
- Conduct an annual review (or more often if conditions change) of the effectiveness of this program and any active project ECP's that extend beyond a year. This includes a review of available dust control technologies to ensure these are selected and used when practical.
- Coordinate work with other employers and contractors to ensure a safe work environment relative to Silica exposure.

Project Manager:

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- Ensure all applicable elements of this Respirable Crystalline Silica Program are implemented on the project including the selection of a Competent Person.
- Assist the Local Office in conducting job site assessments for Silica containing materials and perform employee Respirable Crystalline Silica hazard assessments in order to determine if an ECP, exposure monitoring, and medical surveillance is necessary.
- Assist in the selection and implementation of the appropriate control measures in accordance with the Construction Tasks identified in OSHA's Construction Standard Table 1; and potentially including (but not limited to) - a written Exposure Control Plan (ECP), exposure monitoring, Hazard Communication training, medical surveillance, housekeeping and others.
- Ensure that employees using respirators have been properly trained, medically cleared, and fit-tested in accordance with the company's Respiratory Protection Program. This process will be documented.
- Ensure that work is conducted in a manner that minimizes and adequately controls the risk to workers and others. This includes ensuring that workers use appropriate engineering controls, work practices, and wear the necessary PPE.
- Where there is risk of exposure to Silica dust, verify employees are properly trained on the applicable contents of this program, the project-specific ECP, and the applicable OSHA Standards (such as Hazard Communication). Ensure employees are provided appropriate PPE when conducting such work.

Competent Person and/or Site Manager (Superintendent, Foreman, etc.)

- Make frequent and regular inspections of job sites, materials, and equipment to implement the written ECP.
- Identify existing and foreseeable Respirable Crystalline Silica hazards in the workplace and take prompt corrective measures to eliminate or minimize them.
- Notify the Project Manager and/or Operations Team of any deficiencies identified during inspections in order to coordinate and facilitate prompt corrective action.
- Assist the Project Manager and Operations Team in conducting job site assessments for Silica containing materials and perform employee Respirable Crystalline Silica hazard

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assessments in order to determine if an ECP, exposure monitoring, and medical surveillance is necessary.

Employees:

- Follow recognized work procedures (such as the Construction Tasks identified in OSHA's Construction Standard Table 1) as established in the project's ECP and this program.
- Use the assigned PPE in an effective and safe manner.
- Participate in Respirable Crystalline Silica exposure monitoring and the medical surveillance program.
- Report any unsafe conditions or acts to the Site Manager and/or Competent Person.
- Report any exposure incidents or any signs or symptoms of Silica illness.

DEFINITIONS

If a definition is not listed in this section, please contact your supervisor. If your supervisor is unaware of what the term means, please contact the Competent Person or your Safety Department.

- Action Level means a concentration of airborne Respirable Crystalline Silica of 25 $\mu\text{g}/\text{m}^3$, calculated as an 8-hour TWA.
- Competent Person means an individual who is capable of identifying existing and foreseeable Respirable Crystalline Silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them.
- Employee Exposure means the exposure to airborne Respirable Crystalline Silica that would occur if the employee were not using a respirator.
- High-Efficiency Particulate Air (HEPA) Filter means a filter that is at least 99.97 percent efficient in removing monodispersed particles of 0.3 micrometers in diameter.
- Objective Data means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating employee exposure to Respirable Crystalline Silica associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace

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conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

- Permissible Exposure Limit (PEL) means the employer shall ensure that no employee is exposed to an airborne concentration of Respirable Crystalline Silica in excess of 50 $\mu\text{g}/\text{m}^3$, calculated as an 8-hour TWA.
- Physician or Other Licensed Health Care Professional (PLHCP) means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required by the Medical Surveillance Section of the OSHA Respirable Crystalline Silica Standard.
- Respirable Crystalline Silica means Quartz, Cristobalite, and/or Tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle size- selective samplers specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality-Particle Size Fraction Definitions for Health-Related Sampling.
- Specialist means an American Board Certified Specialist in Pulmonary Disease or an American Board Certified Specialist in Occupational Medicine.

REQUIREMENTS

Specified Exposure Control Methods

When possible and applicable, Stuart Dean will conduct activities with potential Silica exposure to be consistent with OSHA's Construction Standard Table 1. Supervisors will ensure each employee under their supervision and engaged in a task identified on OSHA's Construction Standard Table 1 have fully and properly implemented the engineering controls, work practices, and respiratory protection specified for the task on Table 1 (unless Stuart Dean has assessed and limited the exposure of the employee to Respirable Crystalline Silica in accordance with the Alternative Exposure Control Methods Section of this program).

The task(s) being performed by Stuart Dean identified on OSHA's Construction Standard Table 1 is/are: Select any/all of the following that apply:

Table 1: Specified Exposure Control Methods When

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Working With Materials Containing Crystalline Silica

Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
1	Stationary masonry saws	- Use saw equipped with integrated water delivery system that continuously feeds water to the blade. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
2a	Handheld power saws (any blade diameter) when used outdoors	- Use saw equipped with integrated water delivery system that continuously feeds water to the blade. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
2b	Handheld power saws (any blade diameter) when used indoors or in an enclosed area	- Use saw equipped with integrated water delivery system that continuously feeds water to the blade. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
3	Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less) for tasks performed outdoors only	- Use saw equipped with commercially available dust collection system. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. - Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None	None
4a	Walk-behind saws when used outdoors	- Use saw equipped with integrated water delivery system that continuously feeds water to the blade. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
4b	Walk-behind saws when used indoors or in an enclosed area	- Use saw equipped with integrated water delivery system that continuously feeds water to the blade. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
5	Drivable saws for tasks performed outdoors only	- Use saw equipped with integrated water delivery system that continuously feeds water to the blade. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

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Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
6	Rig-mounted core saws or drills	- Use tool equipped with integrated water delivery system that supplies water to cutting surface. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
7	Handheld and stand-mounted drills (including impact and rotary hammer drills)	- Use drill equipped with commercially available shroud or coving with dust collection system. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. - Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. - Use a HEPA-filtered vacuum when cleaning holes.	None	None
8	Dowel drilling rigs for concrete for tasks performed outdoors only	- Use shroud around drill bit with a dust collection system. - Dust collector must have a filter with 99% or greater efficiency and a filter cleaning mechanism. - Use a HEPA-filtered vacuum when cleaning holes.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
9a	Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector.	None	None
9b	Vehicle-mounted drilling rigs for rock and concrete	Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None
10a	Jackhammers and handheld powered chipping tools when used outdoors	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
10b	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask

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Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
10c	Jackhammers and handheld powered chipping tools when used outdoors	- Use tool equipped with commercially available shroud and dust collection system. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. - Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
10d	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	- Use tool equipped with commercially available shroud and dust collection system. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. - Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
11	Handheld grinders for mortar removal (i.e., tuckpointing)	- Use grinder equipped with commercially available shroud and dust collection system. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. - Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	Powered Air-Purifying Respirator (PAPR) with P100 Filters
12a	Handheld grinders for uses other than mortar removal for tasks performed outdoors only	- Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
12b	Handheld grinders for uses other than mortar removal when used outdoors	- Use grinder equipped with commercially available shroud and dust collection system. - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. - Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	None	None

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Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
12c	Handheld grinders for uses other than mortar removal when used indoors or in an enclosed area	• Use grinder equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
13a	Walk-behind milling machines and floor grinders	• Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
13b	Walk-behind milling machines and floor grinders	• Use machine equipped with dust collection system recommended by the manufacturer. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. • When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None	None
14	Small drivable milling machines (less than half-lane)	• Use a machine equipped with supplemental water sprays designed to suppress dust. • Water must be combined with a surfactant. • Operate and maintain machine to minimize dust emissions.	None	None
15a	Large drivable milling machines (half-lane and larger) for cuts of any depth on asphalt only	• Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. • Operate and maintain machine to minimize dust emissions.	None	None
15b	Large drivable milling machines (half-lane and larger) for cuts of	• Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.	None	None

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Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
	four inches in depth or less on any substrate	Operate and maintain machine to minimize dust emissions.		
15c	Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate	- Use a machine equipped with supplemental water spray designed to suppress dust. - Water must be combined with a surfactant. - Operate and maintain machine to minimize dust emissions.	None	None
16	Crushing machines	- Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points). - Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. - Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.	None	None
17a	Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab.	None	None
17b	Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
18a	Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions	None	None

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Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
18b	Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None

When implementing the control measures specified in Table 1, Stuart Dean shall:

- For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
- For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
- For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
 - Is maintained as free as practicable from settled dust;
 - Has door seals and closing mechanisms that work properly;
 - Has gaskets and seals that are in good condition and working properly;
 - Is under positive pressure maintained through continuous delivery of fresh air;
 - Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 µm range (e.g., MERV-16 or better); and
 - Has heating and cooling capabilities.
- Where an employee performs more than one task included on OSHA's Construction Standard Table 1 during the course of a shift, and the total duration of all tasks

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combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

Alternative Exposure Control Methods

Alternative Exposure Control Methods apply for tasks not listed in OSHA's Construction Standard Table 1, or where Stuart Dean cannot not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1.

First, Stuart Dean will assess the exposure of each employee who is or may reasonably be expected to be exposed to Respirable Crystalline Silica at or above the Action Level in accordance with either the Performance Option or the Scheduled Monitoring Option.

- **Performance Option** – Stuart Dean will assess the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to Respirable Crystalline Silica.
- **Scheduled Monitoring Option:**
 - Stuart Dean will perform initial monitoring to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, and in each work area. Where several employees perform the same tasks on the same shift and in the same work area, Stuart Dean will plan to monitor a representative fraction of these employees. When using representative monitoring, Stuart Dean will sample the employee(s) who are expected to have the highest exposure to Respirable Crystalline Silica.
 - If initial monitoring indicates that employee exposures are below the Action Level, Stuart Dean will probably discontinue monitoring for those employees whose exposures are represented by such monitoring.
 - Where the most recent exposure monitoring indicates that employee exposures are at or above the Action Level but at or below the PEL, Stuart Dean will repeat such monitoring within six months of the most recent monitoring.



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- Where the most recent exposure monitoring indicates that employee exposures are above the PEL, Stuart Dean will repeat such monitoring within three months of the most recent monitoring.
- Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the Action Level, Stuart Dean will repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the Action Level, at which time Stuart Dean will probably discontinue monitoring for those employees whose exposures are represented by such monitoring, except when a reassessment is required. Stuart Dean will reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the Action Level, or when Stuart Dean has any reason to believe that new or additional exposures at or above the Action Level have occurred.

Stuart Dean will ensure that all Respirable Crystalline Silica samples taken to satisfy the monitoring requirements of this program and OSHA are collected by a qualified individual (i.e. a Certified Industrial Hygienist) and the samples are evaluated by a qualified laboratory (i.e. accredited to ANSI/ISO/IEC Standard 17025:2005 with respect to Crystalline Silica analyses by a body that is compliant with ISO/IEC Standard 17011:2004 for implementation of quality assessment programs).

Within five working days after completing an exposure assessment, Stuart Dean will individually notify each affected employee in writing of the results of that assessment or post the results in an appropriate location accessible to all affected employees.

Whenever an exposure assessment indicates that employee exposure is above the PEL, Stuart Dean will describe in the written notification the corrective action being taken to reduce employee exposure to or below the PEL.

Where air monitoring is performed, Stuart Dean will provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to Respirable Crystalline Silica. When observation of monitoring requires entry into an area where the use of protective clothing or equipment is required for any workplace hazard, Stuart Dean will provide the observer with protective clothing and equipment at no cost and shall ensure that the observer uses such clothing and equipment.

Once air monitoring has been performed, Stuart Dean will determine its method of compliance based on the monitoring data and the hierarchy of controls. Stuart Dean will use engineering

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and work practice controls to reduce and maintain employee exposure to Respirable Crystalline Silica to or below the PEL, unless Stuart Dean can demonstrate that such controls are not feasible. Wherever such feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, Stuart Dean will nonetheless use them to reduce employee exposure to the lowest feasible level and shall supplement them with the use of respiratory protection.

In addition to the requirements of this program, Stuart Dean will comply with other programs and OSHA standards (such as 29 CFR 1926.57 [Ventilation], when applicable where abrasive blasting is conducted using Crystalline Silica-containing blasting agents, or where abrasive blasting is conducted on substrates that contain Crystalline Silica.

Control Methods

Stuart Dean will provide control methods that are either consistent with Table 1 or otherwise minimize worker exposures to Silica. These exposure control methods can include engineering controls, work practices, and respiratory protection. Listed below are control methods to be used when Table 1 is not followed:

Stuart Dean does not work in any conditions other than Table 1.

Respiratory Protection

Where respiratory protection is required by this program, Stuart Dean will provide each employee an appropriate respirator that complies with the requirements of the company's Respiratory Protection Program and the OSHA Respiratory Protection Standard (29 CFR 1910.134).

Respiratory protection is required where specified by the OSHA Construction Standard Table 1, for tasks not listed in Table 1, or where the company has not fully and properly implemented the engineering controls, work practices, and respiratory protection described in Table 1. Situations requiring respiratory protection include:

- Where exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls;
- Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible; and



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- During tasks for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL.

Housekeeping

Stuart Dean does not allow dry sweeping or dry brushing where such activity could contribute to employee exposure to Respirable Crystalline Silica unless wet sweeping, HEPA-filtered vacuuming, or other methods that minimize the likelihood of exposure are not feasible.

Stuart Dean does not allow compressed air to be used to clean clothing or surfaces where such activity could contribute to employee exposure to Respirable Crystalline Silica unless:

- The compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air; or
- No alternative method is feasible.

Written Exposure Control Plan

When employee exposure on a construction project is expected to be at or above the Action Level, a Written Exposure Control Plan (ECP) will be established and implemented. This ECP will contain at least the following elements:

- A description of the tasks in the workplace that involve exposure to Respirable Crystalline Silica;
- A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to Respirable Crystalline Silica for each task;
- A description of the housekeeping measures used to limit employee exposure to Respirable Crystalline Silica; and
- A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to Respirable Crystalline Silica and their level of exposure, including exposures generated by other employers or sole proprietors.

The written ECP will designate a Competent Person to make frequent and regular inspections of job sites, materials, and equipment to ensure the ECP is implemented.

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The written ECP will be reviewed at least annually to evaluate the effectiveness of it and update it as necessary. Having said this, ECP's are project specific and most project durations do not exceed a year. The written ECP will be readily available for examination and copying, upon request, to each employee covered by this program and/or ECP, their designated representatives, and OSHA.

Medical Surveillance

Medical surveillance will be made available for each employee who will be required to use a respirator for 30 or more days per year due to their Respirable Crystalline Silica exposure. Medical surveillance (i.e. medical examinations and procedures) will be performed by a PLHCP and provided at no cost to the employee at a reasonable time and place.

Stuart Dean will make available an initial (baseline) medical examination within 30 days after initial assignment, unless the employee has received a medical examination that meets the requirements of the OSHA Respirable Crystalline Silica Construction Standard within the last three years. The examination shall consist of:

- A medical and work history, with emphasis on past, present, and anticipated exposure to Respirable Crystalline Silica, dust, and other agents affecting the respiratory system in addition to any history of respiratory system dysfunction, including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing), history of tuberculosis, and smoking status and history;
- A physical examination with special emphasis on the respiratory system;
- A chest X-ray (a single postero-anterior radiographic projection or radiograph of the chest at full inspiration recorded on either film [no less than 14 x 17 inches and no more than 16 x 17 inches] or digital radiography systems) interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconiosis by a NIOSH-certified B Reader;
- A pulmonary function test to include forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) and FEV1/FVC ratio, administered by a spirometry technician with a current certificate from a NIOSH-approved spirometry course;
- Testing for latent tuberculosis infection; and
- Any other tests deemed appropriate by the PLHCP

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Stuart Dean will make available medical examinations that include the aforementioned procedures (except testing for latent tuberculosis infection) at least every three years. If recommended by the PLHCP, periodic examinations can be more frequently than every three years.

Stuart Dean will ensure that the examining PLHCP has a copy of the OSHA Respirable Crystalline Silica Construction Standard, this program, and the following information:

- A description of the employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to Respirable Crystalline Silica;
- The employee's former, current, and anticipated levels of occupational exposure to Respirable Crystalline Silica;
- A description of any personal protective equipment (PPE) used or to be used by the employee, including when and for how long the employee has used or will use that equipment; and
- Information from records of employment-related medical examinations previously provided to the employee and currently within the control of Stuart Dean.

Stuart Dean will ensure that the PLHCP explains to the employee the results of the medical examination and provides each employee with a written medical report within 30 days of each medical examination performed. The written report shall contain:

- A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to Respirable Crystalline Silica and any medical conditions that require further evaluation or treatment;
- Any recommended limitations on the employee's use of respirators;
- Any recommended limitations on the employee's exposure to Respirable Crystalline Silica; and;
- A statement that the employee should be examined by a Specialist if the chest X-ray is classified as 1/0 or higher by the B Reader, or if referral to a Specialist is otherwise deemed appropriate by the PLHCP.



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Stuart Dean will also obtain a written medical opinion from the PLHCP within 30 days of the medical examination. The written opinion shall contain only the following in order to protect the employee's privacy:

- The date of the examination;
- A statement that the examination has met the requirements of the OSHA Respirable Crystalline Silica Construction Standard, and
- Any recommended limitations on the employee's use of respirators.

If the employee provides written authorization, the written opinion shall also contain either or both of the following:

- Any recommended limitations on the employee's exposure to Respirable Crystalline Silica; and/or
- A statement that the employee should be examined by a Specialist if the chest X-ray is classified as 1/0 or higher by the B Reader, or if referral to a Specialist is otherwise deemed appropriate by the PLHCP.

If the PLHCP's written medical opinion indicates that an employee should be examined by a Specialist, Stuart Dean will make available a medical examination by a Specialist within 30 days after receiving the PLHCP's written opinion. Stuart Dean will ensure that the examining Specialist is provided with all of the information that the employer is obligated to provide to the PLHCP.

Stuart Dean will ensure that the Specialist explains to the employee the results of the medical examination and provides each employee with a written medical report within 30 days of the examination. The written report will contain:

- A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to Respirable Crystalline Silica and any medical conditions that require further evaluation or treatment;
- Any recommended limitations on the employee's use of respirators; and
- Any recommended limitations on the employee's exposure to respirable crystalline Silica.

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- In addition, Stuart Dean will obtain a written opinion from the Specialist within 30 days of the medical examination. The written opinion shall contain the following:
- The date of the examination;
- Any recommended limitations on the employee's use of respirators; and
- If the employee provides written authorization, the written opinion shall also contain any recommended limitations on the employee's exposure to Respirable Crystalline Silica.

Hazard Communication

Stuart Dean will include Respirable Crystalline Silica in the company's Hazard Communication Program established to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Stuart Dean will ensure that each employee has access to labels on containers of Crystalline Silica and those containers respective Safety Data Sheets (SDS's).

All employees will be trained in accordance with the provisions of the OSHA Hazard Communication Standard and the Training Section of this program. This training will cover concerns relating to cancer, lung effects, immune system effects, and kidney effects.

Stuart Dean will ensure that each employee with the potential to be exposed at or above the Action Level for Respirable Crystalline Silica can demonstrate knowledge and understanding of at least the following:

- The health hazards associated with exposure to Respirable Crystalline Silica;
- Specific tasks in the workplace that could result in exposure to Respirable Crystalline Silica;
- Specific measures Stuart Dean has implemented to protect employees from exposure to Respirable Crystalline Silica, including engineering controls, work practices, and respirators to be used;
- The contents of the OSHA Respirable Crystalline Silica Construction Standard;

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- The identity of the Competent Person designated by Stuart Dean; and
- The purpose and a description of the company's Medical Surveillance Program.

Stuart Dean will make a copy of the OSHA Respirable Crystalline Silica Construction Standard readily available without cost to any employee who requests it.

Recordkeeping

Stuart Dean will make and maintain an accurate record of all exposure measurements taken to assess employee exposure to Respirable Crystalline Silica. This record will include at least the following information:

- The date of measurement for each sample taken;
- The task monitored;
- Sampling and analytical methods used;
- Number, duration, and results of samples taken;
- Identity of the laboratory that performed the analysis;
- Type of personal protective equipment (PPE), such as respirators, worn by the employees monitored; and
- Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

Stuart Dean will ensure that exposure records are maintained and made available in accordance with 29 CFR 1910.1020. Exposure records will be kept for at least 30 years.

The employer shall make and maintain an accurate record of all objective data relied upon to comply with the requirements of the OSHA Respirable Crystalline Silica Construction Standard. This record shall include at least the following information:

- The Crystalline Silica-containing material in question;
- The source of the objective data;

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- The testing protocol and results of testing;
- A description of the process, task, or activity on which the objective data were based, and
- Other data relevant to the process, task, activity, material, or exposures on which the objective data were based.

Stuart Dean will ensure that objective data are maintained and made available in accordance with 29 CFR 1910.1020. Objective data records will be kept for at least 30 years.

Stuart Dean will make and maintain an accurate record for each employee enrolled in the Medical Surveillance portion of this program. The record shall include the following information about the employee:

- Name and social security number;
- A copy of the PLHCPs' and/or Specialists' written medical opinions; and
- A copy of the information provided to the PLHCPs and Specialists.

Stuart Dean will ensure that medical records are maintained and made available in accordance with 29 CFR 1910.1020. Medical records will be kept under lock and key for at least the duration of employment plus 30 years. It is necessary to keep these records for extended periods because Silica-related diseases such as cancer often cannot be detected until several decades after exposure. However, if an employee works for an employer for less than one year, the employer does not have to keep the medical records after employment ends, as long as the employer gives those records to the employee.

PROGRAM EVALUATION

This program will be reviewed and evaluated on an annual basis by the Safety Officer unless changes to operations, the OSHA Respirable Crystalline Silica Construction Standard (29 CFR 1926.1153), or another applicable OSHA Standard require an immediate re-validation of this program.

APPLICABLE FORMS

The following lists applicable forms relating to this program.

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APPENDICES

APPENDIX A - Written Exposure Control Plan (ECP) template



Stuart Dean Co., INC Silica Exposure Control Plan Appendix A

Instructions for completing the Silica Exposure Control Plan

- Identify the project, date, individuals involved in creating the plan, and the competent person(s) on site as defined by 29 CFR 1926.1153.
- Create a list of activities that will be completed by Stuart Dean Co., INC (Stuart Dean) employees throughout the duration of the project. The plan may be amended throughout the project as additional work is added that differs from the original plan. Identify the potential silica containing material(s) in the description of the work activity. Attach a safety data sheet as appropriate and available to this plan.
- Determine the duration the operation must be conducted during the days the activity will occur. This information is required to determine the appropriate control measures if using Table 1 of 29 CFR 1926.1153. If the duration is greater than 4 hours in a given day and respiratory protection is required per Table 1, the respirator must be worn throughout the entire day.
- Define the control measures to use to protect the worker and those in proximity. The choices for control measures include ventilation, vacuum systems, water delivery (integrated or spray), work practices (time exposure), and/or respiratory protection. These methods can be either selected from Table 1 or by developing alternative methods based on air sampling (objective data). Discuss this information with Operations/Health & Safety team to ensure the information is available and the methods comply with 29 CFR 1926.1153.
- Define the barricades, signage, and other methods to implement to protect workers in proximity from respirable crystalline silica exposures. The methods should be substantial to prevent access into the silica exposure area and include signage warning of the silica hazard.
- Define the housekeeping plan for clean-up and disposal of the silica containing materials. Acceptable housekeeping methods include wet sweeping (water or water based sweeping compound) or hepa vacuum capture. Materials that are disturbed using wet methods should be cleaned up prior to allowing the material to dry in order to avoid potential for airborne exposures when the material is dry. Workers must be appropriately protected when using methods outside of the aforementioned means, including when cleaning out vacuums if respirable crystalline silica hazards are present.
- Identify the methods for workers to maintain personal hygiene and to avoid regenerating respirable crystalline silica exposure during clean up. Using compressed air to remove respirable crystalline silica from clothing or the body is not permitted. Hand wash stations and similar methods can be utilized for personal hygiene.
- Document any additional specific items, concerns, or controls related to the project and the work.
- All Stuart Dean employees affected by respirable crystalline silica exposures on the project must be trained on the information contained in this Silica Exposure Control Plan. Additional training materials should be attached and completed including health hazard information, task-specific or tool-specific training, medical surveillance, and other information contained in 29 CFR 1926.1153.
- Any questions related to this program should be directed to Stuart Dean's Health & Safety Officer.



Stuart Dean Co., INC Silica Exposure Control Plan Appendix A

Project:	Stuart Dean Co., INC	Date:	Completed: Per 1926.1153	
Describe the activity and identify respirable crystalline silica containing material				
	Duration: ≤ 4 hours or 4-8 hours or 8-16 hours or 16-24 hours or 24-32 hours	Define control measures (Table 1 or Alternative Method)	Barricades/Access control measures	Housekeeping Plan
Personal Hygiene Plan (provide description of methods)				
Additional comments				

EXHIBIT E

Architectural Metal Restoration and Maintenance

Basic Principles for the restoration of brass, stainless steel and aluminum architectural surfaces

The primary service offering of the Stuart Dean Company is the restoration and maintenance of architectural metal. The company got its start in the early 1930's by applying lacquer to brass doors and window frames in commercial office buildings in New York City. From that time the company has grown into a national corporation that has done everything from those simple tasks of years gone by to multi-million dollar projects involving the repainting of sixty story office buildings.

There are certain fundamental principles regarding the restoration and maintenance of architectural metal surfaces that we will cover in this note. You will not be an expert when you are done reading it (though we recommend that you re-read it again and again until all of the knowledge imparted within it is second nature). What the reader will have is a good basic knowledge of the fundamentals of metal restoration principles and techniques. This note should be read in conjunction with the other, lengthier, training documents that you will be provided. The bottom line, however, is one we stressed repeatedly in the sales training manual document – expertise in our industry is a function of experience, and only the accumulation of experience will provide you with the education necessary to make you a true expert in the art and science of metal restoration and maintenance.

Metal Maintenance – the Basics

We are in business because of a fundamental fact regarding all architectural metal appointments (doors, frames, building facades, light fixtures, etcetera) – their appearance will in every instance deteriorate. This deterioration can vary significantly in severity and type depending on the metal surface in question, ranging from the simple accumulation of dirt and soot to permanent destruction of the surface itself. The metals will react differently from each other, and also differently within their own category depending on things such as the local climate, their location (interior or exterior) and their exposure to direct sunlight. Let's walk through some of the basic issues for brass, aluminum and stainless steel – the three most commonly used architectural metals that will require ongoing field maintenance of one kind or another.

Brass

Brass is an alloy of copper and zinc. While there are a variety of trade names to the architectural metal broadly categorized as brass, these names (such as Muntz metal) typically refer to the varying degrees of copper and zinc in the particular item in question. Virtually all of the brass/bronze/yellow-gold colored window frames, revolving doors and elevator entrances you may see in an office building or hotel are brass. Bronze, which

is often mistaken for brass, is a much softer alloy of copper and tin and lacks the durability for most of the common applications to which brass is put.

For reasons unknown to us, a common type of what is unquestionably a brass alloy goes by the commercial name of “architectural bronze”. This “architectural bronze” is a 90% to 10% alloy of copper and zinc (and hence is unquestionably a brass, as defined by metallurgists and Webster’s Dictionary) though it goes by the very confusing name of architectural bronze. This is the reason you may often hear a Stuart Dean colleague refer to “bronze” and rarely to “brass”. A great deal of the metal we are cleaning is therefore *technically* a brass, but it is a type of brass that goes by the commercial appellation of “architectural bronze”. This may seem like a quibble of sorts – but experts know these distinctions and any Stuart Dean employee needs to be an expert.

Brass can vary in appearance, both by dint of variations in the amounts of the base alloy, but also as a function of some restoration techniques that deliberately dye the surface to a different shade. Nevertheless, the restorative techniques for all types of brass are broadly similar, with some important exceptions.

Brass is a beautiful architectural metal, but it’s main problem is that left uncoated it will very quickly oxidize. As you will read in your complimentary textbook “Architectural Metals”, the oxidation process actually involves the growth of a patina coating that will protect the base metal. Unfortunately, the patina does not grow in a uniform and attractive manner, but rather typically manifests itself as dark spots and streaks. In an urban or coastal environment, freshly cleaned brass will begin to oxidize and discolor in as little as two weeks or sometimes even less. Given how time consuming it is to clean in the first place, it therefore makes sense to apply a protective coating to the metal to help maintain its attractive appearance.

In most instances, architectural brass is installed with what is called a satin finish. A satin finish has a grain to it, as opposed to a smooth mirrored finish. Grains are given architectural designation numbers to indicate their depth and direction, with the typical installation of brass having a #4 finish. In most situations, the Stuart Dean technician will be restoring brass to the #4 finish. What follows is a brief description of the methodology.

First, the item in question, be it a revolving door, window frame or elevator entrance, needs to be carefully masked off with protective paper. This is both to protect adjacent surfaces from being splattered with some of the cleaning material, but primarily to protect it from overspray during the lacquering process. Once this is completed, the field mechanic will strip the remains of any existing coating on the metal with a solvent such as acetone, and then begin to clean the metal itself with an abrasive pad and water. Fairly hard scrubbing - ALWAYS IN THE SAME DIRECTION AS THE EXISTING GRAIN - is necessary to thoroughly clean the metal of any dirt and oxidation build-up. Recall that the oxidizing patina is a coat that has grown organically bound to the top layer of the brass – it is often pretty tough to remove. All things being equal, it typically takes considerably longer to thoroughly clean a brass surface than an aluminum or stainless steel surface. Once thoroughly cleaned, a final wipe down of the surface is done

with acetone to remove any residue or contaminants. Once this is completed the item is ready for its protective coating.

Brass virtually always requires lacquer, but the type of lacquer typically falls into one of two categories. For items that are subjected to lots of touching by hands, an air-drying nitrocellulose lacquer is appropriate. Nitrocellulose lacquers are more resistant to the wear imparted by frequent touching, though they do have a drawback – they are relatively quickly broken down by ultraviolet radiation in the form of direct sunlight. For this reason, the nitrocellulose lacquers are only for interior and “high-touch” applications (swing doors, revolving doors, elevator entrances and frames etcetera). For exterior items that go largely untouched and face sunlight (directly or indirectly) an acrylic lacquer is used. These lacquers are far more UV resistant. Interior or exterior, acrylic or nitrocellulose, it is ALWAYS important to spray multiple coats of lacquer. Interior and frequently touched items should receive at least three coats, exterior items at least four coats. The lacquer coating is always applied with a spray gun using compressed air from a gas or electric compressor.

The two other most common brass finishes are the mirror finish and the statuary finish (more commonly referred to as an oxidized finish). Mirror-finish brass (a #8 finish, as opposed to #4 for satin finishes) is as the name implies nearly perfectly reflective – like a mirror only the underlying metal has a brass or yellow-gold tint to it. Mirror finish brass is never cleaned with abrasive materials of any kind. It is instead polished by hand with a common brass polishing material after the residue of the existing lacquer coating has been stripped away. Once thoroughly hand polished, these items are sprayed with one single coat of lacquer. Because of the lack of a grain the ability of a mirrored finish to hold multiple coats of lacquer is compromised – if more than one coat is sprayed, the coating will begin to sag and run, leading to a highly unattractive finish. As you can imagine, mirror finish brass is very problematic from a maintenance standpoint – exterior applications, even if untouched, rarely last even one full year. Applications on high-use doors and revolving doors need to be done every six months at a minimum.

A statuary finish, or in the parlance of architectural specification, a US 10B statuary finish, is achieved by wiping a satin finish brass item in multiple alternating applications of potassium sulfate and sulfured potash (both in liquid form). (This two-part application process has in recent years been largely replaced with new chemicals that can achieve the statuary appearance by means of multiple applications of a single liquid that blends elements of the two used in the old process). The brass is usually installed with a statuary finish, but it is also possible to convert brass to this finish in the field. The end result of the alternating application of the chemicals (or multiple applications of the single chemical) is to gradually darken the brass to an antique brown color, all while maintaining the grained finish. As the metal gradually darkens it is usually necessary to even out the color by lightly buffing the metal surface with a mild abrasive. When a uniform or nearly uniform dark color is achieved, the item is ready to be sprayed with the appropriate lacquer, with the same number of coats as regular satin finished brass.

Brass – Scratch Removal

Most minor scratches and mars to the surface of satin finish, and often even mirrored brass are removed during basic cleaning. Unfortunately, sometimes brass can be deeply scratched – especially in elevator cabs. Many years ago the scratching of graffiti in elevator control panels and doors was a major problem, but for whatever cultural reason (plus the widespread introduction of security cameras in elevators) the graffiti problem has ebbed. Mechanical scratches (scratches to the door as a result of their opening and closing), or simple scratches caused by moving carts or other things are still a problem, however.

Most elevators that have brass interiors (the doors, control panels and any transom panel above the doors) are clad to an underlying aluminum or steel base. In other words, you are not dealing with a solid two or three inches of base metal (this is also true of doors and frames, but scratch removal on those items is rare and so less of an issue). The brass cladding is typically only 3/32nds of one inch thick. This is a very important thing to keep in mind.

When a satin finish item (natural colored or statuary) has a moderately deep scratch, the following method is typically applied. First, the item in question is stripped of existing lacquer. Next, a handheld machine featuring a rotating dyna-cushion pad with an abrasive strip attachment is gently and gradually applied to the immediate area of the scratch itself. The friction of the rotating abrasive pad will very gradually sand down the area immediately above and below (or on either side of) the scratch, thus gradually removing it while also removing the absolute minimal amount of metal. Once the scratch has been removed, the entire area needs to be re-cleaned by the above-described methods so as to recreate to as great a degree possible the uniform appearance of the item in question. The item is then re-lacquered.

For mirror finish items the method is by necessity more delicate. Sanding with an abrasive strip is rare for mirror finish items – it is done only occasionally for particularly deep scratches – as it will subsequently require much more time to re-polish and achieve a mirror finish. Instead, a hand-held machine with a comparatively softer polishing material is strapped to the rotating dyna-cushion and one or more polishing compounds (called rouges) is used to delicately polish the offending scratch out. Here also, the item is stripped of lacquer at the outset, and then re-cleaned and re-lacquered once the scratch removal is finished. In either of the two situations – satin or mirrored finishes, carefully feathering the sanding or polishing process to ensure a relatively uniform final finish over the entire area of the scratch is very important and requires real skill. This is not a task for inexperienced mechanics or for those who lack a fair degree of mechanical coordination.

There are two very important things to keep in mind when removing a scratch. The first is that even if expertly done, there is usually some variation in the appearance of the item relative to its pristine from-the-factory state. The reason is simple – the scratch removal process by necessity removes some microscopically small layer of the brass around where the scratch was. That area will by necessity reflect light slightly differently than an area further away that is more uniform in depth. This is absolutely unavoidable.

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The problem is more pronounced with mirrored brass, as any flaw in a mirror is much more noticeable than one in a satin or matte finish.

The second, and even more important point relates to something said at the outset of the section – the depth of the metal cladding itself. A very deep scratch may have penetrated half of the 3/32nds of an inch of the cladding all by itself. The scratch removal process inevitably involves the generation of significant heat and at some point the heat may prove sufficiently high to literally delaminate the brass cladding from the underlying base metal. If this happens the entirety of the brass cladding on the item (for example, an entire elevator door) needs to be replaced. This should not be a concern on a relatively new item with a minor or “average” scratch. But if an item has repeatedly had scratches removed in the same area, or if there is a very deep scratch (you can easily trace your fingernail to some degree of depth) you need to inform the property manager beforehand of the potential problem and make it very clear that in the event of delamination we are not at fault.

This concludes our very brief overview of the techniques for brass refinishing in the field. As stated at the outset, this is a general overview – you’ll learn a lot more as you gain experience.

Stainless Steel

Stainless steel is an outstanding selection for architectural appointments. It is even harder than all commonly used brass alloys, is remarkably stain resistant (as the name implies), does not oxidize to any meaningful degree (it will not naturally discolor) and is relatively easy to maintain.

Steel is an alloy of iron and manganese. It is a wonderfully strong alloy with a wide variety of applications, but unfortunately it is very prone to corrosion, particularly in urban and coastal environments. In the early part of the last century metallurgists discovered that by adding ten percent or more of chromium to the base steel alloy, a new and far more corrosive resistant alloy was created. Those creative wordsmiths called it “stainless steel”.

This section will be brief both because they aren’t many curveballs when it comes to maintaining stainless steel and because the basic cleaning method is very similar to brass. Most commercial applications are of the #4 satin finish common to most types of brass installations. Cleaning stainless steel is comparatively easy – it can be cleaned using either pumice stone (or any of a variety of powdered stainless steel cleaners) with water and a cloth rag. The #4 finish stainless steel must always be cleaned in the direction of the grain.

Stainless steel typically does not *require* lacquer because as mentioned it does not oxidize. However, in many environments exterior items may be coated with either a nitrocellulose or acrylic lacquer to prevent the build-up of soot and dirt and to expedite periodic maintenance. In urban areas with lots of grime, the grained satin finish is going to attract and hold more of such material than a surface that has been made far smoother

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by a coat of lacquer. Furthermore, the periodic monthly washing and washing of the metal can be done far more rapidly because there is no necessity of a deep clean with an abrasive material. We will talk a little bit more about this in the maintenance section below.

Stainless steel can also come in a mirror-finish, although this look (like mirror finish brass) has fallen out of fashion among designers and architects. Mirror finish stainless steel is simply polished with a rag and a polishing compound, or in some instances simply washed with a soft sponge and briefly towel dried.

Stainless steel can also be oxidized to a darker shade that is similar to the appearance of the statuary finish on bronze. A similar process involving the application of dyeing liquids is used.

The removal of scratches from stainless steel is done using techniques that are the same as those used for brass. The one thing to keep in mind with stainless steel is that it is significantly harder than brass and as a consequence scratch-removal takes a lot longer. The same issues regarding the subtle change of appearance before and after the scratch removal as well as the delamination risks apply.

Aluminum

Aluminum is by far – *by far* – the most ubiquitous architectural metal in use for doors, window frames and building facades today. Almost every stand-alone fast food restaurant in the United States and around the world has aluminum swing doors and window frames, and ninety percent or more of new skyscraper (defined as buildings with twelve or more stories) construction features aluminum curtain-walls (the exterior façade encompassing the window frames, decorative panels and windows).

This ubiquity is somewhat odd in that until comparatively recently aluminum was considered a rare metal – like gold or platinum. That it was ever considered such is even more odd given that aluminum is the third most abundant element on earth (after oxygen and silicon). The problem with aluminum was that it did not (and does not) exist in its pure state on earth, but rather must be refined from bauxite ore, a process that was extremely expensive until the very end of the nineteenth century.

Aluminum's great advantage is that it is a light, comparatively strong and relatively inexpensive metal. Strictly speaking, almost all aluminum used for construction purposes is an alloy with ninety-five percent or more being aluminum combined with small amounts of zinc, manganese, copper, iron and silicon. The aluminum alloys common to architectural use typically cost much less than brass or stainless steel on a comparative unit basis.

Aluminum comes in a variety of guises, but most commonly it is either anodized or painted. Both of those finishes are coatings on the base aluminum alloy. Prior to the 1950's aluminum was used without any type of protective coating – with often fairly

negative consequences from a maintenance perspective, at least in exterior urban or coastal applications.

This raw, or “mill finish” aluminum, was more durable than raw steel when it came to withstanding the corrosive effects of climate and pollution, though that is a bit of damnation by faint praise, akin to saying a baked potato is sturdier than mashed potatoes. The surface of mill finish aluminum was easily penetrated by the residue of acidic pollution and formed discoloring “pits”, or collections of grime and oxidation. Many of the new installations of this material on exterior applications in the aftermath of World War II were compromised along these lines and became very unattractive. Compounding the problem was that once the metal became pitted, it could not be field-repaired or restored and usually required painting. The paints available at that time were of comparatively very low quality, and thus were not an economically viable solution.

In the middle 1950’s, likely directly as a result of the foregoing issues, the aluminum manufacturers introduced the anodizing process on an industrial scale. Anodizing involves submerging extruded aluminum pieces in a sulfuric acid bath while simultaneously running an electrical current of a specified voltage through the liquid. The combination of these two factors results in oxygen migrating from the acid to form an aluminum oxide coating on the surface of the base aluminum alloy. The depth of this coating is determined by the length of time in the acid bath, and is usually measured in “mils” (pronounced “mills”), an industry term that refers to a measure equal to one-thousandth of one inch (.001 inch). In any event, this aluminum oxide coating is *vastly* more durable than mill-finish aluminum. An added bonus is that anodized aluminum can come in a range of metallic colors other than, well, aluminum, and various shades of brown and black. Indeed, most anodized aluminum is not aluminum colored and as such a great many people are unaware that the metal they are handling virtually every day of their life is in fact aluminum.

Among the early examples of the use of new anodic-coated aluminum are the many Mies Van der Rohe (a famous German architect who emigrated to the US) designed buildings in Chicago. Most of these buildings are over fifty years old and their aluminum facades are (in many instances) in astonishingly good condition, given the amount of pollution they’ve endured. For the average person, though, the most common and almost ubiquitous example of anodized aluminum is the metal door one opens to enter almost any McDonald’s, Burger King, or Starbucks in Anytown USA. Anodized aluminum is *everywhere*.

In many instances, anodized aluminum is practically maintenance free, at least in the sense that it can be neglected for quite some time in certain installations and will show almost no deterioration. On doors and their adjacent frames the anodic coating can be cut or banged such that one can begin to see silver scratches where the top layer of the anodic coating has been breached. In these cases, customers sometimes prefer to periodically paint the door with a lacquer tinted with aluminum flake to match the existing finish. It is also true that in many urban environments, *any* grained metal (and anodized aluminum almost always has a grain) will attract dirt and soot and need to be cleaned occasionally. Water and a mild detergent along with a soft cloth or sponge are

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often all that is necessary. As is the case with stainless steel, the application of a prophylactic coating will expedite periodic wash and wax treatments to remove surface dirt and will also help to protect the anodic coating itself.

Problems for anodized finishes are more pronounced when a) the metal is in an exterior environment, subject to automotive and other pollutants, and isn't at least periodically washed or b) located near saltwater bodies. Over the course of the last fifty years the thickness of the anodic coatings have become less and less, due to environmental and cost concerns. As a practical matter this has made anodized aluminum more prone to (eventually) become pitted and damaged in a way that was common to mill-finish aluminum (though it takes many years, rather than just two or three as was the case with mill-finish aluminum). A good way to protect the metal from such damage is to periodically clean it in one of the manners described above, and then apply (by hand) a prophylactic silicon/acrylic based coating. These coatings are remarkably durable, comprehensively protect the anodic coating from environmental degradation and – perhaps best of all – do not peel or flake. Rather, over time they simply oxidize and fade away. Because the necessity of time consuming masking and surface prep that is required for most sprayed-on lacquers is avoided, this process is usually relatively inexpensive. Curtain-walls are commonly treated in this manner, with a suggested refinishing cycle of once every five to seven years, depending on the location of the property.

It is very important to try to avoid cleaning anodized aluminum with abrasive materials, especially acrylic pads and such. Since the late 1980's almost all anodized aluminum comes from the factory with a coating that is .8 mls in thickness (The Mies Van der Rohe buildings cited earlier have anodized aluminum with 2.2 mls of thickness). At .7 mls. anodized coatings can begin to fail. It is very easy to remove a ml. or two of the thickness of the coating with aggressive, abrasive rubbing. In other words, cleaning this metal incorrectly can drastically reduce its ability to avoid serious deterioration by oxidation, pollution and other problems. If the coating is comprehensively damaged the only solution left is repainting, which is relatively very costly. In some cases one can use pumice stone (an abrasive powder) and water or an acrylic pad PROVIDED you determine that the baseline anodic coating is thick enough to withstand more aggressive cleaning. Most divisions have equipment that can measure thickness of the anodic coating to determine if it can withstand the more aggressive methods.

Painted aluminum surfaces present a set of maintenance issues that are both less expensive, and *vastly* more expensive, depending on the situation. By painted aluminum we refer to the doors, windows, frames, and curtain-walls that were installed with a factory-finish painted coating. The easiest way to distinguish anodized aluminum from painted aluminum is the absence of a grain on the latter (anodized aluminum also tends to "feel" metallic, whereas painted surfaces feel more like a plastic or paint). Anodized aluminum is always a metallic, light-to-dark brown or black shade. Painted aluminum can be those colors but often is not (any items that are green, blue or red, for example, are painted).

Generally speaking, painted aluminum comes with one of two varieties of coating (from the factory). The first and most common are highly UV resistant fluoropolymers with special resins that last an exceptionally long time – 20 to 30 years. These paints are very carefully applied in the factory, always after a base primer, and are cured at high temperatures. They are also very expensive - \$350 per gallon or more. The second most common type is what is called a powder coat, which is far, far less expensive, and not surprisingly far less durable. Powder coats typically come with warranties of only five to seven years. These two by no means encompass all the types of paints you will come across (which include urethanes, polyesters, and vinyls, among many others) but they are the most common to come across in exterior applications in our field.

When first installed, the only maintenance painted aluminum requires is periodic cleaning with sponges and a mild detergent. This cleaning is often for aesthetic reasons, but also will remove the residue of pollutants that can more readily damage the appearance of painted surfaces than an anodized surface. It is EXTREMELY important to follow the recommended cleaning methods from the manufacturer of the item because painted aluminum can be easily damaged by incorrect or inappropriate cleaning methods. Most factory-finished painted aluminum items come with a warranty against chipping, peeling, fading etcetera for a set number of years. Using a harsh cleaner or an abrasive to remove “tough” stains can compromise the integrity of the finish resulting in premature deterioration. This is a very big deal, especially in the case of an aluminum curtain-wall. If the paint deteriorates within the warranty period, but it is subsequently discovered that an inappropriate cleaning process was used on the surface, the manufacture may very well be off the hook, leaving the owner of the building on the hook. And this can be a very expensive hook.

Proper cleaning methods are crucial because painting a façade is an extremely expensive undertaking. A “small” façade painting project can run a couple of hundred thousand dollars, and large one’s can run to five million or more. Unfortunately for building owners it is almost always the case that the curtain-wall will have to be comprehensively re-caulked because otherwise proper field application techniques for spraying a new coating cannot be followed. The caulking can cost as much or more as the painting part of these projects.

Each year Stuart Dean will execute between ten and fourteen million dollars worth of work dedicated solely to painting aluminum surfaces of one type or another. In some instances this may involve applying a paint, or more accurately, a high performance fluoropolymer coating, to an anodized surface that has either been compromised or because the owner would like to give his property a new look. In others, we will be painting over a factory finish that has worn away due to some combination of ultraviolet light, pollution, salt air or perhaps all three. These projects are very complex, and require detailed knowledge of the condition of the existing surface and which of a variety of high performance coatings may be best suited for the project at hand. It is important for our salespeople to ALWAYS be on the lookout for these projects and not simply because of the potential for a large commission – they are a critical part of our future growth strategy. Fortunately for Stuart Dean (perhaps less so for many owners) there are literally

tens of thousands of buildings with painted and anodic-coated aluminum curtain-walls that are coming to the end of their serviceable life and will need to be serviced soon.

General Maintenance Considerations

All architectural metal needs some minimal baseline of maintenance in order to either extend its service life or to ensure a clean professional appearance congruent with the building's image. As we have outlined above, some need more frequent attention than others with brass absolutely requiring maintenance (usually multiple times within a calendar year) while other items, such as painted aluminum surfaces, may only require periodic wash and wax service.

What is worth stressing is that if a customer *must* clean their architectural appointments (brass) or prefers to clean them frequently to keep them clean and/or extend the service life of the finish (stainless steel and aluminum) it *always* makes sense to have a maintenance agreement with regularly scheduled intervals of cleaning designed by a metal maintenance professional. The reason for this is because in almost every instance it is the least expensive way to maintain metal.

This was touched on briefly in the basic sales training manual but the example bears repeating here. Occasionally one may come across a customer who believes that they'd be better off cleaning items "when they need it" as opposed to being on a regular schedule designed by a professional expert. They believe that they can save money by doing it this way.

There are four major problems with this approach. The first, and obvious one is that cleaning things "when they need it" implies one or more items have already become an eyesore. Our goal is to keep things looking clean all the time, not some of the time, or most of the time.

The second is that depending on the item, cleaning something "when it looks like it needs it" in order to save money may be an extremely expensive blunder. For example, almost any metallic surface in a recessed carport exposed to lots of automotive exhaust will deteriorate very badly if it is not (for brass) cleaned and lacquered, or (for any type of aluminum) washed and waxed. Waiting "until it needs it" – in other words, when the metal becomes badly pitted, may result in the metal now needing to be painted or in some extreme cases replaced. A corollary of this second problem is that for metals such as brass waiting to clean them "when they need it" may actually be more expensive than simply sticking to a more frequent maintenance routine. The reason for this is that the more oxidation that grows on a neglected surface, the longer it takes to remove. In other words, thoroughly cleaning a badly deteriorated brass door could take twice as long as cleaning one that has mildly deteriorated. In such a situation, the customer hasn't actually saved a dime and could end up spending more.

The fourth problem is the efficiency problem. Consider a building that has the following brass appointments scattered around its lobby – revolving doors, swing doors, interior and exterior light fixtures, interior and exterior lobby level window frames,

elevator entrance doors and frames, elevator call button pads, elevator interiors. Some of these items can be done in a single eight-hour shift, but many cannot. Some of the items make take two hours to clean and lacquer, some make take 14 hours.

The problem with picking and choosing arises because every time we make a service call to restore items we need to travel to and from the building site. Directly or indirectly, the customer has to bear this cost. By not allowing for an optimized schedule that maximizes the work efficiency of an eight-hour shift to minimize travel time, costs go up, and they can go up a lot depending on the item. Calling up Stuart Dean to come to a building to clean an item that takes four hours is going to cost anywhere from 20% to 40% more than if we can work it into a schedule. The same problem results for item(s) that take twelve or twenty or thirty hours – they will incur fractional days. Because of our eighty plus years of experience, we have a very good idea of what schedules should be and how to craft a maintenance program to virtually eliminate fractional days. Any fears of over-pricing should be allayed by the competitive bidding process – while we are rarely the least expensive service provider, our costs are typically reasonably close to those of the competition.

Maintenance routines can be modified to fit a particular customer's budget, but any deviations from our recommended frequencies should be clearly explained to the customer.

Closing Thoughts

As was stated at the outset of this note, the information contained within it is hardly comprehensive and does not make one an expert. That being said, any Stuart Dean salesperson should know *all* of its content without exception. By and large, in over ninety five percent of your interactions with customers in relaying what we do and how we do it, the information contained in these pages, along with that in some of your other training materials, will be the only information you ever have to impart. This information should also provide you with a baseline of knowledge to have discussions with your customer and potential customers *immediately*, so long as you comprehensive master it.

EXHIBIT F

METAL FINISHES MANUAL

*For Architectural
and Metal Products*



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DISCLAIMER

This manual was developed by representative members of the National Association of Architectural Metal Manufacturers (NAAMM) and the National Ornamental & Miscellaneous Metals Association (NOMMA) to provide their opinion and guidance on the selection and specification of metal finishes. This manual contains advisory information only and is published as a public service by NAAMM and NOMMA. NAAMM and NOMMA disclaim all liability of any kind for the use, application, or adaptation of material published in this manual.

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Acknowledgement

NAAMM and NOMMA wish to thank their members and officers as well as industry experts for assistance and cooperation in producing this edition of the *Metal Finishes Manual*.

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Introduction To Metal Finishing

NAAMM/NOMMA AMP 500-06

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INTRODUCTION TO METAL FINISHING

The variety of finishes used on architectural metals, like other aspects of building technology, becomes increasingly complex. Recognizing the need for organized information on this subject, the National Association of Architectural Metal Manufacturers (NAAMM) published the first edition of this Manual in 1964. A second edition was published in 1969, a third edition in 1976, and a fourth edition in 1988. In response to the continuing demand for the Manual, this edition, containing still further revisions, is being published jointly by NAAMM and the National Ornamental & Miscellaneous Metals Association (NOMMA).

The scope and nature of this edition are the same as those of the former editions, but all of the contents have again been carefully and critically reviewed. Obsolete data has been deleted, errors have been corrected, references to standards and supplementary sources of information have been updated, and the text has been extensively revised to reflect current practices.

The Manual consists of five chapters and an Introduction to Metal Finishing, which briefly explains the applicability of the various finishes for architectural applications. The first four chapters cover finishes for the specific architectural metals, aluminum, the copper alloys, stainless steel, and carbon steel and iron respectively. Chapter 5 covers applied coatings used on all metals.

It is still the prime purpose of the Manual to provide the architect with essential information about the many finishes available, and to assist him in selecting and properly identifying them. It is intended as a reference handbook, dealing briefly with all of the finishes commonly used, but not attempting to provide complete information about them. With the many new developments constantly occurring, a small volume such as this can serve only as an introduction to this very broad subject. For those desiring more comprehensive information, numerous references to supplementary sources are provided.

The production of satisfactory finishes on architectural metal requires teamwork and cooperation among the metal supplier, the fabricator, the

finisher, the architect and the contractor. It is not the sole responsibility of any one of these parties. The architect must understand the characteristics and limitations of the many finishes available, so that he may select those which are proper and appropriate for his purposes, and he should be able to clearly define his requirements. It is the responsibility of the supplier and fabricator to interpret these requirements sympathetically, to furnish the appropriate alloys, and to see that all necessary steps are taken to produce the desired effects.

The contractor must see that the finishes supplied are handled and installed with care, and are properly protected after installation. A satisfactory end result is the common aim of all parties, but a lack of mutual understanding can easily result in dissatisfaction. One of the aims of this Manual is to minimize the likelihood of such deficiencies by encouraging a better common knowledge of the subject, for the benefit of all concerned.

General Classification of Finishes

All of the finishes commonly used on the architectural metals can be classified as one of three principal types:

Mechanical Finishes, which are the result of physically affecting the surface of the metal by some mechanical means. This means may be the forming process itself, or a subsequent operation performed either before or after the metal is fabricated into an end use product.

Chemical Finishes, which are accomplished by means of chemicals, and which may or may not have a physical effect upon the surface of the metal.

Coatings, which are applied as finishes, either to the metal stock or to the fabricated product. These coatings may be either:

- a) Formed from the metal itself by a process of chemical or electrochemical conversion, or
- b) Formed by the application of some added material.

The relative importance of the three basic types of finish varies with the different metals. They are all used extensively on aluminum, but on carbon steel and iron, the coatings are far more important than either mechanical or chemical finishes. The copper alloys are commonly subject to both mechanical and chemical finishes. On stainless steel the mechanical finishes are the common standard, while chemical finishes and coatings are infrequently used. Table 1 - Comparative Applicability of the Various Types of Finishes provides an overall view of the extent to which the various types of finishes are normally used on the different metals.

Because many of these finishes are not distinctly or uniquely suited to any one metal alone, and usages overlap considerably, the subject has not been found to lend itself to a neatly compartmented treatment, arranged either by metals or by finishes. It has seemed advisable, therefore, to classify the bulk of the discussion according to metals, treating under each metal not only those finishes which are uniquely its own, but also the mechanical and chemical finishes as applied to that metal. This necessarily involves some repetition of basic information regarding the more common finishes, but these overlaps seem justifiable in the interests of providing optimum clarity and minimizing the need to refer from one chapter to another. With certain types of applied coating, however, the chief concern centers on the coating itself, rather than on any particular substrate, and it has seemed advisable to discuss such finishes under the heading of Applied Coatings, rather than identifying them with any one metal. Thus the typical mechanical and chemical finishes, as well as the unique coating finishes for each of the metals are discussed in Chapters 1 through 4 under headings identified by the metals, along with the designation system used for denoting these finishes. The organic, laminated, and vitreous coatings, however, being generally applicable to several metals, receive separate consideration in Chapter 5.

The Function and Source of Finishes

The function of metal finishes may be protective, decorative or both. A majority of the many surface treatments identified in this Manual as "finishes" are not, in fact, final treatments, but only intermediate steps in a finishing process. Many

are applied for protective reasons, some for reasons of appearance, and a few are simply cleaning processes. Usually several steps are required in preparing a metal surface for its specified end use condition. All of these steps are designated, in the terms of the trade, as "finishes," though only the final treatment is actually exposed to use; the others are in fact simply preparatory treatments. This is often the case, for example, where compound finish designations are the general rule, as is explained in Chapters 1 and 2.

Only a few of the many finishes discussed are provided by the basic suppliers of the metal. In the main, these are the so called "as fabricated" finishes, which are usually the cheapest form of mechanical finish, and are available on all of the metals. Sheet stock of various metals is also available from the basic suppliers with several types of applied coatings, and aluminum and stainless steel sheet are supplied also with embossed and coined patterned textures. All of the other finishes are "process finishes," and are applied by the manufacturer or fabricator of the product or by other companies specializing in finishing work. The quality of finish on many architectural products depends largely, therefore, on the skill of the fabricator or finisher rather than on the basic supplier, but the quality of the alloys furnished by the supplier is always a factor of prime importance.

Variations in Appearance; The Value of Samples

Visual appearance is often a major concern with metal finishes, and uniformity of appearance may be critical in many architectural applications. Some types of finish present no problems in this latter respect, while others are subject to slight variations. Uniformity of appearance is often dependent upon the alloys used, and in certain mechanical finishing processes it is affected also by the equipment and speeds used in the finishing operation itself. With the non ferrous metals, the achievement of a desired result often depends as much on specifying the right alloy as on choosing the right finish.

With rigid control of such variables, a high degree of uniformity can be achieved in any finish, but the architect should recognize that, except with opaque coatings, it is unrealistic to expect perfect uniformity of color and texture, particularly if the finish is provided by different parties or from different stocks of metal. For this reason it is rec-

ommended that the supplier or fabricator should always be consulted concerning critical requirements. The use of representative samples is usually advisable, too, as a means of describing requirements in applications where precise control is essential. When color is involved, at least two samples should be used, to define the permissible range of color.

The Choice of a Finish

A good working knowledge of metal finishes requires more than an understanding of the technicalities of their processes and the ability to designate them properly. If the architect is to specify them intelligently he or she will be concerned not

only with the esthetic effect desired, but also with their practical appropriateness and their relative costs as well.

These finishes vary considerably in the amount of labor they require, and consequently in their costs. Frequently money is wasted in the use of unnecessarily expensive finishes in locations where they can't be distinguished, and sometimes the choice of impractical finishes has needlessly complicated production processes, resulting in objectionable delays and expenses. On the other hand, some important jobs have suffered because of the unwise selection of a "low cost" finish or the arbitrary decision to avoid the relatively insignificant cost of a critical finishing operation.

Precautions

An attempt has been made in this Manual, by the prominent listing of "Precautions," to specifically point out the limitations inherent in certain types of finishes, and to indicate their most appropriate applications as well as their relative costs. It is hoped that the architect will find this information helpful in using all of the architectural metals more effectively.

**TABLE 1 - COMPARATIVE APPLICABILITY OF THE VARIOUS FINISHES
FOR ARCHITECTURAL APPLICATIONS**

	Type of Finish or Treatment	Metal			
		Aluminum	Copper Alloys	Stainless Steel	Carbon Steel and Iron
MECHANICAL FINISHES	As Fabricated	-----common to all of the metals----- <i>(produced by hot rolling, cold rolling, extruding or casting)</i>			
	Bright rolled	-----commonly used----- <i>(produced by cold rolling)</i>			Not used
	Directional grit textured	-----commonly used----- <i>(produced by polishing, buffing, hand rubbing, brushing or cold rolling)</i>			Rarely used
	Non-Directional matte textured	-----commonly used----- <i>(produced by sand or shot blasting)</i>			Rarely used
	Bright polished	-----commonly used----- <i>(produced by polishing and buffing)</i>			Not used
	Patterned	-----available in thin sheets of all metals-----			
CHEMICAL FINISHES	Non-etch Cleaning	-----commonly used on all of the metals-----			
	Matte finish	Etched finishes Widely used	Seldom used	Not used	Not used
	Bright finish	Limited uses	Rarely used	Not used	Not used
	Conversion coatings	Widely used as pretreatment for painting	Widely used to provide added color variations	Not used	Widely used as pretreatment for painting
COATINGS	Anodic <i>(See Ch 1)</i>	Traditional type of finish	Not used	Not used	Not used
	Organic <i>(See Ch 5)</i>	Widely used	Opaque types rarely used; transparent types common	Sometimes used	Most important type of finish
	Vitreous <i>(See Ch 5)</i>	Widely used	Limited use	Not used	Widely used
	Metallic <i>(See Ch 4)</i>	Rarely used	Limited use	Limited use	Widely used
	Laminated <i>(See Ch 5)</i>	Substantial uses	Limited use	Not used	Substantial uses

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Chapter 1: Finishes For Aluminum

NAAMM/NOMMA AMP 500-06

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FINISHES FOR ALUMINUM

General

Aluminum is unique among the architectural metals with respect to the large variety of finishes used. Nearly all of the finishing processes discussed in this Manual, in fact, are not only appropriate but commonly used for this metal, whereas some of them are seldom if ever applied to other metals. Those used on aluminum include several varieties under each of the three major types of finishing processes, as shown in the following summary. The mechanical, chemical and anodic coating finishes, along with their descriptions and standard designations, are explained in detail in this chapter. The other coating

finishes, which are used on other architectural metals as well, are discussed in detail in Chapter 5, Applied Coatings.

Note that most of the finishes in the following Summary are not applied by the prime producers of aluminum, but by other processors or by the manufacturers of the end use products. The only true mill finishes, in fact, are the "As Fabricated" finishes, though some producers also supply sheet and coil stock with organic and laminated coatings, as well as patterned sheet. All of the other finishes are referred to as process finishes, being applied by others after the metal leaves the mill.

SUMMARY OF TYPICAL ALUMINUM FINISHES

Finish	Aluminum Association Finish Designation (see page 14)	Finish Normally Supplied By			Relative Costs (on flat surfaces)
		Mill	Process- sor	Fabricator or Finisher	
MECHANICAL					
As Fabricated	M10 Series	X			base
Buffed	M20 Series			X	wide range ¹
Directional Textured	M30 Series			X	wide range
Non-Directional Textured	M40 Series			X	wide range
Patterned	MnX (Specify)	X	X		low to medium ²
CHEMICAL					
Cleaned only	C10 Series		X	X	very low
Etched	C20 Series			X	very low
Brightened	C30 Series			X	very low
Conversion Coatings	C40 Series	X	X	X	very low
Other	CnX (Specify)	X	X		low to medium ²
ANODIC COATINGS					
General	A10 Series		X	X	medium to high
Protective/Decorative	A20 Series		X	X	medium to high
Architectural Class II	A30 Series			X	medium to high
Architectural Class I	A40 Series			X	medium to high
Other	AnX (Specify)				
Electroplated and Other Metal	E Series				
ORGANIC COATINGS					
Resinous (See Chapter 5)	R Series	X	X	X	low to medium
Vitreous (See Chapter 5)	V Series		X	X	high
Laminated (See Chapter 5)	L Series	X	X		medium

The term PROCESSOR, as used here, refers to a "middleman" between the mill and the fabricator, who applies coatings, textures or other finishes to metal in bulk form, generally cut sheet or strip or coil stock. FABRICATOR refers to the producer of stock metal shapes or the manufacturer of the end-use product. He either provides the final finish, or sends the fabricated product to a finisher who does this work. The FINISHER does not usually fabricate products, but provides finishes as specified, to products fabricated by others.

The RELATIVE COSTS indicated are necessarily approximate, for general guidance only. Exact costs vary considerably with quantity, type of product, method of application, quality of work and other influences, and should always be verified.

¹ If these finishes are applied by automatic means in production lines, the cost is generally low, but if applied by hand methods, as is sometimes necessary, it can be relatively high.

² Certain embossed patterns, because of their stiffening effect, permit the use of thinner metal, and this saving can in some cases offset their cost. In other cases patterned finishes involve extra costs.

Mechanical Finishes

Mechanical finishes are those that involve the use of no chemical or electrochemical treatment and no additive but provide a surface texture by mechanical means alone. These textures vary widely in character, ranging from the surface appearance resulting from the various production processes to highly reflective surfaces produced by successive grinding, polishing and buffing operations, with costs also varying considerably, in proportion to the amount of processing required.

“As Fabricated” Finishes

The term “As Fabricated” can refer either to the metal stock or to a fabricated product. As a finish designation for aluminum stock it refers to the surface appearance and texture imparted to the metal by the rolling mill, extrusion press, or casting mold which shapes it. Subsequent fabrication operations on the aluminum, such as forming, sawing, punching, drilling, milling, etc., including scratches, can mar the “as fabricated” finish. Under some conditions the marring can be corrected by simple mechanical deburring and smoothing. For other conditions, the marring results in an unacceptable “as fabricated” mechanical finish, and a subsequent finishing operation will be required and should be specified. The subsequent operations most commonly specified for aluminum are a smooth specular buffed finish or a medium satin directional textured finish. Where welding is required on exposed surfaces, discoloration and surface irregularities will result. Discoloration on etched or anodized surfaces resulting from welding cannot be removed.

“As Fabricated” mechanical finishes, as a class, are the simplest and least expensive obtainable. Such finishes can be quite acceptable for architectural applications and are widely used. Typical of these are specular “as fabricated” cold rolled sheet and nonspecular “as fabricated” extrusions. Highly polished rolls used at the mill for the final pass provide the specular finish on the cold rolled sheet. Carefully machined and well maintained dies for the extrusion press ensure extruded surfaces free of objectionable die marks or striations.

The uncontrolled natural finishes resulting from the different forming processes vary somewhat according to the process. Hot rolled and heat treated products have a comparatively dull surface finish and show a certain amount of darkening or discoloration, while cold rolled surfaces have a

brighter and more metallic color. Extruded products have an intermediate appearance, somewhat resembling that of cold rolled items, and can have noticeable surface striations caused by the extrusion die. Castings have a rougher matte finish, die castings being the smoothest and sand castings the roughest.

The typical variations of the “As Fabricated” finish can be identified as follows:

- a) **Unspecified:** This is the natural finish provided by extrusion, casting, hot rolling or cold rolling with unpolished rolls. On rolled products it can vary from dull to bright, and can have stains or light films of rolling oil.
- b) **Specular as fabricated:** A mirror like cold rolled finish, produced on one or both sides of sheet by final passing through highly polished rolls. Not applicable to extrusions, forgings or castings.
- c) **Nonspecular as fabricated:** This is a designation used to refer to a more uniform finish than that provided under the “Unspecified” classification but lacking the specularity of the “Specular as fabricated” finish.

Buffed Finishes

These finishes are generally produced by successive processes of grinding, polishing and buffing, or by buffing alone, if the “as fabricated” finish is acceptably smooth. They are used where a top quality bright appearance is required, and are frequently specified for entrance doors and their framing or for highlighting extrusions and patterned sheet, as well as for hardware. Because of their high reflectivity they should not be used on wide flat surfaces. The cost of these finishes varies widely with the complexity of the product and the number of steps required to achieve the desired effect.

These are process finishes, applied by the fabricator or finisher, and among the many variations possible, two types are generally considered as standard:

- a) **Smooth specular (mirrorlike):** This is the brightest mechanical finish obtainable and is produced by buffing. In order to achieve this lustrous finish the surface is ground and/or polished in one or more stages prior to buffing. When this is required, the final finishing prior to buffing is done with 320 grit.
- b) **Specular:** This finish is accomplished by buff-

ing only, no preliminary grinding or polishing operations being necessary. The resulting finish can show some evidence of scratches or other surface irregularities.

Directional Textured Finishes

Finishes of this type are used in many applications where a smooth satiny sheen of limited reflectivity is desired. The characteristic soft texture results from tiny, nearly parallel scratches in the metal surface produced by wheel or belt polishing with fine abrasives, by hand rubbing with stainless steel wool, or by brushing with abrasive wheels. Always be sure when using any metal finishing materials to clean the aluminum prior to any anodizing process. In belt polishing, the fineness of the finish is controlled by the size of the grit used, the speed of the belt, the hardness of the block or pad used, the pressure exerted on the block, and the condition of the belt.

These are all process finishes, and generally five standard types are recognized:

- a) **Fine satin**
 - b) **Medium satin**
 - c) **Coarse satin**
- These finishes are produced by wheel or belt polishing with grits of varying degrees of fineness.
- d) **Hand rubbed:** This is another type of satin finish obtained by rubbing with abrasive cloths or with stainless steel wool of increasing degrees of fineness, finishing with No. 0 or No. 00. Hand rubbing is a comparatively expensive finishing process, and is used only where the nature of the work being finished makes other methods impractical. It is frequently employed, however, to even out and blend in satin finishes produced by other means. Again, when using any metal materials in finishing, be sure to clean before any anodizing process.
 - e) **Brushed:** Several varieties of directional finish with approximately parallel scratch lines can be produced by using power driven stainless steel wire wheel brushes, brush backed sander heads (Vonnegut wheels), abrasive impregnated foamed nylon discs (Scotch-Brite®), or abrasive cloth wheels (PG wheels). Again, when using any metal materials in finishing, be sure to clean before any anodizing process.

Non Directional Textured Finishes

These are matte finishes of varying degrees of roughness, produced by blasting sand, glass beads, or metal shot against the metal under controlled conditions. Their principal use in architectural work is on items produced by casting.

The texture of the surface is determined by the size and type of abrasive used, the amount of air pressure, and the position and movement of the nozzle. The finer the abrasive the smoother the finish. A comparatively rough finish is obtained by using coarse silica sand, while the smoothest finishes are obtained by dust blasting with a very fine abrasive and by "vapor honing" with a slurry of extremely fine abrasive and water.

The architect should recognize that these finishes produced by blasting have restricted applicability. Because the impingement of the abrasive under pressure tends to distort the metal, their use is not recommended on material less than ¼ in. (6 mm) thick. There is usually difficulty, too, in obtaining uniform appearance, especially after anodizing, unless special equipment is used to regulate pressure and nozzle movement.

Since the surface produced by even the finest abrasive is actually rough, readily shows fingerprints, and collects and retains dirt, some type of protective treatment is necessary to retain a clean appearance. Clear lacquers are often used for this purpose, and anodizing provides an excellent protective coating, particularly on castings, where such finishes are most appropriate.

The common variations of the sandblasted finishes obtained by using washed silica sand or aluminum oxide of different degrees of fineness are:

- a) **Extra fine matte**
- b) **Fine matte**
- c) **Medium matte**
- d) **Coarse matte**

Shot blasting is used to provide peened finishes. By using steel shot of different sizes the following standard variations are produced:

- e) **Fine shot blast**
- f) **Medium shot blast**
- g) **Coarse shot blast**

Note: steel shot can become impregnated in aluminum causing a problem of dissimilar metals. This also will cause serious problems during the anodizing process.

Patterned Finishes

Patterned finishes are available in thin sheet, in a wide variety of sculptural designs and textures. These are produced by passing "as fabricated" sheet either between two machined matched design rolls, impressing patterns on both sides of the sheet (embossing), or between a design roll and a smooth roll, "coining" one side of the sheet only.

Some coined and embossed patterns are available from the mill; others are produced only by secondary processors.

Chemical Finishes

There are numerous methods of providing intermediate process finishes on metals by washing or dipping the fabricated product in chemical solutions, and many of these are of a proprietary nature. Such treatments have a variety of specific purposes, but in general they are used

- to merely clean the surface, without otherwise affecting it.
- to provide a clean matte textured surface (by etching),

PRECAUTIONS

Regarding the Use of Mechanical Finishes on Aluminum

An "As Fabricated" finish is the finish on the metal as it is received from the rolling mill, roll former, extrusion press, or casting mold, prior to any further mechanical, chemical, anodic, organic, or vitreous finishing operation. In many architectural applications this finish will be acceptable without further mechanical finishing. However, in some products, fabrication operations subsequent to the original as fabricated finish, such as forming, sawing, punching, drilling, milling, etc., can mar the finish so that it is unsatisfactory for architectural applications.

Clad sheet should not be mechanically finished because of the possibility of penetrating such products. It will be necessary to perform additional mechanical finishing operations, and these should be specified for the cladding.¹

Buffed finishes are not recommended for broad surfaces where visual flatness is desired. The high reflectivity of these surfaces accentuates the waviness or oil canning caused by forming operations or temperature changes and can be objectionable. The use of patterned or etched sheet, with or without formed contours, is advised for such applications.

Bright finishes accent all surface blemishes while satin finishes tend to minimize surface blemishes.

Sandblast finishes should not be specified for thin sheet because distortion usually results.

Chemical etching will usually cause noticeable discoloration at welded joints regardless of mechanical or anodic finishes. Where etching and anodizing are to be used, the product, if possible, should be designed so that welded joints are not exposed. The degree of discoloration will depend on both the parent alloy and the filler alloy used for welding. In the selection of filler alloys ease of welding, strength of joint, color matching, and the effect of subsequent heat treatment are factors which must be considered. Some combinations of parent alloys and filler alloys can provide acceptable color matching but not provide adequate strength, and vice versa. Information on this subject is available from The Aluminum Association, or contact the finisher.

All surface protective coverings such as non-adhesive papers, adhesive papers, and stripable plastic films should be removed after receipt at the site as soon as there is no longer a need for the protection. These coverings can affect the surface finish and become brittle and unpeelable under exposure to sunlight and the elements as well as cause staining on the finished product.

¹To improve the finishing characteristics and increase the corrosion resistance of certain alloys in sheet and plate form, they are sometimes "clad" with other aluminum alloys. The thickness of the cladding on each side is usually 5% or less of the total thickness, hence it can be penetrated by abrasive processes.

- to produce a smooth, bright finish, or
- to chemically convert the surface of the metal, providing a film which is a good substrate for organic coatings.

Many types of chemical treatment are used on aluminum as finishing processes, but few of these are in themselves true finishes. Most of them are intermediate steps in an overall finishing process, requiring at least the subsequent application of some form of protective coating.

Non-etch Cleaning

Various chemical treatments are widely used to thoroughly clean the metal preparatory to the application of other finishes. These have no physical effect upon the surface of the metal, and can not be classified as true finishes. They produce a chemically clean surface which is free of all foreign matter such as oil, grease, fingerprints, solid particles of any kind, tarnish, other chemical reaction products, and even surface absorbed gases. Such preparatory cleaning is essential for the successful application of any type of additive coating.

Two such cleaning methods are commonly used:

- Degreasing:** Vapor degreasing exposes the metal to vapors from chlorinated solvents such as trichlorethane and perchlorethylene, and is performed in special degreasing machines. Solvent or solvent emulsion cleaning, with hydrocarbon solvents, is used to remove oil and grease from the metal surface, and is less expensive than vapor degreasing. To achieve maximum cleanness, degreasing of any type should be followed by chemical cleaning. Check to see if this method is subject to EPA regulations.
- Chemical cleaning:** This method is used when animal fats and oils must be removed. The metal can be sprayed with, or immersed in, any number of proprietary or non proprietary solutions, usually at elevated temperatures, after which it is rinsed with water. Inhibited chemicals are used on aluminum, to prevent etching of the surface. Solutions used on ferrous metals are usually not appropriate because of their etching effect. Most of the commonly used cleaners are special detergent products.

Matte Finishes

Finishes of this type are referred to as etched finishes in the aluminum industry, where chemical etching is a very common finishing treatment. The so-called "frosted" finishes are obtained by this means, and the etching process is often used also to prepare surfaces for anodizing. Where a less durable finish is acceptable, the etching can be followed by simply the application of a protective coating of clear lacquer.

These finishes change the surface texture of the metal from a metallic shine to a satin or dull sheen, and are regulated to give varying degrees of roughness. This controlled surface roughening can be accomplished either by alkali solutions with various additives or by various acid solutions. Where production quantities are involved, the cost of obtaining satin finishes by such means is usually much less expensive than that of producing them mechanically. However, for short runs, or when dealing with assemblies of various metals or large assemblies with only small areas to be finished, mechanical methods may be preferable.

A wide variety of acid and alkaline etches is used, producing various degrees of matte finish. The more common of such standard finishes are:

- Fine matte:** This finish is produced by using a mild alkali solution such as trisodium phosphate.
- Medium matte:** The most common "caustic etch" finish, obtained by treating the surface with sodium hydroxide (caustic soda).
- Coarse matte:** This finish is generally produced by using a solution containing sodium fluoride plus sodium hydroxide.

Bright Finishes

A variety of bright finishes, ranging from "mirror bright" to "diffuse bright," are produced either by chemical brightening, obtained by immersing the metal in certain acid solutions, or by electrolytic brightening—both methods producing visually similar results.

In electropolishing, minute irregularities in the metal surface are removed by making the article to be brightened the anode in an electrolyte. This process produces surfaces that are free from mechanical stresses and embedded abrasive particles, and also results in a somewhat different appearance than that produced by mechanical buffing.

For aluminum products there are two standard types of bright finish, designated as:

- a) **Highly specular:** This finish is the result of preliminary buffing, followed by electropolishing or chemical brightening, and produces a mirror like surface on certain alloys. It is widely used as a finish for reflectors.
- b) **Diffuse bright:** A finish generally produced by first applying a caustic etch (medium matte) finish, followed by chemical brightening.

Conversion Coatings

Although chemical conversion coatings are generally used on aluminum to prepare the surface for painting, some types can also be used as a final finish.

Since the natural oxide film on aluminum surfaces doesn't always provide a good bond for paints, other organic coatings, and laminates, its chemical nature is often "converted" to improve adhesion and undercoating conversion protection. These "conversion films" or "conversion coatings" are generally applied by use of phosphate or chromate solutions, many of which are proprietary in nature. One of the simplest methods of improving the adhesion of organic coatings is to etch the surface with a phosphoric acid solution, thus providing a good mechanical bond.

The conversion "finishes" commonly used are:

- a) **Acid-chromate fluoride treatments**, also provided by proprietary chemicals and result-

ing in either clear or yellowish surface colors. Finishes of this type are usually governed by ASTM B 449, Specifications for Chromates on Aluminum. The proprietary solutions used include Bonderite 714 and 721, Alodine 1200 series, NR2 and NR3, and Iridite 14 and 14-2.

- b) **Acid-chromate fluoride phosphate treatments**, which generally employ proprietary chemical processes and result in either a clear or typically greenish surface color. Among the more common of these processes are Alodine 407-47 and 401-45, and Bonderite 701, the former producing a light green surface suitable as a final finish.

- c) **Acid-chrome free phosphate free fluoride treatments** usually use proprietary chemical processes and produce a clear or iridescent surface color. Among the proprietary finishes of this type is Alodine 4830/4831

NOTE: Alodine, Bonderite and Iridite are registered trade names of Parker/Amchem and Allied Kelite Division of The Richardson Company, respectively.

Anodic Coatings

Probably the most important, and certainly the most unique, of all of the aluminum finishes is that provided by the anodizing process. In essence, the anodizing process consists of immersing the aluminum to be anodized in an appropriate acid solution, referred to as the electrolyte, and passing a direct electric current between the aluminum and the elec-

PRECAUTIONS

Regarding the Use of Chemical Finishes on Aluminum

Proper pretreatment is absolutely essential to the satisfactory performance of the subsequently applied finishes. For organic coatings it should take place immediately prior to the application. Strict quality control is a necessity throughout the process.

Chemically brightened finishes for large surfaces such as fascias and spandrel panels can cause handling problems and some difficulty in obtaining uniformity under production conditions.

Chemical finishing of assemblies involving different metals or alloys is usually impractical because each of the different metals or alloys is likely to be affected differently.

All surface protective coverings such as non-adhesive papers, adhesive papers, and strippable plastic films should be removed after receipt at the site as soon as there is no longer a need for the protection. These coverings can affect the surface finish and become brittle and unpeelable under exposure to sunlight and the elements.

trolyte, with the aluminum acting as the anode. This results in the controlled formation of a durable oxide film or coating on the surface of the aluminum. In general, such coatings are many times thicker than the naturally formed oxide film and can be transparent, translucent or opaque, depending on the alloys and/or processes used. Anodic coatings do not affect the surface texture of the aluminum, however fine this texture is, but they greatly increase resistance to corrosion and provide increased resistance to abrasion.

Proper surface treatment prior to anodizing is essential. This will require the use of the appropriate chemical cleaning and finishing processes described under **Chemical Finishes**. If soil or grease are present their removal by vapor degreasing or inhibited chemical cleaner is the first requirement. All metal residue from finishing or grinding must also be removed. Chemical etching or brightening are commonly used following the cleaning where the final appearance requires such preanodizing treatments. Etching is the most economical and most extensively used pre finish. Its matte appearance is not only attractive, but it effectively conceals minor surface marring.

Pre anodizing treatments can receive one of the buffed, directional, non directional or patterned finishes described under **Mechanical Finishes**. However, "as fabricated" mill finishes on both sheet and extrusions are of a quality that eliminates the need for a subsequent mechanical finishing operation. Because of this, most architectural products today are simply etched and anodized.

Several different anodizing processes are presently used for architectural aluminum products. The principal differences in these processes are the solutions used for the electrolytes, the voltages and current densities required, and the temperature at which the electrolyte is maintained. Depending on which process is used, and the length of treatment time, the anodic coating will vary somewhat in thickness, hardness and porosity. Because of this there are some differences in the protective capabilities of the different coatings.

Clear anodic coatings are produced by the **sulphuric acid process** which was the first commercially used process for anodizing architectural aluminum. It imparts an excellent, comparatively thick, transparent, durable, protective coating to the aluminum surface, and it is economical.

Color anodic coatings are obtained by impregnating the coating with organic dyes or pigments, by using alloys and processes that produce integral color, or by electrolytically depositing pigments in the anodic film. The clear anodic coatings produced by the sulfuric acid process are suitable for accepting a wide variety of organic dyed colors considered sufficiently resistant to ultraviolet degradation for exterior use.

Integral color anodic coatings in the bronze-grayblack range are produced by both the basic sulfuric acid process and by proprietary mixed acid processes. These colors are durable, have good resistance to ultraviolet, and are widely used for exterior applications of architectural aluminum products. One such process also goes by the title Duranodic Process.

In the basic sulfuric acid anodizing process, integral colors can be obtained with certain controlled alloys and by employing lower temperatures and higher current densities than those used in the conventional process. Coatings so produced are referred to as integral color hardcoats. With proprietary mixed acid electrolyte processes, controlled alloys and higher current densities are also used, and temperatures are closely controlled as are the concentrations of the mixed acids. With mixed acids, integral colors can be obtained without the relatively low temperatures required for the sulfuric acid process, hence they are more economical to produce. The color and the shade of the oxide coatings produced by these processes are determined by the composition and temper of the alloys used, by the concentration of acids in the electrolyte, and by anodizing conditions such as time, temperature, and current density.

Brite Dip Anodizing is used primarily in the bathroom fixture industry. This 'brite' finish is accomplished by a mixture of Nitric acid and Phosphoric acid. The vapors from this process are environmentally hazardous and not available everywhere. There is a chemical brightening process, basically electropolishing, that is starting to replace the older more hazardous process when this brite appearance is requested.

Electrolytically deposited anodic coatings are produced by proprietary processes used in conjunction with sulfuric acid anodizing and provide colors in the light bronze to black range, similar to those produced by integral color processes and equally appropriate for exterior use.

The colors, as the name of the process implies, are obtained through the electrolytic deposition of colorfast, stable, metallic pigments in the base of the pores of the anodic coating by submersion in a metal salt bath, such as cobalt or tin, under low power.

For architectural applications the thickness and weight of the coating are of prime importance. Coatings specified for exterior applications exposed to atmospheric pollutants, or not having regular maintenance, should have at least 0.7 mil thickness and a minimum coating weight of 27 mg. per square inch. For resistance to extreme exposure conditions such as sea water or abrasive actions, integral color hardcoats up to 3.0 mils thick have been used.

In all of the architectural anodizing processes the subsequent sealing of the pores in the oxide coating is a prime essential. The sealing of the pores is done to make the coating nonabsorbent and to provide maximum resistance to staining and corrosion. Clear, integral color and electrolytically deposited color coatings are usually sealed in deionized boiling water or metal salt sealants.

Surfactants and wetting agents can be used, but they should be controlled so as not to cause poor adhesion of any organic overcoating.

Classification of Anodic Coatings

For purposes of identification, the various anodic finishes are classified by the Aluminum Association under four general types: General Anodic Coatings, Protective and Decorative Coatings, Architectural Class II Coatings and Architectural Class I Coatings. Each of these classifications has several subdivisions, as shown in Table 1-5, page 1-21.

The first two classifications apply to general industrial work, not to architectural products. Only the last two, as their names indicate, are of architectural interest and will be described here.

Architectural Class I Coatings

These are coatings 0.7 mil or more in thickness and weighing not less than 27 mg. per sq. in., or a density not less than 38 g per sq in., and include the hardest and most durable anodic coatings available. They are appropriate for interior architectural items subject to normal wear, and for exterior items that receive a minimal amount of cleaning and maintenance. It is possible to produce hard coat Class I finishes in thicknesses ranging from 1 to 3 mils.

Coatings in this range have been used successfully in such applications as railings on piers which are subject to severe salt water exposure. However, production of these thick hard coat finishes requires special anodizing facilities of which there are only a limited number in this country. Availability should be checked. Please note that the heavier Class I coating will actually enhance surface imperfections and blemishes rather than hiding them.

Architectural Class II Coatings

Thickness of these coatings ranges from 0.4 to 0.7 mils, with corresponding weights of from 15.5 to 27 mg per sq in., or a density ranging from 22 to 38 g per sq in.; the lower figures being the minimums recommended for architectural uses. Coatings of this class are appropriate for interior items not subject to excessive wear or abrasion, and for exterior items such as storefronts and entrances, which are regularly cleaned and maintained.

Quality Control Tests

After anodizing is completed, tests are performed on representative samples taken at random from the rack loads to determine that the coating meets the specified thickness and weight and is properly sealed. The following *ASTM Test Methods* for checking thickness and weight are universally accepted and recommended, and should be specified:

- *ASTM B 244, Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy Current Instruments.* This non destructive method determines coating thickness by the lift off effect of a probe coil that contacts the coating and generates eddy currents in the aluminum substrate.

- *ASTM B 137, Test Method for Measurement of Weight of Coating Mass per Unit Area on Anodically Coated Aluminum.* This test involves weighing a small sample of known surface area on an analytical balance, dissolving the coating in a solution that does not attack the aluminum, then reweighing the specimen and comparing weights.

Properly sealed anodic coatings are proof against absorption of coloring materials or staining. To check for proper sealing the following stain test can be used:

- *ASTM B 136, Test Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.*

PRECAUTIONS

Regarding the Use of Anodic Coatings on Aluminum

Anodic coating can be restored only by removing the coated item and refinishing it in the shop, at the cost of considerable time and expense. Items subject to heavy wear or abrasion should therefore either receive a sufficiently heavy coating to insure that it will not be worn through, or should be given some other type of finish that can be more easily restored.

Flash welding can be successfully done on frontal areas to be anodized, providing the "flash" is mechanically removed, but arc welding of assemblies to be anodized should be done only in concealed areas, because objectionable discoloring can result. If required, it should be undertaken only with the advice of a competent and experienced fabricator. The selection of filler rod for welding is also very important. If the wrong material is used, any exposed weld joint can turn black in the anodizing process. The most common filler rod if the aluminum is to be anodized is 5356 or 5856 Rod. Again, hidden welds if possible or minimal welds are preferred because even with these filler materials, a noticeably different shade in the weld area will be seen after anodizing.

Joints between large anodized panels should be interrupted with divider strips, shadow lines, or changes in plane or texture, rather than being treated as simple butt joints, to minimize variations in shade.

Assemblies which are to be anodized must have drainage holes provided, so that acid trapped in hollow areas can drain out and be properly flushed. Acid trapped in joints must also be thoroughly washed out. Otherwise, it will drain out after installation, causing objectionable stains.

When thick sheet is used for components which are to be anodized, and no grinding, polishing or buffing is required, a specialty sheet product should be specified, to minimize "structural streaking." Specialty sheet is not generally recommended, however, if mechanical finishing is intended, but the finish in such cases should be sufficiently textured to conceal the "structural streaking." If a textured finish is not acceptable, thicker specialty sheet can be used, provided extreme care is exercised during both the fabricating and finishing processes.

Composite structures consisting of wrought, cast, and welded aluminum will exhibit extreme ap-

pearance differences after anodizing due to their differing alloy composition and metallurgical structure. Aluminum that has been cold worked extensively, such as in tapered aluminum flagpoles and lighting support poles, can exhibit apparent color variation within a single alloy after anodizing. This color variation due to anodizing cold worked aluminum cannot be controlled. Anodizing should not be specified for composite or extensively cold worked structures when appearance differences are unacceptable.

In specifying color anodizing it must be recognized that each alloy produces its own characteristic shade, and specific colors can be provided only by certain alloys. The selection of alloys should be carefully specified and controlled, and not mixed indiscriminately.

For example, the 'Duranodic' process mentioned above requires either of four series of alloys to get the proper color: 1100, 5000, 6000, or 7000. However, mixing them together in a structure, and in some cases within the same alloy (i.e. 6061 & 6063), does not provide the same coloring on the entire weldment. All will shade differently when anodized together.

Specifications should include the requirement of color samples showing the color range to be expected in production of any specific color and shade.

With the exception of lead and titanium, other metals should not be included in assemblies to be anodized, as the anodizing process will dissolve them.

All surface protective coverings such as adhesive paper and strippable plastic films should be removed as soon as possible after installation because they can become brittle and unpeelable under exposure to sunlight and weather, and under these conditions they can cause staining.

For maintenance of anodic finishes ordinary wax cleaners, soap or mild detergents and water are generally satisfactory. **DO NOT USE** alkaline or acid materials. Some anodizers offer touch-up materials, in either spray or liquid form, to their customers.

Refer to AAMA 609/610-02, "Cleaning and Maintenance Guide for Architecturally Finished Aluminum."

Quality of the seal can also be checked by the following ASTM and ISO (International Standards Organization) tests:

- ASTM B 680, *Test Method for Seal Quality of Anodic Coatings on Aluminum by Acid Dissolution.*
- ISO 3210, *Assessment of Sealing Quality by Measurement of the Loss of Mass after Immersion in Phosphoric Chromic Acid Solution.*
- ASTM B 457, *Test Method for Measurement of Impedance of Anodic Coatings on Aluminum.*
- ISO 2931, *Assessment of Quality of Sealed Anodic Oxide Coatings by Measurement of Admittance or Impedance.*

Recommendations of the proprietary process anodizers should be followed with regard to seal tests.

Guide Specifications and Inspection Methods

Four publications of the American Architectural Manufacturers Association (AAMA) are recommended as references for those who desire more detailed information or who require guidance on specifying and inspecting anodized finishes for architectural aluminum products. These publications are listed below:

- AAMA 611-98, *Voluntary Specification for Anodized Architectural Aluminum.*
- AAMA 2603-02, *Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.*
- AAMA 2604-02, *Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.*
- AAMA 2605-02, *Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.*

Care and Maintenance of Anodized Aluminum

(The material appearing in this section has been excerpted from AAMA "Care and Handling of Architectural Aluminum from Shop to Site," CW-10-97. See also, Chapter 5, Applied Coatings.)

General Considerations

Building owners and managers, along with the architects who have designed their buildings, have

always been concerned about the appearance of the exterior wall. The attractiveness of the wall design and the continued excellent appearance of a properly located building brings in and keeps satisfied tenants. The architect who has specified anodized aluminum wall and window components has done so first because of the beauty which can be achieved with such anodized finishes and second because of the long life, durability, and low maintenance that these finishes provide. It then becomes the responsibility of the building owner or manager to see that the original beauty of the building exterior is maintained in order to preserve the desirability and profitability of the property.

The American Architectural Manufacturers Association, recognizing the need for the aluminum industry to provide information on the care and maintenance of exterior wall finishes, released a publication titled "*Cleaning and Maintenance Guide for Architecturally Finished Aluminum*, AAMA 609/610-02." This specification outlines methods, equipment, and materials to clean anodized aluminum after construction and for subsequent, periodic maintenance. The methods outlined are applicable to architectural products fabricated from both rolled and extruded shapes, including window and door frames, store fronts, and entrances, curtain walls, mullions, hand rails, flag poles, and hardware. The information provided in the specification is useful to building owners, managers, architects, contractors, and others in the building industry who are interested in the proper care and maintenance of anodized aluminum.

As with any finished building material, aluminum requires reasonable care prior to and during installation and periodic cleaning and maintenance after installation. Although anodized aluminum is exceptionally resistant to corrosion, discoloration and wear, its natural beauty can be marred by harsh chemicals, abuse, or neglect. Such conditions usually affect only the surface finish but do not reduce the service life of the aluminum. All exterior surfaces collect varying amounts of soil and dirt, depending on geographic area, environmental conditions, finish and location on the building. These factors and the owner's attitude regarding surface appearance determine the type and frequency of cleaning required. The aluminum cleaning schedule should be integrated with other cleaning schedules for efficiency and economy. For example, both the glass and the aluminum

curtain wall can be cleaned at the same time.

Cleaning may be required more often in one geographic area than another when appearance is of prime importance. More frequent cleaning will be required in heavy industrialized areas than in rural areas. Seasonal rainfall can affect washing frequency by removing water soluble deposits and less adherent soil. In foggy coastal regions, frequent cycles of condensation and drying can create a heavy buildup of atmospheric salts and dirt which can adhere tenaciously. In climates where the rainfall is low, the opportunity for atmospheric washing of the surface is minimal. Los Angeles, for example, with its unique combination of limited rainfall, temperature fluctuation, smog and condensation, requires that aluminum be cleaned more frequently than in other metropolitan areas with more frequent rainfall.

In both wet and dry climates, recessed and sheltered areas usually become more heavily soiled because of the lack of rain washing. More frequent and longer periods of condensation also occur in protected areas, increasing the adhesion of the soil. This is particularly true of soffit areas on overhangs, bottoms of fascia panels, sheltered column covers, and the like. Periodic maintenance inhibits long term accumulation of soil which, under certain conditions, can accelerate weathering of the finish.

Cleaning Procedures

Cleaning procedures for aluminum should be initiated as soon as practical after completion of installation to remove construction soils and accumulated environmental soils and discolorations.

Cleaning work should start at the top of the building and proceed to the ground level in a continuous drop. Using a forceful water spray, an area the width of the stage or scaffolding should be rinsed as cleaning proceeds from the top down.

Because surface soils can be light or heavy, several progressively stronger cleaning procedures can be employed depending on the severity and tenacity of the soil. Only trial and error testing can determine which will be most effective. The simplest procedure to remove the soil is the one which should be used.

For light soils, the simplest procedure is to flush the surface with water using moderate pressure. If soil is still present after air drying the surface, scrubbing with a brush or sponge and concurrent spraying

with water should be tried. If soils still adhere, then a mild detergent cleaner should be used with brushing or sponging. Washing should be done with uniform pressure, first horizontally then vertically. Following the washing, the surfaces must be thoroughly rinsed by spraying with clean water.

If it is necessary to remove oil, wax, polish, or other similar materials, methyl-ethyl-ketone (MEK) or an equivalent solvent is recommended for clean up. Extreme care must be exercised when solvents of this type are used since they can damage organic sealants, gaskets and finishes. These solvents should never be used on anodic finishes protected by clear organic coatings unless the organic coating has deteriorated and should be removed.

Removing heavy surface soils can require the use of an abrasive cleaning pad. In this procedure the pad is thoroughly soaked with clean water or a mild detergent cleaner and the metal surface is hand scrubbed with uniform pressure. Scrubbing action should be in the direction of the metal grain. Scrubbing with a nylon cleaning pad impregnated with a surface protectant material is also recommended for removing stubborn soils and stains. After scrubbing, the surface should be rinsed thoroughly with clean water to remove all residue. In some circumstances it is necessary to wipe the surface with a solvent. The surface is then permitted to air dry or is wiped dry with a chamois, squeegee or lint free cloth.

Power cleaning tools can be used to remove unusually heavy soils from large areas including panels and column covers. When using such tools, the surface must be continually flushed with clean water or a mild detergent cleaning solution to provide lubrication and a medium for carrying away the dirt. After an area has been machine scrubbed, it must be rinsed with clean water and thoroughly scrubbed with a fairly stiff bristle brush. The surface is then either air dried or wiped dry.

Inspection

It is suggested that the building owner or manager provide an engineer or other qualified representative to inspect the cleaning work. Care must be taken to see that metal seams, crevices, sills, and other areas that can trap water, cleaner, or dirt are carefully cleaned and dried. A final inspection to ensure that no discoloration or stains remain on the surface is recommended.

Cleaning Precautions

Certain precautions must be taken when cleaning anodized aluminum surfaces. Aluminum finishes must first be identified to select the appropriate cleaning method. Aggressive alkaline or acid cleaners must never be used. Cleaning hot, sun heated surfaces should be avoided since possible chemical reactions will be highly accelerated and cleaning non uniformity could occur. Strong organic solvents, while not affecting anodized aluminum, can extract stain producing chemicals from sealants and can affect the function of the sealants. Strong cleaners should not be used on window glass and other components where it is possible for the cleaner to come in contact with the aluminum. Excessive abrasive rubbing should not be used since it could damage the finish.

Field Protection and Maintenance

Field protection and maintenance of cleaned surfaces is of particular interest. A wipe-on surface protectant is now available which is estimated to provide protection for 12 to 24 months in the harshest environments. This protectant is applied to a thoroughly cleaned and dried anodized surface with a lint free cloth or felt pad. The benefits of such an application are twofold; first, it protects the finish, and second, it makes subsequent maintenance easier. Subsequent maintenance can be reduced to simply flushing the surface with water, permitting it to dry and wiping on a surface protectant every few years. In applying this protectant it is very important that the manufacturer's recommendations be carefully followed.

Equipment and Products

Equipment and products needed for cleaning and maintaining anodized aluminum finishes are listed in Section 7 of AAMA 609/610-02. These include mild soaps, detergents, non etching cleaners, abrasive cleaning pads and cleaning machines. AAMA, however, has not evaluated these materials nor does its listing constitute an endorsement. This list is included only as an aid to potential users in identifying the materials.

Many waxes are available for application to anodized finishes, but they are best used on interior items such as hand rails, doors, and decorative metals. It is generally not practical to use these materials on high rise portions of a building.

Care and Maintenance of Painted Aluminum

(The material appearing in this section has been excerpted from AAMA CW-10-97, Care and Handling of Architectural Aluminum from Shop to Site.)

General Considerations

Care and maintenance guidelines for anodized aluminum also apply to painted aluminum. The architect depends on the finish to provide the beauty in the building he has designed. The building owner and manager want to preserve this beauty thereby preserving the desirability and profitability of the property.

As in the case of anodized aluminum, the American Architectural Manufacturers Association released a publication *Cleaning and Maintenance Guide for Architecturally Finishes Aluminum*, AAMA 609/610-02. This guide outlines methods, equipment, and materials applicable for cleaning architecturally finished aluminum after construction and for subsequent periodic maintenance.

Organic aluminum coatings do not normally show an appreciable amount of dirt accumulation. In many atmospheres, dirt and soil would not be detrimental to the coating, but cleaning and surface care is desirable for the sake of appearance. In areas where heavy industrial deposits have dulled the surface, where materials from construction processes have soiled the surface; or where cleaner has run down from other surfaces, surface cleaning is desirable.

Climatic conditions affect the cleanliness of organic coatings in the same way they affect anodized coatings. In some areas rainfall can be sufficient to keep exterior surfaces looking clean and bright. In areas of low rainfall or in heavily industrialized areas, periodic cleaning will be necessary. This is also true of foggy coastal regions with frequent cycles of condensation and drying which can cause a build up of atmospheric salts and dirt. In any climate, sheltered areas under overhangs can become soiled from lack of rain washing. Cleaning painted aluminum components in the exterior wall may be scheduled along with cleaning the glass.

If automatic wall cleaning equipment is to be used on a building, a test should be made early in the equipment design to ensure that the cleaning solutions and brushes, as well as the frequency of cleaning, will have no detrimental effect on the coating.

Cleaning Procedures

Painted surfaces should be cleaned as soon as possible after installation to remove construction soils and accumulated environmental soils. Ideally, a forceful water rinse from the top down should be employed before applying any cleaner. Some type of surface agitation helps. A low volume of water at moderate pressure is better than a high volume at low pressure. Rubbing the surface with soft brushes, sponges or cloth during the rinsing also helps.

If a simple water rinse with brushing, sponging, or rubbing with a cloth is not sufficient to remove the soil, a mild detergent or mild soap will be necessary.

Washing with a mild detergent or mild soap should be done by brushing or sponging with a uniform pressure, first horizontally, then vertically. Following the washing, the surfaces must be thoroughly rinsed with clean water. If the cleaner has been permitted to dry, sponge the surfaces while rinsing, if necessary. Rinsed surfaces are permitted to air dry or wiped dry with a chamois, squeegee or lint free cloth.

Cleaner run down should be minimized and those areas subject to run down should be rinsed immediately, and as long as necessary, to lessen the probability of streaking.

Cleaning chemicals must not be allowed to collect on surfaces, to "puddle" on horizontal surfaces or to collect in joints and crevices. These surfaces, joints and crevices should be thoroughly flushed with water and dried.

Mild detergents and soaps, which are safe for bare hands, should be safe for coated aluminum. Stronger detergents, such as some dishwasher detergents, should be carefully spot tested. Some of the latter would necessitate using rubber gloves and long handled brushes. Some mild cleaning solutions are available for automatic building washing machines.

Mild solvents such as mineral spirits can be used to remove grease, sealant or caulking compounds. Stronger solvents or solvents containing cleaners can soften paints. To prevent damage to the finish, the coating manufacturer should be consulted and these types of solvent or emulsion cleaners should first be spot tested. Care should be taken to assure that no surface marring takes place in this manner since it could give an undesirable appearance at certain viewing angles. Cleaners of this type are usually

applied and removed with a clean cloth. Remaining residue should be washed with mild soap and rinsed with water. Use solvent cleaners sparingly.

Since solvents can extract materials from sealants which could stain the painted surface or could prove harmful to sealants, their possible effects must be considered. Test a small area first.

If cleaning heavy tenacious surface soil or stubborn stains has been postponed, a more aggressive cleaner and technique is required. Cleaner and technique should be matched to the soil and the painted finish. Some local manual cleaning may be needed at this point. Always follow the recommendations of the cleaner manufacturer as to proper cleaner and concentration. Test clean a small area first. Cleaners should not be used indiscriminately. Do not use excessive, abrasive rubbing since it can alter surface texture or impart a "shine" to the surface.

Dried concrete spillage on the painted surface can be quite stubborn to remove. Special cleaners and/or vigorous rubbing with non abrasive brushes or plastic scrapers may be necessary.

Diluted solutions of Muriatic Acid (under 10%) can be effective in removing dried concrete stains, and effective proprietary cleaners for concrete and mortar staining are available. However, a test area should be tried first, and proper handling precautions must be exercised for safety reasons.

Mixing cleaners **can be very dangerous**, as well as ineffective. For example, mixing chlorine containing materials such as bleaches, with other cleaning compounds containing ammonia, can produce poison gas.

Always rinse the surface after removing heavy surface soil.

Summary of Cleaning Tips

- Overcleaning or excessive rubbing can do more harm than good.
- Strong solvents (MEK for example) or strong cleaner concentrations can cause damage to painted surfaces.
- Avoid abrasive cleaners. Do not use household cleaners that contain abrasives on painted surfaces.
- Abrasive materials such as steel wool, abrasive brushes, etc., can wear and harm finishes.
- Avoid drips and splashes. Remove run downs as quickly as possible.

- Avoid temperature extremes. Heat accelerates chemical reactions and can evaporate water from solution. Extremely low temperature can give poor cleaning results. Cleaning under adverse conditions can result in streaking or staining. Ideally, cleaning should be done in shade at moderate temperature.
- Do not substitute a heavy duty cleaner for a frequently used, mild cleaner.
- Do not scour painted surfaces.
- Never use paint removers, aggressive alkaline, acid or abrasive cleaners. Do not use trisodium phosphate or highly alkaline or highly acid cleaners. Always do a test surface.
- Follow manufacturers recommendations for mixing and diluting cleaners.
- Never mix cleaners.
- To prevent marring, make sure cleaning sponges, cloth, etc., are grit free.
- "An ounce of prevention is worth a pound of cure."
- In addition to the foregoing, consideration must be given to the effects run down can have on shrubbery, personnel, equipment and other

items located below. Such considerations can affect the timing in the cleaning schedule.

Inspection

It is suggested that the building owner or manager provide a qualified inspector to see that the cleaning operations are carried out in accordance with the recommended procedures.

Standard Finish Designations (as established by the Aluminum Association)

For many years, each of the prime producers of aluminum had his own system for identifying the many different finishes available. This resulted in a bewildering assortment of unrelated finish symbols, confusing to both architects and fabricators. Recognizing the necessity of correcting this situation, the Aluminum Association, in 1959, formed a committee representing all of the major producers, to study the problem and formulate an industry wide designation system acceptable to all.

The result was the Aluminum Association Finishes Designation System, adopted by the Association in 1963 and first published in 1964. Subsequent developments in anodizing processes,

Table 1-1: Finishes for Aluminum Hardware

Listed in this table are the Builders Hardware Manufacturers Association (BHMA) designations for finishes most commonly in use today on aluminum hardware. Since U.S. Finish Designations occasionally appear in specifications, the nearest U.S. equivalents of the BHMA code numbers are shown on the list. For a complete listing and descriptions of hardware finishes refer to *ANSI/BHMA A156.18, American National Standard for Materials and Finishes*.

Code No.	Description	Nearest US Equivalent
627	Satin aluminum, clear coated	US27
628	Satin aluminum, clear anodized	US28
666	Bright brass plated, clear coated	US3
667	Satin brass plated, clear coated	US4
668	Satin bronze plated, clear coated	US10
669	Bright nickel plated	US14
670	Satin nickel plated	US15
671	Flat black coated	US19
672	Bright chromium plated over nickel	US26
673	Aluminum clear coated	USP
688	Satin aluminum, gold anodized	US4

minor modifications, and several new designations have resulted in the current (revised) Designation System.

The Aluminum Association's Finish Designation System, as explained in the following discussion, is designed to cover all commonly used finishes, and provides also for accommodating new finishes as they are developed. The National Association of Architectural Metal Manufacturers endorses this system and recommends its consistent use not only by all of its member companies but by all those who are concerned with identifying and specifying aluminum finishes.

In this system, seven categories—the mechanical finishes, the chemical finishes, and five types of coatings—are designated by different letters as follows:

Mechanical Finishes	M
Chemical Finishes	C
(including conversion coatings)	
Anodic Coatings	A
Resinous and Other Organic Coatings....	R
Electroplated and Metallic Coatings	E
Vitreous Coatings	V
Laminated Coatings	L

Each of these categories in turn includes a variety of specific finishes bearing an identifying two digit number. The designation for any finish, then, consists of one of these seven letters followed by two digits. In the case of Protective and Decorative Anodic Coatings (Table 1-5) three digit numerals are used to further define them by minimum coating thickness and weight. To date, however, numbers have been assigned to only those finishes classified as Mechanical Finishes (Table 1-3), Chemical Finishes (Table 1-4) and Anodic Coatings (Table 1-5).

The method tentatively recommended for identifying other types of coating finish is explained in Table 1-2, which summarizes the system in its present form. It will be seen that designations have not yet been determined for many of the specific types of applied coatings. This matter is still under study, however, and it is anticipated that the sys-

tem will be extended to include at least the more common of these finishes.

The descriptions of finishes given under the heading "Examples of Methods of Finishing" in Tables 1-3, 1-4, and 1-5 are intended only as illustrations of appropriate methods and not as specifications. Alternatives to these methods of obtaining the finish are acceptable, provided that an equivalent finish is produced. There are many variations and limitations of both equipment and procedures in the finishing industry which require modifications of such suggested methods.

Explanation of the Use of the System

Where only a simple finish is called for, a single designation is used alone (e.g. M33), but more frequently two or more designations will be combined to form a composite designation identifying a sequence of operations leading to a final finish (e.g. C22A31).

When designations for chemical or applied finishes are used alone, it is to be understood that other processing steps normally used as preparation for the specified finish can be used at the option of the finisher. When a finish requires two or more treatments of the same class, the class letter should be repeated, followed in each case by the appropriate two digit numeral.

The use of the letter 'x' in all categories of the designation system (e.g. M1x, C2x, etc.) requires additional explanation. This symbol indicates that the Aluminum Association has not yet assigned any specific designations in the classification so designated; any finishes in these categories presently have no recognized numerical designation and must therefore be described in words.

The 'x' symbol is to be used by the specifier; he should not arbitrarily substitute a digit of his own selection in place of the "x."

The procedure to be followed where such finishes are concerned is illustrated in Examples 4 and 5 on page 1-17.

The examples on the following page illustrate the use of the system. Note that each designation is preceded by the letters AA to identify it as an Aluminum Association designation.

Hardware Finishes

Architectural hardware finishes are designated by code numbers established by the Builders Hardware Manufacturers Association (BHMA). The nearest US equivalents of BHMA numbers are listed in its standard *ANSI/BHMA A156.18-2000*. Samples of selected finishes are available from its New York office. The equivalent aluminum finishes are listed in Table 1-1.

Example 1 – Architectural Building Panel

To specify a matte anodized finish such as that produced by first etching the aluminum and then applying a durable clear anodic coating, the architect would use the designation

AA – C22A41, which represents:

C22 – Chemical Finish, Etched, Medium Matte (Table 4)

A42 – Anodic Coating, Architectural Class 1, clear coating 0.7 mil or thicker (Table 5)

Example 2 – Architectural Extrusion with Integral Color

If an architect wishes to specify an anodized finish with a non specular surface and an integral color, he uses the designation

AA – M12C22A42, of color to match approved sample.

These symbols represent:

M12 – Mechanical Finish, Non specular as fabricated (Table 3)

C22 – Chemical Finish, Medium Matte (Table 4)

A42 – Anodic Coating, Architectural Class 1, Integrally colored coating 0.7 mil or thicker (Table 5)

Example 3 – Extruded Assembly, Welded, with Integral Color

Because of the necessity of dressing down and blending the welded areas, a directional textured, rather than bright finish is usually specified in this case, though for some products concealed welding can be successfully used to join prefinished parts. The designation (for a directional finish) should be

AA – M32A42, of color to match approved sample. This calls for:

M32 – Mechanical Finish, Directional Textured, Medium Satin (Table 3)

A42 – As in Example 2 above

Example 4 – Etched Finish with Clear Lacquer Protection

Since clear lacquer is a type of organic coating and, as such, has no specific finish designation, the type to be used must be specified.

This finish, then, would be designated approximately as follows:

AA – C22R1x, using "ABC" Company's clear methacrylate lacquer No. _____,
applied in two coats with interim drying, to a total thickness of 0.6 mils.

(C22 designates a medium matte etch).

Example 5 – Patterned Sheet with Organic Coating

In this case, both the pattern and the coating must be specified, and the designation would be

AA – M1xC41R1x, using "One" Company's pattern No. _____ and
"Another" Company's (brand) coating, _____
_____color, applied... (state requirements)....

(C41 designates acid chromate fluoride pretreatment)

TABLE 1-2 - SUMMARY OF STANDARD DESIGNATIONS FOR ALUMINUM FINISHES

All designations are to be preceded by the letters AA, to identify them as Aluminum Association designations.
Finishes printed in boldface type are those most frequently used for architectural work.

MECHANICAL FINISHES (M)			
As Fabricated	Buffed	Directional Textured	Non-Directional Textured
M10—Unspecified	M20—Unspecified	M30—Unspecified	M40—Unspecified
M11—Specular as fabricated	M21—Smooth specular	M31—Fine satin	M41—Extra fine matte
M12—Non-specular as fabricated	M22—Specular	M32—Medium satin	M42—Fine matte
M1x—Other	M2x—Other	M33—Coarse satin	M43—Medium matte
		M34—Hand rubbed	M44—Coarse matte
		M35—Brushed	M45—Fine shot blast
		M3x—Other	M46—Medium shot blast
			M47—Coarse shot blast
			M4x—Other
CHEMICAL FINISHES (C)			
Non-Etched Cleaned	Etched	Brightened	Chemical Conversion Coatings
C10—Unspecified	C20—Unspecified	C30—Unspecified	C40—Unspecified
C11—Degreased	C21—Fine matte	C31—Highly specular	C41—Acid chromate-fluoride
C12—Inhibited	C22—Medium matte	C32—Diffuse bright	C42—Acid chromate
chemical cleaned	C23—Coarse matte	C33—Highly specular	fluoride-phosphate
C1x—Other	C24—Fine matte	C3x—Other	C43—Alkaline chromate
	C25—Adhesion pretreatment		C44—Non-chromate
	C26—Desmut		C45—Non-rinsed chromate
	C27—Desmut		C46—Non-rinsed non-chromate
	C28—Etched designs		C4x—Other
	C2x—Other		
ANODIC COATINGS (A)			
General	Protective and Decorative	Architectural Class II	Architectural Class I
A10—Unspecified	A21*—Clear (natural)	A31—Clear (natural)	A41—Clear (natural)
A12—Chromic acid anodic	A22*—Integral color	A32—Integral color	A42—Integral color
A13—Hard, wear and abrasion resistant coatings	A23*—Impregnated color	A33—Impregnated color	A43—Impregnated color
A14—Nonchromate adhesion pretreatment	A24—Electrolytically deposited color	A34—Electrolytically deposited color	A44—Electrolytically deposited color
A1x—Other	A2x—Other	A3x—Other	A4x—Other

*Third digit (1, 2 or 3) added to designate min. thickness in 1/10 mils. See TABLE 1-5

ELECTROPLATED (E)

E10—Unspecified

E1x—Specified

ORGANIC COATINGS (R), VITREOUS COATINGS (V), and LAMINATED COATINGS (L)

The following designations can be used until more complete systems are developed.

Resinous and Organic

R10—Unspecified

R1x—To be specified

Vitreous – Porcelain and Ceramic Types

V10—Unspecified

V1x—To be specified

Laminated

L10—Unspecified

L1x—To be specified

TABLE 1-3 - STANDARD DESIGNATIONS FOR MECHANICAL FINISHES

All designations are to be preceded by the letters AA, to identify them as Aluminum Association designations.

Type of Finish	Designation	Description	Examples of Method of Finishing
AS FABRICATED	M 10	Unspecified	
	M 11	Specular as fabricated	
	M 12	Non-specular as fabricated	
	M 1x	Other	To be specified.
BUFFED	M20	Unspecified	Optional with finisher.
	M21	Smooth specular	Polishing with grits coarser than 320 and finishing with 320 grit, using peripheral wheel speed of 6,000 fpm (30 m/s). Then buffing with tripoli based buffing compound, using peripheral wheel speed of 7,000 (36 m/s) to 8,000 fpm (41 m/s).
	M22	Specular	Buffing with tripoli compound, using peripheral wheel speed 7,000 (36 m/s) to 8,000 fpm (41 m/s).
	M2x	Other	To be specified.
DIRECTIONAL TEXTURED	M30	Unspecified	Optional with finisher.
	M31	Fine satin	Wheel or belt polishing with aluminum oxide grit of 320 to 400 size, using peripheral wheel speed of 6,000 fpm (30 m/s).
	M32	Medium satin	Wheel or belt polishing with aluminum oxide grit of 180 to 220 size, using peripheral wheel speed of 6,000 fpm (30 m/s).
	M33	Coarse satin	Wheel or belt polishing with aluminum oxide grit of 80 to 100 size; peripheral wheel speed of 6,000 fpm (30 m/s).
	M34	Hand rubbed	Hand rubbing with stainless steel wool lubricated with neutral soap solution. Final rubbing with No. 00 wool.
	M35	Brushed	Brushing with rotary stainless steel wire brush, wire diameter 0.0095 in. (0.24 mm); peripheral wheel speed 6,000 fpm (30 m/s) or various proprietary satin finishing wheels or satin finishing compounds with buffs.
	M3x	Other	To be specified.
NON-DIRECTIONAL TEXTURED	M40	Unspecified	Optional with finisher.
	M41	Extra fine matte	Air blasting with 200-mesh washed silica sand or aluminum oxide, using 45 psi (310kPa) pressure with gun held 8-12 inches (203-305 mm) from work at 90° angle.
	M42	Fine matte	Air blasting with 100 to 200-mesh silica sand or aluminum oxide. Air pressure 30 to 90 psi (207 to 621 kPa), depending on metal thickness; gun held 12 in. (305 mm) from work at angle of 60° to 90°.
	M43	Medium matte	Air blasting with 40 to 80-mesh silica sand or aluminum oxide. Air pressure 30 to 90 psi (207 to 621 kPa), depending on metal thickness; gun held 12 in. (305 mm) from work at angle of 60° to 90°.
	M44	Coarse matte	Air blasting with 16 to 20-mesh silica sand or aluminum oxide. Air pressure 30 to 90 psi (207 to 621 kPa), depending on metal thickness; gun held 12 " (305 mm) from work at angle of 60° to 90°.
	M45	Fine shot blast	Cast steel shot of ASTM size 70-170 applied by air blast or centrifugal force.
	M46	Medium shot blast	Cast steel shot of ASTM size 230-550 applied by air blast or centrifugal force.
	M47	Coarse shot blast	Cast steel shot of ASTM size 660-1320 applied by air blast of centrifugal force.
	M4x	Other	To be specified.

TABLE 1-4 - STANDARD DESIGNATIONS FOR CHEMICAL FINISHES

All designations are to be preceded by the letters AA, to identify them as Aluminum Association designations.

Type of Finish	Designation	Description	Examples of Method of Finishing
NON-ETCHED CLEANED	C10	Unspecified	Optional with finisher.
	C11	Degreased	Organic solvent using petroleum-based or chlorinated solvents.
	C12	Inhibited chemically	Inhibited chemical type cleaner, 4-6 oz/gal (30-45 g/L), used at 140°-180°F. Cleaned(60°-80°C) for 2 – 5 min with a pH between 4.5 to 8.5.
	C1x	Other	To be specified.
ETCHED	C20	Unspecified	Optional with finisher.
	C21	Fine matte	Tri-sodium phosphate, 3-6 oz/gal (22-45 g/L), used at 140°-160°F (60°-80°C) for 3-5 minutes.
	C22	Medium matte	Sodium hydroxide (caustic soda) 4-6 oz/gal (30-45 g/L), used at 130°-150°F (49°-66°C) for 5-10 minutes.
	C23	Coarse matte	Sodium fluoride, 1.5oz (11g), plus sodium hydroxide 4-6 oz/gal (30-45 g/L), used at 130°-150°F (54°-66°C) for 5-10 minutes.
	C24	Fine matte	Nitric Acid (25% vol) and hydrofluoric acid (1% vol) used at room temperature for 5 to 10 min.
	C25	Adhesion pretreatment	Sulfuric acid (98%) at 16.3% vol and 6% (wt) sodium dichromate with 0.25 oz/gal (1.9 g/L) of 2024 aluminum dissolved used at 140°-158°F (60°-70°C) for 9 to 30 min.
	C26	Desmut	Nitric acid, 25-50% by vol used at room temperature for 1-6 min (hydrofluoric acid can be added [1-5% vol]).
	C27	Desmut	Chromic acid, 13.35 oz/gal (100 g/L) plus sulfuric acid, 8 oz/gal (60 g/L) plus ammonium bifluoride 0.4 – 0.67 oz/gal (3-5g/L) used at ambient temperature for 1 to 6 min.
	C28	Etched designs	Ferric chloride (42% Be), 50% (vol) used at room temperature.
	C2x	Other	To be specified.
	C30	Unspecified	Optional with finisher.
BRIGHTENED	C31	Highly specular	Immersed in 73-83% (vol) phosphoric acid and 2-5% (vol) nitric acid (and additions of 0.01% copper and 10-12% aluminum phosphate) at 194°F (90°C) for 15 sec to 5 min.
	C32	Diffuse bright	Etched finish C22 followed by brightened finish C31.
	C33	Highly specular	Immersed in 15% phosphoric acid, 70% sulfuric acid used at 185°F (85°C) for 20 min with an applied current density of 140 asf (15 A/dm ²).
	C3x	Other	To be specified.
	C40	Unspecified	Optional with finisher.
CHEMICAL COATINGS	C41	Acid chromate-fluoride	Proprietary chemicals treatments of the following general makeup used producing clear to typically yellow colored surfaces – chromic acid (3.4 – 4.0 g/L) plus sodium dichromate (3.0 – 3.5 g/L) plus sodium fluoride (0.8 g/L) used at 86°F (30°C) for 3 min.
	C42	Acid chromate-fluoride-Phosphate	Proprietary chemical treatments of the following general makeup used producing clear to typically green colored surfaces – phosphoric acid (75%), 24 g/L plus sodium fluoride, 5 g/L plus chromic acid, 6.8 g/L.
	C43	Alkaline chromate	Proprietary chemical treatments used producing clear to typically gray colored surfaces.
	C44	Non-chromate	Proprietary chemical treatments of the following general makeup, using no chromates. Example 1: Potassium fluozirconate (K2ZrF4), 0.4 g/L plus ortho-boric acid (H3BO3), 5.0 g/L plus potassium nitrate, KNO3, 10 g/L plus nitric acid (HNO3), 0.4 mL used at 50° – 65°C for 5 to 15 min. Example 2: Zinc oxide, 10.2% wt plus nickel oxide, 1.85% plus phosphoric acid (75%), 44.3% plus nitric acid, 4.5% plus hydrofluoric acid (70%), 0.97% plus fluorosilic acid (35%), 4.2% used at 50°-65°C for 5 to 15 min.
	C45	Non-rinsed chromate	Proprietary chemical treatments in which coating liquid is dried on the work with no subsequent water rinsing.
	C46	Non-rinsed non-chromate	Proprietary chemical treatment in which coating liquid is dried on the work with no subsequent water rinsing.
	C4x	Other	To be specified.

TABLE 1-5 - STANDARD DESIGNATIONS FOR ANODIC COATINGS

All designations are to be preceded by the letters AA, to identify them as Aluminum Association designations.

Type of Finish	Designation	Description	Examples of Method of Finishing
GENERAL	A10	Unspecified	Optional with finisher.
	A11	Preparation for other applied coatings	0.1 mil (3um) anodic coating produced in 15% H ₂ SO ₄ used at 70° ± 2°F, (21° ± 1°C) 12 amp/sq ft (129 A/m ²) for 7 minutes, or equivalent.
	A12	Chromic acid anodizing coatings	To be specified. Example 1: chromic acid (2.5 – 3%) at 40°C at 0.1 – 0.5 A/dm ² for 5 to 30 min to produce a 2 - 15 um (0.1 – 0.6 mil) coating.
	A13	Hard, wear and abrasion resistant coatings	To be specified. Example 1: sulfuric acid (130 g/L) plus oxalic acid (14 g/L) used at 48 – 52°F at 36 asf for 20 min to produce a 1 mil coating.
	A14	Non-chromate adhesion pretreatment	To be specified. Example 1: Phosphoric acid (10%) used at 23 - 25°C at 10-12 V for 20 to 30 min to produce a 1-2 um (<0.1 mil) coating.
	A1x	Other	To be specified.
PROTECTIVE AND DECORATIVE (Coatings less than 0.4 mil thickness)	A21	Clear coating	Coating thickness to be specified. 15% H ₂ SO ₄ used at 70° ± 2°F (21° ± 1°C), 12 amp/sq ft (129 A/m ²).
	A211	Clear coating	Coating thickness - 0.1 mil (3um) minimum. Coating weight - 4 mg/in ² (6.2 g/m ²) min.
	A212	Clear coating	Coating thickness - 0.2 mil (5um) minimum. Coating weight - 8 mg/in ² (12.4 g/m ²) min.
	A213	Clear coating	Coating thickness - 0.3 mil (8um) minimum. Coating weight - 12 mg/in ² (18.6 g/m ²) min.
	A22	Coating with integral color	Coating thickness to be specified. Color dependent on alloy and process methods.
	A221	Coating with integral color	Coating thickness - 0.1 mil (3um) minimum; Coating weight - 4 mg/in ² (6.2 g/m ²) min.
	A222	Coating with integral color	Coating thickness - 0.2 mil (5um) minimum; Coating weight - 8 mg/in ² (12.4 g/m ²) min.
	A223	Coating with integral color	Coating thickness - 0.3 mil (8um) minimum; Coating weight - 12 mg/in ² (18.6 g/m ²) min.
	A23	Coating with impregnated color	Coating thickness to be specified. 15% H ₂ SO ₄ used at 70° ± 2°F (21° ± 1°C), 12 amp/sq ft (129 A/m ²) followed by dyeing with organic or inorganic colors.
	A231	Coating with impregnated color	Coating thickness - 0.1 mil (3um) minimum; Coating weight - 4 mg/in ² (6.2 g/m ²) min.
	A232	Coating with impregnated color	Coating thickness - 0.2 mil minimum; weight - 8 mg/in ² (12.4 g/m ²) min.
	A233	Coating with impregnated color	Coating thickness - 0.3 mil minimum; weight - 12 mg/in ² (18.6 g/m ²) min.
ARCHITECTURAL CLASS II (Coatings with 0.4 to 0.7 mil thickness)	A24	Coating with electrolytically deposited color	Coating thickness to be specified. Application of the anodic coating, followed by electrolytic deposition of inorganic pigment in coating.
	A2	Other	To be specified.
	A31	Clear (natural)	15% H ₂ SO ₄ used at 70° ± 2°F (21° ± 1°C), 12 amp/sq ft (129 A/m ²) for 30 min, or equivalent.
	A32	Coating with integral color	Color dependent on alloy and anodic process.
	A33	Coating with impregnated color	15% H ₂ SO ₄ used at 70° ± 2°F (21° ± 1°C), 12 amp/sq ft (129 A/m ²) for 30 min, followed by dyeing with organic or inorganic colors.
	A34	Coating with electrolytically deposited color	Application of the anodic coating, followed by electrolytic deposition of inorganic pigment in coating.
ARCHITECTURAL CLASS I (Coatings of 0.7 mil or greater)	A3x	Other	To be specified.
	A41	Clear (natural)	15% H ₂ SO ₄ used at 70° ± 2°F (21° ± 1°C), 12 amp/sq ft (129 A/m ²) for 60 min, or equivalent.
	A42	Coating with integral color	Color dependent on alloy and anodic process.
	A43	Coating with impregnated color	15% H ₂ SO ₄ used at 70° ± 2°F (21° ± 1°C), 12 amp/sq ft (129 A/m ²) for 60 min, followed by dyeing with organic or inorganic colors.
	A44	Coating with electrolytically deposited color	Application of the anodic coating, followed by electrolytic deposition of inorganic pigment in coating.
	A4X	Other	To be specified.

REFERENCES

For more detailed information on the subject of finishes for aluminum the following references can be contacted for their publications:

- Aluminum Anodizers Council (AAC), 1000 North Rand Road, Suite 214, Wauconda, Illinois 60084.
- The Aluminum Association (AA), 900 19th Street, NW, Washington, DC 20006; www.aluminum.org.
- Aluminum Company of America (ALCOA), 201 Isabella Street, Pittsburgh, PA. 15212 Technical Center, 100 Technical Drive, Alcoa Center, PA 15069; www.alcoa.com.
- American Architectural Manufacturers Association (AAMA), 1827 Walden Office Square, Schaumburg, IL 60173; www.aamanet.org.
- American Society for Metals (ASM International), 9639 Kinsman Road, Materials Park, OH 44073-0002; www.asm-intl.org.
- Architectural Metals, L William Zahner, John Wiley and Sons, New York, NY.
- Builders Hardware Manufacturers Association (BHMA), 355 Lexington Avenue, 17th Floor, New York, NY 10017; www.buildershardware.com.
- Electroplating Engineering Handbook, Van Nostrand Reinhold Publishing Corp., New York, NY.

Chapter 2: Finishes for The Copper Alloys

NAAMM/NOMMA AMP 500-06

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FINISHES FOR THE COPPER ALLOYS

General

Among the architectural metals, the copper alloys are unique in that they are the only ones possessing integral color. Natural colors vary, depending on the alloy used, ranging from the salmon pink of alloy 110 (copper), through the golden yellows of alloys 385 (Extruded Architectural Bronze), 280 (Muntz Metal) and 230 (Red Brass) to the warm whites of the nickel silvers. The natural color range is augmented by the effects of weathering; patinas or verdigris on antiques; and statuary or oxidized finishes achieved either by exposure to the elements or by accelerated means.

Originally the term "bronze" was applied only to copper-tin alloys, and the term "brass" to alloys of copper and zinc, but this distinction no longer holds. There is now no definite dividing line between these two general classes of the copper-base alloys.

Architects and architectural metal fabricators in common have, for years, referred to the principal architectural alloys of copper as "bronzes" despite the fact that of the five principal alloys so used, none contain tin and three of them, in fact, are true brasses. There is some justification for this, however, since the alloys 230 (Red Brass), 280 (Muntz Metal) and 385 (Extruded Architectural Bronze) do resemble tin bronze architectural castings in color, in both the natural and weathered states.

In the natural finish they are dubbed simply "yellow bronze"; in the intermediate brown weathered states, "statuary bronze"; and in the final weathered or patinated condition, "green bronze". Similarly, the nickel silver alloys are often referred to as "white bronze". In the acknowledgement of this long established custom, therefore, the term "bronze" will generally be used to designate all of these alloys, with the realization that two, three, or even more distinct alloys are frequently required in order to complete a given architectural composition. The common finishes for "bronze" are listed on page 2-3.

Just as with aluminum, many of the finishes listed in the preceding Summary are, as indicated, sup-

plied by processors or product manufacturers, rather than by the prime producers of the metal. The only true end-use finishes supplied at the mill, for architectural work, are the "As Fabricated" finishes; all of the others are referred to as process finishes, being supplied after the metal leaves the mill.

Fastener alloys generally used are 220 (Commercial Bronze, 90%) and 260 (Cartridge Brass, 70%). A Unified Numbering System (UNS) for metals and alloys developed by ASTM and SAE has been applied to copper alloys and is administered by CDA. To utilize the UNS system, simply prefix the present CDA alloy numbers by the letter C and add a suffix 00. Thus, for example, copper alloy No.385 becomes C38500 in the UNS system.

Mechanical Finishes

Mechanical finishes are those that involve the use of no chemical or electrochemical treatment and no additive, but provide a surface texture by mechanical means alone. These textures vary widely in character and range from the surface appearance resulting from the various production processes to highly reflective surfaces produced by successive grinding, polishing and buffing operations. Costs vary in proportion to the amount of processing required.

"As Fabricated" Finishes

The term "As Fabricated" refers either to the metal stock or to a fabricated product. As a finish designation for copper alloy stock it refers to the surface appearance and texture imparted to the metal by the rolling mill, extrusion press, or casting mold that shapes it. Subsequent fabrication operations on the copper alloy, such as forming, sawing, punching, drilling, milling, etc., including scratches, can mar the "as fabricated" finish. Under some conditions the marring can be corrected by simple mechanical deburring and smoothing. For other conditions the marring can result in an unacceptable "as fabricated" mechanical finish, and a subsequent finishing operation will be required and should be specified.

Summary of Typical Copper Alloy Finishes

Finish	Copper Development Ass'n Finish Designation (see page 2-11)	Finish Normally Supplied By		Relative Costs (on flat surfaces)
		Mill	Process- sor Fabricator or Finisher	
MECHANICAL				
As Fabricated	M10 Series	X		base
Buffed	M20 Series		X	medium to high
Directional Textured	M30 Series		X	low to medium
Non-Directional Textured	M40 Series		X	medium
Patterned	M4x (Specify)	X	X	low to medium ¹
CHEMICAL				
Cleaned only	C10 Series	X	X	base or low ²
Matte Dipped		X		base or low ²
Bright Dipped		X		base or low ²
Conversion Coatings	C50 Series		X	medium to high
COATINGS (see <i>Applied Coatings, Chapter 5</i>)				
Organic: Air Dry	060 Series		X	low to medium
Thermo-set	070 Series		X	low to medium
Chemical Cure	080 Series		X	low to medium
Vitreous		X		high
Laminated	L90 Series	X		medium to high
Metallic		X		medium to high

The term PROCESSOR, as used here, refers to a "middleman" between the mill and the fabricator, who applies coatings, textures or other finishes to metal bulk form, generally cut sheet or strip or coil stock. FABRICATOR refers to the producer of stock metal shapes or the manufacturer of the end-use product. He either provides the final finish or sends the fabricated product to a finisher who does this work. The FINISHER does not usually fabricate products but provides finishes, as specified, to products fabricated by others.

The RELATIVE COSTS indicated are necessarily approximate, for general guidance only. Exact costs vary considerably with quantity, type of product, method of application, quality of work, and other influences, and should always be verified.

¹ Certain embossed patterns, because of their stiffening effect, permit the use of thinner metal, and this saving can, in some cases, offset their cost. In other cases, patterned finishes involve extra costs.

² Pricing practice for these finishes varies with different prime producers.

"As Fabricated" mechanical finishes, as a class, are the simplest and least expensive obtainable. Such finishes can be quite acceptable for architectural applications and are widely used. Typical of these are specular "as fabricated" cold-rolled sheet and non-specular "as fabricated" extrusions. Highly polished rolls used at the mill for the final pass provide the specular finish on the cold rolled sheet. Carefully machined and well-maintained dies for the extrusion press ensure extruded surfaces free of objectionable die marks or striations.

These finishes vary somewhat, according to the metal-forming process used. Hot-rolled and heat-treated products have a comparatively dull surface finish and show a certain amount of darkening or discoloration, while cold-rolled surfaces have a brighter and more metallic color. Extruded products have an intermediate appearance somewhat resembling that of the cold-rolled items, and can have detectable surface striations caused by the extrusion die, while castings have a rougher matte finish.

The following are the typical variations of the "As Fabricated" finish:

- Unspecified:** This is the uncontrolled natural finish produced by extrusion, casting, hot-rolling, or cold-rolling with unpolished rolls. On rolled products it can vary from dull to rather bright and have stains or light films of rolling oil.
- Specular:** A mirror-like cold-rolled finish, produced on one or both sides of the sheet by final passing through highly polished steel rolls.
- Matte:** A dull finish produced by hot-rolling, extruding, casting or cold-rolling, followed by annealing.

Polished / Buffed Finishes

These are process finishes, applied by the product manufacturer, and are produced by successive processes of grinding, polishing, and buffing. Because they require a series of operations, they are more expensive than other mechanical finishes, their cost generally being proportional to

the smoothness and brightness provided.

Except for hardware items, fixtures, and occasional highlighting of extruded shapes, these finishes have only limited application to architectural products. Because of their high reflectivity, they should not be used on wide flat surfaces.

Among the many variations possible, two types are generally considered as standards:

- a) **Smooth specular (mirror-like):** This is the brightest mechanical finish obtainable and is produced by first polishing, then buffing. Polishing is an abrading operation that smooths the surface by removing a certain amount of metal. It is usually accomplished in several stages, using abrasive belts or polishing wheels of cloth, felt, or leather, with compounds containing fine aluminum oxide or silicon carbide abrasives. Coarser abrasives are used in the first stages, but final polishing is done with 320 or finer grits. The subsequent buffing process produces a smooth and lustrous surface, removing relatively little metal, but often producing an actual flow of the surface film under the frictional heat developed. The buffing wheels are usually made of stitched muslin discs, and the buffing compounds used consist of very fine abrasives in a suitable binder.
- b) **Specular:** This is a finish of somewhat lesser brightness and is provided by the polishing procedures described above, with some subsequent buffing, but not necessarily sufficient to remove all evidence of scratches and/or other surface imperfections.

Directional Textured Finishes

These are among the most common and popular of the process finishes used on architectural bronze, providing a smooth satiny sheen of limited reflectivity. Their characteristic soft texture results from tiny, nearly parallel scratches in the surface of the metal produced by wheel or belt polishing with fine abrasives, by hand rubbing with stainless steel wool, or by brushing with abrasive wheels.

In belt polishing, the fineness of the finish is controlled by the size of the grit used, the speed of the belt, the hardness of the block or pad used, the pressure exerted on the block, and the condition of the belt.

There are six standard variations of this type of finish:

- a) **Fine satin**
 - b) **Medium satin**
 - c) **Coarse satin**
 - d) **Uniform**
- Produced by wheel or belt polishing with aluminum oxide or silicon carbide abrasives ranging from 240–320 grit for fine satin to 60–80 grit for uniform, using a peripheral speed of approximately 6,000 ft/min (30 m/s).
- e) **Hand rubbed:** Usually provided by rubbing with No. 0 pumice and solvent on a fine brass wire brush or non-woven abrasive mesh pad. This is a relatively expensive finishing process, and is used only where the nature of the work makes other methods impractical. It is frequently employed, however, to even out and blend in satin finishes produced by other means.
 - f) **Brushed:** Coarser directional finishes are produced by using power-driven wire wheel brushes; brush-backed sander heads (Vonnegut wheels), abrasive-impregnated foamed nylon discs (Scotch-Brite®), or abrasive cloth wheels (PG wheels). The wire wheel brushes have wires of stainless steel, brass, or nickel silver; and the degree of fineness is determined by the diameter of the wire, speed of the wheel, and the pressure exerted on the work.

Non-Directional Textured Finishes

These are matte finishes of varying degrees of roughness, produced by spraying sand or metal shot against the metal under controlled conditions. Their principal use in architectural work is on items produced by casting.

The texture of the surface is determined by the size and type of abrasive used, the amount of air pressure, and the position and movement of the nozzle. The finer the abrasive, the smoother the finish. A comparatively rough finish is produced by using coarse silica sand, while the smoothest finishes result from dust blasting with a very fine abrasive or from "vapor honing" with a slurry of extremely fine abrasive and water.

It should be recognized that these finishes have limited applicability to architectural work. Because the impingement of the abrasive under pressure tends to distort the metal, their use is not recommended on material less than ¼ in. (6 mm) thick. There is usually difficulty in obtaining uniform appearance unless special equipment is used to regulate pressure and nozzle movement.

Since the surface produced by even the finest abrasive is actually rough, shows fingerprints, and collects and holds dirt, some type of protective treatment is necessary to retain a clean appearance. Clear organic coatings are usually used for this purpose. In stripping such coatings, complete removal from the roughened surface can prove difficult.

Sandblasted finishes are obtained by using an air blast with silica sand or aluminum oxide or different degrees of fineness that range from #100-#200 mesh for fine texture to #20 mesh for coarse.

The three standard grades of fineness for sandblast finishes are:

- a) **Fine matte**
- b) **Medium matte**
- c) **Coarse matte**

Shot blasting is used to provide peened and burnished finishes that are generally less rough than sandblasted finishes. Shot blasted finishes are obtained by using an air blast with metal shot ranging in size from S-70 for fine texture to S-550

PRECAUTIONS

Regarding the Use of Mechanical Finishes on Copper Alloys

An "As Fabricated" finish is the finish on the metal as it is received from the rolling mill, roll former, extrusion press, or casting mold, prior to any further mechanical, chemical, organic, or vitreous finishing operation. In many architectural applications this finish will be acceptable without further mechanical finishing. However, in some products, fabrication operations subsequent to the original as fabricated finish, such as forming, sawing, punching, drilling, milling, etc., can mar the finish so that it is not satisfactory for architectural applications. For such products it is necessary to perform additional mechanical finishing operations, and these should be specified.

Smooth specular finishes are shop applied by processing methods that are virtually impossible to use in the field. The use of this type of finish in traffic areas where the surface can be subject to marring must be avoided.

Specular finishes are shop applied also. Refinishing can be accomplished in the field, but it necessitates the use of expensive hand methods. These finishes should therefore be used only in areas where exposure to marring is minimal.

For areas not subject to close inspection, the cost of a satin finish is often not justified. An appropriate alternate is a low cost "uniform finish" (No. M36, Table 2-3) that can be applied by belt sanding in a single pass and is quite popular on extrusions, tubes and roll-formed shapes.

The appearance of waviness and buckling in large flat areas ("oil canning") can be minimized by specifying the use of matte or textured finishes or contoured surfaces. Another option is to use thicker material. Stretcher leveled and re-squared sheet also helps minimize "oil-canning." Highly polished or buffed finishes, on the other hand, tend to magnify such irregularities and should be used only on relatively small areas, or where "oil canning" is desired or not a concern.

Sandblasted or shot blasted finishes should not be specified for thin sheet, tube, or extrusions, because of the distortion usually caused by applying such finishes.

Because of difficulties encountered in maintenance, wire brushed finishes should be limited to small areas or highlighting.

All surface protective coverings such as adhesive paper and strippable plastic films should be removed as soon as possible after installation because they tend to become difficult to remove under exposure to sunlight and weather.

for coarse. The three standard grades of fineness for shot blast finishes are:

- a) **Fine shot blast**
- b) **Medium shot blast**
- c) **Coarse shot blast**

Patterned Finishes

Patterned finishes are also available in thin sheet, in a wide variety of sculptural designs and textures. These are produced by passing "as fabricated" sheet either between two machined matched-design rolls, impressing patterns on both sides of the sheet (embossing), or between a design roll and a smooth roll, "coining" one side of the sheet only. The embossing process usually increases the stiffness of the sheet, eliminates distorted reflections, and minimizes marring in service. Such patterned sheets are supplied by some mills and by secondary processors.

Chemical Finishes

Among the most important finishes for the copper alloys are those produced by chemical treatments. Such finishes are obtained by washing or dipping the fabricated product in chemical solutions that can be proprietary in nature, or by spraying or swabbing such solutions on the metal surface. In general, these processes have any of four principal purposes:

- to merely clean the surface, without otherwise affecting it,
- to provide a matte textured surface (by etching),
- to produce a smooth bright finish, or
- to chemically convert the surface film, changing the surface color of the metal and, at the same time, providing a final finish.

Some of these are not true finishes, but only intermediate steps in an overall finishing process. The matte and bright chemical finishes for copper alloys find relatively few architectural applications, the former in particular being used far less extensively than on aluminum. The conversion coatings, however, are of major importance and generally do provide final finishes.

Non-etch cleaning

Several types of chemical treatment are used to thoroughly clean copper alloys before applying

other finishes. They have no physical effect upon the surface of the metal, and cannot be classed as true finishes, but they produce a chemically clean surface that is free of all foreign matter such as oil, grease, fingerprints and soil of any kind.

Two such chemical cleaning methods are commonly used:

- a) **Degreasing:** Vapor degreasing exposes the metal to vapors from chlorinated solvents such as trichloroethylene and perchloroethylene. Special degreasing machines are used either as a batch method or as part of a continuous processing line. Solvent or solvent emulsion cleaning, with hydrocarbon solvents, is used to remove oil and greases from the metal surface and is less expensive than vapor degreasing. To achieve maximum cleanness, degreasing of any type should be followed by chemical cleaning.
- b) **Chemical cleaning:** This method is used when mineral and animal fats and oils must be removed. The metal can be sprayed with, or immersed in, any of a number of proprietary or non-proprietary solutions, usually at elevated temperatures; and then rinsed with water. Only *inhibited* chemicals are used on the copper alloys; the solutions used on ferrous metals are not appropriate because they attack the metal. Some of these inhibited cleaners use as their base a variety of newly developed alkalis and soaps such as sodium tetraborate, disodium phosphate, sodium silicate, and soaps made from various vegetable and animal oils, often with the addition of a wetting agent.

Matte Finishes

Although etched finishes are widely used for architectural aluminum, the term "etching," as used in the copper industry, usually refers to the process of producing surface designs or patterns by selective etching, rather than a type of overall finish. Overall matte finishes, referred to as "matte dipped" finishes, are produced on the copper alloys by chemical means and usually applied after first "bright dipping" the item. Such matte finishes are seldom used, however, on the architectural alloys of copper.

Bright Finishes

Bright dipped finishes also have only limited architectural application, being used chiefly to

prepare the surface for other finishing operations such as plating, or to improve the adherence of paint. They are produced by immersion in solutions of sulfuric acid and nitric acid with a small quantity of water and hydrochloric acid.

Conversion Coatings

The most interesting, and probably the most important, finishes for the copper alloys are the conversion coatings. They serve to chemically "convert" the surface film of the metal. In contrast to their typical uses on the other architectural metals, the principal function of these treatments, as used on the "bronzes," is not simply as a pre-treatment for applied coatings, but to alter the surface color of the metal and, at the same time, provide the final finish. Their purpose is often to duplicate, by accelerated chemical means, the natural weathered effects generally resulting after the metal is exposed to the elements from one to twelve years. Unfortunately, these processes depend largely upon art and craft techniques and are not wholly adequate to meet the current demand for uniform and economical coloring of large surface areas. There is a recognized need either to improve them or preferably to replace them with controlled, semi-automated processes.

These conversion treatments are of two general types: those producing the patinas or verdigris, and those producing the statuary or oxidized colors.

The **patinas**, in particular, are somewhat difficult to control, because successful generation of the conversion coatings is dependent upon a number of variables including temperature, humidity, surface condition of the metal, and method of application. Variations in color are not uncommon, and uniform coating development over large surface areas cannot be readily controlled. A true natural patina on close inspection is not fully uniform. A fully "uniform" conversion coating might be considered "unrealistic" if meant to simulate a naturally weathered surface. Patinated finishes are normally intended for non-traffic areas and in locations where little or no maintenance is required. Clear organic coatings can be applied to improve wear resistance in traffic areas but such applied coatings tend to alter the patina color.

In general, **patinas** are produced by the action of various chloride salts. A few processes employ sulfate-chloride or chloride-carbonate combina-

tions. Among the most common of these processes are the following:

- a) **Acid chloride treatments** develop the chloride salts of copper by use of a saturated solution of sal ammoniac in water, applied by brush or spray, or a cuprous chloride-hydrochloric acid solution, applied by spray or sponge.
- b) **Acid sulfate treatments** generally use the ammonium sulfate solution developed by the Copper and Brass Research Association. This is applied by spray, in a series of coatings, to produce the desired patina density.
- c) **Carbonate treatments** employ various carbonate solutions and are normally mill or process applied. These are seldom used for architectural work.

Note: Due to the popularity of the appearance of an "aged" patina look on copper, and traditional difficulty in achieving this appearance on exposed copper by field applied means, some copper mills are currently producing factory patinated sheet copper through proprietary methods.

Statuary bronze finishes are usually obtained by formation of a surface film of cuprous oxide or a mixture of copper sulfides. The ultimate appearance of the various statuary finishes is critically influenced by such factors as the natural color of the substrate (i.e. the alloy employed), the coarseness or fineness of the mechanical finish on the substrate, and the thickness of the translucent conversion film. Color uniformity depends entirely on the physical homogeneity and chemical cleanliness of the metal surface prior to the actual coloring operation. Statuary bronze finishes can be highlighted by cutting back the conversion coating with an abrasive. The toning achieved by this method can vary from a light golden color to black. Protection of highlighted finishes is desirable since the highlights disappear as the metal oxidizes (tarnishes).

The three most common coloring treatments of this type are:

- a) **Oxide treatments** develop the characteristic statuary brown colors through formation of cuprous oxide. Potassium permanganate and copper salt solutions are commonly used. Ox-

- ide treatments are seldom used for architectural work because of their relative instability.
- b) **Sulfide treatments** produce the statuary brown colors by various aqueous sulfide solutions. Common solutions of this type are potassium sulfide (liver of sulfur), sodium sulfide (liquid sulfur) and ammonium sulfide. Antimony pentasulfide (paste) is also used.
- c) **Selenide treatments** provide deep colors with fast acting selenide solutions. These solutions are toxic and must be handled with care.

PRECAUTIONS

Regarding the Use of Chemical Finishes on Copper Alloys

Neither matte dipped nor bright dipped finishes should be specified as final finishes. Uniformity is difficult to control in these finishes, and they are normally used as “in process” operations to prepare the surface for further finishing.

The appearance of statuary finishes is impaired by dirt, mill scale and fingerprints. Such disfigurements are magnified by the conversion process. Welding and brazing should be limited to concealed areas wherever possible, since weld and braze areas tend to color at different rates than the base metal.

Chemically produced statuary finishes are usually hand applied and require skilled artisans to achieve a uniform finish. Therefore, they tend to be difficult as well as expensive to produce and maintain.

For maintenance of statuary finishes, periodic rubbing with oil is generally recommended. If clear organic coatings were used to protect the original finish, care must be exercised in stripping the coating prior to re-oiling in order to avoid marring the conversion film.

All surface protective coverings such as adhesive paper and strippable plastic films should be removed as soon as possible after installation, because they tend to become brittle and unpeelable under exposure to sunlight and weather.

Clear Organic Coating Finishes

Applied organic coating finishes differ from mechanical and chemical finishes in that they serve their purpose by adding some form of covering, rather than by physically or chemically affecting the surface of the metal itself. Applied coatings applicable to all architectural metals are thoroughly treated in Chapter 5. However, because of the importance of selecting appropriate coatings for preserving the finishes on copper alloys, they are briefly reviewed here.

Clear organic coatings are essentially synthetic resins, natural resins, oils, or combinations of these in solvent solutions that either dry at ambient temperature or are heat cured to hasten solvent evaporation. They are designed to preserve the natural color of the copper alloys by providing a tough, thin barrier layer on the metal surface that effectively retards superficial tarnishing caused by weathering and handling. For most large scale architectural applications, air-dry coatings predomi-

nate, because it is impracticable to heat cure such coatings in situ at such time as coating renewal is required. In general, baked coatings tend to be more durable and resistant to abrasion and chemical attack than their air-dry counterparts. As might be expected, they are also more difficult to strip.

INCRALAC is a clear organic air-drying acrylic lacquer for field or shop coating of copper and copper alloys. In research initiated by the International Copper Research Association (INCRA), INCRALAC provided the best protection of all air-dry coatings tested.

When applied to a properly cleaned metal surface, INCRALAC provides excellent protection indoors. Although some protection is provided on exterior applications, periodic maintenance of the clear coating is required and should be taken into consideration.

The use of abrasive pads followed by washing with a cleaning solvent provides a surface for maximum performance. Steel wool should not be

used because it sometimes contains a corrosion inhibitor that can cause discoloration later. If abrasive pads are not available the surface should be thoroughly washed with a solvent or alkali cleaning solution, or by vapor degreasing. INCRALAC is designed for spray application and should not be brushed. Conventional spray equipment can be used, applying first a mist coat, followed by a wet coat. Two coats are recommended with at least 30 minutes air dry between coats. For some products, where spraying is not entirely satisfactory, dipping is an alternate method of application.

Other widely used clear coatings for both interior and exterior applications include the nitrocellulose lacquers. They are easy to apply and strip. Their chemical resistance is fair and their exterior durability limited so that they are normally renewed yearly. Nitrocellulose coatings are frequently modified with alkyd and acrylic resins in order to improve both durability and abrasion resistance.

Alkyd resins blended with melamine resins produce coatings with good chemical resistance and with durability satisfactory for exterior applications. Like the nitrocellulose coatings, the melamine modified alkyd coatings are relatively low cost. Unmodified alkyd coatings are seldom used.

Acrylic coatings provide good color retention and resistance to chemicals, impact, and abrasion. They are widely used for both exterior and interior architectural applications but are somewhat higher in cost than the previously discussed coatings.

Clear epoxy coatings exhibit excellent resistance to chemicals, impact, and abrasion. Their use on architectural components is limited by the fact that these coatings are only produced in heat cured or chemical catalyst cured formulations. The clear epoxies are primarily interior coatings. They tend to chalk and darken when exposed to the weather.

Color stable, low gloss, modified urethane coatings that retain the excellent chemical and abrasion resistance afforded by the urethane resins are available.

Pigmented coatings are sometimes employed by fabricators and metal maintenance firms to simulate the natural weathered or chemically induced statuary brown colors. Such simulations seldom achieve the desired result since they lack the subtle shading associated with both the natural and chemically induced statuary finishes.

Care and Maintenance of Finishes

Brown Statuary

Regularity is the key to a successful maintenance program. A schedule should be arranged providing periodic cleaning with regular inspections in the interim. The schedule should differentiate between interior and exterior surfaces, and those surfaces subject to handling, scuffing, and abrasion. When a regular maintenance program is followed, most installations can be maintained by oiling or waxing. Some can be maintained by lacquering and a few, by polishing.

Surfaces pre-finished or naturally weathered to the statuary bronze shades should be maintained by periodic oiling with Lemon Oil, U.S.P.; Lemon Grass Oil, Native E.I.; or a high grade paraffin oil.

Mixtures of Carnauba wax and wood turpentine, or beeswax and wood turpentine, as well as quality commercial paste waxes, have been found satisfactory. The costs of waxing versus oiling should be compared.

Oil and wax coatings look best when applied with a well-impregnated, clean, soft cloth followed by rubbing with a second clean, soft cloth to remove excess oil or wax. Frequency of oiling or waxing is as important as the oil or wax used. Newly installed metal should be oiled weekly for the first month in order to build up a protective film. Metals subject to heavy traffic should be oiled or waxed at one to two week intervals. Where traffic is moderate to light, monthly treatment is usually sufficient. In non-traffic areas, quarterly or semi-annual applications are feasible.

At a typical building entrance, door handles, push plates or bars, kick plates, and the door stiles and rails would normally be exposed to heavy traffic. The doorframe and adjacent window wall framing usually receive less handling and would be considered a moderate to light traffic area. Transoms, canopies, and similar metal elements normally out of reach would be classed as non-traffic areas.

To restore statuary finishes, the surfaces can be cleaned with a 5% oxalic acid and water mixture together with a finely ground India pumice powder. Wipe dry with soft clean cloths and apply the coloring solution.

Bronze and other copper alloys can be restored to their original appearance even after years of neglect. Restoration of neglected surfac-

es can require the advice of specialists engaged in maintenance work.

Green Patina

Copper, brass, and bronze are resistant to destructive corrosion. The patina that forms naturally is a protective film.

No maintenance is required for an existing natural patina or one that is in the process of formation.

If a natural statuary finish is desired on copper, weathering can be arrested at the desired point by applying a suitable oil, e.g. raw linseed oil or lemon oil.

Depending on the prevailing climatic conditions and the degree of exposure, the frequency of oiling can be at intervals of from one to three years. Instances have been recorded where the initial oiling applied in two thin coats has preserved the statuary finish in excess of ten years.

PRECAUTIONS

Regarding Color Uniformity of Copper Alloy Finishes

Standard finishes for Builders' Hardware. Owing to the differences in the processes of producing these finishes and the variety of metals to which they are applied, it is impractical to attain an exact match. A standard finish from two or more sources will compare reasonably when the items are viewed at arm's length and approximately 2 ft (0.6 m) apart.

Oxidized finishes represent the natural aging of metals and change with time. Therefore some variations from standard can be expected. Artificially produced finishes do not necessarily match finishes produced by natural aging. Statuary bronzes, BHMA 623 and 624 (US20 and 20A), are more difficult to produce in a given color (shade or tone) than any other standard finish, including other oxidized finishes.

Sources of copper alloys can be domestic producers or foreign producers. In meeting a fabricator's order the supplier delivers the items ordered in the alloy specified but the items can be from different sources. Chances for variations in the alloy are increased under these circumstances, and these variations can result in the inability of the fabricator or the finisher to obtain the color uniformity desired by the architect. Chances of acceptable color match are much better if all material is from the same source.

Color of bronze will change with time and will change differently with different exposures.

Treatments that provide green patinas and brown statuary finishes are influenced by a number of factors that makes exact color uniformity difficult if not impossible to attain.

Standard color samples can change over time thereby changing the reference to which a finisher is working.

Extruded and rolled shapes and plate do not have the same color tones even though they are produced from the same alloys. Similarly, cast and forged items can have different appearances.

The fabricator of architectural bronze products must be aware of these potential problems with color and appearance.

Standard Finish Designations

For many years, the US Finishes Designation System has been used by architects as well as manufacturers, especially in federal work, for specifying finishes to be used on brass and bronze. This system was primarily intended for identifying finishes for hardware. It was generally found to be inadequate for designating the broad range of finishes used in architectural work.

The Department of Commerce, Commercial

Standard CS22-40, that defined US finishes, was dropped after World War II, and the National Bureau of Standards was no longer a source for standard finish samples. Hardware manufacturers, however, continued to use the US designations in their catalogs. Ultimately individual manufacturers established their own interpretations of US finishes and provided their own standard samples. Thus, there are not any truly national US finish standards. The Builders Hardware Manufacturers

Association (BHMA) has established its designations for hardware finishes and has listed the nearest US equivalents of BHMA numbers in American National Standard for Materials and Finishes, ANSI/BHMA A156.18-2000. BHMA has samples of selected finishes available.

Hardware made of brass and bronze, however, is extensively used with architectural products. Finishes on hardware items are now generally designated by finish code numbers of the BHMA. A variety of finishes is available. Table 2-1 shows those most commonly used today. Since U.S. Finish Designations occasionally appear in specifications, the nearest U.S. equivalent of the BHMA number is shown on the list. For a complete listing and description of hardware finishes refer to ANSI/BHMA A156.18-2000.

Specifiers sometimes use the polished finish designations for stainless steel shown in Finishes for Stainless Steel, Chapter 3. While these finishes are applicable to copper alloys, the use of stainless steel designations can cause confusion and is discouraged.

To provide for a better method of identifying architectural finishes, the Copper Development Association, in 1967, adopted a designation system similar to that established several years previously by the Aluminum Association. Many of the finishing processes and effects used on all of the non-ferrous metals are basically the same. The use of a similar identification system, therefore, is

not only logical, but greatly simplifies the work of the architectural specifier in recognizing the similarities and differences.

Four categories are included in this system, representing the most common types of finish -- mechanical finishes, chemical finishes, clear organic coatings and laminated coatings -- each being designated by a different letter as follows:

Mechanical Finishes M
Chemical Finishes C
Clear Organic Coatings O
Laminated Coatings L

The designation for any specific finish in any of these categories will consist simply of a letter followed by two digits. Table 2-2 summarizes the designation system.

Only broad classifications have been proposed for the various types of coatings. All of the more common finishes in both the mechanical and chemical categories, however, have been assigned specific symbols; and these are shown in Tables 2-3 and 2-4 respectively. The descriptions of finishes listed in these tables, under the heading "Examples of Methods of Finishing," are only suggested means of obtaining them; alternate methods of producing equivalent finishes are acceptable in all cases.

Explanation of the Use of the System

A simple finish requires only a single designa-

TABLE 2-1 — FINISHES FOR BRASS AND BRONZE HARDWARE

Code No.	Description	Nearest US Equivalent
605	Bright brass, clear coated	US3
606	Satin brass, clear coated	US4
611	Bright bronze, clear coated	US9
612	Satin bronze, clear coated	US10
613	Dark oxidized satin bronze, oil rubbed	US10B
622	Flat black coated	US19
623	Light oxidized statuary bronze, clear coated	US20
624	Dark oxidized statuary bronze, clear coated	US20A
625	Bright chromium plated over nickel	US26
626	Satin chromium plated over nickel	US26D
632	Bright brass plated, clear coated	US3

tion, but frequently two or more designations will be required to identify a sequence of finishing operations leading to a final finish on a given alloy, for example, M36-C51.

It is understood, however, that when only single designations are used, other processing steps normally followed as preparation for the specified finish can also be used at the option of the fabricator or finisher.

The use of the letter "x" in place of a second digit in all categories of the designation system (e.g., M2x, C5x, etc) indicates that no specific number, other than the general category digit, has yet been assigned to that specific finish. To identify specific "unlisted" finishes having only this general "x" designation, the designation symbol must be followed by a brief word description, as illustrated in examples 3 and 4 following:

Example 1 -- Patina Conversion Coating

To specify a chemically induced patina using the ammonium sulfate process, the following designation would apply:

M36 -- C12-C52 represents:

M36 -- Mechanical Finish, Directional Textured, Uniform (Table 2-3)

C12 -- Chemical Finish, Non-etched Cleaned, Degreased (Table 2-4)

C52 -- Chemical Finish, Conversion Coating, Ammonium Sulfate (Table 2-4)

Example 2 -- Statuary Conversion Coating over Satin Finish

To specify a medium statuary finish on items subject to close inspection, the architect would use the designation:

M32-C55 representing:

M32 -- Mechanical Finish, Directional Textured, Medium Satin (Table 2-3)

C55 -- Chemical Finish, Conversion Coating, Sulfide (Table 2-4)

Example 3 -- Natural Satin Finish, Lacquered

To produce and preserve a fine satin finish on sheet, the following designation is appropriate:

M31-M34-O6x, using "XYZ" Company's clear acrylic lacquer No.____, applied by air spray in two full coats, with interim drying, to a total thickness of 1.0 mil.

In this designation, the symbols used signify the following:

M31 -- Mechanical Finish, Directional Textured, Fine Satin (Table 2-3)

M34 -- Mechanical Finish, Directional Textured, Hand Rubbed (Table 2-3)

O6x -- Coating, Clear Organic, Air Dry, to be specified

Example 4 -- Patterned Finish, Lacquered

Since neither the patterned (mechanical) finish nor the lacquer (organic) coating has a specific finish designation, the general symbols for these processes would be used, supplemented by a brief word description for each, and the designation for the total finish would be:

M11-- M4x-C12-O1x, using "X" Company's Pattern No.____ and "A" Company's Epoxy RR clear coating, applied by airless spray in two full coats with a 10-minute bake at 275 °F (135 °C) following each coat. Total film thickness of coating to be 0.9 mil.

In this designation, the symbols used represent:

M11 -- Mechanical Finish, As Fabricated, Specular (Table 2-3)

M4x -- Mechanical Finish, Non-Directional Textured, to be specified

C12 -- Chemical Finish, Non-etched Cleaned (Table 2-4)

O7x -- Coating, Clear Organic, Thermoset, to be specified.

TABLE 2-2 -- SUMMARY OF STANDARD DESIGNATIONS FOR COPPER ALLOY FINISHES

In this listing, those finishes printed in **boldface type** are the ones most frequently used for general architectural work; those marked * are commonly used for hardware items

MECHANICAL FINISHES (M)			
As Fabricated	Buffed	Directional Textured	Non-Directional Textured
M10 – Unspecified	M20 – Unspecified	M30 – Unspecified	M40 – Unspecified
M11 – Specular as fabricated	M21 – Smooth specular*	M31 – Fine satin*	M41 – (Unassigned)
M12 – Matte finish as fabricated	M22 – Specular*	M32 – Medium Satin	M42 – Fine matte*
M1x – Other (to be specified)	M2x – Other (to be specified)	M33 – Coarse satin	M43 – Medium matte
		M34 – Hand rubbed	M44 – Coarse matte
		M35 – Brushed	M45 – Fine shot blast
		M36 – Uniform	M46 – Medium shot blast
		M3x – Other (to be specified)	M47 – Coarse shot blast
			M4x – Other (to be specified)
CHEMICAL FINISHES (C)			
Non Etched Cleaned		Conversion Coatings	
C10 – Unspecified		C50 – Ammonium chloride	(patina)
C11 – Degreased		C51 – Cuprous chloride-hydrochloric acid	(patina)
C12 – Cleaned		C52 – Ammonium sulfate	(patina)
C1x – Other (to be specified)		C53 – Carbonate	(patina)
		C54 – Oxide	(statuary)
		C55 – Sulfide*	(statuary)
		C56 – Selenide	(statuary)
		C5x – Other (to be specified)	
COATINGS – CLEAR ORGANIC (O)			
Air Dry (Gen'l arch'l work)		Thermoset (Hardware)	Chemical Cure
O60 – Unspecified		O70 – Unspecified	O80 – Unspecified
O6x – Other (to be specified)		O7x – Other (to be specified)	O8x – Other (to be specified)
COATINGS – LAMINATED (L)			
	L90 – Unspecified		
	L91 – Clear Polyvinyl Fluoride		
	L9x – Other (to be specified)		

COATINGS – VITREOUS and METALLIC

Since the use of these finishes in architectural work is rather infrequent, it is recommended that they be specified in full rather than being identified by number.

COATINGS – OILS AND WAXES

These applied coatings are primarily used for maintenance purposes on site. Because of the broad range of materials in common use, it is recommended that, where desired, such coatings be specified in full.

TABLE 2-3 – STANDARD DESIGNATIONS FOR MECHANICAL FINISHES

Type of Finish	Designation	Description	Examples of Method of Finishing
AS FABRICATED	M10	Unspecified	Optional with finisher.
	M11	Specular as fabricated	Cold rolling with polished steel rolls.
	M12	Matte finish as fabricated	Cold rolling followed by annealing; hot rolling, extruding, casting.
	M1x	Other	To be specified.
BUFFED	M20	Unspecified	Optional with finisher.
	M21	Smooth specular	Cutting with aluminum oxide or silicon carbide compounds, starting with relatively coarse grits and finishing with 320 grit, using peripheral wheel speed of 6,000 ft/min (30 m/s). Follow by buffing with aluminum oxide buffing compounds using peripheral wheel speed of 7,000 ft/min (36 m/s).
	M22	Specular	Cutting with compounds as for the M21 finish, followed by a final light buffing.
	M2x	Other	To be specified.
DIRECTIONAL TEXTURED	M30	Unspecified	Optional with finisher.
	M31	Fine satin	Wheel or belt polishing with aluminum oxide or silicon carbide abrasives of 240 - 320 grit, using a peripheral speed of 6,000 ft/min (30 m/s).
	M32	Medium satin	Wheel or belt polishing with aluminum oxide or silicon carbide abrasives of 180-240 grit, using a peripheral wheel speed of 6,000 ft/min (30 m/s).
	M33	Coarse satin	Wheel or belt polishing with aluminum oxide or silicon carbide abrasives of 120 - 180 grit, using a peripheral wheel speed of 6,000 ft/min (30 f/s).
	M34	Hand rubbed	Hand rubbing with #0 stainless steel wool and solvent, #0 pumice and solvent, non-woven abrasive mesh pad or Turkish oil and emery.
	M35	Brushed	Brushing with rotary stainless steel, brass or nickel silver wire wheel. Coarseness of finish controlled by diameter and speed of wheel and pressure exerted.
	M36	Uniform	Wheel or belt polishing in a single pass with aluminum oxide or silicon carbide abrasives of 60-80 grit, using a peripheral speed of 6,000 ft/min (30 m/s).
	M3x	Other	To be specified.
NON-DIRECTIONAL TEXTURED	M40	Unspecified	Optional with finisher.
	M41	(number unassigned)	
	M42	Fine matte	Air blast with #100-#200 mesh silica sand or aluminum oxide. Air pressure 30-90 psi (207-621 kPa). Gun 12 in. (305 mm) from work at an angle of 60-90 degrees.
	M43	Medium matte	Air blast with #40-#80 mesh silica sand or aluminum oxide. Air pressure 30-90 psi (207-621 kPa). Gun 12 in. (305 mm) from work at an angle of 60-90 degrees.
	M44	Coarse matte	Air blast with #20 mesh silica sand or aluminum oxide. Air pressure 30-90 psi (207-621 kPa). Gun 12 in. (305 mm) from work at an angle of 60-90 degrees.
	M45	Fine shot blast	Air blast with S-70 metal shot.
	M46	Medium shot blast	Air blast with S-230 metal shot.
	M47	Coarse shot blast	Air blast with S-550 metal shot.
	M4x	Other	To be specified.

TABLE 2-4 – STANDARD DESIGNATIONS FOR CHEMICAL FINISHES

Type of Finish	Designation	Description	Examples of Method of Finishing
NON-ETCHED CLEANED	C10	Unspecified	Optional with finisher.
	C11	Degreased	Treatment with organic solvent.
	C12	Chemically cleaned	Use of inhibited chemical cleaner
	C1x	Other	To be specified.
CONVERSION COATINGS	C50	Ammonium chloride (<i>patina</i>)	Saturated solution of commercial sal ammoniac, spray or brush applied. Repeated applications are required sometimes.
	C51	Cuprous chloride Hydrochloric Acid (<i>patina</i>)	In 500 ml. of warm water, dissolve 164 g. cuprous chloride crystals, 117 ml. hydrochloric acid, 69 ml. glacial acetic acid, 80g. ammonium chloride, 11 g. arsenic trioxide. Dilute to 1 liter. Apply by spray, brush, or stippling. Repeated applications are required sometimes. Avoid use of aluminum containers.
	C52	Ammonium Sulfate (<i>patina</i>)	Dissolve in 1 liter of warm water, 111 g. ammonium sulfate, 3.5 g. copper sulfate, 1.6 ml. concentrated ammonia. Spray apply. 6-8 applications can be required under high humidity conditions.
	C53	Carbonate (<i>patina</i>)	Various formulations utilizing copper carbonate as the major constituent.
	C54	Oxide (<i>statuary</i>)	Principal formulations utilize aqueous solutions of copper sulfates and copper nitrates at temperatures of from 85° C to boiling; or permanganate solutions at temperatures of from 80° C to boiling, using immersion periods of from 30 sec. to 5 min.
	C55	Sulfide (<i>statuary</i>)	2-10% aqueous solutions of ammonium sulfide, potassium sulfide, or sodium sulfide. Solutions swabbed or brushed on. Repeated application increases depth of color.
	C56	Selenide (<i>statuary</i>)	Principally proprietary formulations. Because the solutions are toxic, user preparation should be avoided. Follow manufacturer's directions for use without deviation.
	C5x	Other	To be specified.

TABLE 2-5 – STANDARD DESIGNATIONS FOR LAMINATED FINISHES

Type of Finish	Designation	Description	Examples of Method of Finishing
FILM	L90	Unspecified	Optional with finisher.
LAMINATES	L91	Polyvinyl Fluoride	A one mil clear film, adhesive bonded to the metal surface.
	L9x	Other	To be specified.

REFERENCES

For more detailed information on the subject of finishes for copper alloys, the following references can be contacted for their publications:

American Society for Metals (ASM International), 9639 Kinsman Road, Materials Park, OH 44073-0002; www.asm-intl.org.

Architectural Metals, L. William Zahner, John Wiley and Sons, New York, NY.

Builders Hardware Manufacturers Association (BHMA), 355 Lexington Avenue, 17th Floor, New York, NY 10017; www.buildershardware.com.

Copper Development Association, Inc. (CDA), 260 Madison Avenue, New York, NY 10016, www.copper.org.

Electroplating Engineering Handbook, Van Nostrand Reinhold Publishing Corp., New York, NY.

The Colouring, Bronzing, and Patination of Metals, Hughes and Rowe, Whitney Library of Design, New York, NY.

Internet Search Engine.

Chapter 3: Finishes for Stainless Steel

NAAMM/NOMMA AMP 500-06

In This Section

NAAMM and NOMMA wish to express their appreciation to the Nickel Institute and the International Molybdenum Association for providing the technical expertise of their consultant, Catherine Houska of Technical Marketing Resources, Inc., in revising this Chapter.

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FINISHES FOR STAINLESS STEEL

General

The variety of finishes used on architectural stainless steel is almost infinite and includes standard mill and polished, proprietary, electropolished, blasted, rolled, textured, colored, etched, and any combination of these. The polished finishes are most popular, followed by the other finishes most of which are applied mechanically. The most common finishes are listed in the following summary.

Most of the stainless steel used in architectural work is supplied in the form of sheet or strip, however bar, plate, tube, pipe, wire, extruded and cast shapes and other common forms are available. Finishes for sheet, strip, and plate products are defined in ASTM A 480/ASTM A 480M, General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip. There are no ASTM specifications covering finishes for other product forms but sheet finishes are often applied to them.

The most common finishes for stainless are sheet finishes. They are available from a mill, ser-

vice center, or polishing house directly, and are also commonly applied by product fabricators. Other finishes, such as embossing, coining, engine turning, non-directional, distressed, and special rolled finishes are also applied mechanically. Non-mechanical options include color and etching.

Mechanical Finishes

A) Standard Rolled Mill Finishes

Rolled finishes are created when a stainless steel coil is passed through a set of rolls. The finish on the rolls is transferred to the surface of the coil. This category includes the mill finishes No. 1, 2B, 2BA, 2D. They are directional and the rolling direction should be marked on the back of cut panels so they can be installed in the same direction. Alternatively, the metal can be ordered with protective strippable film with printed arrows indicating direction applied to the front. There can be differences in appearance from one end of the coil to the other due to roll wear. For maximum uniformity, panels are numbered as they are cut from

SUMMARY OF TYPICAL STAINLESS STEEL FINISHES

	Finish	Finish Normally Supplied By		Relative Costs (on flat surfaces)
		Mill	Processor Fabricator or Finisher	
MECHANICAL	Standard Mill Finishes X			base
	(Nos. 1, 2D, & 2B sheet and Nos. 1 & 2 strip)			
	Bright Annealed X			low
	Polished ¹			
	Nos. 3 & 4 sheet X	X	X	low to medium
	Hairline X	X	X	low to medium
	No. 6 sheet.....		X	high
	Nos. 7 & 8 sheet.....	X	X	medium
	No. 9 (Super No. 8) sheet.....	X	X	high
	Embossed and Coined X	X		medium to high ²

The term *Finish Processor*, as used here, refers to a "middleman" between the mill and the fabricator, who applies coatings, textures, or other finishes to metal in bulk form, generally cut sheet or strip or coil stock. *Fabricator* refers to the producer of stock metal shapes or the manufacturer of the end use product. The fabricator also either provides the final finish or sends the fabricated product to a finisher who does this work. The *Custom Finisher* does not usually fabricate products, but applies finishes as specified to products fabricated by others.

The *Relative Costs* indicated are necessarily approximate, for general guidance only. Exact costs vary considerably with quantity, thickness of metal, type of product, quality of work, etc., and should always be verified.

¹ With the exception of hairline, No. 9, embossed and coined, these are ASTM A480 finishes. In addition there are numerous proprietary buffed, polished, and rolled finishes.

² Certain embossed patterns, because of their stiffening effect, permit the use of thinner metal, and this saving can in some cases offset their cost. In other cases patterned finishes involve extra cost.

the coil, and consecutive panels are installed in close proximity. If more than one coil is needed for a project, all of the coils should come from the same producer and off the same line.

1) Hot Rolled

The No. 1 finish is dull with uneven color and texture and is produced by hot rolling, annealing, and descaling by pickling. Grinding marks and similar blemishes are common. Heavy sheet, plate, bars, and shapes used for structural applications are supplied with this finish. When these components must be visible, it is common for a secondary finish, like polishing or abrasive blasting, to be applied to provide a uniform appearance. No. 1 finish is the least expensive mill finish.

2) Cold Rolled

Nos. 2D, 2B, and 2BA are sheet and strip finishes. They start with a cold rolled coil that is annealed and pickled.

The No. 2D finish is a uniform, dull, low reflectivity, sheet and strip finish. The dull appearance is produced by pickling or descaling. In architecture, this finish is almost exclusively used for roofing. A final pass through special dull rolls, which transfer their dull finish to the coil, is used to meet flatness requirements and improve finish uniformity. Very few service centers stock 2D, and it often must often be ordered in mill quantities. It is the preferred finish for deep drawing applications because the finish holds lubricants well.

The 2B finish is a more reflective and resembles a smooth, cloudy mirror. The final finish is produced by a light pass through polished rolls. Heavier passes can be used if higher tensile strengths are required (see ASTM A666) for structural applications. It can vary significantly in appearance from supplier to supplier and coil to coil ranging from a fairly dull finish that is only slightly brighter than a 2D to a fairly bright, cloudy mirror. It is rarely used for architectural applications other than flashings, but it is a common starting finish for polishing and embossing. There is no additional cost for applying either finish. Even if a secondary finish will be applied, finish matching is maximized by obtained all of the 2B from the same producer and processing line (sequential coils).

When the final annealing is done in a furnace with a controlled atmosphere, it is referred to as Bright Annealing. For architectural applications, the

bright annealed coil is given a light pass through highly polished rolls to flatten the coil and enhance finish uniformity. This finish is identified as 2BA. The process produces a bright, reflective, mirror-like finish, which is used as a lower cost alternative to highly polished stainless for architectural trim, panels, and fascia. The appearance of this mirror-like finish can vary from hazy to clear. Because it is less uniform than polished stainless, it is generally used above street level or for elevated interior applications. It is not unusual for a Buffed BA to be specified for aesthetic applications where consistency is important. Buffing produces a consistent mirror finish. BA can also be the starting finish for embossing or coining, selective polishing or etching. It is slightly more expensive than a No. 2D or No. 2B finish.

B) Coining and Embossing

Both *Coining* and *Embossing* are the result of passing a coil through a specially designed set of rolls to create a raised pattern. Pressing the pattern into the stainless steel displaces and cold works the metal resulting in an increase in strength. The pattern depth or degree of metal displacement determines the increase in strength and impact and scratch resistance. These finishes provide improved visual flatness and increase in strength. They also make it possible to use thinner sections which can sometimes offset the added cost of this finish. Each supplier has a wide range of unique patterns.

When a coil is passed through one smooth and one textured roll, it is referred to as Coining and the process creates a light, raised, one-sided pattern. The most popular Coined patterns mimic fabric-like lines. This finish has been used on the exterior of many well known stainless steel buildings to achieve optical flatness including the Petronas Towers and Canary Wharf.

Both *Embossing* rolls have pattern surfaces that interlock with each other. This creates the deep, two-sided pattern. Embossed and Coined patterns are used for applications like roofing, wall panels, column covers, furniture, elevator panels, kitchen refrigerator doors, cabinets, and back splashes.

The starting finishes are most often 2B or 2BA but occasionally a 2D or fine No. 4 is used. The choice of starting finish determines reflectivity. These stainless steel finishes are covered by ASTM A947M unless heavy gauge floor plate is desired. Stainless

steel floor plate is covered by ASTM A793.

C) Other Rolled Finishes

Rolled finishes were developed by stainless steel producers to mimic the appearance of common finishes. They simulate abrasive blasted and the No. 3, No. 4, and Hairline polished finishes. They are applied by passing the coils through specially treated rolls and are one- or two-sided. Their strength, impact, and scratch resistance are similar to that of other flat finishes but they are generally more uniform in appearance from coil to coil and provide better corrosion resistance. They have been used for roofing, wall panels, appliances, and other applications. The finishes that mimic abrasive blasting are flatter, more uniform, and more cost effective than abrasive blasted sheet or strip. The rolled finishes that simulate No. 3 or 4 finishes are approved alternatives to mechanically polished No. 3 and 4 finishes in ASTM A480/A480 M.

D) Other Mechanical Finishes

1) Angel Hair (Angel Hair and Suede are proprietary names. Vibration or non-directional are more generic terms.)

There are numerous names for this finish including vibration, non-directional polish, and suede finish. A very fine, non-directional scratch pattern is created with a stainless steel wire wheel or a vibrating nonmetallic abrasive pad. The scratches can be long or short, and the finish can be applied by hand or with CNC-operated equipment to flat and curved surfaces. It hides light random scratching in high traffic areas and has a soft, low reflectivity appearance. This finish has been used for both interior and exterior applications and has a fairly low level of reflectivity. Examples include the Experience Music Museum and Walt Disney Concert Hall. This finish is usually blendable.

2) Distressed Finishes

Distressed finishes have coarser scratches

than the Angel Hair finish and are applied using a small grinding wheel, coarse stainless steel wire brushes, or a coarse nonmetallic abrasive pad. They can be applied by hand or with CNC-operated equipment. This pattern hides heavier random scratching in high traffic areas. This finish is usually blendable.

3) Swirl Patterns

Grinding wheels or stainless steel wire brushes are used to create swirl patterns, which can range in size and pattern. The finish can be applied by hand or with CNC-operated equipment to flat or curved pieces and to small or large areas. Swirl patterns hide accidental scratches in high traffic areas and add visual depth. The pattern is sometimes described as having a 3 dimensional appearance. A well-known example of extensive use of this finish is the Denver Airport. This finish is usually blendable.

4) Engine-Turned Patterns

Engine-Turned patterns are created on cut pieces of sheet or strip with CNC-controlled equipment, which grind circles ranging from 0.5 in. (13 mm) to 12 in. (305 mm) in diameter into a highly polished or bright annealed finish. The circles can range in size, overlap, and form decorative patterns. When the ground circles cover the entire surface, they can be effective in making light random scratching less visible by drawing the eye to the ground circle.

5) Abrasive Blasted

Stainless steel can be abrasive blasted with a variety of media to create a non-directional, repairable finish. The choice of media will determine the appearance. It is important to clean the surface before and after blasting. Clean media that has not been used on other metals must be used to avoid surface contamination. Steel shot should never be used on stainless steel. Some abrasives, such as sand and aluminum oxide, can

Finish appearance with various abrasive media

Abrasive Media

fine sand or silicon carbide
glass beads
stainless steel shot
ground quartz

Finish

dark, coarse finish
light, smooth, grainy finish
small, curved indentations
shiny, coarse, angular indentations

become embedded in the surface and can lead to unanticipated corrosion problems in demanding applications. Abrasive blasting is ideal for heavier sections and improves scratch resistance by cold

working the surface. Distortion can occur when abrasive blasting thin flat sheets. Fingerprints are much less noticeable on more reflective abrasive blasted surfaces.

PRECAUTIONS

Protective Strippable Plastic Films

Protective strippable plastic films can be applied by the producer, processor, fabricator or finisher to protect the stainless steel surface finish during shipment, installation and fabrication. The use of a strippable protective plastic film, during forming operations that do not require heat, helps to protect the surface from contamination by other metals and light scratching. It also acts as a lubricant. During shipping, storage or installation, film can help to prevent damage from light scratching. Fine steel particles and dirt accumulations from the job site are generally removed with the film. If an appropriate film life is specified and the film is UV rated, the protective film can be left in place until just prior to turnover. This can eliminate the need for final cleaning or reduce the cleaning necessary.

The commonly used protective films are porous and do not prevent corrosion from salt water, water containing deicing salt, swimming pool atmospheres, corrosive acids and other substances that can be corrosive to some stainless steels. When there is exposure to a corrosive environment, the presence of a film can accelerate corrosion by acting as a crevice. Protective strippable films should be removed immediately after installation if the environment is corrosive.

If the component that the film is applied to will be stored or installed in an exterior location, a UV rated film must be specified. The specified film life should take into consideration the total time that the film will be required and potential project delays. If the film is nearing the end of its warranted life, it should be removed and replaced as required. Film that is left in place past its warranted life or exposed to conditions for which it was not designed can be difficult to remove, leave residual adhesive on the surface, or be a factor in corrosion.

When stainless steel arrives from the mill or processor, it has a protective passive film on the surface. As long as the surface is clean and exposed to oxygen, the passive film will automatically form if the surface is abraded or machined. If the surface is protected from contamination and scratching during fabrication, transit, and installation, and there is no welding, chemical passivation of the surface after fabrication is not required. Washing with a mild, chloride-free detergent and water solution or an ammonia and water window washing solution may still be necessary.

If an improper film type is selected or it is left in place too long, the film supplier should be contacted to determine an appropriate water based cleaner or solvent for removal of the residual adhesive. The type of adhesive determines the most effective cleaner. Solvents will not damage the stainless steel. If a solvent based cleaner is needed, rubbing alcohol or citric cleaners are often tried before more aggressive solvents.

The Use of Mechanical Finishes on Stainless Steel

For some architectural applications, the metal is ordered from the mill, service center or processor with the desired final finish. If proper care is exercised, such fabricating processes as brake forming, roll forming, punching, shearing, and welding

will likely affect the surface only locally and in a minor way; and these areas can be "blended" to match the adjacent areas **if they have a directional polished finish.**

The mill rolled, embossed, coined, and colored finishes **cannot be matched** in the fabricator's shop. As a general rule, therefore, **these**

finishes should not be specified for products whose fabrication requires severe bending or welding of the metal unless subsequent overall finishing of the product is intended, or appearance is not critical.

Pre-polished mill finishes of 3 to 7 can vary from supplier to supplier and coil to coil. If the finishes are to match, all the material should be polished by one experienced metal finisher who can control the uniformity of the finish to a more precise degree.

For welded assemblies in which fusion welds must be finished to blend inconspicuously with adjacent metal, a directional finish such as No. 4 sheet finish or a special "blendable" finish is usually advisable.

The proper use of abrasives is very important - use silicon carbide, not aluminum oxide, for corrosive interior or exterior applications. Silicon carbide abrasives may need to be replaced more frequently to obtain a uniform appearance. Aluminum oxide can be used in interior, non-corrosive applications. A 36-50 grit aluminum oxide can produce a bright, uniform finish. Do not use sand, glass beads, or other abrasive media previously used on other metals.

Removing Embedded Iron or Carbon Steel

When iron or carbon steel particles adhere or become embedded in the surface, they will rust and discolor the stainless steel and give the incorrect impression that the stainless steel is rusting. Iron contamination can result from carbon steel wire brushing; inadequate cleaning of tools or work areas where carbon steel is also fabricated; forming without a protective strippable plastic film; use of contaminated abrasive blasting with media; improper handling; or exposure to airborne carbon steel particles in the shop or at the job site. Depending on the depth of penetration, the rusting or discoloration can be removed by passivation. ASTM A380 defines passivation and describes appropriate cleaning methods for removing iron or carbon steel contamination and approved nondestructive tests to determine if there is iron contamination.

If the stainless steel has been stained by carbon steel surface contact but the carbon steel is

not embedded in the surface, the staining can usually be removed with either phosphoric or oxalic acid followed by a water rinse. If the finish is not subject to damage from fine abrasives, a 200 mesh or finer calcium carbonate abrasive with no chlorides, such as Bon Ami, can be used. Two other household cleaning products, Zud and Bar Keeper's Friend, include both oxalic acid and this fine abrasive but they also contain chlorides so they must be carefully rinsed off surfaces. Abrasives should not be used on delicate finishes such as colored stainless steel or mirror finishes.

If iron is embedded in the surface, the depth to which it is embedded will determine the cleaning method. Cleaning with phosphoric acid, nitric acid, or citric acid/sodium nitrate solution followed by a water rinse can be used. Some suppliers of stainless steel welding products also sell affective stronger stainless steel rust removers.

The surface must be degreased prior to an acid treatment and the acid thoroughly rinsed off and neutralized after use. With proper application, these acids will aggressively attack and remove carbon steel but will not harm the stainless steel surface. Deeply embedded iron particles can necessitate significant surface removal with a coarse abrasive, grinding wheel or belt followed by re-finishing. Alternatively, deeply embedded carbon steel can be removed by painting the problem area with stainless steel pickling paste per manufacturers recommendations. This strong acid will remove even deeply embedded carbon steel but refinishing will be necessary. The acid must be neutralized after use.

Weld Clean-Up

Weld scale and heat tint must be removed in accordance with ASTM A380 to restore the corrosion resistance and appearance of the stainless steel.

Weld heat tint and weld splatter can be removed effectively with mechanical cleaning or a stainless steel pickling paste. Acceptable mechanical cleaning methods include use of a clean stainless steel wire brush or a grinding wheel. In particularly corrosive environments, research has shown that a combination of pickling paste and grinding is the most effective means of maximizing the weld's corrosion resistance. No matter which method is used, the chromium depleted surface layer must be removed to restore corrosion resis-

tance. A visual standard should be considered to establish aesthetic requirements.

Oil-Canning Avoidance

To minimize "oil-canning" in large flat areas, a nonreflective matte, textured, patterned, or contoured finish is often recommended. Highly polished reflective finishes should be used in such locations only if extreme care is given to thickness selection, detail design, and fabrication. These surfaces are also susceptible to scratches and dents if used at pedestrian level and can look oil canned even when they are very flat.

Post Installation Cleaning

All foreign matter should be thoroughly cleaned from stainless steel surfaces following installation to restore the original appearance. This is typically done with a mild detergent and water solution, ammonia and water window washing solution or pressure washing with hot water. Cleaning guidelines can be obtained from the Nickel Development Institute's Guidelines for Maintenance and Cleaning, series 11 014, or ASTM A380 can be referenced.

In new construction, many contractors use a muriatic acid (also known as hydrochloric acid) solution to clean new masonry, tile, stone, or cement work. Muriatic acid will aggressively attack any stainless steel causing rapid severe corrosion. If it splashes or sprays on to stainless steel it must be thoroughly washed off and neutralized immediately to prevent corrosion.

Surrounding surfaces should also be neutralized, so that residual acid residue does not combine with moisture and come in contact with the stainless steel at a later date. Citric acid masonry cleaning products will not damage stainless steel but the solution should be confirmed to be free of muriatic acid.

Polished Finishes

These finishes are produced by successively finer polishing belts or by passing a stainless steel coil through special rolls that simulate a No. 3 or 4 polish. The No. 7, 8 or 9 finishes are polished with successively finer belts and then buffed. They vary in cost depending on the number of operations involved and the degree of smoothness required. (see Table 3-2) They can be provided on

sheet, strip, tube, pipe, and any of the other stainless steel shapes.

The Nos. 3 and 4 polished finishes are characterized by very fine parallel "grit lines," and are produced by belt or wheel polishing with fine grit abrasives or by rolling. When it is mechanically finished, No. 3 is usually finished with abrasives between 80 and 150 grit and on sheet or strip it can typically have an average surface roughness of up to Ra 40 micro-inches. A No. 4 is commonly used as an architectural finish and can be produced by mechanical polishing or rolling. If mechanical polishing is used, the final pass can be between 120 and 320 grit. The average surface roughness on sheet or strip can typically be up to Ra 25 micro-inches. No common stainless steel specification requires that a finish meet specific surface roughness requirements. Surface roughness influences appearance and corrosion performance so it can be important to specify a maximum allowable surface roughness or surface roughness range. There can be overlap between the surface roughness measurements and grit ranges for the No. 3 and No. 4 finishes. Either finish can be polished wet or dry. Wet polishing produces a smoother, finer finish. When they are applied to sheet, the polishing lines are usually short, but on pipe, tube, and fabricated components the polishing lines are often long. This should be considered when matching finishes. Polished finishes on tubing and pipe are described by the grit rather than a finish number.

Fabricators or specialty polishers normally apply polished finishes to stainless steel bars and shapes. Small cross section flat round, hex and square bars are available "cold finished." Heavier sectioned flats, angles, other shapes are commercially available only "hot rolled" or "extruded". They are typically purchased with a rough abrasive blasted and pickled surface that must be ground smooth before polishing. Polishing such shapes is more expensive. Thinner angles, channels and shapes can be cold rolled after polishing. If this is done with a protective strippable plastic film in place that is suitable for forming, no further polishing is required.

A soft, satin, directional No. 6 Finish is typically produced by Tampico brushing a No. 4 finish with an oil and abrasive mixture. It has a silver white appearance. The high wear rate of Tampico brushes make it difficult to obtain a uniform appearance and this finish is known for having fingerprint problems. ASTM A480/A480M allows other polishing

methods to be substituted if they produce a finish with the same surface roughness, reflectivity, and an appearance that a stainless steel surface finish expert considers visually identical. Polishing lines should be soft, and the resultant finish should be much less reflective than a No. 4. The No. 6 polish is not widely available. It was used for the exterior columnar features on the exterior walls of the Empire State Building and in other early stainless steel projects. A surface finish sample that acts as a visual standard is particularly important when specifying this finish because a wide range of visually different finishes are sometimes called a No. 6.

Still smoother and more reflective finishes (Nos. 7 and 8 Sheet Finishes) are obtained by buffing polished surfaces. The semi-bright No. 7 is produced by buffing a finely ground finish. No. 7 is a mirror-like finish but residual grit lines are still visible. The highly reflective, mirror-like, No. 8 is typically produced by polishing with successively finer abrasives, then buffing. Very faint polishing grit lines can be visible on the final product.

Additional Polished Finishes

A) Hairline Polish

A finish with very long seemingly endless polishing lines is called a hairline, long-grain, or fine-line finish. It is more reflective than a No. 4 polish. Small scratches can be repaired in the field with Scotch-Brite® pads of equivalent grit or roughness. Some suppliers have identified this as a No. 5 or No. 6 finish, but this finish is not defined by ASTM A480/A480M. A visual standard that is agreed upon in advance by all parties is advisable. This finish can be produced by applying it over a bright annealed finish, passing a bright annealed coil through special rolls, or as the final step in a series of gradually finer abrasives. If this finish is obtained by polishing, it is applied with Scotch-Brite® pads.

B) No. 9 or Super No. 8 polish

This finish is referred to as a Super or Supreme No. 8 or No. 9, 10, 11 or even 12 polish. It is buffed longer than an ASTM No. 8 polish, typically about 60 minutes, to achieve a true mirror polish. It is not defined by ASTM and supplier terminology for this finish varies. Applications range from decorative panels to bathroom mirrors. It is usually purchased already machine polished in sheet form and requires specifying stainless steel with

very low sulfur (0.005 or less) levels. If the right quality of stainless steel is not specified, impurities in the metal can cause flaws during polishing. A true mirror finish obtained by hand polishing is expensive.

Colored Finishes

Stainless steel can be colored by several methods. The scratch resistance and color stability of these processes vary and should be taken into consideration during selection. Although some of these processes slightly improve corrosion resistance, this should not be considered a substitute for selecting an appropriate grade of stainless steel for the environment. Any welding must be done before the color is applied. The only coloring process that is repairable is paint.

Electrochemical coloring (also called light interference or INCO coloring) is achieved by immersing stainless steel in a hot acid solution and applying an electrical current. A full spectrum of colors is available including gold, bronze, purple, blue, red, black, and green. Color can be applied uniformly or varied for a rainbow effect. Ultraviolet radiation does not cause fading. The underlying finish is visible. Color can be removed selectively by etching, polishing, or engraving. Scratching can damage the color. When the color is applied over a coined or embossed finish and the raised areas are buffed, the remaining color is recessed and protected and this finish has performed well in high traffic areas. Forming or bending sharp angles can change the finish color in the deformed area. Flat panels can appear to be different colors when viewed from different angles or under different light conditions. Curving can introduce visible color variation on large sheets. Some colors are more difficult to match from sheet to sheet and requirements should be discussed with suppliers in advance. The process slightly improves corrosion resistance but not significantly enough to change stainless steel grade or type requirements.

Sputtering is sometimes referred to as plasma vapor deposition (PVD) and applies a very thin, colored ceramic coating to the surface. Available colors include gold, black, blue, wine red, rose gold, silver gold, and brass. The most common color is gold, which has a TiN (titanium nitride) coating and is sometimes referred to as Ti-Gold. The color is stable, uniform, and significantly more abrasion resistant than electrochemical coloring.

The pattern of underlying finish is visible and color can be removed selectively by etching or engraving. The finish can be damaged by more aggressive scratching but it is significantly more scratch resistant than electrochemical color. If the surface is not properly prepared prior to sputtering, delamination can occur during bending. Purchase requirements should require that the material pass a bend test prior to shipment acceptance.

A dull black color can be achieved by immersing stainless steel in a molten salt bath of sodium dichromate. The color can be brightened with wax or oil. The color is durable, reasonably abrasion resistant, and does not chip or fade. Moderate deformation does not damage the color. The automotive industry and manufacturers of solar collectors use this coloring method. It is rarely used for architecture.

Painting stainless steel is similar to painting other metals except that it is done for aesthetic reasons rather than corrosion protection. The repainting schedule will be dependent on the paint's performance. The surface finish must be clean, dry, and rough enough for adherence. An appropriate primer and paint system should be selected. The No. 2B and No. 2D mill finishes, etched finishes, and a No. 3 and 4 polishes have been painted successfully. Several suppliers sell pre-painted or coil coated stainless steel.

Terne metal (80% lead, 20% tin), tin, and a zinc/tin coatings are primarily used for roofing but have also been used for exterior wall panels. They weather to a medium to dark gray and can be damaged by scratching or abrasion. The final color is dependent on the environment. Traditional lead containing coatings should not be used in locations with low sulfur dioxide levels in the air or the lead can oxidize resulting in red spots on the surface.

The coating provides some additional corrosion protection but it should not be assumed that a less corrosion resistant stainless steel can be used. This finish can be painted using manufacturer recommended primers and paints.

Stainless steel can be plated with gold, copper alloys, and other metals. Copper plated stainless has had limited use in roofing applications when the strength of stainless and color of copper were desired. Gold plating is soft and easily abraded and is sometimes hard coated. The hard coating could discolor and deteriorate over time.

Electropolished Finishes

Electropolishing can be used on stainless steel, especially austenitics. This process, described under Bright Finishes in Chapter 1 Finishes for Aluminum, is used for floor plate and items that would be difficult to polish, such as hardware and trim. Electropolishing reduces surface roughness, removes inclusions, and increases reflectivity. Smoother finishes are more corrosion resistant. In addition, the process produces a higher quality protective passive surface layer on stainless steel more than what would naturally occur in air and, in combination with the surface smoothing and removal of inclusions, improves corrosion resistance. Electropolishing is a good way to reduce the potential for corrosion in corrosive exterior and interior applications like pools or shower rooms, but it should not be considered a substitute for using an appropriate grade for that environment.

Graphic Finishes

Graphic etched, polished and abrasive blasted patterns are created by selectively applying a protective acid resistant film to a highly polished surface. Etching uses acid to remove a thin layer of stainless steel from the unprotected areas and changes the color of these areas to dull silver gray and roughens the surface. The etched pattern can be left as is or made more reflective. The finish is often electropolished after completion. Both custom and stock etched patterns are available.

In selective polishing, unprotected areas are polished or buffed to create a pattern. Some have a three dimensional appearance. In selective abrasive blasting, abrasive media are used to create the pattern. Fine detail can be achieved with any of these techniques, and the difference in reflectivity of the finishes creates the pattern.

Like other metals, letters or lines can be cut into stainless steel by engraving. This is most commonly used for signage. Engraved patterns can be electrochemically colored or sputtered and engraving can be done after both of these coloring processes.

Standard Product Dimensions

The standard dimensions for stainless steel sheet, strip, and plate are defined by ASTM A 480/A 480M General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet,

TABLE 3-1 – CLASSIFICATION OF STAINLESS STEEL SHAPES

Item	Description	Dimensions		
		Thickness	Width	Dia. or size
PLATES	Flat-rolled or forged	3/16 (5) & over	over 10 (254)	
SHEET	Coils and cut lengths:	under 3/16 (5)	24 (610) & over	
STRIP	Coils and cut lengths:			
	Cold finished	under 3/16 (5)	under 24 (610)	
BARS	Hot finished flats	0.125 (3) & over	10 (254) or less	
	Cold finished flats	0.125 (3) & over	10 (254) or less	
PIPE and TUBING	The most commonly used ASTM specification for architectural and structural applications is ASTM A554 Standard Specification for Welded Stainless Steel Mechanical Tubing (round, square and rectangular). For information on standard sizes consult service centers, producers, or the Specialty Steel Industry of North America (SSINA) website. The SSINA website also lists producers and service centers.			
EXTRUSIONS and ROLL FORMED SHAPES	Structural components are often produced by extrusion and roll forming. The relevant specifications are ASTM A276 and A484/A484M. Some standard shapes are available but most are custom. Extrusions are limited in size to shapes that will fit inside a 9½ in. (229 mm) diameter circle Stainless steel that is up to 0.38 inches thick and 48 inches wide can be roll formed. A list of commonly stocked sizes and suppliers can be found at the Specialty Steel Industry of North America website.			
a)	ASTM A276 and A484/A484M are the specifications that cover stainless steel bars and shapes used in architecture.			
b)	General requirements for stainless steel wire and wire rods are covered in ASTM A555/A555M.			
c)	SSINA website is www.ssina.com .			

and Strip. ASTM does not provide surface finish definitions for other product forms. (ASTM does have dimensional tolerance requirements for other product forms.) The standard shapes and their dimensions are listed in Table 3-1. In the discussion that follows, the finishes for each type of product are explained.

Plate Finishes

Plate finishes are defined in ASTM A 480/A 480M. In most cases, plate is used for structural applications, but there are other installations where these finishes are used.

Hot-Rolled or Cold-Rolled, and Annealed or Heat Treated: The scale is not removed from the plate. This impairs corrosion resistance making the finish unsuitable for most applications. It is usually an intermediary processing step or used for heat resisting applications.

Hot-Rolled or Cold-Rolled, and Annealed or Heat Treated, and Abrasive Blasted or Pickled: This dull silver finish is essentially equivalent to a No. 1 sheet finish and could be used for structural components. The surface is often not that uniform in appearance. Grinding marks and other surface imperfections are common so additional finishing after fabrication is typically assumed in aesthetic applications.

Hot-Rolled or Cold-Rolled, and Annealed or Heat Treated, Surface Cleaned and Polished:

This is generally equivalent to a No. 3 or 4 polish depending on the purchasers finish requirements. The surface is cleaned by abrasive blasted and pickling and polishing is used to smooth the finish and make it more uniform. This finish was used on the exterior of the Gateway Arch in St. Louis. There are polishing houses who specialize in plate.

Hot-Rolled or Cold-Rolled, and Annealed or Heat Treated, Descaled and Temper Passed: Passing the abrasive blasted and pickled plate through smooth rolls gives it a smoother finish.

Hot-Rolled or Cold-Rolled, and Annealed or Heat treated, Descaled; and Cold-Rolled and Annealed or Heat Treated, Descaled, and Optionally Temper Passed: Like the preceding finish this is smooth but with fewer surface imperfections.

Sheet Finishes

Sheet finishes are defined in ASTM A 480/A 480M. The stainless steel finishes most widely used in architectural work are sheet finishes. These are identified by a system of numbers and letters, the unpolished, or, "mill" finishes being Nos. 1, 2D, bright annealed (usually 2BA), and 2B, and the polished finishes being Nos. 3, 4, 6,

7, and 8. The use of the polished finishes is not limited to sheet products; they can be applied to all product forms if desired by referencing ASTM A480/A480M.

The sheet finishes are described broadly by the finishing operations used to obtain them, as shown in Table 3-2.

**TABLE 3-2 - DESIGNATION AND DEFINITION OF STANDARD
MECHANICAL FINISHES FOR STAINLESS STEEL SHEET IN ACCORDANCE
WITH Note 4, ASTM A480/A480M**

Finish Designation	Definition
Unpolished Finishes:	
No. 1	Hot-rolled, annealed and descaled - Commonly referred to as hot-rolled, annealed and pickled or descaled. This is a dull, nonreflective finish.
No. 2D	Cold-rolled, dull finish - A smooth, nonreflective cold-rolled, annealed, and pickled or descaled finish. This nondirectional finish is favorable for retention of lubricants in deep drawing applications.
No. 2B	Cold-rolled, bright finish - A smooth, moderately reflective cold-rolled annealed and pickled or descaled finish typically produced by imparting a final light cold-rolled pass using polished rolls. This general-purpose finish is more readily polished than a No. 1 or 2D finishes. Product with 2B finish is normally supplied in the annealed plus lightly cold rolled condition unless a tensile-rolled product is specified.
Bright Annealed	A bright, cold-rolled finish retained by final annealing in a controlled atmosphere furnace - A smooth, bright, reflective finish typically produced by cold rolling followed by annealing in a protective atmosphere so as to prevent oxidation and scaling during annealing.
Polished Finishes	
No. 3	Intermediate polished finish, one or both sides - A linearly textured finish that may be produced by either mechanical polishing or rolling. Average surface roughness (Ra) can generally be up to 40 micro-inches. A skilled operator can generally blend this finish. Surface roughness measurements differ with different instruments, laboratories, and operators. There can also be overlap in measurements of surface roughness for both No. 3 and No. 4 finishes.
No. 4	General purpose polished finish, one or both sides - A linearly textured finish that is produced by either mechanical polishing or rolling. Average surface roughness (Ra) can generally be up to 25 micro-inches. A skilled operator can generally blend this finish. Surface roughness measurements differ with different instruments, laboratories, and operators. There can also be overlap in measurements of surface roughness for both No. 3 and No. 4 finishes.
No. 6	Dull, satin finish, Tampico brushed, one or both sides - This finish has a soft, satin appearance typically produced by Tampico brushing a No. 4 finish.

No. 7	High luster finish - Has a high degree of reflectivity. It is produced by buffing a finely ground surface, but the grit lines are not removed. It is chiefly used for architectural or ornamental purposes.
No. 8	Mirror finish - This is a highly reflective, smooth finish typically produced by polishing with successively finer grit abrasives, then buffing. Typically, very faint buff of polish lines can still be visible on the final product. Blending after part assembly can be done with buffing.
TR Finish	Cold-worked to obtain specified properties - The finish resulting from the cold-rolling of an annealed and descaled or bright annealed product to obtain mechanical properties higher than that of the annealed condition. Appearance will vary depending upon the starting finish, amount of cold work, and the alloy.
Architectural Finishes	Sometimes described as a No. 5 finish – These are a separate category and may be negotiated between buyer and seller, as there are many techniques and finish variations available throughout the world.

Text notes in ASTM specifications: These notes are descriptive information and are not legally binding. If surface roughness maximums or specific surface appearance characteristics are desired the purchaser is encouraged to tighten the specification by making them an additional requirement.

Strip

Stainless steel strip has five mill finishes defined by ASTM A480/A480M. No. 1 Strip Finish is similar to a No. 2D sheet finish, which is produced by cold rolling to the specified thickness, followed by annealing and pickling.

It varies in appearance from dull gray matte to a fairly reflective surface. No. 2 Strip Finish is the same as a No. 1 finish except that it is followed by a final cold roll pass, generally on highly polished rolls. If the rolls are highly polished, it is equivalent to a No. 2B sheet finish.

It is a smoother, more reflective finish than No. 1 Strip Finish. The Bright Annealed, TR Finish, and No. 3 and 4 polished finishes are also available on strip and are produced to the requirements for sheet finishes.

It should be recognized that within each of these finish categories some variation should be expected, due to the characteristics of the different alloys and differences in metal thickness and methods of processing.

Bars

Hot-finished bars are commonly produced by

hot rolling, forging, pressing, extruding, or similar hot working procedures applied to ingots, blooms, or billets. The bar may be heat treated and cleaned by blasting, pickling, or some other descaling method. Final finishes also include rough turning; and machine straightening, centerless grinding, and polishing. The dimensional tolerances for hot-finished bars are less stringent than those for cold-finished bars.

Bars cut from flat-rolled stainless steel products have two surfaces that are pickled or descaled, and two cut surfaces, except when the bar is heat treated subsequent to cutting, in which case all surfaces are descaled or pickled. The flat product can be polished prior to cutting, and the cut edges ground.

Cold-finished bars have the surface finish that results from hot-finished bars being further processed by additional cold drawing. The final finish can be cold-drawn, burnished, centerless ground, or polished to provide closer tolerances and improved surface finish. The dimensional tolerances applicable to cold-finished bars are more stringent than those applicable to hot-finished bars.

The optional surface conditions and finishes which can be specified for stainless bars are shown

in Table 3-3. Note that the mechanically polished finishes can be any of those identified as sheet finishes in Table 3-2 and should be specified by referencing ASTM A480/A480M and the specific finish.

Wire

Stainless steel wire is produced in a large variety of compositions and finishes, usually designed for certain specific end uses. Many of these are suitable for architectural uses, but, since ASTM A555/A555M does not define wire finishes, wire producers should be consulted for information.

Pipe and Tubing

Ornamental/Structural grade tubing and pipe (round, square, and rectangular) is usually produced from a No. 2 strip finished material in thicknesses less than 0.180 in. (5 mm) which is formed and seam welded. Thicknesses of 0.180 in. (5 mm) and up are usually produced from 2D annealed and pickled as well as hot finished raw materials. Specifying seamless tubing provides no additional corrosion benefit in architectural applications but can substantially increase cost. The relevant ASTM specification is ASTM A554.

Although these products are produced from strip or plate finishes, processing changes the surface finish on the end product. Stretch or tooling marks can be evident especially on larger OD and/or heavy wall material that has not been

polished. The surface can be polished by the mill supplier, a specialty polishing house, or the fabricator to equate to polished sheet finishes with the hot rolled product requiring a bit of extra effort. Round products requested pre-polished are supplied with either a circumferential or longitudinal finish. Square and rectangular tubing is supplied polished longitudinally.

If a finish similar to the sheet No. 3 or 4 polish is desired, final polishing grits of 180, 240 and 320 are available. These are generally longer grained finishes than sheet or strip finishes. Buffed finishes, which are similar in appearance to a No. 7 or 8 polish, are also available. It is generally more cost effective to purchase pre-finished product and blend the finish as necessary after fabrication. Large diameter square and rectangular tubing is typically not supplied by the mill suppliers with the corner radius polished. Due to the diversity of products, service centers or mill suppliers should be consulted regarding available finishes and surface conditions of each product.

Extrusions

The natural finish resulting from extrusion (usually followed by a drawing operation) resembles a No. 1 sheet finish. The surfaces can be finished by clean, unused sand or glass bead blasting or can be polished by the fabricator or finisher to produce a polished sheet finish if desired.

TABLE 3-3 – SURFACE FINISHES AND CONDITIONS FOR STAINLESS STEEL BARS

Surface Finishes	Condition		
	Hot worked only	Annealed or otherwise heat treated	Annealed and cold worked to high tensile strength*
Scale not removed (excluding spot conditioning)	X	X	
Rough turned	X	X	
Pickled or blast cleaned and pickled	X	X	
Cold drawn or cold-rolled		X	X
Centerless ground		X	X
<u>Mechanically polished (sheet finishes)</u>		X	X

* Produced in a variety of stainless steels including Types 303Se, 304/304L, and 316/316L, 430 and 17-4pH

TABLE 3-4 – FINISHES FOR STAINLESS STEEL HARDWARE

Code No.	Description	Nearest US Equivalent
629	Bright Stainless Steel, 300 Series	US32
630	Satin Stainless Steel, 300 Series	US32D

Hardware Finish Designations

Finishes for architectural hardware made of stainless steel are generally designated by finish code numbers of the Builders Hardware Manufacturers Association (BHMA). Listed below are the two most commonly used. Since U.S. Finish Designations occasionally appear in specifications, the nearest former U.S. equivalent of the BHMA number is shown on the list. For a complete listing and description of hardware finishes refer to ANSI/BHMA A156.18, American National Standard for Materials and Finishes.

Selection of Proper Grade, Care, and Maintenance of Stainless Steel

Stainless Steel came into being in the early 1900's. Metallurgical engineers discovered that adding chromium and nickel to ordinary carbon steel would improve stain and corrosion resistance. Stainless steels contain at least 12 percent chromium and form a thin (invisible), protective, corrosion-resistant, passive film on their surface. This film forms spontaneously as long as the stainless steel surface is clean when the chromium reacts with oxygen in air or water. If the film is damaged or removed during fabrication or polishing, it self-repairs immediately so long as the surface is clean.

The most commonly used architectural stainless steels are Types 304 and 316. The former is suitable for most interior and mildly corrosive exterior applications, but if the site is more aggressive, molybdenum-containing Type 316 or an even more corrosion-resistant stainless steel may be necessary to avoid corrosion, particularly if there will not be regular cleaning.

While it is assumed other architectural metals will corrode without preventive maintenance, stainless steel is often expected to remain pristine with little or no maintenance. The level of maintenance required to keep the material attractive in any given environment is determined by the stainless steel grade, finish, location, design, and owner's aesthetic requirements.

Rural or suburban areas with low population densities and light, non-polluting industry can be categorized as rural. A site that appears rural can be impacted by migrant air pollution, so it is important to determine if there is industry upwind of the site. Type 304/304L is usually the most cost-effective choice

for boldly exposed surfaces in rural areas. Sheltered surfaces could experience minor discoloration over time if not cleaned. Smoother surface finishes provide better resistance to tarnishing and accumulate less dirt. Regular washing helps to retain a pristine appearance.

Urban sites include residential, commercial, and light industrial locations with low to moderate pollution from vehicular traffic and similar sources. Type 304/304L is usually the most cost-effective choice unless pollution levels are high, in which case slight tarnishing can occur. This can be avoided with regular cleaning and by specifying smoother surface finishes. Type 316/316L performs well in areas with high levels of urban pollution, and while cleaning may not be necessary for corrosion resistance, it improves overall appearance.

Sulfur and nitrogen oxides from coal combustion, and gases released from chemical and process industry plants typically characterize industrial sites. Surface deposits, such as soot from incompletely burned fuel or iron oxides, increase the environment's severity.

When industrial pollution levels are low to moderate, Type 316/316L performs well and is usually the most cost-effective choice. Type 304/304L may be satisfactory if a smooth finish is selected for a regularly washed application. If pollution levels are high, Type 316 can develop corrosion staining, but this is minimized if smooth finishes and regular washing are specified. For aggressive conditions, a more highly alloyed stainless steel may be needed. Pollution controls have made aggressive conditions less common in the US but they are common in other parts of the world.

Seawater contains a mixture of salts (sodium, magnesium, calcium, and potassium chlorides), and local wind patterns determine how far they are carried inland. Generally, locations within 5 mi to 10 mi (9 km to 18 km) of salt water are at risk for chloride-related corrosion, but local weather patterns vary and the performance of metals near the site should be evaluated prior to material selection. Type 304/304L can experience severe pitting in coastal and marine environments and should be used with caution. If the environment is less corrosive, Type 304 is acceptable if a smooth surface finish is specified, and it is frequently cleaned. Type 316/316L is usually the most cost-effective stainless steel for low to moderately corrosive

coastal architectural applications, and generally provides good service. If unwashed, some discoloration can occur after long-term exposure.

A specialist should be consulted if the component is close to, or immersed in seawater to determine the most cost-effective grade. If the component is occasionally splashed, such as railings beside the water, Type 316 may be inadequate unless a smooth finish is used, and it is frequently washed. If a rougher finish is desired or regular cleaning is impractical, a more corrosion-resistant grade should be used, such as 317LMN, 904L, or 2205. If the material will be regularly splashed or immersed in seawater, super-duplex stainless steels, such as 2507 or six percent-molybdenum austenitic, should be specified.

Typically, chloride or salt accumulations on handrails, doorstops, and other street-level applications are heavier in areas where deicing products are used than in coastal locations. All deicing products contain chlorides, typically sodium, calcium or magnesium chloride. If a site is exposed to both coastal and deicing salt or chlorides, the environment becomes even more aggressive. Deicing salt carried by road mist and wind have been found as high as the 50th floor of high-rise buildings and over 600 ft (183 m) from busy highways. It contaminates soil and is found in airborne dust throughout the year. Vehicle and wind speeds and traffic levels are the most important factors in determining how far deicing salt laden road mists will travel.

If a location has low to moderate deicing salt exposure, is boldly exposed and washed by heavy rain in the spring, Type 316 needs only occasional cleaning to remove dirt accumulations, particularly if a smooth finish is selected. Some light staining can occur over time but can be removed.

If the application is in close proximity to a road or sidewalk, or if there are horizontal or sheltered surfaces, Type 316 is usually still suitable if a smooth surface finish is selected and if salt deposits are washed off annually after the last deicing. In some areas, heavy spring rain may provide sufficient cleaning. If a rough finish is selected or if cleaning is infrequent, staining can occur over time but can generally be removed. A more highly alloyed stainless steel may be needed in particularly aggressive environments with high salt and pollution exposure.

Research has shown a direct correlation be-

tween surface finish roughness and the likelihood of corrosion. Smoother surface finishes retain less dirt and debris, and provide better corrosion performance than rougher finishes. As a result of this research, the European Standard EN 10088 recommends a surface roughness of Ra 20 micro-inches or 0.5 microns or less for polished finishes used in environments with high levels of particulates, corrosive pollution, and/or salt exposure, and in applications where regular maintenance is unlikely. Alternatively, a more corrosion-resistant product could be used if a rough finish is desired for aesthetic reasons. Similar guidelines should be followed for finishes produced by means other than polishing. For most embossed finishes, the roughness of the finish should be measured prior to pressing the pattern into the metal. However, when the coined or embossed finish simulates another finish (i.e., abrasive blasting or polishing) or if the pattern is likely to retain dirt and debris, the roughness of the final finish should also be measured.

If the design requires welding sections thicker than about 0.25 in. (6 mm), and the weld will be exposed to a corrosive environment, use low carbon versions of the stainless steels (i.e., 304L or 316L) to reduce the risk of sensitization and improve weld corrosion resistance. (The corrosion resistance of Type 304 is equivalent to Type 304L, and Type 316 is equivalent to Type 316L.)

Stainless Steel Selection Guidelines Based on Site Score

Extracted from the International Molybdenum Association (IMO) publication IMO ABC 00, *"Which Stainless Steel Should I Specify for Exterior Applications?"*

Select all of the items on the following list that describe the site, design and maintenance schedule. Add up the points and calculate the total site score. Selecting smooth surface finishes, regular manual cleaning or heavy rain-washing, and avoiding sheltered components will reduce the potential corrosiveness of an environment. Surface roughness should be below Ra 20 micro-inches (0.5 microns or micrometers) and polished finishes should have a clean-cut silicon carbide finish. Information about the stainless steel selection system, case studies, and a free software program that assists users in making stainless steel selection decisions can be found at <http://www.imoa.info>.

Maintenance and Cleaning

If an appropriate stainless steel, finish, and design are selected, and there is adequate heavy rainfall to remove surface accumulations, it is possible for an application to look attractive for many years without regular manual cleaning. For a pristine appearance, only occasional cleaning is necessary to remove stubborn dirt and hydrocarbons.

Accumulations of corrosive airborne pollutants and salt can cause corrosion. Dirt accumulations can cause unsightly streaking. Where horizontal surfaces cannot be avoided, as in window sills and copings, the surfaces should be smooth, sloped for easy drainage, and provided with a projecting drip so that the wash does not run down the face of the wall below.

Joints in the wall should be so designed so that any water which penetrates them, as well as any condensation which can occur within the wall, will be conducted away by an internal drainage system.

When cleaning is required, a mild chloride-free detergent, water, and degreaser solution is usually sufficient. Alternatively, an ammonia and water window cleaning solution is an effective way of removing light soil and fingerprints. Stronger degreasers are needed for heavier oil and grease deposits. Proprietary stainless steel cleaners that do not contain oil, hydrocarbons, wax, or other products that coat the surface can also be used. Stainless steel panels can be washed when nearby windows are washed using the same cleaning solution.

In cases of stubborn dirt or staining, a chloride-free, 200-mesh or finer calcium carbonate powder, such as Bon Ami, can be used without damaging most finishes. Fine abrasive cleaners containing oxalic acid (such as Zud or Bar Keeper's Friend) are particularly effective against corrosion staining. Cleaners with abrasives are not appropriate for colored and other delicate finishes. Some household and 'stainless steel' cleaners

contain harsh abrasives and acids that will damage architectural finishes, and should be tested in an inconspicuous location before use.

Abrasive pads and cleaners should be avoided, as they will change the finish. Steel wool should never be used on stainless steel because steel particles will embed in the surface and cause staining of the stainless steel as the transferred material rusts. Soft non-metallic brushes that will not scratch the surface can be used to loosen dirt. If changing the surface finish is not a concern, stainless steel wool or a non-metallic abrasive pad (such as a Scotch-Brite® pad) can be used to remove stubborn stains.

The fabrication department can also contribute to ultimately rusting in spots. Many fabricators utilize work tables made of carbon steel and/or fabricate carbon steel using the same tools and while the job is being processed, the job can also be dragged across these work tables or cross contaminated by improperly cleaned tooling. This can embed carbon steel particles in the surface. These particles will contaminate the stainless and will eventually create a rusting problem in those contacted areas.

Temporary protective coatings of wax, oil, or lacquer are unnecessary; can accelerate corrosion as they fail; and are not recommended for exterior applications. The use of strippable films of adhesive paper or plastic is common practice during manufacture, transit, and installation to prevent surface damage or contamination. Such coverings can be applied over finished surfaces by the mill or surface finish supplier. Protective coatings or coverings on the fabricated parts shipped to the job site should always be removed as soon as possible after installation, and all adhesive residue should be removed completely. Careful specification of protective films can avoid adhesive residue. Adhesive chemistry can vary substantially and the film manufacturers advice should be sought in their removal.

For accumulations of oil or grease, proprietary

Table 3-5: Stainless Steel Selection Based on Site Score

Score	
0 to 2	Type 304 is generally the most economical choice.
3	Type 316 is generally the most economical choice.
4	Type 317L or a similar more corrosion resistant stainless steel is suggested.
≥5	A more corrosion resistant stainless steel such as 2205, 904L, 317LMN, or a 6% molybdenum austenitic stainless steel may be needed. The advice of a stainless steel corrosion specialist is suggested to confirm the severity of the location and to assist in stainless steel selection.

Table 3-6 – Estimated Site and Design Score

Points		Score
Section 1	Environment (select only the one highest applicable score)	
<i>Rural</i>		
0	Very low or no pollution	
<i>Urban Pollution</i> (light industry, automotive exhaust)		
0	Low	
2	Moderate	
3	High *	
<i>Industrial Pollution</i> (aggressive gases, soot, iron oxides, chemicals, etc.)		
3	Low or moderate	
4	High *	
Section 2	Coastal and/or Deicing Salt (chloride) Exposure (Select the one highest applicable score) If there is exposure to both coastal and deicing salt, obtain assistance from a stainless steel atmospheric corrosion expert.	
Coastal/Marine Salt Exposure only		
1	Low (1 to 10 miles (1.6 to 16 km) from salt water	
3	Moderate (100 ft to 1 mile (30 m to 1.6 km) from salt water	
4	High (<100 feet (30 m) from salt water)	
5	Marine (some salt spray or occasional splashing)*	
8	Severe Marine (continuous splashing)*	
10	Severe Marine (continuous immersion)*	
Deicing Salt Exposure only (distance from road or ground)		
0	No salt (chlorides) were detected on a sample from the site and no change in exposure conditions is expected	
0	Traffic levels on nearby roads are too low to generate road mist, or wind levels are too low to carry chlorides to the site, and no deicing salt is used on sidewalks	
1	Very low salt exposure (typically >600 ft (180 m) or 12 floors from salt source)**	
2	Low salt exposure (typically 100 to 600 ft (30 to 189 m) or up to 12 floors from salt source)**	
3	Moderate salt exposure (typically <100 feet (30 m) or 3 floors from salt source)**	
4	High salt exposure (Direct application or splash zone)*	
Section 3	Local Weather Pattern (select only one)	
-1	Temperate or cold climates, regular heavy rain (not sheltered)	
-1	Hot or cold climates with typical humidity below 50%	
0	Temperate or cold climate, occasional heavy rain (not sheltered)	
0	Tropical or subtropical, wet, regular or seasonal very heavy rain (not sheltered)	
1	Temperate climate, infrequent rain, humidity above 50%	
1	Regular very light rain or frequent fog	
2	Hot, humidity above 50%, very low or no rainfall***	
Section 4	Design Considerations (select all that apply)	
0	Boldly exposed for easy rain cleaning	
0	Vertical surfaces with a vertical or no finish grain	
-2	Surface finish is pickled, electropolished, or roughness $\leq$ Ra 12 microinches (0.3 micron)	
-1	Surface finish roughness Ra 12 micro inches $< x \leq$ Ra 20 micro inches (0.3 to 0.5 micron)	
1	Surface finish roughness Ra 20 $< x \leq$ 40 micro inches (0.5 up to 1 micron)	
2	Surface finish roughness $>$ Ra 40 micro inches (1 micron)	
1	Sheltered location or unsealed crevices ***	
1	Horizontal surfaces	
1	Horizontal finish grain orientation	
Section 5	Maintenance Schedule (select only one)	
0	Not washed	
-1	Washed at least annually	
-2	Washed four or more times per year	
-3	Washed at least monthly	
	Total Site Score:	

* Potentially a highly corrosive location. Have a stainless steel corrosion expert evaluate the site.

** A sample from the site should be tested to determine if chlorides are present. Some locations of this type are exposed to chlorides but others are not.

*** If there is also salt or pollution exposure, have a stainless steel corrosion expert evaluate the site.

stainless steel degreasers, an organic solvent, mineral spirits, acetone, alcohol, benzene, citric cleaner, or a caustic solution such as trisodium polyphosphate can be used, followed by a water rinse. If more aggressive cleaning is needed to remove dirt deposits, a 200 mesh or finer calcium carbonate abrasive that does not contain chlorine should be

used, such as Bon Ami. It should be tested in a low visibility location first to ensure that it will not damage the finish and should be applied in the same direction as the polishing lines. Many common household abrasives are too harsh and will scratch the finish. They often also contain chlorides.

Refer to the following for more information on grade selection:

Nickel Institute publication No. 11 024, *Stainless Steels in Architecture, Building and Construction: Guidelines for Corrosion Prevention*, provides detailed information about evaluating the environment and selecting an appropriate product. Visit www.stainlessarchitecture.org.

Which Stainless Steels Should I Specify for Exterior Applications? and case studies from IMOA provide additional information on grade selection. Visit <http://www.imoa.info>.

If more corrosion resistance than Type 316 is needed, request the IMOA publication, **Practical Guidelines for Fabrication of Duplex Stainless Steels**, and Nickel Institute publication 11 021, **High Performance Stainless Steels**.

Additional comparative architectural metal corrosion data for different environments can be found in The **Construction Specifier** article, "Metals for Corrosion Resistance: Part II," (November 2000).

Chapter 4:

Finishes for Carbon Steel & Iron

NAAMM/NOMMA AMP 500-06

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FINISHES FOR CARBON STEEL & IRON

General

It is well known that most substances tend to revert to their natural form, and among the architectural metals, carbon steel and iron are the most conspicuous examples of this rule. All of the common metals oxidize, or corrode, to some extent, but while the oxides forming on other metals generally inhibit the progress of further corrosion, the oxide, or rust, that forms on ordinary carbon steel and iron does not act in this way. Instead, if not prevented, oxidation progresses until the metal reverts to essentially the same state in which it was found in nature. It is generally the chief function of the finishes used on the common ferrous metals to counteract this tendency, to inhibit corrosion.

Some of the high strength, low alloy, copper bearing structural steels have been used in exposed applications such as building structural elements, curtain walls, bridge structures and transmission towers without applying paint for surface protection. These steels are referred to in the industry as "weathering steels." When exposed to the weather they develop a relatively tight, adherent oxide film that tends to protect the surface against further oxidation or rusting, with time the film darkens and takes on a color ranging from dark reddish brown to a warm purple black. These surfaces, however, are not fully resistant to the effects of rain and serious rust staining can occur where water runs down and off the building on materials such as concrete.

While exposed surfaces have excellent durability, unexposed surfaces and interior surfaces do not develop sound oxide films and must be cleaned and painted with rust inhibiting primers in the same way that other carbon steels are protected. Today these steels are not often used for architectural applications.

The term "finish," when used in reference to iron and steel, usually has a somewhat different connotation than when used in reference to the nonferrous metals. On the other metals it generally implies a surface treatment by mechanical or chemical means, and less frequently refers to an applied coating of some kind. With iron and steel

the reverse is true" most of the common finishes used on these metals are applied as coatings. Mechanical and chemical processes are extensively used for cleaning and surface preparation, but rarely as true finishes.

All types of additive coatings are used far more extensively on carbon steel than on other architectural metals, and for two basic reasons:

- 1) a protective covering is usually essential, as already explained, and

- 2) if an opaque coating is to be used on a metal it is only the coating itself which is seen, and for many applications costs can be minimized by using the most economical substrate having the necessary physical properties.

The ferrous metals satisfy this requirement. It should be noted, however, that the durability of many organic coatings under exposure to the elements is influenced by the durability of the base metal itself. Deterioration of the coating may be initiated at the interface between the coating and the substrate, due to the penetration of the coating by corrosives, and the corrosion resistance of the base metal therefore becomes a critical factor.

Probably the most common finish for architectural steel and iron is paint, a form of organic coating, applied by brush, spray, flow coating or dipping and frequently air dried. Relatively inexpensive metallic coatings of zinc, aluminum or combinations of these two metals, are applied to many steel building products, serving either as a base for subsequent organic coatings or as a final finish. Vitreous coatings in the form of porcelain enamel and plastic films as laminated coatings are also used.

With the exception of some hardware items, metallic coatings are not used on architectural products made of aluminum, copper alloys or stainless steel. On the other hand they are commonly applied to carbon steel and iron. For this reason metallic coatings are discussed in this section. The organic, vitreous and laminated coatings, being more general in their appropriateness, are given separate consideration in Applied Coatings,

SUMMARY OF TYPICAL IRON AND STEEL FINISHES

Finish	Finish Normally Supplied By			Relative Costs (on flat surfaces)
	Mill	Process- sor	Fabricator or Finisher	
MECHANICAL				
As Fabricated	X			base
(hot rolled, cold rolled)				
Patterned			X	low to medium
(Other mechanical processes are generally for cleaning only.)				
CHEMICAL				
Cleaned only.....			X	very low
Conversion Coatings.....		X	X	low
(usually pretreatments for painting)				
COATINGS				
Metallic.....	X	X	X	medium to high
Organic (see Chapter 5)	X	X		low to medium
Vitreous (see Chapter 5)			X	high
Laminated (see Chapter 5)		X		medium

The term PROCESSOR, as used here, refers to a "middleman" between the mill and the fabricator, who applies coatings, textures or other finishes to metal in bulk form, generally cut sheet or strip or coil stock. FABRICATOR refers to the producer of stock metal shapes or the manufacturer of the end-use product. He may also provide the final finish or he may send the fabricated products to a finisher who does the work. The FINISHER does not usually fabricate products, but provides finishes as specified, to products fabricated by others.

The RELATIVE COSTS indicated are necessarily approximate, for general guidance only. Exact costs vary considerably with quantity, type of product, quality of work, etc., and should always be verified.

Certain embossed patterns, because of their stiffening effect, permit the use of thinner metal, and this saving may in some cases offset their cost. In other cases patterned finishes involve extra cost.

Chapter 5. The table above summarizes the common usage of all of the various finishes commonly used on architectural iron and steel.

Mechanical Surface Treatments

As previously stated, true finishes applied by mechanical means are rarely if ever used on architectural iron and steel. Mechanical surface treatments are important, however, in preparing the metal to receive applied coatings, and these deserve consideration.

Mill Finishes

The **hot-rolled mill finish** on carbon steel is usually characterized by a tight mill scale and rust powder. For painting, all loose mill scale and rust particles should be removed, as they are likely to prevent complete adhesion and may provide focal points for incipient corrosion.

Cold-rolled surfaces should always be properly degreased before painting, and if they are extremely smooth, may also require roughening to insure good adherence.

Cleaning Methods

The following mechanical methods are used most extensively on carbon steel and iron to remove

mill scale, corrosion products and dirt, but they are not effective in removing oil and grease:

Hand cleaning (SSPCSP2)* is commonly accomplished with wire brushes, abrasive paper or cloth, scrapers, chisels or chipping hammers. Such methods are best adapted to spot cleaning, and are not recommended for use on large areas when more effective and cheaper methods are available.

Power tool cleaning (SSPCSP3)* A large variety of power driven brushes, grinders and sanders, mostly of the rotary type, are used for removing scale, rust, and dirt from heavy stock. Because of the severity of such cleaning methods, though, they are less appropriate for thin metal. This method of cleaning is more effective and more economical than hand cleaning for large surfaces, but may be slow as compared with other available methods.

Shot and sandblasting This is perhaps the best means of obtaining a clean surface suitable for painting, and may be done either wet or dry. Blasting should be used with caution on thin metal, however, because of the danger of its distorting the metal. These are relatively expensive processes and may be hazardous, so are usually used only where the highest quality work is required. All solid contaminants and even tight scale can be

removed, and besides being clean, the resulting surface is sufficiently roughened to ensure good paint adhesion.

**The Society for Protective Coatings has four different specifications covering different degrees of blast cleaning:*

SSPCSP5 Blast Cleaning to "White Metal"*

SSPCSP6 Commercial Blast Cleaning*

SSPCSP7 Brushoff Blast Cleaning*

SSPCSP10 "Nearwhite" Blast Cleaning*

Flame cleaning This method is not generally recommended. It is appropriate only for heavy steel parts because the heat of the oxyacetylene torch used causes sheet and light members to buckle. It is effective in removing heavy rust and mill scale, but leaves tightly adhering oxides. All grease, oil and dirt should be removed before flame cleaning, and for best results the metal should be scraped and wire brushed after flame cleaning, and painted while still warm.

Chemical Treatments

Chemical treatments are not employed on architectural iron and steel to provide surface finishes, but are employed only to either 1) thoroughly clean the surface, without otherwise affecting it, or 2) to chemically convert the surface film so as to provide a good bond for applied coatings. Such treatments are briefly described in the following paragraphs.

Cleaning Processes

Three types of chemical cleaning process are in common use.

Pickling: (SSPCSP8)* This cleaning process very commonly used on ferrous metals, particularly sheet, bars and light shapes, to remove scale and oxide coatings. It consists of immersing the metal in a dilute acid solution, followed by rinsing first in water, then in other solutions and thorough drying.

Vapor degreasing: This process exposes the metal to vapors from chlorinated solvents such as trichloroethylene and perchlorethylene, and is performed in special degreasing machines, either by a batch method or as part of a continuous processing line. The chlorinated solvents are widely used in industrial cleaning operations, but have the disadvantages of being toxic and comparatively expensive, and they do not provide the degree of cleanliness that certain finishing operations such as plating may require.

Alkaline cleaning: This method is used when mineral and animal fats and oils must be removed. The metal may be sprayed with or immersed in

any of a number of proprietary or nonproprietary solutions, usually at elevated temperatures, after which it is rinsed with water. Caustic soda, soda ash, and alkaline silicates and phosphates are among the common cleaning agents used.

**Reference to detailed specification for this method, as established by the Society for Protective Coatings.*

Conversion Coatings

Conversion coatings are widely used, both on carbon steel and galvanized steel, to "convert", the chemical nature of the surface film, thus improving the bond for paint or other applied coatings. Acid phosphate solutions are most commonly used for such treatments. These are generally proprietary solutions, and produce a fine matte surface texture, usually slate gray in color.

Applied Coatings

As already indicated, the finishes used on architectural iron and steel are nearly always some form of applied coating, and by far the most common are the organic coatings such as paint. Metallic, vitreous and laminated coatings are also widely used, however, the relative extent of usage of these types probably being in the order named.

Since the organic, vitreous and laminated coatings are extensively used on other architectural metals also, it has seemed advisable to discuss these three coating types in a separate section, rather than as a finish for any one metal in particular, and this is done in Applied Coatings, Chapter 5. The use of metallic coatings for architectural purposes, though, is confined almost exclusively to iron and steel, and on this substrate they have many important applications for building products and accessories. Consequently this type of coating is discussed in some detail here, with special attention to zinc and aluminum.

Metallic Coatings

The metals most commonly used in the architectural field, for the coating of carbon steel, are the following:

Aluminum	Nickel
Cadmium	Terne metal
Chromium	(8090% lead, 2010% tin)
Copper	Tin
Lead	Zinc

The prime function of all such coatings is to

provide protection against corrosion, permitting the mechanical properties of steel to be used with reliable assurance of durability. Some of the coatings, however, have important decorative value as well.

As compared with other applied coatings, some of the metallic coatings provide unique protective value through electrolytic action. If the coating is anodic to, or less noble than the base metal, as in the case of zinc, it protects by "sacrificial action;" if cathodic, or more noble, its protective value is due to freedom from pinholes and to its own relative chemical inactivity in the environment to which it is exposed.

There are a number of different methods by which metallic coatings may be applied:

- a) **The Hot Dip Process**, in which the steel item, after being thoroughly cleaned, is immersed in a molten bath of the coating metal. Zinc, tin, lead, and aluminum are applied commercially by this process, and consequently in the architectural field this method of coating is by far the most widely used.
- b) **The Thermal Spraying Process**, often referred to as "metallizing," which may be used with most of the metals listed above, and is extensively used for applying zinc and aluminum coatings. In this process the coating metal in the form of a wire or powder is fed into a specially constructed spray gun operated with compressed air and fuel gas. The gas is ignited at the nozzle, and the coating metal is melted as it is fed into the nozzle, then is projected at high speed against the surface to be coated. The coating adheres to the base metal by a combination of mechanical interlocking and metallurgical bonding. Thermal spraying is the only method of metallic coating that is practical for use in the field.
- c) **The Electroplating Process**, which has long been used to apply coatings of many different metals to steel. Zinc and cadmium are commonly applied by this method, and both are anodic to steel, but most other electroplated coatings are cathodic, providing protection by surface covering alone. The most common among these are nickel, chromium, nickel followed by chromium, and copper followed by nickel or by nickel and chromium.
- d) **The Cladding Process**, which produces bime-

tallic products consisting of a steel or other metal core, covered with a thin sheet layer of the coating metal. Copper cladding may be applied by casting the copper about a heated steel core mounted in a covered mold out of contact with the air, by dipping the steel core into a bath of molten copper, or by depositing the copper electrolytically. Stainless steel cladding may be accomplished by electrowelding stainless steel onto the carbon steel core, or by placing the carbon steel between two sheets of stainless steel and rolling. Aluminum cladding is accomplished by rolling flat steel, cleaning it thoroughly, and placing it between two sheets of aluminum and either cold rolling or warm rolling at between 600 °F (315°C) and 700°F (370°C) "Alclad" aluminum stock is also produced by this method, using an aluminum alloy core sheet and very thin cladding of high purity aluminum. Also, by a roll bonding process developed in Great Britain, steel may be clad with lead to provide both the corrosion resistance and the sound attenuation properties of lead.

- e) **The Cementation Process**, by which the coating metal is alloyed into the surface layers of the steel. A variety of different processes are used, including one by which small articles are zinc-coated by packing them in zinc dust in an airtight revolving container and heating to a temperature in the neighborhood of the melting point of zinc.
- f) **The Fusion Welding Process**, which involves either depositing weld metal under a slag covering by the electric arc method, or fusing the surfaces of two bodies of metal in contact, by passing a high density current. These initial steps are followed by heating and rolling.

Painting with heavily mineral-pigmented paints has also been found to produce corrosion resistance comparable to some of these metallic coating processes, and the protective value of zinc-rich paints is particularly significant. While this is not technically a metallic coating, but a paint, and is therefore discussed in Applied Coatings, Chapter 5, the merits of this means of providing protection from corrosion should be recognized at this point.

Most of the metallic coating of building and architectural products is done by the hot-dip and electroplating processes, and aside from hardware

items and lighting fixtures, by far the most common of these are zinc coatings, aluminum coatings and aluminum-zinc coatings. These types of finishes, therefore, deserve detailed consideration.

Zinc Coatings (Galvanizing)

Zinc coatings protect the steel base from corrosion by a twofold action. In addition to providing a protection barrier which seals out moisture and other airborne corrodents, they also protect by galvanic action. The anodic relationship of zinc to iron is such that even when the iron is exposed by small breaks in the coating, the zinc still provides protection, being slowly consumed in these limited areas by sacrificial action.

Zinc coatings are applied by several methods. In order of their commercial importance, these are the hot-dip method, electrodeposition (electrogalvanizing), thermal spraying, and several proprietary processes. The effective protective life of these coatings depends primarily on their thickness, but the uniformity and adherence of the coating is also essential to good performance. Regardless of the method of application, the heavier the coating, the longer will be the rustfree life of the metal. Its adherence, especially under mechanical deformation, must also be considered, because flaking or peeling of the coating may expose more base metal than can be protected by anodic action.

For architectural uses, two types of zinc coated sheets are available:

- 1) Galvanized sheets with ordered coating class G90 (Z275) (Minimum Check Limit TripleSpot Test 0.90 oz/ft² (275 g/m²) of sheet) or heavier, for use where exposures require durable protection.
- 2) Electrolytically zinc-coated sheets with coatings of 01Z (03G) of minimum 0.01 oz/ft² (3 g/m²) of sheet, usually requiring additional painting for satisfactory durability.

Two variations of the hot dip method are used; one for continuous sheet and strip, the other for fabricated shapes. Continuous coatings are quite uniform and ductile, and the most commonly produced is the G90 (Z275) coating, which has a thickness of approximately 3/4ths of one mil on each side. The G90 (Z275) coating is the grade most frequently used in architectural applications, but heavier coatings, up to 3.6 oz/ft² (1100 g/m²), can be supplied for use where severe exposures call

for increased durability. Table 4-1 lists the commonly available coating thicknesses and weights of commercial galvanized sheet.

After-fabrication galvanizing is a versatile process by which articles ranging in size from nuts and bolts to structures 1500 ft (460 m) in height have been protected. ASTM standards A 123/A 123M, A 153/A 153M, and A 653/A 653M provide for minimum coating weights up to 3.6 oz/ft² (1100 g/m²) depending on material thickness. Molten zinc baths in the 50-60 ft (15-18 m) range are available, allowing materials up to 90 ft (28 m) in length to be galvanized by double end dipping. The ability to accommodate these sizes, together with the ability to bolt or weld prefabricated structures after galvanizing, permit most any structure to be galvanized. Complex shapes and open vessels may be galvanized inside and out in one operation.

All types of plain carbon steel, some low-alloy steels, and iron and steel castings can be hot-dip galvanized after fabrication, providing a thick zinc and zinc alloy coating that is metallurgically bonded to the base metal. The molten zinc is applied in even thickness on edges and flat surfaces, covering corners and seams and penetrating recesses to give protection to potential corrosion sites. Though galvanizing is more tolerant of surface defects in the substrate than most other coating processes, the absence of defects will ensure a better quality coating, particularly where appearance is important. Because the rate of zinc corrosion relative to that of steel is known for many types of atmosphere, a specific maintenance free life can usually be predicted. The standard galvanized coating applied after fabrication lasts up to 75 years, even in industrial, marine or urban atmospheres.

Lightweight coatings of only 0.01 oz/ft² (3 g/m²) are normally applied by electroplating rather than hot dipping. Electroplating is used for small articles such as screws and other miscellaneous hardware items. Coating uniformity by this process may be poor, however, and most large scale electroplating is limited to strip and wire. Electrodeposited zinc generally has a fine matte surface which creates a good base for paint. While such coatings will protect the steel base from rusting during storage and fabrication, they are not heavy enough to provide effective protection for outdoor use or interior applications exposed to moisture. These light coatings should be specified only for painted parts or for mild interior exposures.

Coating Thickness

Coating thickness (measured as coating weight in ounces per square foot or grams per square meter) is an important factor in the effective application of galvanized sheet. The coating weight should be chosen carefully, with full attention to the fabrication method and type of environment in which the sheet will be expected to serve. In general, the effectiveness of the zinc coating to protect the steel substrate from corrosion in any given environment is directly proportional to the coating thickness. For example, for any spe-

cific set of environmental conditions, a G90 (Z275) coating will last about 50 percent longer than a G60 (Z180) coating, maintenance, painting and all other factors being equal.

Factors in addition to corrosion resistance must be considered when selecting coating thickness. For example, the adherence of the coating generally is inversely proportional to the thickness; therefore, a thin coating is more desirable for applications involving high amounts of forming. Also, spot welding becomes more difficult as the coating thickness increases.

TABLE 4-1 AVAILABLE COATING THICKNESSES AND WEIGHTS OF COMMERCIAL GALVANIZED SHEETS AND COIL

Coating Thickness - English Units (Metric Units)			
ASTM A653 Coating Designation	Minimum Coating Weight oz/sq ft (g/m ²)		
	Triple Spot Average Both Sides ⁽²⁾	Single Spot Test	
		One Side	Total Both Sides
G210 (Z600)	2.10 (600)	0.72 (204)	1.80 (510)
G185 (Z550)	1.85 (550)	0.64 (190)	1.60 (415)
G165 (Z500)	1.65 (500)	0.56 (170)	1.40 (425)
G140 (Z450)	1.40 (450)	0.48 (154)	1.20 (385)
G115 (Z350)	1.15 (350)	0.40 (120)	1.00 (300)
G90 (Z275)	0.90 (275)	0.32 (94)	0.80 (235)
G60 (Z180)	0.60 (180)	0.20 (60)	0.50 (150)
G40 (Z120)	0.40 (120)	0.12 (36)	0.30 (90)
G30 (Z90)	0.30 (90)	0.10 (30)	0.25 (75)

1 oz/ft² coating weight = 1.7 mils coating thickness

7.14 g/m² coating weight = 1 mm coating thickness

Courtesy of US Steel Corp.,
Pittsburgh, PA

1. The coating designation number is the term by which this product is ordered.

2. The weight of coating in oz. per sq. ft. refers to the total coating on both surfaces. The triple spot average encompasses an edge-center-edge sampling to determine adequate coverage across the sheet width. Typically, about half this coating is on each side.

Design Considerations for Galvanizing

In order to produce optimum quality galvanizing and to ensure reasonable coating costs certain rules must be followed in the design of products which are to be hot-dip galvanized after fabrication.

Drainage: For effective galvanizing, cleaning solutions and molten zinc must flow into, over, through and out of the fabricated product without undue resistance. Failure to provide for this free, unimpeded flow is a frequent cause of problems. Improper design of drainage results in galvanizing of poor appearance and excess buildup of zinc. These are unnecessary and costly.

Venting: It is mandatory that tubular fabrications and hollow structurals be properly vented. Proper galvanizing requires that the inside, as well as the outside, be completely cleaned and coated with zinc. To achieve this, air and frothy fluxes must be allowed to flow upward and completely out. Cleaning solutions and molten zinc must be allowed to flow in and completely wet the surfaces. Since items to be galvanized are immersed and withdrawn at an angle, the vent holes should be located at the highest point and drainage holes at the lowest point in each member. Vent holes can be closed with drive caps or plugs after galvanizing.

Distortion: Some fabricated assemblies may distort at the 850°F (455°C) galvanizing temperature as a result of relieving stresses which were induced during steel manufacture and subsequent fabricating operations.

Following are some recommendations to minimize distortion:

- Where possible use symmetrical rolled sections. I-beams are preferred to angles or channels.
- Use parts in an assembly that are of equal or near equal thickness, especially at joints.
- Bend members to the largest acceptable radii to minimize local stress concentration.
- Accurately preform members of an assembly so that it is not necessary to force, spring or bend them into position during joining.
- Continuously weld joints using balanced welding techniques to reduce uneven thermal stresses.

- Avoid designs which require double dip galvanizing or progressive galvanizing.
- Consult the galvanizer regarding the use of temporary bracing and/or reinforcing to minimize or prevent warpage and distortion during galvanizing.

Guidelines for minimizing warpage and distortion are given in *ASTM A 384/A384M, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies*. These guidelines are also generally applicable to the hot-dip coating of steel with other metals.

Special procedures are also recommended for weldments and castings. However, aside from pointing out that there are basic design considerations which must be taken into account when galvanizing steel assemblies, it is not the purpose of this manual to cover product design requirements and manufacturing processes in detail. *ASTM A 385, Standard Practice for Providing High Quality Zinc Coatings (Hot-Dip)*, covers various aspects of designing for hot-dip galvanizing. Excellent detailed information on all aspects of hot-dip galvanizing is available from the American Galvanizers Association.

Special Finishes and Paint Pretreatments for Galvanized Sheets

Most of the galvanized sheets used by industry are supplied with the regular "spangled" finish produced by the continuous galvanizing line. For architectural applications, however, certain other finishes may be required, to improve the bonding of paint or other organic coatings, and these may be obtained on special order.

Wipe Coated Galvanized Sheets are hot-dipped sheets on which the zinc is wiped down as the steel leaves the zinc pot. The resulting product has a light zinc-iron alloy coating of approximately 0.1 oz/ft² (30 g/m²) to 0.5 oz/ft² (150 g/m²) and does not have a spangle. When required, it is produced to be suitable for painting after cleaning. These sheets may have certain longitudinal lines resulting from the wiping operation.

Galvannealed Sheets are hot-dipped sheets which have been heat treated after coating to produce a dull gray zinc-iron alloy surface which is free of the typical spangles. Although these sheets can be painted without further surface preparation except for normal

cleaning, surface treatment is usually recommended to ensure good paint adhesion and durability. The surface alloy lacks ductility, however, and powdering of the coating sometimes occurs in local areas of severely formed parts.

The most widely known and used of the pretreatment processes is a hot phosphate treatment in which a chemical solution, or a series of chemical solutions, is allowed to react with the zinc of the coating to produce a thin crystalline surface composed largely of zinc phosphate. This film is measurable and usually falls within the range of 0.02 oz/ft² (6 g/m²) to 0.03 oz/ft² (9 g/m²) of sheet. The phosphatizing process renders the surface suitable for immediate painting without further preparation except for normal cleaning, and since it is a surface treatment only, the other characteristics of the coated sheet are the same as those of standard hot dipped sheets.

Another paint pretreatment used by fabricators is called a "wash primer." This is a material which is mixed with phosphoric acid and applied

like a very thin coat of paint, and if used freshly mixed usually gives good results. It can be purchased from industrial paint suppliers, or directly from some paint manufacturers. (See SSPC-PS 27.00)

Paintability of Untreated Galvanized Surfaces

Galvanized surfaces frequently are painted to increase their service life or improve their appearance. Untreated commercial galvanized finishes are generally not suitable for painting with "ordinary" paints, however, unless they have been allowed to weather in the atmosphere for several weeks or months. Recent research, however, has shown that with the proper paint even unweathered surfaces can be painted satisfactorily.

A study conducted by the Committee of Galvanized Sheet Producers, with the assistance of the Society for Protective Coatings, has produced important new information regarding the painting

PRECAUTIONS

Regarding the Use of Weathering Steel and of Galvanized Finishes

Extreme caution should be exercised in detailing the use of weathering steel. Water running off weathering steel carries minute particles of iron oxide which have a tendency to adhere to the wetted surface and will be evidenced by discoloration of these surfaces.

Great care should also be given to the detailing of weathering steel surfaces that will not be boldly exposed to the atmosphere. Interior surfaces, surfaces covered by gaskets, all internal members, and faying surfaces which may be in contact with moisture resulting from condensation or water penetration must have protective coatings; otherwise advanced corrosion may occur within a short period of time.

The use of weathering steel is not recommended in locations where it may be continuously wet, or subject to appreciable amounts of salt spray.

In specifying galvanized sheets the most important consideration is the coating thickness or weight needed. The standard G90 coating (minimum of 0.90 oz. per sq. ft. of sheet) will normally be adequate, but for critical exposures such as aggressive industrial atmospheres, heavier coatings (e.g., G165, G185, G210 or G235) are recommended.

Zinc coatings will be burned off by ordinary welding operations. The coating can be restored, to provide excellent corrosion protection, by thermal spraying, by painting with zinc dust, zinc oxide or zinc rich paint, or by the use of certain proprietary products.

Zinc-coated surfaces in contact with concrete containing cinders or salty aggregates, or with oak or red cedar wood, should be protected by a coat of bituminous paint.

Galvanic corrosion is likely to result if a zinc coating is in contact with more noble metals such as copper or copper alloys.

Zinc-coated items should not be left standing on cinders at the building site, as the soluble sulphites are very corrosive to zinc.

Zinc-coated items should not be stored in packs or bundles where they may be subject to moisture due to condensation or other causes.

of galvanized surfaces. While it confirms that mill treatments such as bonderizing and galvannealing result in superior paint-holding qualities, this study has also shown that untreated sheets, both new and weathered, can be painted with a minimum of preparation and with excellent adherence by following a few simple rules. In brief, the results of the study are summarized as follows:

1. Zinc dust-zinc oxide and Portland cement-oil paints provide the best results. Latex or other proprietary paints specifically intended for galvanized sheets can also be used.
2. Quality of paint is of great importance; it should be purchased only from reputable manufacturers.
3. Chemical treatment of galvanized sheets by the mill to minimize "wet storage stain" (not to be confused with special finishes or pretreat-

ments) has a negligible effect on the adhesion of the recommended paints. When materials galvanized after fabrication are to be painted soon after they are galvanized, no post-treatment of the surface should be specified.

4. Weathering is desirable, but not necessary, to achieve good adhesion, when the correct paint is used.

Aluminum Coatings (Aluminizing)

The aluminizing of steel is a much newer process than galvanizing, and aluminum coated steel sheets for architectural uses have been commercially available only since 1952. But since such sheets offer the strength of steel in combination with the corrosion resistance of aluminum they have found acceptance in many building applications.

**TABLE 4-2 AVAILABLE THICKNESSES
AND WEIGHTS OF TYPE 2 ALUMINIZED SHEET AND COILS**

TYPE 2: Hot-dip coated with commercially pure aluminum. It is intended principally for applications requiring atmospheric corrosion resistance. Type 2 may ultimately be manufactured into corrugated roofing and siding, grain bins, air conditioner housings and drying ovens.

ALUMINIZED SHEET TABLE <i>Thickness & Weight Equivalents</i>				
Thickness in Inches			Pounds Per Sq Ft	
Mean	Low	High	Type 1	Type 2
.138	.129	.147	5.598	5.571
.123	.114	.132	4.977	4.950
.108	.099	.117	4.365	4.338
.093	.085	.101	3.753	3.726
.079	.071	.087	3.182	3.115
.071	.065	.077	2.856	2.829
.064	.058	.070	2.570	2.543
.058	.053	.063	2.325	2.298
.052	.047	.057	2.081	2.053
.046	.041	.051	1.836	1.809
.040	.036	.044	1.591	1.564
.037	.033	.041	1.469	1.441
.034	.030	.038	1.346	1.319
.031	.027	.035	1.224	1.197
.028	.024	.032	1.101	1.074
.025	.021	.029	0.979	0.952
.022	.019	.025	0.857	0.829
.020	.017	.023	0.775	0.748
.019	.016	.022	0.764	0.707
.017	.014	.020	0.653	0.625
.016	.013	.019	0.612	0.585

Courtesy of Block Steel Corp., Skokie, IL

Two grades of aluminum-coated steel are available:

Type 1 has an aluminum-silicon coating which provides excellent resistance to a combination of corrosion and high temperatures (to 1250°F), and has important uses in the automotive industry.

Type 2, the architectural grade, has a commercially pure aluminum coating which exhibits excellent resistance to atmospheric corrosion, but is not recommended for use at temperatures above 900°F (480°C).

Aluminum coatings are applied by the hot dip process. Unlike zinc coatings they offer no significant protection by anodic action in most environments, but they do provide a durable barrier which prevents moisture and other corrodents from reaching the base metal. Cut edges of coated sheets are vulnerable to some rusting and should usually be protected, but the rusting is said to be limited to the edge itself, and no rust bleeding or undercutting of the aluminum occurs. In certain environments the coating can be preferentially corroded by metals lower in the galvanic series, and the same protective measures against galvanic corrosion as those recommended for aluminum are generally advised.

Aluminized steel weathers much the same as aluminum, the general corrosion resistance of the coating in normal atmospheric exposures being similar to that of aluminum alloy 1100.

Commonly available sizes of aluminized steel sheets are listed in Table 4-2.

Aluminum Zinc Coatings

The coating of steel with aluminum and zinc combines the protective properties of both of these metals. It is produced by hot dip coating cold rolled sheet steel on a continuous line. Aluminum provides the barrier protection and long life of aluminum coatings while the zinc provides the sacrificial or galvanic protection of zinc coatings at cut or sheared edges. This combination of coatings produces a highly corrosion resistant sheet steel.

Chromate pretreatments for prepainted sheets are recommended instead of zinc phosphates or complex oxide pretreatments typically used for prepainted galvanized steel. Chromate pretreatments result in improved resistance to edge creep and provide better corrosion resistance than other types of pretreatment.

New epoxy primers, approved by the manufacturers of aluminum zinc coated steels, should be used to improve paint adhesion and to overcome edge creep without adversely affecting other properties.

Aluminum zinc coated sheet steels with hot-dip coated and prepainted edges can be supplied. Such protection produces outstanding resistance to corrosion originating at the edge.

TABLE 4-3 FINISHES FOR CARBON STEEL HARDWARE

Finishes for architectural hardware made of carbon steel are generally designated by finish code numbers of the Builders Hardware Manufacturers Association, BHMA. A variety of finishes are available. Listed below are those most commonly in use today. Since U.S. Finish Designations occasionally appear in specifications, the nearest U.S. equivalent of the BHMA number is shown on the list. For a complete listing and description of hardware finishes refer to ANSI/BHMA A156.18, American National Standard for Materials and Finishes.

Code No.	Nearest US Description	Equivalent
604	Zinc plated, dichromate sealed	N.A.
631	Flat black coated	US19
633	Satin brass plated, clear coated	US4
637	Bright bronze plated, clear coated	US9
639	Satin bronze plated, clear coated	US10
640	Oxidized satin bronze plated, oil rubbed	US10B
649	Light oxidized bright bronze plated, clear coated	US20
650	Dark oxidized statuary bronze plated, clear coated	US20A
651	Bright chromium plated over nickel	US26
652	Satin chromium plated over nickel	US26D

Specification Standards for Galvanizing

- ASTM A 123/A 123M – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - ASTM A 153/A 153M – Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - ASTM A 653/A 653M – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - ASTM A 879/A879M – Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.
 - ASTM A 924/A 924M – Specification for General Requirements for Sheet Steel, Metallized by the Hot-Dip Process.
 - ASTM B 633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
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REFERENCES

For more detailed information on the subject of metallic finishes for carbon steel, the following references are suggested:

AWS C2.23M/C2.23 Specification for the Application of Thermal Spray Coating (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel, American Welding Society, www.aws.org.

Recommended Details of Galvanized Structures, American Galvanizers Association, Centennial, CO, www.galvanizeit.org.

Painting Galvanized Structural Steel, American Galvanizers Association, Centennial, Colorado, www.galvanizeit.org.

The Design of Products to be Hot Dip Galvanized after Fabrication, American Galvanizers Association, Centennial, CO, www.galvanizeit.org.

Systems, Standards, Guides, and Specifications, The Society for Protective Coatings (formerly the Steel Structures Painting Council) Pittsburgh, PA, www.sspc.org.

Surface Preparation Specifications, ASTM, www.astm.org.

Chapter 5: Applied Coatings

NAAMM/NOMMA AMP 500-06

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Applied Coatings

General

One usually looks at paint as a way to add an attractive color (appearance) to a surface. Metals, including coated steel sheet products, are often painted for this reason. But, in addition to the use of paint to provide color, there is another reason to paint coated steel sheet. That reason is: additional corrosion protection!

Coatings may be described by their appearance (e.g., clear, pigmented, metallic, or glossy) and by their function (e.g., corrosion protective, abrasion protective, skid resistant, decorative, or photosensitive). Coatings may be distinguished as organic or inorganic, although there is overlap. For example, many coatings consist of inorganic pigments dispersed in an organic matrix (the binder).

This chapter is limited to coatings with organic binders that are applied purposefully to a substrate. Electroplated copper, nickel, and zinc coatings are not discussed. Discussion of organic coatings is further restricted to those materials that can be historically traced back to paints.

What is the difference between a coating and paint? Not much—the terms are often used interchangeably. However, it has become a common practice to use coatings as the broader term and to restrict paints to the familiar architectural and household coatings and sometimes to maintenance coatings for doors and windows, bridges and tanks. Still another common term that is essentially a synonym for coatings and paint is finish.

Coatings are used for one or more of three reasons: (1) for decoration (2) for protection, and/or (3) for some functional purpose. The low gloss paint on the ceiling of a room fills the decorative need, but it also has a function: It reflects and diffuses light to help provide even illumination. The coating on the outside of an automobile adds beauty to a car and also helps protect it from rusting. While the public most commonly thinks of house paint when talking about coatings, all kinds of coatings are important throughout the economy, and they make essential contributions to most high-tech fields.

Since about 1965, the pace of technical

change has increased. A major driving force for change has been the need to reduce VOC (volatile organic compound) emissions because of their detrimental effect on air pollution. The drive to reduce VOC emissions has also been fueled by the rising cost of organic solvents. Other important factors have also accelerated the rate of change in coatings. Increased concern about toxic hazards has led to the need to change many raw materials that were traditionally used in coatings. Furthermore, manufacturers often want their coatings modified so that they can be used at faster production rates, baked at lower temperatures, or changed in color. Product performance requirements have tended to increase, most notably is the need for increased effectiveness of corrosion protection by coatings.

Composition of Coatings

Organic coatings are complex mixtures of chemical substances that can be grouped into four broad categories: (1) binders, (2) volatile components, (3) pigments, and (4) additives.

Binders are the materials that form the continuous film that adheres to the substrate, binds together the other substances in the coating to form a film, and presents an adequately hard outer surface. The binder governs, to a large extent, the properties of the coating film. Vehicle is a commonly encountered term. It usually means the combinations of the binder and the volatile components of a coating. Today, most coatings, including water-borne coatings, contain at least some volatile organic solvents. Exceptions are powder coatings and radiation curable coatings.

Volatile components are included in a majority of coatings. They play a major role in the process of applying coatings, they are liquids that make the coating fluid enough for application, and they evaporate during and after application.

Pigments are finely divided insoluble solids that are dispersed in the vehicle and remain suspended in the binder after film formation. Generally, the primary purpose of pigments is to provide color and opacity to the coating film. However,

they also have substantial effects on application characteristics and on film properties. While most coatings contain pigments, there are important types of coatings that contain little or no pigment, commonly called clear coats, or just clears. Clear coats for automobiles and transparent varnishes are examples.

Additives are materials that are included in small quantities to modify some property of the coating. Examples are catalysts for polymerization reactions, stabilizers, and flow modifiers. Most coatings are complex mixtures. Many contain several substances from each of the four categories, and each substance is usually a chemical mixture.

The number of possible combinations is limitless. The number of different applications is also limitless.

Explanation of Terms

Trade sales paint is the term used in the coatings industry to designate those coating products that are sold over the counter and usually applied in the field. However, coatings intended for application to industrial structures are not included in this category.

Industrial finishes is a term used to designate either those coatings that are applied in the factory or those used for industrial maintenance.

Enamel is a type of paint distinguished for its gloss. Enamels differ from flat paints by having a higher percentage of liquid binder, which usually makes them harder, smoother, less porous, more durable, and better able to withstand scrubbing. Commonly, they are either gloss or semi-gloss, the gloss enamels having the higher percentage of binder and the lower percentage of pigments; flat enamels contain a flattening agent to eliminate the gloss. Most enamels are solvent reduced, but in recent years field applied latex (water-reduced) semigloss enamels have been gaining in use.

Lacquer is a clear or colored solution coating that dries by solvent evaporation alone. Drying may take place either at ambient temperature or with the aid of applied heat.

An air-dry coating is any coating that dries or is chemically cured at ambient temperatures,

either in the field or in a controlled factory environment.

A baking coating is a coating composition, either clear or pigmented which requires an elevated temperature either to accelerate solvent evaporation or to cure or crosslink the film to its hard, completely polymerized form.

Plural component coatings begin forming film by chemical reactions after mixing two or more components. The reactions can proceed either at room or at elevated temperatures. In theory neither component reacts on its own, that is, it requires the other part to yield a dry coating film. These coatings generally possess superior durability, adhesion and corrosion protection properties.

Waterborne coatings are essentially the same as conventional coatings except that the resin (binder) has been suspended in water through the use of surfactants and that the majority of solvents are replaced by water. Waterborne coatings can either be air-dry or chemical crosslinking. Due to lower VOCs waterborne coatings are more environmentally friendly than solvent-based paints. Most chemistries such as epoxy, polyurethane, alkyds, polyesters, etc., can be made into waterborne coatings.

Powder coatings, as the name implies, are coatings in solid form. The fine particles of a one-part coating is sprayed onto metals and some plastics. The powder adheres to the substrate by electrostatic forces.

There are two types of powder coatings. Thermoplastic and thermosetting. Thermoplastic powders include chemistries such as nylon, polyethylene and vinyl. Thermoplastic powders are sprayed onto preheated parts (or dipped into clouds of powder in a fluidized bed) followed by further baking in the oven at 350-450 F. Upon cooling a tough coating film much like conventional coating is obtained. The average film build is about 200 microns (8 mils).

Thermosetting powder coatings include epoxy, polyurethane, polyester and any combination thereof. The fine powder is usually sprayed electrostatically and baked at temperatures in the range of 275-450 F. The average film build is about 50 microns (2 mils).

Essential Properties of Coatings

Certain desirable properties are present to a varying degree in all coatings, depending upon their composition. These properties can be selectively controlled by adjusting the components of the formula. Very often, though, when one property is improved, another is weakened; hence compromises are frequently necessary. The user may find it advisable to accept somewhat less than highest performance in respect to one property in order to obtain better performance in respect to another.

Some of the more important properties of metal coatings and their roles in performance are briefly outlined in the following paragraphs. The intended use determines which properties are pre-eminent in any given case. Hence the coating with properties that most closely meet the requirements should be selected for maximum performance.

Flow relates to the ease with which a coating can be applied. Too much ease of flow may result in a runny, poor hiding film, especially on vertical surfaces; poor flow may cause brush or roller drag, which slows application, increases labor costs, and results in surface imperfections. To help assure thick films where needed, bodying agents (rheology control agents) may be used to reduce flow and aid film build.

Leveling refers to the ability of a coating to smooth out after application by brush, roller or spray gun. Coatings should spread evenly over the surface, without valleys between brush marks, stipple from rollers or "orange peel" effects from spraying. Their protective value is reduced in all such visible depressions.

Film thickness is directly related to protection against moisture and corrosive environments as well as other potential sources of damage. Naturally, as film build, or thickness increases, coverage per gallon decreases. A specified film build may result from a single coat or from multiple coats depending on the solids content of the coating and the thickness specified. Most coatings provide dry films of from 1.0 to 2.5 mils (0-62.5 microns) per coat, but high solids coatings, such as plastisols, can provide coatings between 4.0 to 8.0 mils. For exposure to highly corrosive atmospheres a total of 1.0 mils, usually in more than one coat, is gen-

erally considered necessary. However, protection is also a function of the properties of the coating resin. For example, a 3.0 mil epoxy coating may be superior to a 7.0 mil linseed oil alkyd coating. Manufacturers standards should be consulted for properties of coatings which they supply.

Spreading rate depends on the desired film thickness and the amount of hiding pigments in the coating. Where good hiding property is a prime requirement, a properly pigmented flat coating should hide at a spreading rate of 400 to 500 square feet per gallon in one coat. If surface protection is critical, as with an anticorrosive paint, the required coating may have a spreading rate of only 150 square feet per gallon and two or three such coats may be required. High build coatings are usually preferred in such instances.

Permeability of coatings, or the ability of moisture and gases to work their way through, is diminished by increasing film thickness and increased by adding extender pigment or certain hiding pigments. Thick coatings add to substrate protection. Each combination of binder and pigment has an optimum relationship for limiting permeability most effectively. This is called the Critical Pigment Volume Concentration (CPVC), and indicates the percentage of pigment that the binder can completely wet and bind up. As the percentage of pigment exceeds this concentration each added pigment particle, as a general rule becomes a pathway for moisture or corrosive chemicals. Permeability is also reduced by multiple coatings.

Adhesion of a coating to a substrate must be tenacious if cracking and peeling are to be avoided. Surfaces must be free of contamination before applying coatings if satisfactory adhesion is to be obtained. The importance of clean surfaces to good adhesion cannot be overemphasized. In some instances abrasive blasting is needed to obtain suitable surface conditions. Aluminum and other non-ferrous metals may require chromate treatments or wash primers to ensure proper adhesion.

Flexibility is essential if the coated material is to be subjected to forming processes. Even if this is not a requirement, any coating to be used on the exterior of a building must be able to withstand

dimensional changes caused by expansion and contraction under thermal stress.

Abrasion and impact resistance is desirable in all coatings, to minimize physical damage to the film, both between the application of successive coats and after the finished product is used.

Stain resistance has gained increasing importance in recent years because of a widespread application of graffiti in public places. Very hard undercoats, usually topped with clear solvent resistant ultra hard polymers, are now available to resist penetration of inks and the solvents carrying them.

Weatherability of a metal coating depends on its resistance to chalking, which eventually deteriorates the coating film; to color changes caused by ultraviolet rays; to wind driven rain, to salt spray, if near the sea, and to wind borne chemicals.

Weldability of a primer is the ability of the coating to withstand the heat of welding without losing its protective value.

Film Formation-Drying and Curing

Dry time is significant because it indicates the "safe" period, when the threat of surface contamination has ended and when a successive coat may be applied. There are three mechanisms of drying.

1) Drying through the evaporation of solvents or water. All lacquers and varnishes follow this mechanism. There are also two significant stages for this type of drying:

A) set-to-touch, or surface drying, when dust and surface contaminants will have no effect, and

B) through dry, when drying is complete to the substrate and recoating can proceed. Too rapid drying, in addition to affecting leveling, also affects "wet

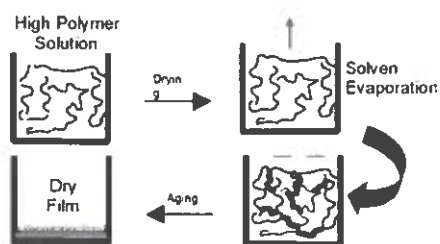


Figure 5-1. Drying by solvent evaporation.

edge," or the ability of the applied coating to stay wet so that when applied to an adjoining area it will blend with the edge of the first coated area without showing an overlap. Schematic representation of film formation by drying is given in Figure 5-1.

2) Drying of latex systems through evaporation of water, solvents and coalescence. While most latex systems follow the two steps of set-to-touch and surface drying, molecules within the matrix continue coalescing until a cohesive film is obtained. This is analogous to through-dry in the solvent-borne systems but usually takes longer than those systems. This process, depending on the chemistry of systems, may be slow or fast. In either case, the film is dry to touch. In general recoating will require a longer wait than the solvent borne systems. Schematic representation of film formation from a latex solution by coalescence is given in Figure 5-2.

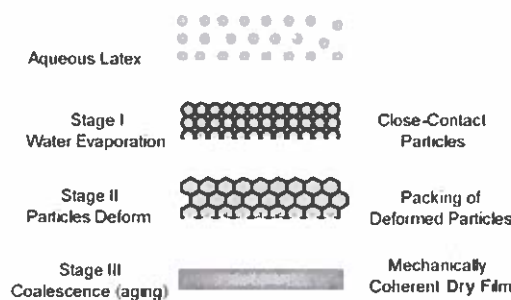


Figure 5-2. Coalescence in latex systems.

3) Drying by curing or chemical reactions. These reactions are commonly called cross-linking reactions. Similar to the above two categories, the film formation is a function of time and temperature. In general, chemically crosslinked systems are more weatherable, durable, corrosion and solvent resistant than simple air-drying lacquer type coatings. Drying oils and some alkyd coatings are one-part coatings that crosslink when exposed to environmental oxygen. Most room temperature crosslinking coatings are two-part systems. In general the film formation begins soon after the parts are mixed together and continues for several hours or days. Most two part systems are formulated to provide a set-to-touch state in a matter of minutes or hours while the through cure (completely crosslinked) may take additional days. Exposing two part systems to elevated temperatures will speed up the cure. Schematic representation of film formation by chemical crosslinking is given in Figure 5-3.

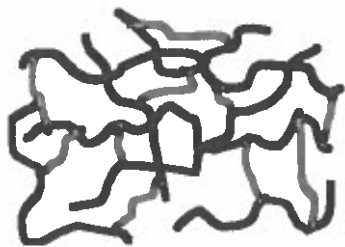


Figure 5-3. Chemical crosslinking.

Chemical crosslinking one component coatings requires elevated temperatures to cure. In general, the higher the temperature, the faster the cure and film property development. Thermosetting powder coatings, one part epoxy, polyurethane, polyester melamine coatings require temperatures in the range of 275-420° F for a complete cure.

Powder coatings are deposited on an object as finely divided solids consisting of resinous material, additives to aid performance, and colorants if desired. The object to be coated is electrically grounded if the powder is to be electrostatically sprayed, and may be heated before or after the powder is applied. A less frequently used procedure is the fluidized bed process, in which the object is heated and immersed in an enclosure in which the powder is "fluidized" by a gentle air current. Coalescence of the powder particles on the heated surfaces, in either method, leaves a smooth, hard coating. Schematic representation of film formation in powder coatings is given in Figure 5-4.

Adhesion of Coatings

Except for temporary and protective coatings, all other types of surface coatings must adhere tenaciously to the substrates and preferably last as long as the object itself. Since coatings must function by surface attachment only, the nature and condition of the surface is critical to the success of any durable coating venture.

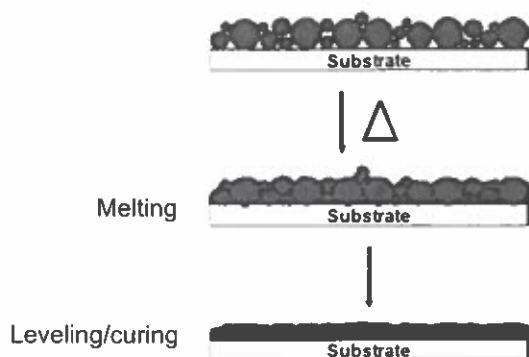


Figure 5-4. Fusion and crosslinking in powder coatings.

Both durability and performance of coatings, to a large extent, depends on cohesion and adhesion. Cohesion is associated with the strength of coating. That is, how tough, how elastic or how hard a coating is. Adhesion, on the other hand, is viewed as the strength of the bonds that the coating forms with a surface. These are two different and interrelated properties. Adhesion loss due to cracking is related to coating strength while "sheeting off" and delamination of a coating may be due to the lack of adhesion possibly as a result of poor surface preparation. The schematic representation of cohesion and adhesion as a function of weathering is shown in Figure 5-5.

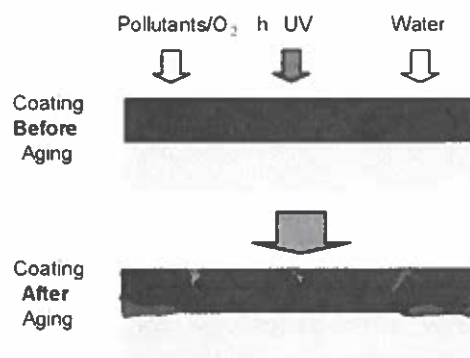


Figure 5-5. Adhesion and cohesion loss in a coating.

An important factor controlling this property is the balance between adhesion and cohesion. In general, the difficulty of removing the coating can be strongly affected by the roughness of the substrate. If the substrate has undercut areas that are filled with cured coating, a mechanical component makes removal of the coating even more difficult, analogous to holding two dovetailed pieces of wood together. However, greater surface roughness is only of advantage if the coating penetrates completely into all irregularities, cracks, and crevices of the surface. Failure to completely penetrate can lead to less coating to interface contact and will leave voids between the coating and the substrate, which can cause problems.

In order to obtain interaction between a coating and a substrate, it is necessary for the coating to wet the substrate. Simply, the surface tension of the coating must be lower than the surface tension



Figure 5-6. Schematic representation of wetting a surface by a liquid.

of the substrate. In the case of metal substrates, clean metal surfaces have very high surface tensions and any coating will wet a clean metal surface.

Wetting is the first step in securing a coating onto a surface. A complete wetting will allow the spread of coating over the entire surface of the substrate, permitting penetration through the imperfections and undercuts within the substrate. Schematics of wetting and its degrees are shown in Figure 5-6. The lack of wetting is demonstrated by a grey sphere contacting the surface at only one point (upper left). The complete wetting is indicated by the flat grey liquid. Subsequent to this, the coating cures or hardens while within the substrate, thereby securing the coating onto a surface.

Wetting is a function of surface free energy. The surface free energy simply is the energy difference between atoms on the very top surface of a substrate and the atoms in the bulk. The higher the surface energy, the better is wetting. Conversely, it is difficult to completely wet low surface energy substrates. Liquids generally bead up on low surface energy surfaces. This is analogous to water drops on a freshly washed and waxed car.

Wetting can be improved and enhanced in two ways. 1) By modifying the substrate surface. This can be accomplished by removing oils, and dirt etc. Once grease and other materials are removed, surfaces of most steel and aluminum substrates demonstrate high free energy which will allow good wetting. This method is discussed in more detail under the **Surface Preparation Methods**. 2) By reducing the surface tension of coating (or using low surface tension coatings). Among the coating materials, silicone coatings and those containing Teflon are the lowest surface tension coatings.

It is critical that the coating provides good adhesion to a metal surface by complete penetration into the surface irregularities of the metal substrate (Figure 5-7). This requires sufficiently low surface

tension to obtain wetting, but the degree of penetration is controlled by the viscosity of the continuous phase of the coating. Slowly evaporating solvents should be used in coatings to be applied directly over metal. Systems that cross-link slowly minimize the increase of viscosity of the continuous phase. Because viscosity of the vehicle drops with increasing temperature, baking coatings can be expected to provide better adhesion than a similar composition coating applied and cured at room temperature. This confirms that the observation that superior performance is obtained with high temperature baked, slow-cure primers when excellent adhesion is a critical requirement.

Adhesion is strongly affected by the interaction between coating and substrate. On a clean steel substrate containing some iron oxide, the formation of certain bonds between a coating binder and

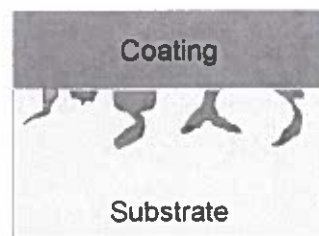


Figure 5-7. Mechanical adhesion.

the surface is very probable. There are several more theories of adhesion discussion of which is beyond the scope of this publication.

The adhesion of coating is also affected by the development of stresses as a result of shrinkage during drying of the film. For example, most fast dry lacquers lose solvents in a matter of minutes a substantial volume reduction occurs in the fraction of a second. This loss of volume supply the force needed to pull the film from the substrate. Hence, less external force must be applied to remove the film, and adhesion is poorer. Sometimes such stresses can be relieved by heating the coating to anneal it. Internal stresses can also result from

solvent loss from the film and other polymerization reactions, as well as changes in temperature. These stresses alone or in combination with internal stresses developed during film formation can affect coating durability, particularly adhesion.

Surface Engineering

Many of the most pressing issues the coatings industry faces today are related to surface preparation. The highest quality coating will show excellent results only if the surface pretreatment (cleaning and priming) is performed correctly and the overall system is maintained up to its potential.

Proper preparation of the metal surface prior to coating is one of the most important requirements for a successful finishing operation.

Without a good bond to the substrate no coating will perform satisfactorily. Adhesion is therefore a prime essential in all cases, not merely at the time of application but continuing indefinitely, and this can be assured only by proper surface preparation. It is entirely possible to produce, with a minimum of surface preparation, a painted metal surface which appears to have adequate adhesion before exposure to corrosive influences. Most organic coatings, however, are permeable to moisture and gases, and corrosion of the metal may occur under the organic film. Unless the surface has been properly prepared, such corrosion leads to the formation of metal salts and moisture pockets beneath the coating, causing premature failure of the protective coating by loss of adhesion.

Ideally, nothing should be allowed to come between the bare metal and the coating. Even the slightest deposit of ever present moisture from the atmosphere will play some role, depending upon circumstances, in determining the life of the coating. Careful shop coaters will even go so far as to heat the metal products prior to applying a coating, so that even the suspicion of moisture will be eliminated.

More obvious than moisture are surface contaminants such as dust, rust, mill scale (a complex bluish iron oxide that forms on steel in forging or forming processes), grease, oil, weld deposits, sweat or chemicals. These must all be removed if adhesion is to be adequate to keep corrosive materials away from the substrate and to permit

the corrosion fighting chemicals in the primer coat to perform their function.

Since coatings must function by surface attachment only, the nature and condition of the adherent surfaces is critical to the success of any coating venture. A rough surface provides more surface area than a smooth one of the same gross dimensions. In addition, the surface will usually have a chemical composition different from that of the bulk and in some cases the surface composition has little in common with the bulk composition either through adsorption of contaminants from the environment or from segregation of bulk constituents at the surface. The outer layers can be loosely bound or tightly adhered and might have high or low cohesive strength in themselves. Contaminant and segregated bulk components are not always homogeneously distributed in the surface region and in-homogeneities can lead to potential corrosion sites, weak bond areas, and bond discontinuities that can concentrate stress.

The "surface" of metals such as steel or aluminum alloys might consist of several regions having no clearly defined boundaries between them (Figure 5-8).

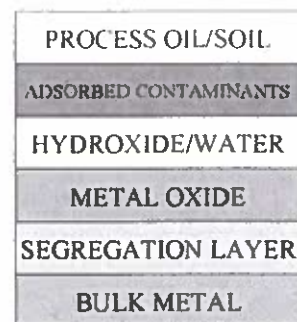


Figure 5-8. Schematic representation of a metal surface prior to surface preparation.

Moving outward from the bulk metal, there will likely be a region which is still metallic but which has a chemical composition different from the bulk due to the segregation of alloying elements, or impurities. Next, there will be a mixed oxide of the metals followed by the hydroxide and probably an absorbed water layer (Figure 5-9).

In addition, there will be contaminants absorbed from the atmosphere that might include sulfur, nitrogen, halogen or other compounds depending on the local air and rain pollutants and how the metal has been stored. There could also

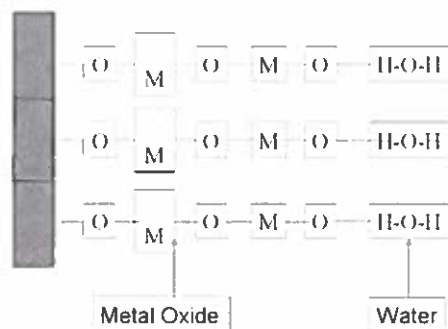


Figure 5-9. Schematic representation of a clean metal surface.

be processing aids such as rolling oils, cutting lubricants, drawing compounds and corrosion inhibitors. Finally, the mechanical working of the metal will probably have, to some degree, mixed all these regions together into something for a non-homogeneous "surface frosting".

Choosing surface treatments and primers is as important to success as choice of coating. All must be considered at once since success depends on their proper interaction. Surface treatments are operations that change the morphology or composition of the substrate surface and may involve adding as well as removing or rearranging material. Primers are usually thin organic coatings applied to the surface (which might also have been treated) to give a more reproducible and durable surface for the coating. In all cases, the major reason for treating or priming is not necessarily to improve the adhesion but rather to produce a controlled, reproducible and durable surface in order to obtain a more predictable coating.

The cheapest and least controlled is to simply accept whatever surface is present and make no attempt to change it. This can be entirely adequate in many constructions. Solvent wiping can remove many organic contaminants but requires ventilation and that the solvent be changed as needed to avoid redepositing contaminants (the "steady state" situation). Mechanical abrasion, such as sanding or shot blasting, is effective where the substrate is sturdy enough. Abrasion usually leaves abrasive residue embedded in the surface and the fresh surface of many materials can be quite reactive so that it changes rapidly on exposure to air or to cleaning solvents. Chemical stripping or acid etching removes the outer layers and replaces them with a more controlled layer, but as with solvent cleaning, there is the danger of redeposition or

poor stripping if the enchants are not kept clean and at the proper concentrations. Etching followed by deliberate deposition of a controlled surface can provide the most reproducible surface but at the greatest expense. Physical deposition such as treatment of steel with zinc to produce galvanized surface is an excellent way. Chemical deposition of the new surface, such as in chrome conversion coating or zinc phosphate treatment, has been used for many years where long life and durability of metal constructions are important.

The processes commonly used for cleaning and conditioning the surface vary somewhat with the different metals and coatings, but they may generally be classified as follows:

1. Chemical treatments: Pickling, or acid cleaning (SSPCSP8) alkali cleaning, conversion treatments.
2. Solvent cleaning and degreasing (SSPC-SP1).
3. Mechanical cleaning: hand cleaning (SSPCSP2); power tool cleaning (SSPCSP3) abrasive or shot blasting (SSPCSP5, SP6, SP7, SP10)1 flame cleaning, steam cleaning.

The first two methods listed, chemical and solvent cleaning, are used for all of the metals. The term "pickling" is used in the iron and steel industry and the term "acid cleaning" in the nonferrous metal trades. All of the typical processes have been described in some detail in the discussions of chemical finishes and treatments, as applied to the various metals, in Chapters 1, 2, 3, and 4. The use of mechanical methods for cleaning is largely confined to carbon steel and iron, and they have therefore been discussed in connection with finishes for those metals in Chapter 4.

Frequently pretreatments are applied after cleaning to serve either as passivators of the metal or to provide a better bond for primers that may otherwise not be sufficiently adherent to the metal surface. Phosphates, chromates and other chemicals used in pretreatments discourage corrosion by making the metal passive to electrical flow that may be set up if moisture reaches the surface. A vinyl wash primer is spread, like the passivators, in films of fractional mil thickness to bind the primer to surfaces to which it would not otherwise adhere.



Figure 5-10. Mechanical adhesion as a result of surface roughness.

Surface roughness affects adhesion in two ways 1) through surface roughening one is actually increasing the surface area where coating contacts the surface. The larger the contact area the harder it is to remove a coating. Therefore, the difficulty of removing a coating can be increased by increasing the surface area. 2) By providing surface irregularities, pores, holes and crevices into which the coating solidifies. In this manner the coating, much like a nail in a wood assembly, acts as a mechanical anchor. Therefore, if the substrate has undercut areas that are filled with solidified and hard coating, a mechanical component makes removal of the coating more difficult, analogous to holding two dovetailed pieces of wood together. Iron or zinc phosphate coatings provide larger contact areas and thus enhance adhesion and corrosion resistance. Figure 5-10 illustrates a hypothetical profile of a substrate profile.

Mechanical Cleaning

The mechanical, abrasive method is suitable where steel surfaces exhibit severe corrosion, loosely adherent heat scale, or numerous weldments and where soils have been carbonized in and around the exposed weldment area. These

types of surface contaminants make it very difficult to achieve any form of quality adhesion.

Chemical cleaning alone, even a five stage system probably will not produce a clean enough surface if parts exhibit the characteristics listed above.

Three Types of Mechanical Surface Preparation:

1) Air/Media Blast: The most common type generally referred to as sandblasting is a combination of compressed air and media. Problems associated with employee safety, referred to as "silicosis" has altered wide spread use in open air environments. A specially designed cabinet or enclosed area, along with air induced breathing apparatus, has insured continuing growth of this method of mechanical surface preparation.

2) Water/Media Blast: This method is gaining popularity because of the reduction of silicosis associated problems. Wet spot blasting of weldments has become accepted because of these reasons: (a) during the welding process, oily soils are carbonized, creating an impossible cleaning condition through a three or five stage washer. (b)

Optimum Process for Mechanical Cleaning

<u>Normal Process</u>	<u>Optimum Process</u>
1. Blast	1. Chemically degreased
2. Clean and phosphate	2. Rinse
3. Rinse	3. Dry
4. Seal rinse	4. Blast
5. Dry	5. Alkaline clean
6. Coating	6. Rinse
	7. Phosphate
	8. Rinse
	9. Seal Rinse
	10. Dry off
	11. Coating

The surface of weldments is basically inert to the development of a conversion coating because of the scale developed. Wet spot blasting units are relatively inexpensive, low in labor requirements, and prove to provide the best possible substrate conditions prior to phosphatizing.

3) Centrifugal Wheel (Airless): This airless process is quite popular for larger, heavier-bodied parts where rust and scale must be removed. Centrifugal wheel is most often done in an enclosed cabinetry operation. The media is normally steel shot of varying sizes, depending on the substrate profile required.

Chemical Cleaning: The highest quality coating will show excellent results ONLY if the pretreatment (cleaning and phosphating) is done correctly, and the overall system is maintained up

to its maximum potential.

Chemical pretreatment, primarily iron phosphating, is the most widely used pretreatment prior to coating. In this process a thin layer of phosphate coating is deposited onto steel substrates. Because the coating is an integral part of the steel, it is usually highly adherent which provides an excellent base for coating adhesion. The simplest operation can require about 5-15 minutes. The thin phosphate coating is smooth to touch, however, on a molecular level it provides larger surface area of adhesion. A close up picture of a typical phosphated steel surface is shown in Figure 5-11.

Corrosion Control

Rusting, the oxidation of iron and steel to iron oxides, is the most common form of corrosion and

Dip Tank Application Methods

Dip Tanks - Best suited for large volumes of small parts.

3 Stage Dip -	1	2	3	4	5
	Clean & Phosphate	Rinse	Seal Rinse	-----	-----
5 Stage Dip -	Alkaline Clean	Rinse	Phosphatize	Rinse	Seal/Rinse

Time: 3 - 15 minutes
Temperature: 160 - 180°F
Concentration: 6 - 15% volume

Advantages

Low cost process equipment will handle volume of small parts.

Good for multi-configured parts not likely to receive good spray coverage.

Disadvantages

Need 5 stage for best results.
Cleaning with impingement is difficult (smut).
High chemical concentrations require high heat.

Iron Phosphating

Purpose - Promote adhesion of coatings, prevent corrosion, and maximize life of coatings.

Iron Phosphating - The development of an amorphous coating on iron bearing metals.

Process - 1 stage, 3 stage, 5 stage

Time: 60 seconds, 90 seconds for spray

3 - 5 minutes for dip

Temp: Ambient to 160°F (60-70°C)

20-60 mg/sq. ft. (20-60 mg/900 cm²)

Advantages

Low cost
Wide parameters
Application easy to maintain
Disposal not complicated
Industry standard for most coatings

Disadvantages

Less corrosion protection
than zinc phosphate

Line speed requires planning.

Zinc Phosphating

Purpose - Promote adhesion. Increase corrosion protection.
Zinc phosphating - Microcrystalline formation.
Primary metals - Ferrous (iron bearing)
Aluminum and zinc bearing
Process - 5 stage minimum, typically 7 stage.
Time: 60 - 90 seconds spray
3 - 5 minutes dip
Temp: 140 - 160°F (60 - 70 °C)
150 - 300 mg/sq. ft. (150 - 300 mg/cm²)

Advantages

Increase corrosion protection

Disadvantages

More costly
Greater process Equipment
Zinc effluent treatment
Greater control required

Seal Rinse Advantages/Disadvantages

Non-Chrome

Advantages

No disposal problems
Good adhesion
Removes unreacted phosphate

Disadvantages

Less tolerance to hard H₂O
Daily dumping and recharge
Less salt spray hours
Requires D.I. water

the most obvious one (Figure 5-12). The good news about rust for the coating industry is that paint can be used to control it. The bad news is that it is not really totally preventable. However, in many cases, through good manufacturing processes one can delay corrosion for long periods of time.

Corrosion is an electrochemically driven process of energy exchange. In this process, the metal, which was originally found in nature as an ore, is reconverted back to its ore. In the metallic



Figure 5-11. Photo-micrograph of phosphated steel.

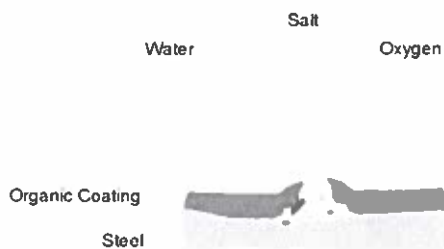


Figure 5-12. Cross section of a corrosion site.

state, the metal is in a higher energy state than it was when combined with other elements as an ore. That is, corrosion is a naturally occurring phenomenon. In short, metals corrode because they need to return to their original form.

Corrosion has four components. The metal (part of it) that corrodes (anode); the metal (part of it or another metal such as weld material) that causes corrosion (cathode); some sort of electrical connection; and a conductive media such as salt water (electrolyte). The first three requirements are always present in a fabricated metal work piece- such as steel and weld material and the connection. However, dry salt alone without two other reagents cannot cause corrosion. The other two reagents are water (moisture) and oxygen. The three reagents, salt (ions, electrolyte); water, and oxygen are called the Corrosion Triangle. For corrosion to happen all three must be present and at the right concentration. The schematic of corrosion triangle is shown in Figure 5-13.

Some metals corrode faster than the others. This tendency is also related to how much energy it takes during the smelting process to produce the metal. The more energy that must be imparted in the smelting process, the more readily the metal corrodes. In Figure 5-14, the most "active" metals are those that most readily release energy, and therefore, they are the ones most susceptible to corrosion.

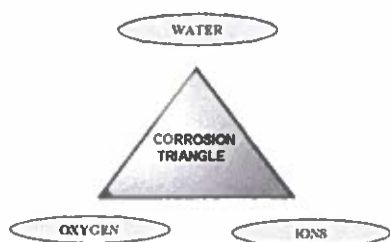


Figure 5-13. Chemical components of corrosion.

The surface of steel is not at all homogenous. Some areas are more active (are more prone to oxidation) than others and if there is scratch, pin-hole, or scribe, that area definitely will be more active. Weld metal often is more active than surrounding steel. Steel is more active than the mill scale that sometimes covers it (incompletely). These more active sites are where oxidation (corrosion) occurs.

Unlike many other metal oxides such as those of chromium, zinc, copper, and aluminum, rust does not stick tightly to iron and steel. In addition, it tends to pick up water from the air and is somewhat soluble in water. Therefore, rust tends to pull away from iron or steel so that new rust is

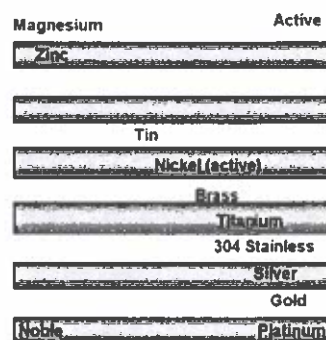


Figure 5-14. The most "active" metals are those that most readily release energy.

formed. The growing rust layer tends to push any paint away from the metal and also acts as weak boundary layer, particularly when water is present, so the coating may adhere poorly.

As the coating loses adhesion, salt solution moves into the gap and corrosion spreads further and further. After the coating falls off or is scrapped off, the effects of this process often are seen as a series of concentric circles around the original point of attack. These circles indicate (Figure 5-15) that the corrosion occurred as a series of stages rather than in a smooth, continuous process.

Corrosion has many types and shapes. While all types result in some type of damage, some are less dangerous than others. A few of the well known types are as follows:

- Flash rust
- Blistering
- Filiform corrosion
- Perforation corrosion

Stress corrosion
Cosmetic corrosion
Erosion corrosion
Pitting corrosion
Granular corrosion

Of the above, flash rust is the easiest one to deal with. Flash rust occurs when steel grit debris corrodes due to surface moisture. It can be easily prevented by surface treatment prior to priming or painting.

Blistering, which is the first sign of corrosion, generally is the result of poor adhesion. All organic coatings are permeable to water, oxygen, and various ions from the environment. If there is a marginal adhesion, water and ions can penetrate the coating and find their way to the metal surface. As the permeation and penetration process continues more water, ions, and soluble additives from the coating will collect beneath the coating. The trapped water and salts exert osmotic pressure. At some point, the forces generated by osmotic pressure displace the paint from the substrate and bends the coating film, thereby leading to the formation of a blister.

Osmotic pressures can be expected to range between 2,500 and 3,000 kPa while the resistance of organic coatings to deformational forces is much lower, ranging from 6-40 kPa. As the blister grows larger, the exposed area of unprotected steel surface increases, more corrosion products are formed, and the process proceeds still more rapidly. However, if the coating covers the whole surface and provides a tenacious adhesion, probability of water becoming in contact with a bare steel surface will be greatly decreased. Schematic representation of this process is shown in Figure 5-16.

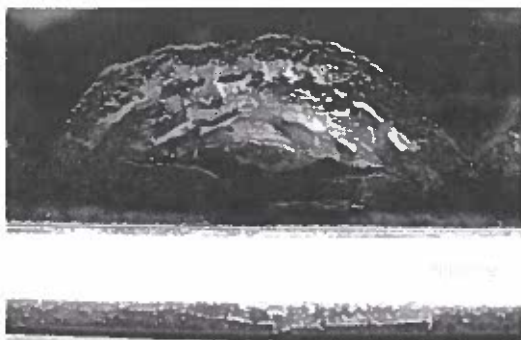


Figure 5-15. Corrosion of steel.

Techniques for Controlling Corrosion

Techniques for the control of corrosion are very diversified. The three basic types that can easily be employed are: Barrier protection (paint), inhibitive primer protection, and cathodic protection (sacrificial zinc-galvanized steel).

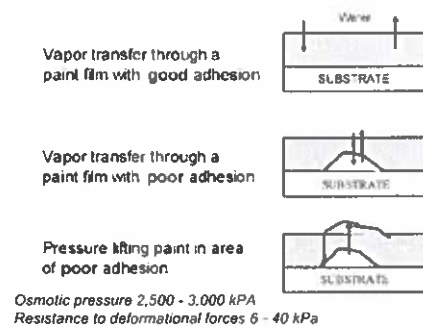


Figure 5-16. Schematic representation of blister formation mechanism.

Corrosion Prevention by Coatings

How can corrosion be prevented or reduced? A number of things can be done before objects are painted, better design, better quality substrates (galvanized steel, for example), better cleaning, and better pretreatment. Design is crucial. If an object traps water, electrolyte (salt) and dirt, corrosion will occur regardless of the quality of the preparation and paint. On the other hand, a good design, coupled with good cleaning, pretreatment, and painting should resist corrosion for a very long time. Closer cooperation between designers, pretreatment suppliers, painters, and paint manufacturers is needed. This is part of the total system concept. The whole "finish" must be developed with cooperation between all of the suppliers. The various components cannot be taken in isolation.

What is the part of the coating in this scenario? Consider the constituents of the corrosion site: the metal substrate, water, oxygen, and a salt solution. If any one of the latter three can be removed, corrosion will be prevented. Typical organic coatings have such high water permeabilities that water cannot be kept out. With oxygen, there will be enough present for corrosion except in the case of very thick (15 mil) maintenance coatings. Therefore, the only thing left for the coating is to prevent salt (ions, electrolyte, which penetrates the coating much slower than water or oxygen) from getting to the metal surface or greatly reduce the rate of penetration. If corrosion does begin, then

the job of the coating is to prevent or reduce the spread of corrosion.

The substrate is kept isolated from conductive electrolyte by the physical, insulating barrier of the crosslinked coating (more of a filter than a barrier), by the use of flat platelike pigments such as mica-ceous iron oxide which provide another barrier.

Another approach is to use inhibitive primers that contain special inhibitive pigments that dissolve in water. Unlike the ions of corrosive salt, these materials react with the substrate to form protective films that further protect steel from corrosion.

A somewhat different technique is to alter the nature of the very top surface of the substrate. One way to prevent or reduce corrosion is to use a material that is sacrificial, i.e., it dissolves instead of the iron or steel. Galvanized steel has a zinc coating that plays this part. The zinc becomes the anode (a larger one) and slowly dissolves, but the steel (the cathode) does not. In addition, the zinc corrosion products are more stable, passivating, and adherent than is rust. They are relatively impermeable, block pores in the coating, and generally provide a protective barrier. A variation of this method exists in which a powdered zinc is incorporated into a coating formulation. The sacrificial material used in organic coatings is zinc dust (90-95 % of the total weight of the dry coating). Metal contact between the steel and the zinc particles is essential in the early stages of the exposure, but due to the corrosion products, good protection is provided even after the contact has been lost.

Even with well-formulated coatings containing effective corrosion inhibitors, damage can occur to the cured film that allows corrosion to begin. In such a case, it is crucial for the coating to have the ability to resist the spread of corrosion. To do this a coating must have adhesion, especially good wet adhesion, and be resistant to alkaline corrosion products. If the coating cannot be lifted or dissolved, then it will be very difficult for the salt solution to travel along the metal/coating interface and widen the corrosion front. Unfortunately, poor surface preparation and pretreatments with poor alkali resistance can negate the effects of a good coating and allow corrosion to spread.

Metallic Coatings

Steel sheet is a very versatile product. Unfor-

tunately, steel sheet is prone to rusting, a phenomenon that causes the surface to become unsightly and, over time, may contribute to product failure. For this reason, steel has been protected by a variety of methods ranging from internal alloying (stainless steel, for example), to coating with paints or metallic coatings.

Galvanized coatings and other metallic coatings on steel sheet provide good, long-term protection from corrosion. One can obtain many years of corrosion protection through the proper use of the metallic coatings available in today's market. Nevertheless, the application of high quality paint can add substantially to the overall life of coated steel sheet products. A classic example of the improvement in product life that a good paint system can provide is the enhancement achieved with automotive-body steels. The metallic coating on automotive body panels is quite thin compared with the metallic coating thickness on sheet panels used for many other types of applications, but with the synergistic effect of the paint systems used by the automotive industry, the life of the body panels is very long.

Metallic coatings can protect steel in two ways:

1. Like paint, they provide **barrier protection**, and
2. In many instances, they provide **galvanic protection**.

Each of these types of protection is described below.

Barrier Protection

The main mechanism by which galvanized coatings protect steel is by providing an impervious barrier that does not allow moisture to contact the steel - without moisture (the electrolyte) there is no corrosion. The nature of the galvanizing process ensures that the metallic zinc coating has excellent coating adhesion, abrasion, and corrosion resistance.

Galvanized coatings will not degrade over time as with other barrier coatings, such as paint. However, zinc is a reactive material and will corrode and erode slowly. For this reason, the protection offered by galvanized coatings is proportional to the coating thickness. The ability of a zinc coating to protect steel by acting as a barrier depends on zinc's corrosion rate. It is therefore important to

understand zinc's corrosion mechanism and what factors affect its corrosion rate.

Freshly exposed galvanized steel reacts with the surrounding atmosphere to form a series of zinc corrosion products. In air, newly exposed zinc reacts with oxygen to form a very thin zinc oxide layer. When moisture is present, zinc reacts with water and carbon dioxide resulting in the formation of zinc carbonate. Zinc carbonate is a thin, tenacious, and stable (insoluble in water) layer that provides protection to the underlying zinc, and results in its low corrosion rate in most environments.

The second shielding mechanism is zinc's ability to galvanically protect steel. When base steel is exposed, such as at a cut edge or scratch, the steel is cathodically protected by the sacrificial corrosion of the zinc coating. In practice, this means that a zinc coating will not be undercut by rusting steel because the steel cannot corrode adjacent to the zinc coating. Any exposure of the underlying steel, because of severe coating damage or at a cut edge, will not result in corrosion of the steel and has minimal effect on the overall performance of the coating.

If the coating is consumed, why use it? In the case of a zinc coating, the rate of corrosion that it undergoes while protecting steel is considerably lower than that of the steel. In this way, a thin coating of zinc can be applied to steel to protect the steel for a long time. For example, in a rural atmosphere where the number and concentration of pollutants in the air is generally quite low, zinc might corrode at a rate of 1.0 m/year (0.04 mil/year) while low-carbon steel in this same environment might corrode at a rate 5 times as high (5 $\mu\text{m}/\text{year}$ or 0.2 mil/year) or even higher. A primary reason for the reduced rate of zinc corrosion versus the rate for steel is that, as it corrodes, it forms an adherent, protective oxide/carbonate film on its surface similar to the oxide film on the surface of aluminum. This film itself helps to prevent contact between the environment and fresh zinc. Thus, the rate of corrosion decreases. Recall that steel typically does not form a protective film in that the oxide layer spalls, thereby, constantly exposing fresh iron to the environment.

The film that forms on the surface of zinc is not as protective as the aluminum oxide film on the surface of metallic aluminum. That is, the oxide is susceptible to dissolution if the moisture is

sufficiently acidic, for example. This is good and bad. It is good in that, if the oxide film were totally protective, the zinc would no longer offer galvanic protection to the steel at exposed areas. Thus, rusting of steel would occur at scratches and other exposed areas. The downside of the somewhat incompleteness of protection of the oxide film on a galvanized sheet is that the coat itself corrodes and thus, has a defined life.

Among the commercially available metallic-coated steel sheet products, zinc (galvanize) offers the most galvanic protection. Galfan® behaves somewhat similarly with respect to the level of galvanic protection that it provides. Galvalume® steel sheet offers somewhat reduced galvanic protection versus a galvanized or Galfan® coating. What does this mean about the relative performance of these products?

As with most things in life, everything comes with a price. Galvanically protective coatings are consumed by corrosion eventually. That is why a galvanized sheet has a definite lifespan before the corrosion of the steel begins. Thus, the amount of zinc applied to the steel during manufacture, described as the coating weight (mass), is important to the life of the product. Coating weight (mass) is expressed as G60 (Z180), G90 (Z275), G200 (Z600) etc. per ASTM Specification A 653/A 653M. G60 (Z180) means that the coating weight (mass) is 0.60 oz/ft² (180 g/m²), minimum (total coating on both sides of the sheet). This coating weight (mass) can be translated into thickness; a G60 (Z180) coating of zinc is about 0.00055 in. (0.014 mm) per side of the sheet.

For a galvanized coating, the rate of corrosion of the coating is typically linear in most environments. That is, twice the coating thickness translates to twice the life. That is, a G60 has twice the thickness of a G30 coating and the life of the product (defined, perhaps, as the time to 10 percent rust) in a given environment is approximately twice as long. Similarly, a G90 coating is approximately 50 percent thicker than a G60 coating, and thus would be expected to perform 50 percent better (in terms of time to 10 percent rust). Of course, different environments are more or less corrosive than other sites, so that the "life" of the coating varies considerably for different "environment types".

When the salt spray test is used for testing metallic-coated steel sheet, the corrosion performance is rated in the following ways:

- Number of hours until rusting of the steel is first evident,
- Number of hours until 5% of the surface area is rusted,
- Number of hours until 10% of the surface area is rusted, etc.

The onset of red rust on a sample of galvanized sheet, for example, means that the coating has been consumed by the corrosion reaction, and the corrosion of the base steel is beginning. There is no one best performance criterion. It simply depends on what the user defines as failure. The following table is one guideline that can be used as a measure of expected performance of three zinc-containing hot-dip coatings.

Coating Galvanized Steel

The main mechanisms by which galvanized coatings protect steel are:

- 1) By providing an impervious barrier that does not allow moisture to contact the steel - without moisture (the electrolyte) there is no corrosion.
- 2) By acting as an anode and sacrificially corroding thereby protecting the steel substrate.

Zinc is a reactive material and will corrode and erode slowly while protecting the steel substrate. For this reason, the protection offered by galvanized coatings is proportional to the coating thickness. While in theory by increasing the zinc coating thickness substantial corrosion resistance can be obtained, in practice, mostly due to process and economical reasons, it provides a limited value.

In general, the application of high quality paint can add substantially to the overall life of zinc coated steel sheet products. The reason for improved corrosion resistance is as follows:

In situations where the accumulations of zinc corrosion products build up over the surface, the effective anode area will inevitably be reduced. In this case, while the barrier properties of the film may improve, the cathodic protection of newly exposed steel at nicks and abrasions will be diminished. A similar situation arises when abrasions and scratches occur. In this case, the area of active zinc available for cathodic protection may be limited to merely the edges of the zinc film at the immediate site of the scratch and is insufficient to protect the area of the steel exposed.

In addition, where the pH of the environment is outside of the 5.5-9.5 range (acid rain or heavily industrial and cattle spaces), acidic and alkaline constituents of the environment may attack and dissolve the polarizing barrier film of zinc corrosion products and the zinc anode itself. The anode will be consumed more rapidly, with its eventual destruction and consequent breakdown of the steel for lack of the protective anode.

Primer Coat

On carbon steel or iron, the application of a rust inhibiting primer is an essential step in the finishing process. Aside from inhibiting corrosion and helping to seal the surface, this first coat must also contribute to the adhesion of subsequent coatings. To accomplish the above functions, the primer itself must adhere tenaciously, be rather imperme-

Table 5-1: Guideline to Salt Spray Resistance of Zinc Containing Hot-Dip Coatings

Product	Approximate Time to 5% Red Rust (per micron [μ m] of coating thickness)
Galvanize (zinc-coated)	10 hours ¹
Galfan® (zinc-5% aluminum alloy-coated)	25 hours ²
Galvalume® (55% aluminum-zinc alloy-coated)	50 hours ³

*Galfan is a trademark of the Galfan Technology Centre, Inc. *Galvalume is a registered trademark of BIEC International, Inc.

¹Galvanize Z275 – typical coating thickness/side is 20.5 μ m, so approximate time to 5% red rust is 205 hours in salt spray.

²Galfan ZGF275 – typical coating thickness/side is 21.5 μ m, so approximate time to 5% red rust is 540 hours in salt spray.

³Galvalume AZ50 – typical coating thickness/side is 21.5 μ m, so approximate time to 5% red rust is 1075 hours in salt spray.

able to the elements and agents of weather and the topcoat inhibit corrosion by various mechanisms. The primer should be formulated in such a way that none of its components will be softened or attacked by the high resin content and solvent of enamels used over them. "Enamel holdout" is a required characteristic of such primers.

A hot rolled mill finish is usually a satisfactory surface for receiving prime coats, if it is free of rust and loose scale. Tight blue mill scale on such surfaces need not be removed if they are primed soon after manufacture, and if the intended use is for interior work where there will not be high humidity. But if the steel has been exposed to the atmosphere for only a few days, sufficient invisible rust will usually be present to require the removal of mill scale regardless of the intended use of the end product. Rust pitting is never acceptable on metal to be used for architectural iron work. Cold rolled surfaces are likely to be oily and should be properly cleaned. If they are extremely smooth, phosphatizing or some form of abrading, such as mechanical steel brushing, will usually insure satisfactory primer adhesion.

The most successful corrosion-inhibiting primer coats usually contain pigments that are compounds of zinc, chromium or molybdenum with oxidizing, ionizing or sacrificial action. Those used in organic coatings include zinc oxide, zinc phosphate, zinc dust and calcium, zinc or strontium molybdate.

For use on aluminum, primers usually contain chromate pigments. Vinyl wash primers can be used in place of conversion coatings except on intricate assemblies, but for exterior use should be followed by a chromate primer. Primers containing lead, mercury or copper should not be used on aluminum.

Primer Vehicles

The vehicles or binders commonly used for primer coats on carbon steel and iron are the following:

Epoxy: Excellent adhesion over carefully prepared surfaces is provided by epoxies. They are resistant to impact, moisture and chemicals. For high performance, epoxies combined with polyamide resins are used with lead pigments or zinc dust. With zinc dust, epoxy primers also permit welding of the protected surface. Epoxy esters, made with a fatty acid, are used for less demanding conditions. (See SSPC PS 13.01).

Phenolics: With basic silica lead chromate or zinc chromate, phenolics provide good protection when exposure to excessive dampness or water immersion is likely to occur. A phenolic with red lead is also used (See TTP86, Type IV).

Alkyds: Usable with most corrosion-inhibiting pigments, alkyds serve as binders for moderately priced, readily adherent primers of intermediate durability, where meticulous surface preparation is not practicable. (See SSPC PS 2.00)

Acrylics: In both waterborne and solvent-thinned versions, the acrylics have proven successful for coil coatings and other finishes. Waterborne versions are used for maintenance primers where conditions permit only water blasting, acrylics can be applied over moist surfaces. Hardness, flexibility, and water resistance are good.

Polyesters: These provide impact resistance, hardness, solvent resistance and gloss retention with oven curing.

Vinyls: Recently developed high-build vinyl primers with iron oxide or zinc chromate provide excellent chemical resistance with less application effort than older types of vinyl, which are excellent except for their extremely limited film build. (See SSPC PS 4.00)

Silicates: Ethyl silicate and other silicates with zinc dust constitute outstanding primers under extremes of weather and salt and chemical exposure. (See SSPC PS 12.00).

Chlorinated rubber: Excellent resistance to moisture vapor transmission and to acids, alkalis and various salts characterize coatings based on chlorinated rubber.

Oils: These are often added to other vehicles to penetrate rust and promote adhesion. Some linseed oil, often combined with alkyds, is used with red lead. Where only the poorest preparation can be given to rusted surfaces, straight red lead in oil is used. (See TTP86, Type 1 and SSPC Paint System 1.00)

Intermediate Coats

Metal fabricators are usually required to apply a shop coat primer, with the intermediate and

final coats generally being applied in the field by the painting contractor. With increasing frequency, however, specifications are calling for complete coating in the shop before delivery, to reduce costs and obtain what is generally regarded as a better job, avoiding the problems of moist field conditions, uncertain temperatures, dust and other enemies of good coating performance. In such specifications, field touchup is required, to correct any damage received in transit.

Depending on the film build desired and the resinous binder used, one or more intermediate coats may be needed between the primer and the final topcoat. To get a 7 mil film for a difficult environment, one epoxy coat may be sufficient, but to get the same film build with a conventional vinyl, as many as four coats and a primer may be required. When lesser film builds are adequate, a single epoxy, urethane, or alkyd topcoat may be sufficient.

A first intermediate coat should have essentially the same properties as the primer. Frequently it is the same paint with a tinted hiding pigment to insure complete coverage. A second intermediate coat, when used, should be the same as the topcoat or midway in properties between the primer and the topcoat. A slight color difference is preferred, to insure that any voids in the topcoat will be apparent.

Current primer technology has, in many cases, eliminated the need for intermediate coats with most inorganic zinc, organic zinc, and epoxy polyamide primers. This is significant because of the saving in labor costs.

Factory Applied Finishes

Until recently, factory applied metal finishes were almost exclusively solvent-reducible. Now, however, Federal and local regulatory agencies in some states limit the amount and types of solvent that may be released into the atmosphere. Consequently, water-reducible, powder and high-solids finishes are replacing a growing number of solvent-reduced materials and there is little doubt that this trend will continue for some time. It appears, though, that many solvent-reduced products cannot readily be replaced, and it is likely that with suitable changes in solvent content they will continue to be used.

Water-reducible acrylics, alkyds, polyesters, siliconized polyesters, modified urethanes and fluorocarbons, are growing in importance as factory applied finishes. High-solids coatings, requir-

ing little solvent, have also been gaining in usage, some of them being cured by ultraviolet or electron beam radiation. Powder coating for architectural metal products is also successfully being used.

Architectural metal coatings applied at the factory on both ferrous and nonferrous metals may be either clear or pigmented. Clear lacquers are often used as short-term protective coatings for aluminum and the copper alloys, but are not recommended for stainless steel. Many clear finishes degrade on exterior exposure because the sun's ultraviolet rays gradually affect their molecules. Clear acrylics, however, have long been recognized for their ability to withstand UV radiation. Also, some costly aliphatic urethane binders, developed for aircraft and space vehicles, have demonstrated outstanding UV resistance. The less resistant clears can somewhat be improved by addition of UV absorbers.

Pigmented coatings are affected less by UV light than the clears, because pigments to some degree screen or absorb them. Zinc oxide is particularly effective as a UV absorber. Because they yellow and chalk under UV exposure, epoxies, phenolics and some alkyds and urethanes are not normally selected for white and pastel colors on exteriors, although alkyds are satisfactory when their vegetable fatty acid components are derived from soybean oil, safflower oil or other suitable drying oils.

Factory applied finishes fall into two categories with respect to curing method: those that are air-dried and those that are force dried or baked. Binders used with either type may harden by oxidation or other chemical reactions, or by physical steps made possible by application. The latter include evaporation of the solvents in the applied coating, if the material is a lacquer, or the coalescence of binder particles if a latex emulsion, such as an acrylic, is used.

Factory applied finishes are mainly enamels. This means that they have a high proportion of resin and usually form hard, resistant finishes. Some enamel binders are thermosetting and require heat to harden them; others are heated only to hasten reaction with oxygen, or to hasten polymerization of the combination of certain chemical constituents. Some lacquers are heated to speed evaporation of the solvents and thus the drying of the film.

High performance exterior metal finishes, factory applied and heat-treated, have been rap-

idly growing in importance over the past decade. These virtually qualify as super coatings, some of them being guaranteed for as long as 15 years of service. Included among these are coatings based on fluorocarbons, silicone acrylics, silicone polyesters, and vinyl plastisols. These coatings are gaining wide acceptance as finishes on both aluminum and steel, for such products as industrial wall panels, metal curtain wall, and windows, in moderate to severe chemical environments. They are not to be confused, however, with the so-called "high performance architectural coatings" (HIPAC), which are field applied and air-dried products usually based on epoxies, silicone alkyds, urethanes or other excellent binders. These, with very limited exceptions, do not approach the performance of the factory applied and oven-treated super coatings.

Coatings chemists have become highly skilled in tailoring the factory applied finishes to provide specific properties. Nevertheless, the improvement of a given property can often be accomplished only at the expense of lower performance in respect to some other property. The dominant challenge will usually determine which properties will be emphasized, and in many instances some compromises are necessary. It is important, therefore, that the specifier recognize which properties are most essential for a specific application and select the combination of coating properties that will provide optimum overall performance.

Assume, for example, that a client desires a light colored high performance exterior coating. The coating preferred may be based on a binder which, though highly durable, is known to fade and lightly chalk. If white is mandatory, a somewhat less durable but nonyellowing and nonchalking coating may have to be selected. Or a binder with maximum impact resistance may be indicated, but the best binder for this purpose may offer inferior solvent resistance, and this may be a consideration of such importance as to require a compromise on impact demands.

In the following discussion of the various binders used in factory applied finishes and in the accompanying chart, generalizations rather than specific recommendations are presented. Performance properties and costs are necessarily stated in relative terms. This information is intended to provide reliable basic data for the specifier in respect to the various coatings and their general uses, *but final selections should be*

made only after consultation with representatives of reliable manufacturers.

Acrylic Resins: Acrylics have many valuable properties, notably their color and gloss retention and exterior weathering, both as clears and pigmented. While they are many higher performing resins available today, the price per function favors the use of acrylics as a coating. Premium quality acrylics, medium in price, have performed satisfactorily in many industrial atmospheres for more than a decade. They are suitable for use as a topcoat over epoxies, organic zinc primers, chlorinated rubber and some alkyd primers. Acrylics are available. Aside from the widely used emulsions, they are available as solvent-reducible thermosetting and thermoplastic metal finishes, and their use as water-reducible metal finishes for many purposes is steadily growing. Acrylic organosols and powder coatings are also available.

Alkyd Resins: These resins, in the past, have been the workhorses of the coatings industry because of their adhesion, flexibility, hardness, and general serviceability. Their low cost has made them attractive, in spite of their relatively limited service life and the tendency of some types to yellow in outdoor exposure. In recent years, however, the newer but proven materials such as acrylics and polyvinyl acetate emulsions in the moderate price range of products, and the high performance synthetics such as epoxy, urethane, chlorinated rubber, and vinyl resins, have been replacing them.

Alkyds, which are closely related to polyester resins, can be modified with styrene, silicone, or acrylic resins to overcome some shortcomings and to change the characteristics of the resins. The addition of urea or melamine resins to thermosetting alkyd formulations speeds cure from one hour to seconds, and improves gloss, chemical and solvent resistance, and durability. Alkyds are also used to modify cellulosic lacquers. Alkyd resins in general are susceptible for degradation through hydrolysis over time, yellowing hardening and chalking. Unmodified alkyds can function satisfactorily in indoor applications.

Cellulosic Resins: The types of cellulosic that are used as principal resins in lacquers require the addition of plasticizers or resins such as alkyds,

phenols or urea formaldehyde to improve both adhesion, and tensile strength. The three such types are:

- a. Nitrocellulose (cellulose nitrate), which is flammable and discolors with aging. It is compatible with many plasticizers and other resins and is generally modified with alkyd resins.
- b. Cellulose acetate, which has low flammability but otherwise has most of the limitations of nitrocellulose plus poor compatibility with most plasticizers and resins.
- c. Cellulose acetate butyrate, which, when modified with an acrylic, yields a coating with exceptional hardness, adhesion, and nonyellowing properties.

Two other cellulose are interesting because of their unique applications. Ethylcellulose is dissolved at high temperature in solvent blends that cannot hold it at room temperature. It is returned to ambient temperature and becomes a gel prior to dipping hot objects which, when coated, take on a smooth, uniform film that dries to 15 to 30 mils. This is known as a form of gel coat.

The other cellulose is methylcellulose, in which color particles are suspended and mixed with nitrocellulose or other lacquer materials with a second color, to make multicolor coatings.

Chlorinated Rubber: Coatings based on this resin are used for special purposes, mainly to resist attack by microorganisms; where low permeability to water and water vapor is needed" and where radioactive materials may have to be cleaned up.

Epoxy Resins: Epoxy resins are characterized by their adhesion, gloss, corrosion resistance, hardness, and overall durability. The most important of the several epoxy types are those cured by polyamide resins, which impart flexibility, durability, abrasion and impact resistance, and overall chemical resistance. They are one of the most important binders used in powder coatings.

Thermosetting epoxy acrylics are used where mar resistance, gloss and color retention and chemical resistance are required. Pigmented epoxies cured by amine resins are used in areas where corrosion and chemical resistance is needed. Some epoxies yield high-build, tile-like pigmented coatings capable of withstanding repeated scrubbing in sanitary areas such as hospitals, dairies

and chemical plants. Epoxy resins best function as primers.

Fluorocarbons: These are costly premium coatings, ranking high among the ultra high performance exterior coatings. They are available in a wide variety of colors, but only low to medium gloss. Because of their high resistance to ultraviolet rays, they are distinguished for color retention and excellent weatherability. They have high resistance also to abrasion, impact, chemical attack and dirt pickup, so are easy to maintain. To insure good adhesion, the use of an extremely thin film of epoxyzinc chromate or similar compatible primer is usually required.

Melamine Formaldehyde Resins: These are similar to urea formaldehydes, except that they are not as compatible with many resins. Their advantages are that they harden more rapidly, have better gloss and color retention and alkali resistance, and can be baked at lower temperatures. These resins are used primarily as modifiers.

Phenolic Resins: Combinations of phenol and formaldehyde with or without the addition of vegetable oils have outstanding resistance to alkalis, chemicals, and moisture. They adhere to metal, and some versions are suitable for baking enamels where light or pastel colors are not desired.

Polyester Resins: Polyesters are oil free alkyds with certain advantages in chemical reactivity. They have a wide range of durability and flexibility. Specially formulated polyesters with amine modification are available as water-reducible coatings; various others are used for high solids coatings, powder resins, gel coats, and radiation cured materials. With silicone modifications they serve as high performance exterior coatings.

Silicones: Silicone based coatings are characterized by exceptional resistance to heat and weather exposure. In recent years these properties have been imparted to other binders by silicone modification of organic polymers. Silicone alkyds improve the weathering and gloss retention of alkyds, and silicone modifications of acrylics, polyesters, epoxies and urethanes enhance their weathering and color retention properties. Two of the more widely used ultra high performance exterior coatings for metal are based on siliconized acrylics and siliconized polyesters. Both of these products have excellent color and gloss retention, chalking and erosion resistance, and durability un-

der prolonged outdoor exposure.

Urea Formaldehyde Resins: Added to alkyd resins these provide flexible, hard films with excellent color retention but poor impact resistance.

Urethane Resins: resins and coatings are available in a wide selection of types, ranging from those resembling alkyds, but with some advantages, to highly sophisticated products capable of withstanding exposure to weather, abrasion, scrubbing, solvents and impact. Some air dried versions perform like baked coatings. The newer types have overcome yellowing tendencies. Those derived from versions used for aircraft and space equipment are so hard and solvent resistant that graffiti can be removed from them with strong solvents without discernible damage to the surface.

Urethane coatings are available as one- or two-part solvent and water-reducibles, powder coatings, and as one part moisture cure version. The two components generally cure dry-to-touch in a few minutes at room or elevated temperature depending on their formulation. The two-part urethanes provide better durability, solvent resistance and toughness compared to air-dry urethanes.

These costly resins have outstanding chemical and stain resistance and toughness. The older formulations yellowed and chalked outdoors, but new color stable types have been developed. The moisture-cured versions can be formulated to cure within 30-60 minutes of application.

Vinyl Chloride Copolymers: Vinyl chlorides are combined with varying amounts of polyvinyl acetate for softening and flexibility. The resulting binders are tough, nonflammable and resistant to moisture, oils, salt water and chemicals. Pigmented versions have excellent durability. Factory applied vinyls include solutions, plastisols and organosols. The plastisols have been supplied commercially to the coil coating industry for more than a decade and have found wide use as a high performance exterior coating for building sheets and panels, even when used in corrosive environments.

Powder Coatings: Powder coatings use a wide variety of resins discussed above. Thermosetting powders are available in polyester, epoxy, phenolic, acrylic, silicone resins and their combinations. As such, they demonstrate similar properties to those of liquid resins. Thermoplastic powders include, polypropylene, nylon, fluorinated polymers, and vinyl chloride.

Field Applied Topcoats for Carbon Steel and Iron

The final coat in a system should provide satisfactory protection for the primer and intermediate coats in accord with the specific requirements. While impermeability to moisture is usually desirable in metal coatings, all are permeable to some degree. Impermeability generally is proportional to film thickness. Coatings having a film thickness of 2 mils or less are likely to be permeable, while high build systems up to 40 mils thickness result in long-term impermeability.

Color retention is as important for exterior topcoats as is weather resistance. Many topcoats suitable for wood and masonry may also be used on metal. There are also several high performance coatings the cost of which may justify their use only on metal. Suitable products for use as topcoats on iron and steel are quite numerous. The older solvent reduced paints, such as those based on alkyds and phenolics, still serve useful purposes, and the synthetic resin binders provide topcoats with a wide range of durability potential. These range from the water reducible coatings based on conventional acrylics, polyvinyl acetate or aminized polyesters, with moderate life cycles, to the ultra long term coatings based on epoxies, urethanes, vinyls, certain siliconized polymers, the newer acrylics and the fluorocarbons.

Where moderate durability and indoor applications are required, **alkyds** are considered satisfactory. For exterior application, when gloss retention is an important consideration, the silicone modified alkyds are often used. Special requirements or exposure conditions may require topcoats having higher performance values. **Coal tar epoxies**, for example, consisting of epoxies and bituminous asphalt, are used in heavy coats with suitable pigments where moisture is expected to be unusually severe and color retention is not important. (See SSPC PS 11.01). Where exposure to the sun's rays may cause a buildup of heat on the metal surface, as on siding and roofs, white or light colored coatings are preferred. Aluminum pigmented paints are appropriate for such applications.

A **phenolic** topcoat over a phenolic primer serves well in locations that are damp or subject to chemical fumes, but their tendency to yellow and chalk outdoors may be a problem. With aluminum pigments, however, they have proven very durable. **Chlorinated rubber** finishes serve as

good insulators against electrolytic action where dissimilar metals are in contact, and they have good acid and alkali resistance. **Vinyl** finishes offer outstanding resistance to acids and alkalis and perform well in salt environments, but most of them offer very thin film build per coat. The newer high build vinyls overcome this deficiency but exposures have not yet shown what sacrifices in performance may accompany improved film build and consequent labor saving.

Epoxy finishes are distinguished for their toughness and their acid and alkali resistance, but they tend to chalk and yellow outdoors. Some epoxies, chiefly those combined with polyamides and polyamines, cure at room temperatures but perform like oven baked coatings. These should not be confused with epoxy esters. Other types dry to a tile like hardness but, unlike tile, are seam free, permitting meticulous cleanup in sanitary areas.

Urethane, coatings are available in a wide selection of types, ranging from those resembling alkyds, but with some advantages, to highly sophisticated products capable of withstanding exposure to weather, abrasion, scrubbing, solvents, and impact. Some air dried versions perform like baked coatings. The newer types have overcome yellowing tendencies. Those derived from versions used for aircraft and space equipment are so hard and solvent resistant that graffiti can be removed from them with strong solvents without discernible damage to the surface.

Acrylics, in water reducible formulations for exterior applications, have excellent color and gloss retention and weather resistance. They are suitable for use over inorganic zinc primers, epoxies, chlorinated rubber, and some alkyd primers. Premium quality acrylics, medium in price, have performed satisfactorily in industrial atmospheres for more than a decade.

Application of Coatings

Organic coatings are applied to metals by a variety of methods, depending upon the type of coating and whether the application takes place in the field or in the factory. Field applied paints, varnishes (clear coatings) and lacquers may be applied by brush, roller, or spray gun. Factory applied finishes have traditionally been, and still are, applied by spray, but other methods are being increasingly used. These include flow coatings, curtain coating, roller coating (coil coating), electro-

deposition, and powder coating, among others.

Spray applications, widely used both in the factory and at the job site, are of several different types. The spray guns, all of which are designed to atomize the coating, may use either compressed air or other gas, or hydraulic pressure as the motive force, with various interchangeable nozzles and air caps for different kinds of coating. Thinning of the coating is often necessary, and only recommended types of thinners should be used.

Hot spray is a method which employs heat to thin the coating, instead of a thinner. Its advantages are faster application, ease of applying thicker coats, moderately improved drying time and reduction of overspray.

Airless spray utilizes hydraulic pressure, atomization being achieved by release of the pressure through a small orifice, along with some flash evaporation of solvents. Some units use a combination of heat and pressure. In general, this method has all the advantages of hot spray, plus the elimination of heating units and the minimization of overspray.

Electrostatic spraying uses the principal of electrostatically charging the paint particle sprayed so that it is attracted to the grounded object to be coated which is of opposite polarity. This phenomenon causes paint particles, which might normally have missed the work piece, to be attracted to it and even pulled around to the opposite side of the work piece from that being sprayed. Articles to be coated are conveyed through a spray zone where an electrostatic field is maintained. Transfer efficiencies with electrostatic spraying, i.e., the percent of the material sprayed which reaches the work piece, may often reach as high as 98 percent, effecting a significant reduction in paint usage compared to the usage experienced with conventional methods. Electrostatic application equipment is available in both manual and automatic types and in the form of air spray, airless spray or rotary disk or bell atomizers. Many states now recognize the use of electrostatic spray equipment as a compliance method in reduction of solvent emissions due to the greatly reduced volumes of coating material required in the production process.

Dipping is an old, simple, and relatively crude method of application, in which the object being coated is momentarily immersed in a coating bath. With the proper coating formula, this is an appropriate method for coating complex objects, provided

Table 5-2: REPRESENTATIVE ARCHITECTURAL USES AND

Binder Type	Typical Uses	Application		Cost	Outdoor Life (years)
		Shop	Field		
ACRYLICS – Solvent reducible Water reducible; air dried – baked –	Residential siding and similar products; nets and implements; clear topcoats	yes	no	M	5
		yes	yes	M	5
		yes	no	M	10-15
ALKYDS	Exterior primers and enamels	yes	yes	L-M	5-7
CELLULOSE ACETATE BUTYRATE	Decorative high gloss finishes	yes	no	M	2-3
CHLORINATED RUBBER	Corrosion-resistant paints; swimming pool coatings; protection of dissimilar metals	yes	yes	M	2-3
CHLOROSULFONATED POLYETHYLENE	Paints for piping, tanks, valves, etc.	yes	yes	H	15
EPOXY	Moisture- and alkali- resistant coatings; non-decorative interior uses requiring high chemical resistance	yes	yes	M	15+
FLUOROCARBONS	High performance exterior coatings; industrial siding; curtain walls	yes	yes	H	20
PHENOL FORMALDEHYDE	Chemical- and moisture- resistant coatings	yes	yes	M	10
POLYESTER	Cabinets and furniture; ceiling tile; piping Maintenance finishes for both interior and exterior applications	yes	yes	L-M	15
POLYVINYL CHLORIDE	Residential siding; rain-carrying equip- ment; metal wall tile; baseboard heating covers, etc. Plastics; industrial siding; curtain walls	yes	yes	L-M	5-10
SILICATES (inorganic)	Corrosion-inhibitive primers; solvent- resistant coatings	yes	yes	L-M	10-15
SILICON-MODIFIED POLYMERS	High performance exterior coatings; industrial siding; curtain walls	yes	yes	H-VH	10-15
URETHANE (aliphatic-cured)	Heavy duty coatings for stain, chemical, abrasion and corrosion resistance	yes	yes	M-H	10+

KEY: L = Low; M = Moderate; H = High; VH = Very High; NA = Not Applicable or Not Available; P = Poor; F = Fair

they are designed to permit adequate drainage.

Flow coating is closely related to dipping, and is appropriate for coating objects too large to dip. These are conveyed through a tunnel equipped with nozzles that deluge them, using fluid pressure only. Excess material is collected and pumped back again to the nozzle reservoir.

Curtain coating is a method of finishing flat objects or sheets, in which the item to be coated passes through and perpendicular to a freely falling "curtain," or waterfall, of coating. The flow rate of the falling liquid and the linear speed of the substrate passing through the curtain are regulated to provide the desired thickness of coating. This

method may be used with low viscosity resins or solutions, suspensions, or resin emulsions.

Roller coating is a long established method, suitable only for flat stock, that is commonly used for continuously coating coiled sheet and strip.

The coating is applied by a roller that is continuously replenished with liquid, usually by a feed roller. The application may be either direct or reverse; that is, the application roller may rotate either in the direction of the passing stock or in the reverse direction. Reverseroll coating is more suited for critical work, as it permits independent adjustment of several variables affecting quality.

COMPARATIVE PROPERTIES OF COATINGS

Color Stable Exterior	Gloss Retention Exterior	Stain Resistance	Weather Resistance	Abrasion and Impact Resistance	Flexibility	Water-Reducible Available	Clear Available	Weldable as Primer
yes	VG	G	G	F-G	G		yes	yes*
yes	G	G	F-G	G	G	yes	yes	yes*
yes	G-E	G	G-E	G	G	yes	yes	yes*
no	G	F	F	F	F-G	yes	yes	yes*
yes	G	F	G	G	G	no	yes	no
yes	F	F	G	G	G	no	no	no
yes	NA	F	E	F-G	E	no	no	no
no	P	G	G-E	E	G	yes	yes	yes*
yes	E	E	E	E	G	no	yes	no
no	F	F	G-E	G-E	G	no	yes	yes*
some versions	G-E	G-E	G-E	G	G-E	yes	yes	yes
yes	G	F	G-E	G	G-E	yes	no	yes*
NA	NA	NA	NA	G	G	no	no	yes
yes	G-E	G	G-E	G-E	G	yes	no	no
some versions	E	G-E	G-E	G-E	E	yes	yes	yes*

G = Good; E = Excellent

* For light non-structural welding only

Electrodeposition is a method of coating metal objects by suspending them in a water bath containing resins, electrolytic stabilizers and pigments, so that the objects are virtually plated with resins and color by electrolytic deposition. Objects in the bath become either anode or cathode depending on the chemistry of coating, while the anode (cathode) is either the tank or some suitable object suspended in the tank. Suitable resins and pigments for this process were formerly limited mainly to water-soluble epoxies and alkyd modified phenolic resins and iron oxides, but progress has been made in extending the selection and color range of the resins.

Powder coatings are deposited on an object as finely divided solids consisting of resinous material, additives to aid performance, and colorants if desired. The object to be coated is electrically grounded if the powder is to be electrostatically sprayed, and may be heated before or after the powder is applied. A less frequently used procedure is the fluidized bed process, in which the object is heated and immersed in an enclosure in which the powder is "fluidized" by a gentle current of air.

Coalescence of the powder particles on the heated surfaces, in either method, leaves a smooth, hard coating.

Care and Maintenance of Painted Metals/General Considerations

Organic coatings do not normally show an appreciable amount of dirt accumulation. In many atmospheres, dirt and soil would not be detrimental to the coating, but cleaning and surface care may be desirable for the sake of appearance. In areas where heavy industrial deposits have dulled the surface where materials from construction processes have soiled the surface, or where cleaner has rundown from other surfaces, surface cleaning is desirable.

Climatic conditions affect the cleanliness of organic coatings. In some areas rainfall may be sufficient to keep exterior surfaces looking clean and bright. In areas of low rainfall or in heavily industrialized areas, periodic cleaning will be necessary. This is also true of foggy coastal regions with frequent cycles of condensation and drying which may cause a build up of atmospheric salts and dirt. In any climate, sheltered areas under overhangs may become soiled from lack of rain washing. Cleaning painted metal components in the exterior wall may be scheduled along with cleaning the glass.

If automatic wall cleaning equipment is to be used on a building, a test should be made early in the equipment design to ensure that the cleaning solutions and brushes, as well as the frequency of cleaning, will have no detrimental effect on the coating.

Cleaning Procedures

Painted surfaces should be cleaned as soon as possible after installation to remove construction soils and accumulated environmental soils. Ideally, a forceful water rinse from the top down should be employed before applying any cleaner. Some type of surface agitation helps. A low volume of water at moderate pressure is better than a high volume at low pressure. Rubbing the surface with soft brushes, sponges, or cloth during the rinsing also helps.

If a simple water rinse with brushing, sponging, or rubbing with a cloth is not sufficient to remove the soil, a mild detergent or mild soap will be necessary. Washing with a mild detergent or mild soap should be done by brushing or sponging with a uniform pressure, first horizontally, then vertically. Following the washing, the surfaces must be

thoroughly rinsed with clean water. If the cleaner has been permitted to dry, it may be necessary to sponge the surfaces while rinsing. Rinsed surfaces may be permitted to air dry or may be wiped dry with a chamois, squeegee, or lint free cloth.

Cleaner rundown should be minimized and those areas subject to rundown should be rinsed immediately, and as long as necessary, to lessen the probability of streaking. Cleaning chemicals must not be allowed to collect on surfaces, to puddle on horizontal surfaces, or to collect in joints and crevices. These surfaces, joints and crevices should be thoroughly flushed with water and dried.

Mild detergents and soaps which are safe for bare hands should be safe for coated metal. Stronger detergents, such as some dishwasher detergents, should be carefully spot tested. Some of the latter would necessitate using rubber gloves and long handled brushes. Some mild cleaning solutions are available for automatic building washing machines.

Mild solvents such as mineral spirits may be used to remove grease, sealant, or caulking compounds. Stronger solvents or solvents containing cleaners may soften paints. To prevent damage to the finish, the coating manufacturer should be consulted and these types of solvent or emulsion cleaners should first be spot tested. Care should be taken to assure that no surface marring takes place in this manner since it could give an undesirable appearance at certain viewing angles. Cleaners of this type are usually applied and removed with a clean cloth. Remaining residue should be washed with mild soap and rinsed with water. Use solvent cleaners sparingly.

Since solvents may extract materials from sealants which could stain the painted surface or could prove harmful to sealants, their possible effects must be considered. Test a small area first.

If cleaning heavy tenacious surface soil or stubborn stains has been postponed, a more aggressive cleaner and technique may be required. Cleaner and technique should be matched to the soil and the painted finish. Some local manual cleaning may be needed at this point. Always follow the recommendations of the cleaner manufacturer as to proper cleaner and concentration. Test clean a small area first. Cleaners should not be used indiscriminately. Do not use excessive, abrasive rubbing since it may alter surface texture or

impart a bright "shine" to the surface.

Dried concrete spillage on the painted surface may be quite stubborn to remove. Special cleaners and/or vigorous rubbing with nonabrasive brushes or plastic scrapers may be necessary. Diluted solutions of Muriatic Acid (under 10 percent) may be effective in removing dried concrete stains and effective proprietary cleaners for concrete and mortar staining are available, however, a test area should be tried first and proper handling precautions must be exercised for safety reasons.

Mixing cleaners may not only be ineffective but also dangerous. For example, mixing chlorine containing materials such as bleaches, with other cleaning compounds containing ammonia, can produce poison gas. Always rinse the surface after removing heavy surface soil.

Summary of Cleaning Tips

- Overcleaning or excessive rubbing can do more harm than good.
- Strong solvents (MEK for example) or strong cleaner concentrations can cause damage to painted surfaces.
- Avoid abrasive cleaners. Do not use household cleaners that contain abrasives on painted surfaces.
- Abrasive materials such as steel wool, abrasive brushes, etc., can wear and harm finishes.
- Avoid drips and splashes. Remove rundowns as quickly as possible.
- Avoid temperature extremes. Heat accelerates

chemical reactions and may evaporate water from solution. Extremely low temperature may give poor cleaning results. Cleaning under adverse conditions may result in streaking or staining. Ideally, cleaning should be done in shade at moderate temperature.

- Do not substitute a heavy duty cleaner for a frequently used, mild cleaner.
- Do not scour painted surfaces.
- Never use paint removers, aggressive alkaline, acid, or abrasive cleaners. Do not use trisodium phosphate or highly alkaline or highly acid cleaners. Always do a test surface.
- Follow manufacturers recommendations for mixing and diluting cleaners.
- Never mix cleaners.
- To prevent marring, make sure cleaning sponges, cloth, etc., are grit free.
- "An ounce of prevention is worth a pound of cure."
- In addition to the foregoing, consideration must be given to the effects rundown may have on shrubbery, personnel, equipment and other items located below. Such considerations may affect the timing in the cleaning schedule.

Inspection

It is suggested that the building owner or manager provide a qualified inspector to see that the cleaning operations are carried out in accordance with the recommended procedures.

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Contributing & Referenced Organizations

LIST OF CONTRIBUTING AND REFERENCED ORGANIZATIONS

N.W. LeJeune Road, P.O. Box 351040, Miami, FL 33135.

Builders Hardware Manufacturers Association (BHMA), 355 Lexington Avenue, 17th Floor New York, NY 10017.

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The Aluminum Association (AA), 900 19th Street NW, Washington, DC 20006.

Copper Development Association (CDA), 260 Madison Avenue, New York, NY 10016.

American Architectural Manufacturers Association (AAMA), 1540 East Dundee Road, Suite 310, Palatine, IL 60067-8321.

Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422, www.coatingstech.org.

American Galvanizers Association (AGA), 12200 East Iliff Avenue, Suite 204, Aurora, CO 80014.

International Organization for Standardization (ISO) *Note: ANSI represents U.S. technical activities in this organization.*

American Iron and Steel Institute (AISI), 1000 16th Street, NW, Washington, DC 20036.

National Association of Corrosion Engineers (NACE Intl), 1440 South Creek Dr., Houston, TX 77084, www.nace.org.

American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036.

Porcelain Enamel Institute (PEI), 1911 North Fort Meyer Drive, Arlington, VA 22209.

ASTM International (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

Powder Coating Institute, 2121 Eisenhower Ave., Suite 401, Alexandria, VA 22314.

American Welding Society (AWS), 550

Steel Structures Painting Council (SSPC), 4400 5th Avenue, Pittsburgh, PA 15213.

Zinc Institute (ZI), c/o Zinc Institute Archives, Held by Special Collections, Linderman Library,

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Notes

Notes

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Metal Manufacturers
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National Ornamental
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1535 Pennsylvania Ave.
McDonough, GA 30253

888-516-8585
FAX 770-288-2006
www.nomma.org

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EXHIBIT G

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450
Run By:	STUARTDEANVANDYG		
Req. Start Date:	Customer Contact Name: Sonia Miranda		
Req. Comp Date:	Customer Contact Phone: 312-542-1200		
Schedule Date:	Foreman:		
Customer Name:	Helper 1:		
Work-At Address:	Helper 2:		
	Supervisor:		
Unit No.:	Salesperson: Perla Gonzalez		
After-Hours Contact:	Salesperson Phone:		
After-Hours Phone:			
Building Instructions:			
Work Instructions:			
Scope of Work	Material	Specification	Frequency
A. STATE STREET ELEVATION			
Exterior side of twelve (12) bronze show window units	BRONZE-SATIN	Metal-Wash Wax	3M
Four (4) pair of bronze wall-mounted standpipes	BRONZE-SATIN	Metal-Wash Wax	3M
Four (4) bronze exterior secondary building entrance c/o: exterior side of two (2) doors	BRONZE-SATIN	Metal-Wash Wax	1M
Four (4) bronze exterior secondary building entrance c/o: exterior side of frames, arched transom window and thresholds	BRONZE-SATIN	Metal-Wash Wax	1M
Four (4) bronze exterior secondary building entrance c/o: inner facing of entrances, including two (2) doors, frames, arched transom	BRONZE-SATIN	Metal-Wash Wax	6M
			NONE

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450
Req. Start Date:		Start Time:	
Req. Comp Date:		Day Work:	
Schedule Date:		Job Type:	MAINT
Customer Name:	Harold Washington Library		
Work-At Address:	400 S. STATE STREET		
	400 S. STATE STREET		
	Billbox # 01-154328-HWL400		
	Chicago, IL 60605		
Unit No.:			
After-Hours Contact:		Salesperson:	Perla Gonzalez
After-Hours Phone:		Salesperson Phone:	
Building Instructions:			
Work Instructions:			
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u> <u>Scaffolding</u>
A. STATE STREET ELEVATION - MAIN ENTRANCE			
Bronze of main entrance to library c/o: both sides of four (4) outer entrance doors, exterior side frames and transom window unit, both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Wash Wax	1M NONE
Bronze of main entrance to library c/o: vestibule side of outer entrance facing, including frames and transome window; both sides of inner entrance transome window and frame	BRONZE-SATIN	Metal-Wash Wax	3M NONE
B. CONGRESS STREET ELEVATION			

MW--CH				Stuart Dean Employee Copy	
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450	Run By:	STUARTDEANVANDYG
Req. Start Date:	Start Time:				
Req. Comp Date:	Day Work:				
Schedule Date:	Job Type: MAINT				
Customer Name:	Harold Washington Library				
Work-At Address:	400 S. STATE STREET				
	400 S. STATE STREET				
	Billbox # 01-154328-HWL400				
	Chicago, IL 60605				
Unit No.:					
After-Hours Contact:					
After-Hours Phone:	Salesperson: Perla Gonzalez				
Building Instructions:	Salesperson Phone:				
Work Instructions:					
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>	<u>Scaffolding</u>	
EXTERIOR SIDE ONLY - of two (2) bronze panel door entrances, each c/o: two (2) doors, frame and arched transom panel	BRONZE-SATIN	Metal-Wash Wax	3M	NONE	
Exterior side of six (6) bronze show window units	BRONZE-SATIN	Metal-Wash Wax	3M	NONE	
B. CONGRESS STREET ELEVATION - MAIN ENTRANCE	BRONZE-SATIN	Metal-Wash Wax	1M	NONE	
Bronze main center entrance to library c/o: both sides of four (4) outer entrance swing doors, exterior side frames and transom window unit; both sides of four (4) inner entrance swing doors					

MW--CH		Stuart Dean Employee Copy		
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450	Run By: STUARTDEANANDYG
Req. Start Date:		Start Time:		Customer Contact Name: Sonia Miranda
Req. Comp Date:		Day Work:		Customer Contact Phone: 312-542-1200
Schedule Date:		Job Type:	MAINT	
Customer Name:	Harold Washington Library			Foreman:
Work-At Address:	400 S. STATE STREET			Helper 1:
	400 S. STATE STREET			Helper 2:
	Billbox # 01-154328-HWL400			Supervisor:
	Chicago, IL 60605			
Unit No.:				
After-Hours Contact:				Salesperson: Perla Gonzalez
After-Hours Phone:				Salesperson Phone:
Building Instructions:				
Work Instructions:				
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>	<u>Scaffolding</u>
Bronze main center entrance to library c/o: BRONZE-SATIN vestibule side of outer entrance facing including frames and transom window; both sides of inner entrance transom window and frame	BRONZE-SATIN	Metal-Wash Wax	3M	NONE
C. VAN BUREN STREET ELEVATION				
Two (2) pair of bronze wall mounted standpipes	BRONZE-SATIN	Metal-Wash Wax	1M	NONE
Exterior side of six (6) bronze show window units	BRONZE-SATIN	Metal-Wash Wax	3M	NONE
EXTERIOR SIDE ONLY of two (2) bronze panel door entrances each c/o: two (2) doors, frame and arched transom panel	BRONZE-SATIN	Metal-Wash Wax	3M	NONE

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450
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Req. Comp Date:		Customer Contact Name:	Sonia Miranda
Schedule Date:		Customer Contact Phone:	312-542-1200
Customer Name:	Harold Washington Library	Foreman:	
Work-At Address:	400 S. STATE STREET	Helper 1:	
	400 S. STATE STREET	Helper 2:	
	Billbox # 01-154328-HWL400	Supervisor:	
	Chicago, IL 60605		
Unit No.:		Salesperson:	Perla Gonzalez
After-Hours Contact:		Salesperson Phone:	
After-Hours Phone:			
Building Instructions:			
Work Instructions:			
Scope of Work	Material	Specification	Frequency
Bronze main center entrance to library c/o: both sides of four (4) outer entrance swing doors; exterior side frames and transom window unit; both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Wash Wax	3M
Bronze main center entrance to library c/o: vestibule side of outer entrance facing including frames and transom window unit; both sides of inner entrance transom window and frames	BRONZE-SATIN	Metal-Wash Wax	3M
D. PLYMOUTH COURT ELEVATION			
Bronze entrance to library (north) c/o: both sides of two (2) outer entrance swing doors; both sides of two (2) inner entrance swing doors and frames	BRONZE-SATIN	Metal-Wash Wax	1M
			NONE

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450
Req. Start Date:		Start Time:	
Req. Comp Date:		Day Work:	
Schedule Date:		Job Type:	MAINT
Customer Name:	Harold Washington Library		
Work-At Address:	400 S. STATE STREET		
	400 S. STATE STREET		
	Billbox # 01-154328-HWL400		
	Chicago, IL 60605		
Unit No.:			
After-Hours Contact:		Salesperson:	Perla Gonzalez
After-Hours Phone:		Salesperson Phone:	
Building Instructions:			
Work Instructions:			
Scope of Work	Material	Specification	Frequency
Bronze entrance to library (north) c/o: exterior side of five (5) section bronze window surrounding entrance	BRONZE-SATIN	Metal-Wash Wax	1M
Bronze entrance to library (north) c/o: inner facing of entrance	BRONZE-SATIN	Metal-Wash Wax	3M
Both sides of two (2) bronze swing doors, frame and five-section window around at south entrance	BRONZE-SATIN	Metal-Wash Wax	1M
J. INTERIOR - 1ST FLOOR			
Lobby side of two (2) bronze display case windows (2 in Congress corridor and 1 in State Corridor)	BRONZE-SATIN	Metal-Wash Wax	6M
TOP MEMBER ONLY of circular bronze railing in center	BRONZE-SATIN	Metal-Wash Wax	6M
			NONE

MW--CH				Stuart Dean Employee Copy			
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450	Run By:	STUARTDEANANDYG		
Req. Start Date:	Start Time:			Customer Contact Name:	Sonia Miranda		
Req. Comp Date:	Day Work:			Customer Contact Phone:	312-542-1200		
Schedule Date:	Job Type:			Foreman:			
Customer Name:	Harold Washington Library			Helper 1:			
Work-At Address:	400 S. STATE STREET			Helper 2:			
	Billbox # 01-154328-HWL400			Supervisor:			
	Chicago, IL 60605						
Unit No.:							
After-Hours Contact:				Salesperson:	Perla Gonzalez		
After-Hours Phone:				Salesperson Phone:			
Building Instructions:							
Work Instructions:							
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>	<u>Scaffolding</u>			
Two (2) solid panel bronze escalator well-way enclosures between 1st and 2nd floors	BRONZE-SATIN	Metal-Wash Wax	6M	NONE			
O. INTERIOR - 2ND FLOOR							
Bronze TOP-MEMBER ONLY of balcony handrail	BRONZE-SATIN	Metal-Wash Wax	6M	NONE			
Two (2) solid bronze panel escalator well-way enclosures between 2nd and 3rd floors c/o: step side of panels, well-way side of panels and solid panel between escalators at 3rd floor	BRONZE-SATIN	Metal-Wash Wax	6M	NONE			
P. PASSENGER ELEVATORS							
Fifty-three (53) bronze elevator entrances (four (4) each on floors 1-12 and lower level; one (1) at mezzanine) each c/o: two (2) doors and frame	BRONZE-SATIN	Metal-Wash Wax	6M	NONE			

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450
Req. Start Date:		Run By:	STUARTDEANANDYG
Req. Comp Date:		Customer Contact Name:	Sonia Miranda
Schedule Date:		Customer Contact Phone:	312-542-1200
Customer Name:	Harold Washington Library	Foreman:	
Work-At Address:	400 S. STATE STREET	Helper 1:	
	400 S. STATE STREET	Helper 2:	
	Billbox # 01-154328-HWL400	Supervisor:	
	Chicago, IL 60605		
Unit No.:		Salesperson:	Perla Gonzalez
After-Hours Contact:		Salesperson Phone:	
Building Instructions:			
Work Instructions:			
Scope of Work	Material	Specification	Frequency
Interior bronze of four (4) passenger elevators each c/o: ceiling trim, sidewalls, doors, return panel	BRONZE-SATIN	Metal-Wash Wax	3M
Interior bronze of four (4) passenger elevators each c/o: baseboard	BRONZE-SATIN	Metal-Wash Wax	3M
Interior bronze of four (4) passenger elevators each c/o: handrails	BRONZE-SATIN	Metal-Clean Clear Coat	6M
Interior bronze of four (4) passenger elevators each c/o: handrails	BRONZE-SATIN	Metal-Wash Wax	3M
Q. HANDICAP ELEVATOR			
Four (4) bronze elevator entrances (one (1) each on floors 1-4 and lower level) each c/o: doors and frames	BRONZE-SATIN	Metal-Wash Wax	6M
Interior bronze trim of one (1) handicap elevator c/o: ceiling trim, sidewalls, doors, return panel	BRONZE-SATIN	Metal-Wash Wax	3M

MW--CH				Stuart Dean Employee Copy	
Service Order No.:	MJ007450221001	Service Contract No.:	MJ007450	Run By:	STUARTDEANVANDYG
Req. Start Date:	Start Time:				
Req. Comp Date:	Day Work:				
Schedule Date:	Job Type: MAINT				
Customer Name:	Harold Washington Library				
Work-At Address:	400 S. STATE STREET				
	400 S. STATE STREET				
	Billbox # 01-154328-HWL400				
	Chicago, IL 60605				
Unit No.:					
After-Hours Contact:					
After-Hours Phone:	Salesperson: Perla Gonzalez				
Building Instructions:	Salesperson Phone:				
Work Instructions:					
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>	<u>Scaffolding</u>	
Interior bronze trim of one (1) handicap elevator c/o: baseboard	BRONZE-SATIN	Metal-Wash Wax	3M	NONE	
Interior bronze trim of one (1) handicap elevator c/o: handrails	BRONZE-SATIN	Metal-Wash Wax	3M	NONE	
I hereby accept the work as performed					
Signature: _____					
Name (Printed): _____					
Date Completed: _____					

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450211201	Service Contract No.:	MJ007450
Req. Start Date:		Start Time:	
Req. Comp Date:		Day Work:	
Schedule Date:		Job Type:	MAINT
Customer Name:	Harold Washington Library		
Work-At Address:	400 S. STATE STREET		
	400 S. STATE STREET		
	Billbox # 01-154328-HWL400		
	Chicago, IL 60605		
Unit No.:			
After-Hours Contact:		Salesperson:	Perla Gonzalez
After-Hours Phone:		Salesperson Phone:	
Building Instructions:			
Work Instructions:			
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>
A. STATE STREET ELEVATION			
Exterior side of twelve (12) bronze show window units	BRONZE-SATIN	Metal-Clean Clear Coat	6M
Four (4) bronze exterior secondary building entrance c/o: exterior side of two (2) doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M
A. STATE STREET ELEVATION - MAIN ENTRANCE			
Bronze of main entrance to library c/o: both sides of four (4) outer entrance doors, exterior side frames and transom window unit, both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M
B. CONGRESS STREET ELEVATION			
			NONE

MW--CH				Stuart Dean Employee Copy	
Service Order No.:	MJ007450211201	Service Contract No.:	MJ007450	Run By:	STUARTDEANVANDYG
Req. Start Date:	Start Time:				
Req. Comp Date:	Day Work:				
Schedule Date:	Job Type: MAINT				
Customer Name:	Harold Washington Library				
Work-At Address:	400 S. STATE STREET				
	400 S. STATE STREET				
	Billbox # 01-154328-HWL400				
	Chicago, IL 60605				
Unit No.:					
After-Hours Contact:					
After-Hours Phone:	Salesperson: Perla Gonzalez				
Building Instructions:	Salesperson Phone:				
Work Instructions:					
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>	<u>Scaffolding</u>	
EXTERIOR SIDE ONLY - of two (2) bronze panel door entrances, each c/o: two (2) doors, frame and arched transom panel	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	
Exterior side of six (6) bronze show window units	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	
B. CONGRESS STREET ELEVATION - MAIN ENTRANCE					
Bronze main center entrance to library c/o: both sides of four (4) outer entrance swing doors, exterior side frames and transom window unit; both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	
C. VAN BUREN STREET ELEVATION					
Exterior side of six (6) bronze show window units	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	

MW--CH				Stuart Dean Employee Copy	
Service Order No.:	MJ007450211201	Service Contract No.:	MJ007450	Run By:	STUARTDEANVANDYG
Req. Start Date:	Start Time:				
Req. Comp Date:	Day Work:				
Schedule Date:	Job Type: MAINT				
Customer Name:	Harold Washington Library				
Work-At Address:	400 S. STATE STREET				
	400 S. STATE STREET				
	Billbox # 01-154328-HWL400				
	Chicago, IL 60605				
Unit No.:					
After-Hours Contact:					
After-Hours Phone:	Perla Gonzalez				
Building Instructions:					
Work Instructions:					
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>	<u>Scaffolding</u>	
EXTERIOR SIDE ONLY of two (2) bronze panel door entrances each c/o: two (2) doors, frame and arched transom panel	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	
Bronze main center entrance to library c/o: both sides of four (4) outer entrance swing doors; exterior side frames and transom window unit; both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	
D. PLYMOUTH COURT ELEVATION					
Bronze entrance to library (north) c/o: both sides of two (2) outer entrance swing doors; both sides of two (2) inner entrance swing doors and frames	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	
I hereby accept the work as performed Signature: _____					

MW--CH		Stuart Dean Employee Copy Name (Printed): _____ Date Completed: _____

MW--CH			Stuart Deane Employee Copy	
Service Order No.:	MJ007450220601	Service Contract No.:	MJ007450	Run By: STUARTDEANVANDYG
Req. Start Date:	Start Time:			
Req. Comp Date:	Day Work:			
Schedule Date:	Job Type: MAINT			
Customer Name:	Harold Washington Library			
Work-At Address:	400 S. STATE STREET			
	400 S. STATE STREET			
	Billbox # 01-154328-HWL400			
	Chicago, IL 60605			
Unit No.:				
After-Hours Contact:	Salesperson: Perla Gonzalez			
After-Hours Phone:	Salesperson Phone:			
Building Instructions:				
Work Instructions:				
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u>	<u>Scaffolding</u>
A. STATE STREET ELEVATION				
Exterior side of twelve (12) bronze show window units	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE
Four (4) pair of bronze wall-mounted standpipes	BRONZE-SATIN	Metal-Clean Clear Coat	12M	NONE
Four (4) bronze exterior secondary building entrance c/o: exterior side of two (2) doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE
Four (4) bronze exterior secondary building entrance c/o: exterior side of frames, arched transom window and thresholds	BRONZE-SATIN	Metal-Clean Clear Coat	12M	NONE
Four (4) bronze exterior secondary building entrance c/o: inner facing of entrances, including two (2) doors, frames, arched transom	BRONZE-SATIN	Metal-Clean Clear Coat	36M	NONE

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450220601	Service Contract No.:	MJ007450
Req. Start Date:		Run By:	STUARTDEANANDYG
Req. Comp Date:		Customer Contact Name:	Sonia Miranda
Schedule Date:		Customer Contact Phone:	312-542-1200
Customer Name:	Harold Washington Library	Foreman:	
Work-At Address:	400 S. STATE STREET	Helper 1:	
	400 S. STATE STREET	Helper 2:	
	Billbox # 01-154328-HWL400	Supervisor:	
	Chicago, IL 60605		
Unit No.:		Salesperson:	Perla Gonzalez
After-Hours Contact:		Salesperson Phone:	
After-Hours Phone:			
Building Instructions:			
Work Instructions:			
Scope of Work	Material	Specification	Frequency
A. STATE STREET ELEVATION - MAIN ENTRANCE			
Bronze of main entrance to library c/o: both sides of four (4) outer entrance doors, exterior side frames and transom window unit, both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M
Bronze of main entrance to library c/o: vestibule side of outer entrance facing, including frames and transome window; both sides of inner entrance transome window and frame	BRONZE-SATIN	Metal-Clean Clear Coat	36M
B. CONGRESS STREET ELEVATION			
			NONE

MW--CH		Stuart Dean Employee Copy	
Service Order No.:	MJ007450220601	Service Contract No.:	MJ007450
Req. Start Date:		Start Time:	
Req. Comp Date:		Day Work:	
Schedule Date:		Job Type:	MAINT
Customer Name:	Harold Washington Library	Foreman:	
Work-At Address:	400 S. STATE STREET	Helper 1:	
	400 S. STATE STREET	Helper 2:	
	Billbox # 01-154328-HWL400	Supervisor:	
	Chicago, IL 60605		
Unit No.:		Salesperson:	Perla Gonzalez
After-Hours Contact:		Salesperson Phone:	
After-Hours Phone:			
Building Instructions:			
Work Instructions:			
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u> <u>Scaffolding</u>
EXTERIOR SIDE ONLY - of two (2) bronze panel door entrances, each c/o: two (2) doors, frame and arched transom panel	BRONZE-SATIN	Metal-Clean Clear Coat	6M NONE
Exterior side of six (6) bronze show window units	BRONZE-SATIN	Metal-Clean Clear Coat	6M NONE
B. CONGRESS STREET ELEVATION - MAIN ENTRANCE			
Bronze main center entrance to library c/o: both sides of four (4) outer entrance swing doors, exterior side frames and transom window unit; both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M NONE

MW--CH		Stuart Dean Employee Copy	
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Req. Comp Date:		Customer Contact Name:	Sonia Miranda
Schedule Date:		Customer Contact Phone:	312-542-1200
Customer Name:	Harold Washington Library	Foreman:	
Work-At Address:	400 S. STATE STREET	Helper 1:	
	400 S. STATE STREET	Helper 2:	
	Billbox # 01-154328-HWL400	Supervisor:	
	Chicago, IL 60605		
Unit No.:		Salesperson:	Perla Gonzalez
After-Hours Contact:		Salesperson Phone:	
After-Hours Phone:			
Building Instructions:			
Work Instructions:			
<u>Scope of Work</u>	<u>Material</u>	<u>Specification</u>	<u>Frequency</u> <u>Scaffolding</u>
Bronze main center entrance to library c/: vestibule side of outer entrance facing including frames and transom window; both sides of inner entrance transom window and frame	BRONZE-SATIN	Metal-Clean Clear Coat	36M NONE
C. VAN BUREN STREET ELEVATION			
Two (2) pair of bronze wall mounted standpipes	BRONZE-SATIN	Metal-Clean Clear Coat	12M NONE
Exterior side of six (6) bronze show window units	BRONZE-SATIN	Metal-Clean Clear Coat	6M NONE
EXTERIOR SIDE ONLY of two (2) bronze panel door entrances each c/o: two (2) doors, frame and arched transom panel	BRONZE-SATIN	Metal-Clean Clear Coat	6M NONE

MW--CH				Stuart Dean Employee Copy	
Service Order No.:	MJ007450220601	Service Contract No.:	MJ007450	Run By:	STUARTDEANANDYG
Req. Start Date:		Start Time:		Customer Contact Name:	Sonia Miranda
Req. Comp Date:		Day Work:		Customer Contact Phone:	312-542-1200
Schedule Date:		Job Type:	MAINT		
Customer Name:	Harold Washington Library			Foreman:	
Work-At Address:	400 S. STATE STREET			Helper 1:	
	400 S. STATE STREET			Helper 2:	
	Billbox # 01-154328-HWL400			Supervisor:	
	Chicago, IL 60605				
Unit No.:					
After-Hours Contact:				Salesperson:	Perla Gonzalez
After-Hours Phone:				Salesperson Phone:	
Building Instructions:					
Work Instructions:					
Scope of Work	Material	Specification	Frequency	Scaffolding	
Bronze main center entrance to library c/o: both sides of four (4) outer entrance swing doors; exterior side frames and transom window unit; both sides of four (4) inner entrance swing doors	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	
Bronze main center entrance to library c/o: vestibule side of outer entrance facing including frames and transom window unit; both sides of inner entrance transom window and frames	BRONZE-SATIN	Metal-Clean Clear Coat	36M	NONE	
D. PLYMOUTH COURT ELEVATION Bronze entrance to library (north) c/o: both sides of two (2) outer entrance swing doors; both sides of two (2) inner entrance swing doors and frames	BRONZE-SATIN	Metal-Clean Clear Coat	6M	NONE	

MW--CH				Stuart Dean Employee Copy	
Service Order No.: MJ007450220601	Service Contract No.: MJ007450	Run By: STUARTDEANANDYG			
Req. Start Date:	Customer Contact Name: Sonia Miranda				
Req. Comp Date:	Customer Contact Phone: 312-542-1200				
Schedule Date:	Foreman:				
Customer Name:	Helper 1:				
Work-At Address:	Helper 2:				
	Supervisor:				
Unit No.:	Salesperson: Perla Gonzalez				
After-Hours Contact:	Salesperson Phone:				
After-Hours Phone:					
Building Instructions:					
Work Instructions:					
Scope of Work	Material	Specification	Frequency	Scaffolding	
Bronze entrance to library (north) c/o: exterior side of five (5) section bronze window surrounding entrance	BRONZE-SATIN	Metal-Clean Clear Coat	12M	NONE	
Bronze entrance to library (north) c/o: inner facing of entrance	BRONZE-SATIN	Metal-Clean Clear Coat	36M	NONE	
Both sides of two (2) bronze swing doors, frame and five-section window around at south entrance	BRONZE-SATIN	Metal-Clean Clear Coat	12M	NONE	
E. INTERIOR - LOWER LEVEL - VIDEO CORRIDOR					
Eight (8) small bronze wall grilles	BRONZE-SATIN	Metal-Clean Clear Coat	36M	NONE	
I hereby accept the work as performed					
Signature: _____					
Name (Printed): _____					

MW--CH	Stuart Dean Employee Copy
Date Completed: _____	

EXHIBIT H

Stuart Dean Co
870 W. Division Street, Unit F, Chicago, IL 60622

400 S. STATE - METAL MAINTENANCE SCHEDULE

Date: 1/12/2015

Salesperson: Robert Swartz

Job Number: 312542-1300

Start Date: 9/1/2015

End Date: 12/31/2017

Customer: CURENUS Equipment

Address: 400 S. State

City: Chicago

State: IL

Zip: 60605

Work At: 400 S. State

Attention: Jeff Gaynes

Title: Asset Protection Manager

Phone #: 312-542-1300

Fax: 312-542-1362

Engineer: 312-505-474

Security: 312-542-4-91

Dateline: 1/1/2017

IN/OUT

Start Time

\$ Per Day

Meal Type

P.O.#

Scaffold

Equipment

CODE

OL CLEAN/LACQUER

T-U TOUCH-UP

PL POLISH/LACQUER

PO POLISH ONLY

OL CRIZZLE/LACQUER

PT PAINT

WW WAS-UVAX

CJO CLEAN ONLY

COMMENTS:

DANNY MCAMBERA IS ENGINEER

YOU MAY NOT PROP ANY DOORS IN BLDG

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EXHIBIT A

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EXHIBIT I

BOMA/CHICAGO – LOCAL 1
2024 JANITORS AGREEMENT
April 8, 2024 through April 4, 2027
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SCHEDULE

"A"	25	Member Buildings

BOMA/CHICAGO - LOCAL 1 - 2024 JANITORIAL AGREEMENT

**AGREEMENT
BUILDING OWNERS AND MANAGERS ASSOCIATION OF CHICAGO**

AND

**BUILDING SERVICE DIVISION,
SERVICE EMPLOYEES INTERNATIONAL UNION, LOCAL 1
JANITORIAL EMPLOYEES**

April 8, 2024 through April 4, 2027

THIS AGREEMENT, entered into by BUILDING OWNERS AND MANAGERS ASSOCIATION OF CHICAGO, (hereafter designated as the "Association") on behalf of such of its member buildings as are listed in Schedule "A" attached hereto, and BUILDING SERVICE DIVISION, SERVICE EMPLOYEES INTERNATIONAL UNION, LOCAL 1, (hereafter designated as the "Union") covers wages, hours and working conditions for janitorial employees and working supervisors who are now or may hereafter be represented by said Union (hereafter designated as "employees") and who are now or may be employed by such members of the Association as now are or who may hereafter become parties hereto (hereafter designated as "Employers").

ARTICLE I BARGAINING UNIT

The Employers recognize the Union as the sole and exclusive representative of the janitorial employees and working supervisors employed in the buildings which are now or may hereafter be covered by this agreement. Employers and employees shall not bargain independently of the Union with respect to wages, hours of employment or working conditions as provided in this Agreement; the right to bargain on behalf of all such employees is vested solely in the Union. All bargaining unit work, which the Employer controls, and which is performed within a building which is covered by this Agreement, shall be performed solely by employees within the bargaining unit set forth in this Agreement.

ARTICLE II UNION MEMBERSHIP, EMPLOYER RIGHTS AND CHECK OFF

Section 1. The right to employ and discharge for just cause shall be vested solely in the Employer. Nothing contained in this Agreement shall be construed as stipulating the number of employees to be employed by any building or as restricting the right of the Employer to adjust employee work assignments and/or reduce the working force to reflect changes in cleaning specifications and occupancy within the building and/or to accomplish legitimate operating efficiencies; provided, however, that the Employer shall not reduce the number of employees without prior written 10 day notice to the Union. If the Union believes that the changes or adjustments have resulted in the imposition of unreasonable work loads upon employees, it may file a grievance which shall be processed in accordance with Article XIX of this Agreement.

BOMA/CHICAGO - LOCAL 1 - 2024 JANITORIAL AGREEMENT

Section 2. The Employer agrees not to discriminate against members of the Union nor to engage in unfair labor practices. On and after the thirty-first day following the execution of this Agreement, all employees who are then members of the Union, shall as a condition of employment, remain members of the Union in good standing for the duration of this Agreement. All present employees who are not members of the Union and all employees employed after the date of this Agreement by employers covered by this Agreement shall, within 31 days after the date of their employment or the execution of this Agreement, whichever is the later, become members of the Union (unless they are already members) and all such employees shall, as a condition of their employment, remain members of the Union in good standing for the duration of this Agreement. The term member or members in good standing shall be limited to the payment of the initiation fees and dues uniformly required as a condition of acquiring or retaining membership and shall be a financial obligation only.

Section 3. The Employer agrees to deduct on a monthly basis (and prior to the 20th day of such month) from the pay of every employee, who has executed and caused to be delivered to the Employer a written assignment, the regular monthly dues and the initiation fee of the Union, if due and owing, which are necessary to keep such employee as a member in good standing in accordance with the Constitution and Bylaws of the Union, as certified to the Employer by the Union. Where the employee, who is on check off, has insufficient earnings during the first month, the deductions shall be made by the employer from the next wage payment in accordance with billings furnished by the Union.

The parties acknowledge and agree that the term "written assignment" as provided in this Agreement includes authorizations created and maintained by use of electronic records and electronic signatures, including electronically recorded phone calls, consistent with state and federal law. The Union, therefore, may use electronic records to verify Union membership, authorization for voluntary deduction of Union dues and fees from wages for remittance to the Union, and authorization for voluntary deductions from wages for remittance to COPE Funds, subject to the requirements of state and federal law. The Employer shall accept confirmations from the Union that the Union possesses electronic records of such membership and give full force and effect to such authorizations as "authorization" for purposes of this Agreement.

The Employer will submit such sums in total to the Secretary-Treasurer of Local 1 no later than ten (10) days after such deduction was made. Where the employee, who is on check-off, has insufficient earnings during the first pay period in the month, the deductions shall be made by the Employer from the next wage payment in accordance with billings furnished by the Union. With each monthly check-off record, the Employer shall give by building the names, the address of the building where the employee works, wage rate, hours worked per week, address, primary or cell phone (whichever is provided), email address (if provided), social security numbers (last 4 digits) and starting dates of all employees of the Employer who performed janitorial services in the building during the preceding month including, where known, their status as temporary, extra, substitute, or regular employees. The Union will provide to a member building, upon written request by a member building, the information described in the preceding sentence.

The Employer agrees that such deductions shall constitute Trust Funds and will be forwarded by the Employer to the Union within ten (10) days after such deduction is made. Any employer who, without a bona fide reason, intentionally fails to remit such deductions within thirty (30) days on two (2) occasions within any twelve (12) month period shall, in the event of any subsequent failure, be required to pay in addition to the delinquent amount, interest at the rate of two percent (2%) per month thereon, and liquidated damages at the rate of five percent (5%) per month thereon, as well as all costs incurred by the Union in recovering such delinquent amounts, including attorney and auditor fees and court costs.

The Union agrees to indemnify and save the Employer harmless from any liability incurred by reason of any process set forth in Section 3 of this Agreement.

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Section 4. The Employer shall discharge an employee for non-payment of Union initiation fees or dues within ten (10) days after the Employer's receipt of written notice from the Union that such employee is not in good standing. Said notice shall state that the employee has previously been given fifteen (15) days' written notice: (a) of the delinquency; (b) the amount and method of computation thereof; (c) that the employee is not in good standing; and (d) that discharge will result at the end of said fifteen (15) day period unless all arrears are paid. The Union will indemnify, defend and hold the Employer harmless against all liability, damages, claims and costs incurred by the Employer, including but not limited to court costs, judgments and attorney fees and expenses, by reason of the Employer's compliance with this Section. The Union reserves the right, at its option and at its own expense, to appear and defend all such claims whenever suit is brought against the Employer. Employee protests of discharge for alleged non-payment of Union initiation fees or dues will not be subject to the grievance procedure or arbitration.

Section 5. The Employer agrees to deduct and transmit to SEIU Local 1, on a monthly basis, contributions to the SEIU COPE deducted from the wages of employees who voluntarily authorize such deductions on the forms provided for that purpose by the Union. The Union agrees to indemnify and save the Employer harmless from any liability incurred by reason of such deductions.

Section 6. The steward shall be provided a fifteen (15) minute period on the clock to meet with any new employee(s) to orientate them to the Union and the collective bargaining agreement within thirty (30) days of the new employee's start date.

ARTICLE III DISCHARGE AND DISCIPLINE

Section 1. Except as otherwise provided by this Agreement, no employee may be discharged, suspended, disciplined or otherwise penalized without just cause. The Employer agrees that all discipline should be progressive, absent compelling circumstances warranting immediate termination or acceleration of disciplinary penalties.

In addition to those circumstances mentioned elsewhere in this Agreement, just cause circumstances for discharge shall include, but not be limited to, unlawful use or unlawful possession of controlled substances, intoxication, gross insubordination, theft, gross negligence, violence in the workplace, sexual or other unlawful harassment, possession of firearms, and disrespectful treatment of a tenant, visitor, or employee.

Section 2. In cases where the Employer believes that an employee's job performance has become unsatisfactory, such as when an employee is believed to be careless or excessively absent or tardy, the Employer will notify the Union, in writing, of such belief and the Union and the Employer shall cooperate in investigating the matters and taking corrective measures, if warranted. If the Employer contemplates severe disciplinary action beyond a reprimand, then the Employer will notify the Union in writing of such belief and the Union will promptly acknowledge, in writing, receipt of such notice. The Union need not acknowledge receipt of simple warnings or reprimands in which the Employer does not state that severe disciplinary action is contemplated. No warnings or reprimands shall be considered for purposes of disciplinary action after twenty-four (24) months from the date of the warning or reprimand.

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ARTICLE IV WAGES

Section 1.

(a) Employees covered by this Agreement who were employed by the Employer as of April 7, 2022 shall receive the following pay rates during the term of this Agreement:

For the period April 8, 2024 through April 6, 2025 - \$21.65 per hour.

For the period April 7, 2025 through April 5, 2026 - \$22.40 per hour.

For the period April 6, 2026 through April 4, 2027 - \$23.15 per hour.

Employees who, as of the above effective dates, were receiving pay rates in excess of those provided by the previous agreement between the parties or this Agreement shall be entitled to receive the full amount of the hourly increases included in the above rates.

(b) All other employees covered by this Agreement shall receive not less than the following rates of pay during the term of this Agreement:

During their 1st year of employment - \$2.50 below the rate in paragraph (a)

During their 2nd year of employment - \$1.50 below the rate in paragraph (a)

After completion of their 2nd year of employment, such employees shall receive the full rate of pay set forth in paragraph (a) of this Section.

(c) The Employer agrees that it shall not attempt to effectuate wage cost reductions by discharging employees covered by paragraph (a) in order to hire replacements covered by paragraph (b). Accordingly, the total number of employees in any building receiving pay rates pursuant to paragraph (b) shall not be increased as the result of the discharge of employees pursuant to Article III, Section 2.

Section 2.

(a) There shall be a premium of fifty cents (\$0.50) per hour paid when the following work is performed:

High level work - 12 feet and over from floor level

Furniture crating and uncrating

Removal of tile affixed to floor

Moving and storing of construction equipment and material

Exterior metal refinishing - after one hour in one day - from first hour of work

Loading and unloading of trucks and dock labor - after two hours in one day - from first hour of work

Moving furniture - after two hours in one day - from first hour of work

Hand shoveling of snow

(b) Demolition and the initial cleanup in connection therewith shall be at a rate equal to one and one-half (1-1/2) times the regular hourly rate.

(c) Where an employee performs work described by this section for twenty (20) minutes or less per day, there shall be no adjustment in pay. Except as specifically provided herein, employees who perform work described by this Section for more than twenty (20) minutes in a day, shall be guaranteed appropriate pay therefore for a minimum of two (2) hours. No reassignment or change in duties being performed can be made for the purpose of downgrading an employee.

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Section 3. WORKING SUPERVISORS Working supervisors shall be paid the greater of (1) the hourly rate of the highest paid employee they supervise or their own job rate, if higher, plus the cents per hour they were over scale under the prior agreement; or (2) a minimum of twenty cents (\$0.20) per hour above their own job rate, or twenty cents (\$0.20) per hour above the hourly rate of the highest paid employee they supervise, whichever is higher. Salaried working supervisors are entitled to corresponding differentials.

Section 4. CALL IN PAY An employee not scheduled to work on a Saturday or Sunday who is called in to work shall be given at least four (4) hours of work.

Section 5. PAY PERIOD Employees shall be paid at their job location not less often than every two (2) weeks.

ARTICLE V "MOST FAVORED EMPLOYER" CLAUSE

If, following execution of this Agreement, the Union enters into or remains a party to any collective bargaining agreement, written or oral, with another employer or group of employers employing employees in non-residential buildings in the Chicago central area (defined as the area West of Lake Michigan bounded by and including 18th Street, Ashland Avenue, and North Avenue) which provides for wage rates or economic fringe benefits (such as, but not limited to, health and welfare, pensions, holidays or vacations) which are more favorable to such employer than the corresponding provisions of this Agreement, the parties to this Agreement will promptly amend this Agreement to incorporate such more favorable provisions. The Union agrees to file with the Association a copy of each written and summary of each oral collective bargaining agreement it enters into with any other employer or group of employers employing employees in non-residential buildings in the above described Chicago central area within thirty (30) calendar days following the consummation of said agreements. If the Union believes that special circumstances exist, it may request that the Association's Labor Committee waive the application of this Article in whole or in part as it would otherwise apply to an agreement with another employer or group of employers, and the Labor Committee shall have the authority, at its sole discretion, to grant or deny such requests.

ARTICLE VI WORKWEEK

Section 1. The workweek for employees shall be from 35 to 40 hours to be worked in five consecutive days. An employee whose workweek is between 35 and 40 hours as of the effective date of this Agreement shall continue to maintain such workweek.

Section 2. The workday (or night) shall not exceed one (1) hour in excess of actual working time.

Section 3. The Employer guarantees thirty-five (35) hours of work to regularly employed employees who are ready, willing and able to work such hours; provided, however, that Employers maintaining regular work weeks between 35 and 40 hours as of the effective date of this Agreement may continue to maintain such work weeks. The weekly guarantee provided in this section shall not apply in any workweek in which the Employer is required to close a building covered by this Agreement for part or all of a scheduled workday due to an act of God or other circumstances beyond the Employer's control, including but not limited to fire, snowstorm, flood, or an act of terrorism.

Section 4. All work in excess of forty (40) hours in one workweek or all work in excess of the regular weekly schedule of the employees shall constitute overtime and shall be paid for at the rate of one and one-half (1-1/2) times the employee's regular hourly rate.

BOMA/CHICAGO - LOCAL 1 - 2024 JANITORIAL AGREEMENT

Section 5. If an employee is required to work beyond his or her regularly scheduled hours in any day, he or she shall not be required to take compensative time off unless otherwise agreed to by the Employer and the Union, and he or she shall be paid for the extra time, except that overtime payment is not required unless the employee's total of work hours in that workweek is more than forty (40) hours, or in excess of the regular weekly schedule of the employee.

Section 6. The Employer shall not unreasonably demand work in excess of regularly scheduled hours of any employee and the refusal of an employee to work more than twenty (20) hours of such excess time in any month shall not constitute grounds for discharge of such employee.

Section 7. With the consent of the Union, the Employer may use a six day week, Monday through Saturday.

Section 8. For the term of this Agreement, the presently scheduled hours of individual employees shall not be reduced without the written consent of the Union, but employees presently working more than forty (40) hours may, at the election of the Employer, be reduced to forty (40) hours per week.

Section 9. All work done on Sunday shall be paid at one and one-half (1-1/2) times the employee's regular straight time hourly rate.

Section 10. Overtime work shall be distributed equitably among employees able and qualified to perform the needed overtime work.

Section 11. The provisions of this Agreement are in lieu of the rights and benefits provided by the City of Chicago Fair Workweek Ordinance. The parties expressly agree that all rights, requirements and benefits under the Chicago Fair Workweek Ordinance are hereby expressly waived.

ARTICLE VII HOLIDAYS

Section 1.

The following days shall be observed as holidays for all employees except trainees during their first ninety (90) days of employment

New Year's Day	Wed, 1/1/25	Thur, 1/1/26	Fri, 1/1/27
Memorial Day	Mon, 5/27/24	Mon, 5/26/25	Mon, 5/25/26
Fourth of July	Thur, 7/4/24	Fri, 7/4/25	Sat, 7/4/26
Labor Day	Mon, 9/6/24	Mon, 9/5/25	Mon, 9/4/26
Thanksgiving Day	Thur, 11/28/24	Thur, 11/27/25	Thur, 11/26/26
Day after Thanksgiving Day or such other day as may be mutually acceptable to the Employer and the Union			
½ Day Christmas Eve*	Tue, 12/24/24	Wed, 12/24/25	Thur, 12/24/26
Christmas Day	Wed, 12/25/24	Thur, 12/25/25	Fri, 12/25/26
½ Day New Year's Eve*	Wed, 12/31/24	Thur, 12/31/25	Fri, 12/31/26

Plus two (2) of either Martin Luther King's Birthday, Presidents' Day, Lincoln's Birthday, Good Friday, Juneteenth, or such other two days as may be mutually acceptable to the Employer and the Union.

* In lieu of ½ holidays on Christmas Eve and New Year's Eve, the Employer may elect to schedule full day holidays for some or all of its bargaining unit employees on Christmas Eve or on New Year's Eve.

BOMA/CHICAGO - LOCAL 1 - 2024 JANITORIAL AGREEMENT

Each employee covered by this Agreement who has completed one (1) or more full years of service with the Employer shall, in each year of employment, receive five (5) personal holidays/sick leave days to be used either on a day mutually acceptable to the Employer and the employee, on the employee's birthday or any day needed by the employee provided the employee has notified the Employer of the employee's need to be absent from work at least two (2) hours in advance of the employee's scheduled starting time.

Section 2. Each regular employee shall be credited with the normal number of hours at straight time in his or her shift on each of such holidays and, in the case of those holidays which fall on what would have been the employee's regular workday, such time shall be credited as time worked in computing overtime.

Section 3. When a holiday falls on an employee's day off, he or she shall be credited with eight (8) hours at straight time (four (4) hours in the case of one-half day holidays). For employees who regularly work less than forty (40) hours per week, the credited hours shall be the number of hours of the employee's regular daily shift, excluding Saturdays or short hour shifts; one-half that number in the case of one-half day holidays.

Section 4. Employees required to work on holidays shall be paid extra for such hours worked at one and one-half times their regular hourly rate, in addition to the holiday pay. The Employer may schedule regular night shifts either at the beginning or end (but not both) of a calendar day designated as a holiday. Employees working on one of these regular shifts will not be considered to be working on a holiday even if some of the hours worked happen to fall on the calendar day of the holiday. Night shift employees working a regular night shift which is at the beginning of the calendar holiday will be deemed to celebrate their holiday at the end of that day, and vice versa.

Section 5. To be eligible to receive holiday pay, the employee must have been employed by the Employer for at least ninety (90) calendar days prior to the holiday and worked all of his or her scheduled hours on the employee's last scheduled work day before and the employee's next scheduled work day following the holiday, provided that tardiness of up to one hour or leaving work early (with the approval of the Employer) on either of such days shall not disqualify the employee from receiving holiday pay. Employees on approved leaves of absence or layoff who are otherwise eligible to receive holiday pay shall, upon their return to work, receive holiday pay for holidays occurring within ninety (90) days following their last previous day worked. Employees substituting for employees on approved leaves of absence shall not be eligible to receive holiday pay for the first ninety (90) days of said leaves of absence. Employees on approved vacation, personal days approved two weeks in advance, or funeral leave, which ends or begins the day before or after a holiday, are entitled to compensation pursuant to this provision.

Section 6. Any employee who habitually takes an extra day off in connection with the holidays provided for in this Article for reasons obviously not justified, shall be subject to a warning or reprimand, and thereafter to progressive discipline by the Employer.

Section 7. The Union will, through its usual forms of communication and its stewards, urge all employees to provide the Employer with not less than two (2) calendar week's advance notice of the date upon which the employee's birthday falls.

Section 8. If a regular pay day falls on a holiday, employees shall be paid on the day before the holiday and paychecks shall be dated accordingly.

Section 9. The provisions of this Agreement are in lieu of the rights and benefits provided by the Illinois Paid Leave for All Workers Act, Cook County Earned Sick Leave Ordinance, City of Chicago Paid Leave

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Ordinance and the City of Chicago Paid Sick Leave Ordinance. The parties expressly agree that all rights, requirements and benefits under the Illinois Paid Leave for All Workers Act, Cook County Earned Sick Leave Ordinance, City of Chicago Paid Leave Ordinance and the City of Chicago Paid Sick Leave Ordinance are hereby waived.

ARTICLE VIII VACATIONS

Section 1. Regular employees who have been in the service of any building continuously for:

One year,	shall be given an annual vacation of	one week with pay;
Two years,	shall be given an annual vacation of	two weeks with pay;
Six years,	shall be given an annual vacation of	two weeks and one day with pay;
Seven years,	shall be given an annual vacation of	two weeks and two days with pay;
Eight years,	shall be given an annual vacation of	two weeks and three days with pay;
Nine years,	shall be given an annual vacation of	two weeks and four days with pay;
Ten years,	shall be given an annual vacation of	three weeks with pay;
Eighteen years,	shall be given an annual vacation of	four weeks with pay,
Twenty-five years,	shall be given an annual vacation of	five weeks with pay.

Section 2. An additional day's vacation (or ½ day in the case of one-half day holidays) shall be allowed an employee whose vacation period includes one of the holidays listed in this Agreement.

Section 3. Service shall be deemed continuous notwithstanding leaves of absence for sickness, maternity or other reasons agreed to by the Employer.

Section 4. Employees shall be permitted to take vacation in the same year in which it is earned meaning employees are entitled to take vacation during the first year of employment and each year thereafter, based upon the pro-rata amount earned that year. In the first year of employment, employees will not be permitted to take vacation until they are within six (6) months of their seniority date. If an employee has worked less than fifty-two (52) weeks, such vacation shall be based upon the scheduled hours during the total number of weeks the employee has worked. Employees may not carry over accrued but unused vacation days beyond the year following the year in which the vacation is earned. Any accrued but unused vacation days will be surrendered at the end of the year following the year in which the vacation was earned, unless there is a mutually agreed upon written agreement between the parties to carry over vacation due to an emergency designated by the Employer. When a contractor hired by the Building leaves that Building (Outgoing Contractor), the Outgoing Contractor shall send an accurate and timely list to the Union of all employees at the Building and their current vacation accrual and vacation time used to date. The Outgoing Contractor shall also include a list of personal days (Art VII, Section 1) used in the year. The list of vacation accrual and personal days shall be sent to the Union and Building Manager within fifteen (15) business days of the last day of service in the Building by the Outgoing Contractor. If an employee terminates employment having been paid for vacation time that was not yet accrued, the employee authorizes deduction of said amount from the employee's final paycheck.

Section 5. Vacation accrual shall be given to a regular employee so long as such employee is carried on the payroll of the Employer (even though no compensation is paid). No vacation accrual is to be credited to a temporary, extra, substitute, floater or vacation replacement employee; provided, however that any temporary, extra, substitute, floater or vacation replacement employee who has been employed either by the Employer or by the janitorial contractor performing bargaining unit work for the Employer for more than twelve (12) consecutive months shall be eligible to receive vacation benefits. Vacation accrual for such temporary, extra, substitute, floater or vacation replacement employee begins only at such time as the regular employee is dropped from the payroll or after twelve (12) consecutive months of

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employment by the Employer or by the janitorial contractor performing bargaining unit work for the Employer, whichever occurs first. An employee who is absent for 180 days or more shall not be eligible for paid vacation until he/she has returned to active employment for at least 90 days, unless the employee is permanently disabled.

Section 6. Vacation rights of employees shall not be affected by a change of ownership or management of the building so long as they remain in the employ of the new owners or managers. Any employee employed by a contractor whose employment is terminated by reason of change of contractors during the employee's first year of employment in a building and who is retained in the same building by the new contractor shall, upon completion of his or her full first year of employment in the building, be entitled to a full vacation with pay from the new contractor, less any vacation pay which may have been received by the employee from the displaced contractor.

Section 7. For vacation scheduling purposes, an employee shall receive his or her vacation in accordance with seniority and in keeping with the normal vacation scheduling of the building or at such other time as may be mutually acceptable to the Employer and the employee.

Section 8. Vacation checks for only the earned and approved vacation time requested by the employee with fifteen (15) days of advance notice or more shall be paid to the employee no later than the last scheduled day of work before the beginning of the employee's scheduled vacation.

Section 9. Each regular employee shall be credited with the normal number of hours at straight time in his or her shift on each of such vacation days and, in the case of those vacation days which fall on what would have been the employee's regular workday, such time shall be credited as time worked in computing overtime.

Employees required to work on scheduled vacation day(s) shall be paid for hours worked on such day(s) at one and one-half times their regular hourly rate in addition to vacation pay; provided, however, that the foregoing shall not apply if the Employer and employee agree to reschedule the previously scheduled vacation day(s).

ARTICLE IX TERMINATION-VACATION ACCRUAL-FINAL PAYCHECK

Section 1. Any employee who has been in the service of an Employer for more than one year and whose employment is terminated for any reason, shall be compensated on a pro rata basis, taking into account the employee's accrued vacation, if any, and the period worked since the first or anniversary date of employment compared with the vacation to which the employee would be entitled if the employee worked the entire year.

Section 2. Any employee shall receive his or her final paycheck in full at the time of separation, if possible, but in any case within five (5) days or at the next regular payday, whichever comes first.

ARTICLE X FUNERAL LEAVE

The Employer agrees to pay employees covered by this Agreement for necessary absence on account of death in the immediate family, up to and including a maximum of three (3) scheduled workdays at straight time, provided the employee attends the funeral.

The term "immediate family" shall mean: current spouse, parent, step parent, child, step child, brother, sister, current father-in-law and mother-in-law, grandparent or grandchild. In the event the employee is unable to attend the funeral, the employee shall be allowed one day at straight time. One day's pay at

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straight time shall be given on account of death of an employee's current brother-in-law, sister-in-law, son-in-law or daughter-in-law. At the request of the Employer, the Employee shall furnish a death certificate or other acceptable verification of death and proof of relationship acceptable to the Employer.

If an employee is on a scheduled paid personal holiday or vacation at the time of a death that qualifies for paid funeral leave, the employee shall be credited the number of paid leave days equal to the actual paid funeral leave taken provided that the employee notifies the Employer within ten working days of the date of death.

ARTICLE XI WORKING CONDITIONS

Section 1. If uniforms are required, it is agreed that the Employers shall, at their own expense, furnish and maintain them. The employees on their part agree to take good care of such uniforms and to wear them only in the course of their duties during working hours and during lunch time. The Employer shall furnish rubbers to employees whose duties regularly require them to walk in water. If uniforms are furnished by the Employer, the Employer shall also furnish appropriate outdoor garments for snow removal or other outdoor work.

Section 2. The Employers shall provide a clean, sanitary locker room area and lockers, with washing facilities, soap and towels to the extent that such facilities exist. Each building shall provide and maintain an adequate first aid kit in the office of the building or some other central location.

Section 3. The Employer shall furnish cleaning supplies in sufficient quantity and maintain all equipment in such state of repair as is required to perform the work assigned.

Section 4. The Employers shall maintain comfortable working conditions and reasonable temperatures for all employees, including night crews in sealed buildings. The employer shall operate such heating and air conditioning equipment and/or fans, under its control, in order to maintain comfortable working temperatures in a manner consistent with the foregoing provision. Adequate lighting shall be provided in public areas to allow employees access to the areas they are to service.

Section 5. It is agreed that there shall be no limitation on the type of work now being performed by any employee in a member office building.

Section 6. Each employee shall be entitled to twenty (20) minutes of paid, nonworking time per day which shall be taken in two rest periods.

Section 7. The Employer shall not impose an unreasonable workload upon any employee or add on any duties over a reasonable work load. In the event an employee is absent the remaining employees may be temporarily assigned to do part of the work assignments of the absent employees but they shall not be expected to perform their regular full work loads and the extra work. Employees shall not be directed to do part of the work assignments of the absent employees unless and until they have first been instructed, in writing (and if reasonably practicable, in Spanish and/or Polish), as to what portions of their regular work assignment shall not be done in order to do the extra work. Copies of these instructions shall be provided to the steward and the building manager. If the instruction is not given in writing or if copies thereof are not provided to the steward, any discipline imposed upon employees for failure to perform the extra work shall be rescinded. The Employer shall either hire a temporary replacement or assign relief coverage (other than regularly-assigned cleaning employees) to perform the duties of any regularly-assigned general cleaning employee whose recurring job responsibilities cannot be postponed and who is absent for five (5) consecutive working days; provided, that in those buildings with regular night general cleaning staffs of 40 or more employees, the Employer shall hire temporary replacements or assign relief

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coverage if more than 20% or 12 employees (whichever is less) of the regularly-assigned night general cleaning staff employees are off due to previously scheduled absences.

Section 8. No employee shall be required to perform any work under abnormally dangerous conditions, and a failure to perform work under such circumstances, shall not be considered a cause for discharge or discipline.

Section 9. It is agreed that janitorial personnel will perform all traditional janitorial work which consists of general cleaning in and around the buildings.

It is recognized that certain tasks performed by janitorial personnel require added physical exertion, strength or dexterity. These tasks are as follows:

- Heavy cleanup in connection with construction, painting and repair
- Heavy trash removal
- Furniture polishing
- Metal polishing
- High dusting with ladders
- Hosing and sweeping of exterior sidewalks
- Dismantling and cleaning of light fixtures
- Operation of floor-type interior and exterior power machines, industrial-type vacuum cleaners, and wet pickup machines
- Sweeping and dry mopping of public corridors outside of normal general cleaning assignment
- Washroom sanitation - hand scrubbing, hands and knees - (refers to washrooms outside of normal, general cleaning assignment)
- Washing drapes
- Cleaning Venetian blinds (other than dusting)
- Wet mopping - over 16 ounce mop
- Low ladder work
- Sustained washing and polishing of walls or ceilings
- Marble maintenance, exclusive of washing
- Interior metal refinishing
- Operation of incinerators, balers and compactors
- Removal of old carpeting

Janitorial personnel who have heretofore been performing routine Janitorial functions shall not be assigned to the foregoing duties or to the duties described in Article IV, Section 2, except on an emergency basis. Provided, however, that nothing in this Agreement shall be construed to restrict or change existing building practices regarding assignment of janitorial personnel.

Section 10. The Employer shall not require medical approval because of short term illness or disability up to and including five (5) working days, provided however, that when an employee is chronically absent, the Employer may require such medical approval.

ARTICLE XII VETERANS' RIGHTS

The reemployment rights of employees, who are now or may later be in military service and the duties of the Employer in relation to them, shall be governed by the applicable provisions of Federal and State laws.

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ARTICLE XIII HEALTH & WELFARE FUNDS

Section 1. For the period July 1, 2024 through June 30, 2025, the Employer shall contribute the amount of \$932.53 (nine hundred thirty-two dollars and fifty-three cents) each month on behalf of each employee on its active payroll to the SEIU Local 1 & Participating Employers Health Trust; provided, however, that the Employers' contributions shall be prorated for those months in which employees begin working, cease their employment and/or remain on medical or personal leaves of absence for periods in excess of those specified in Article XVII, Sections 1 and 2 and Section 5 of this Article, respectively.

Section 2. For the period July 1, 2025 through June 30, 2026, the Employer shall contribute the amount of \$949.87 (nine hundred forty-nine dollars and eighty-seven cents) each month on behalf of each employee on its active payroll to the SEIU Local 1 & Participating Employers Health Trust; provided, however, that the Employers' contributions shall be prorated for those months in which employees begin working, cease their employment and/or remain on medical or personal leaves of absence for periods in excess of those specified in Article XVII, Sections 1 and 2 and Section 5 of this Article, respectively.

Section 3. For the period July 1, 2026 through June 30, 2027, the Employer shall contribute the amount of \$967.20 (nine hundred sixty-seven dollars and twenty cents) each month on behalf of each employee on its active payroll to the SEIU Local 1 & Participating Employers Health Trust; provided, however, that the Employers' contributions shall be prorated for those months in which employees begin working, cease their employment and/or remain on medical or personal leaves of absence for periods in excess of those specified in Article XVII, Sections 1 and 2 and Section 5 of this Article, respectively.

Section 4. The Employer adopts the provisions of and agrees to comply with and be bound by the Trust Agreement establishing the SEIU Local 1 & Participating Employers Health Trust and all amendments thereto, and also hereby irrevocably designates as its representatives the Trustees named as Employer Trustees in said Agreement, together with their successors selected in the manner therein provided, and further ratifies and approves all matters heretofore done in connection with the creations and administration of said Trust and all actions to be taken by such Trustees within the scope of their authority.

Section 5. Welfare Fund payments shall be continued on eligible employees when said employees are on a medical leave of absence up to the periods provided for in Article XVII, Section 1, or beyond that period for special reasons agreed to by the Employer and the Union. Welfare Fund payments shall be continued on eligible employees when said employees are on a personal leave of absence up to a period of ninety (90) days, or a Union business leave of absence for up to the approved amount of leave, or beyond that period for special reasons agreed to by the Employer and the Union. Beyond that time, the Welfare Fund payment shall be made for and on behalf of the temporary, extra, substitute, floater or vacation replacement employee, but in no event shall an Employer incur such costs on behalf of both the employee on leave and the replacement employee concurrently. Any temporary, extra, substitute, floater or vacation replacement employee who has been employed either by the Employer or by the janitorial contractor performing bargaining unit work for the Employer for more than twelve (12) consecutive months shall have contributions made on his/her behalf.

Section 6. The Employer shall make remittances to the Welfare Fund on or before the fifteenth (15th) calendar day of the month following the month in which the work was performed.

Section 7. With each report to the Welfare Fund, the Employer shall give the names, Social Security numbers and starting dates of new, regular employees and termination dates of regular employees.

Section 8. Payments to the Welfare Fund shall be made on the prelisted remittance forms sent by the

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Fund Office, or reproduced records which give all of the required information in a form acceptable to the Fund. Failure to submit the required information in a form acceptable to the Fund will be subject to the arbitration provisions of Article XIX.

ARTICLE XIV PENSION PLAN

Section 1. For the period April 8, 2024 through June 30, 2025, Employers shall contribute to the SEIU Local 1 & Participating Employers Pension Trust at the rate of \$52.00 per week for each employee regularly scheduled to work thirty (30) or more hours per week who actually work at least 50% of the employee's scheduled workweek. In the event such employee does not work at least 50% of the employee's scheduled workweek, the Employer shall make contributions at the rate of one dollar and thirty cents (\$1.30) per hour for all hours actually worked. For employees not meeting the aforesaid conditions, contributions shall be made at the rate of one dollar and thirty cents (\$1.30) per hour worked for employees who actually worked less than 30 hours per week. Paid holidays, paid vacations and funeral absence (up to three working days) are deemed time worked for pension contribution purposes. The Union and the Employer shall endeavor to have the Trustees of the SEIU Local 1 & Participating Employers Pension Trust arrange to have the employee's last employer notified when an employee makes application for a pension. In the event an employee works during his or her holiday or vacation, one payment to the SEIU Local 1 & Participating Employers Pension Trust is all that will be required.

For the period July 1, 2025 through June 30, 2026, Employers shall contribute to the SEIU Local 1 & Participating Employers Pension Trust at the rate of \$56.00 per week for each employee regularly scheduled to work thirty (30) or more hours per week who actually work at least 50% of the employee's scheduled workweek. In the event such employee does not work at least 50% of the employee's scheduled workweek, the Employer shall make contributions at the rate of one dollar and forty cents (\$1.40) per hour for all hours actually worked. For employees not meeting the aforesaid conditions, contributions shall be made at the rate of one dollar and forty cents (\$1.40) per hour worked for employees who actually worked less than 30 hours per week. Paid holidays, paid vacations and funeral absence (up to three working days) are deemed time worked for pension contribution purposes. The Union and the Employer shall endeavor to have the Trustees of the SEIU Local 1 & Participating Employers Pension Trust arrange to have the employee's last employer notified when an employee makes application for a pension. In the event an employee works during his or her holiday or vacation, one payment to the SEIU Local 1 & Participating Employers Pension Trust is all that will be required.

For the period July 1, 2026 through June 30, 2027, Employers shall contribute to the SEIU Local 1 & Participating Employers Pension Trust at the rate of \$60.00 per week for each employee regularly scheduled to work thirty (30) or more hours per week who actually work at least 50% of the employee's scheduled workweek. In the event such employee does not work at least 50% of the employee's scheduled workweek, the Employer shall make contributions at the rate of one dollar and fifty cents (\$1.50) per hour for all hours actually worked. For employees not meeting the aforesaid conditions, contributions shall be made at the rate of one dollar and fifty cents (\$1.50) per hour worked for employees who actually worked less than 30 hours per week. Paid holidays, paid vacations and funeral absence (up to three working days) are deemed time worked for pension contribution purposes. The Union and the Employer shall endeavor to have the Trustees of the SEIU Local 1 & Participating Employers Pension Trust arrange to have the employee's last employer notified when an employee makes application for a pension. In the event an employee works during his or her holiday or vacation, one payment to the SEIU Local 1 & Participating Employers Pension Trust is all that will be required.

Section 2. Each Employer adopts the provisions of and agrees to comply with and be bound by the Trust Agreement establishing said SEIU Local 1 & Participating Employers Pension Trust, and all amendments thereto, and also hereby irrevocably designates as its representatives the Trustees named as

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Employer Trustees in said Agreement, together with their successors selected in the manner therein provided, and further ratifies and approves all matters heretofore done in connection with the creation and administration of said Trust and all actions to be taken by such Trustees within the scope of their authority, including the authority of the Trustees to restrict the benefit provisions with respect to a new employer group as provided by the Trust Agreement.

Section 3. The Employer shall make remittances to the Pension Fund on or before the fifteenth (15th) calendar day of the month following the month in which the work was performed.

Section 4. With each report to the Pension Fund, the Employer shall give names, Social Security numbers and starting dates of new, regular employees and termination dates of regular employees.

Section 5. Payments to the Pension Fund shall be made on the prelisted remittance forms sent by the Fund Office, or reproduced records which give all of the required information in a form acceptable to the Fund. Failure to submit the required information in a form acceptable to the Fund will be subject to the arbitration provisions of Article XIX.

Section 6. Pension fund payments shall be continued on eligible employees when said employees are on a medical leave of absence up to the periods provided for in Article XVII, Section 1, or beyond that period for special reasons agreed to by the Employer and the Union. Pension fund payments shall be continued on eligible employees when said employees are on a personal leave of absence up to a period of ninety (90) days, or a Union business leave of absence for up to the approved amount of leave, or beyond that period for special reason agreed to by the Employer and the Union.

Beyond that time, the SEIU Local 1 & Participating Employers Pension Trust payment shall be made for and on behalf of the temporary, extra, substitute, floater or vacation replacement employee, but in no event shall contributions be made for both the employee on leave and the temporary, extra, substitute, floater or vacation replacement employee concurrently; provided, however, that any temporary, extra, substitute, floater or vacation replacement employee who has been employed either by the Employer or by the janitorial contractor performing bargaining unit work for the Employer for more than twelve (12) consecutive months shall have contributions made on his/her behalf.

ARTICLE XV HEALTH AND WELFARE - PENSION DELINQUENCIES

Section 1. The Employers recognize the necessity of making prompt Health and Welfare and Pension contributions to preserve the benefit standing of employees and ensure adequate funding of benefits. If an Employer remains delinquent in making payments to either the Welfare Fund or the appropriate Pension Trust for a period of 10 days after written notice of delinquency is given to the building and the Association, or refuses to produce payroll records in accordance with the payroll audit provisions of the Trustees' collection policy, the Union may strike the building to enforce such payments or production of records without regard to the no-strike clause in Article XVIII or the grievance and arbitration procedure provided in Article XIX. The delinquent Employer shall also be responsible for reimbursement to employees of wages lost because of any strike action taken by the Union under this Article.

Section 2. If the Trustees do not receive full amount of the Employer's required Welfare Fund or Pension Trust contribution and the accompanying remittance form by the dates set forth in Article XIII, Section 6 and Article XIV, Section 3 with respect to which contributions are due, the Employer will be required to pay, in addition to the amount of such contribution, interest and liquidated damages at the rates specified in the Trust Agreements on the unpaid amount, as well as accountants' and attorneys' fees and court costs, if any, incurred in effecting collection. The Employer acknowledges receipt of the Trust Agreements and represents to the Union and the Funds that it has read the interest and liquidated damages

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provisions and that the liquidated damages provision is a reasonable approximation of damages to the Funds which are difficult to ascertain. Employer further acknowledges that any right of the Trustees to waive interest or liquidated damages pursuant to the collection policy described in Section 3, below, shall not modify the Employer's agreement that the maximum liquidated damages specified in the Trust are reasonable approximation of actual damages under all circumstances where the Employer is delinquent.

Section 3. Employer acknowledges that the Trustees of the Funds have the Fiduciary obligation under the Employee Retirement Income Security Act of 1974, as amended ("ERISA") to ensure prompt collection of Employer contributions and the resolution of delinquencies through the use of payroll audits and other enforcement procedures. Accordingly, the Employer hereby irrevocably designates as its representatives the Trustees named Employer Trustees of the Funds and their successors in connection with the adoption, amendment and administration of a collection policy setting forth payroll audit and collection procedures in accordance with the terms and conditions of ERISA prohibited transaction class exemption 76-1. Employer hereby consents to and agrees to be bound by the provisions of such collection policy, as amended, as though fully set forth in this Agreement.

ARTICLE XVI SENIORITY

Section 1. The term "seniority" shall mean the length of service of a regular employee in a building; provided that new employees shall be considered probationary employees for the first 45 calendar days of employment. During their probationary period, employees shall have no seniority and may be laid off or terminated at the sole discretion of the Employer and such action shall not be subject to the grievance procedure of this Agreement. An employee's seniority rights shall not be affected by a change of ownership or management of the building so long as said employee remains in the employ of the new owners or managers. The Employer agrees to notify the Union, in writing, promptly upon the consummation of any change in the ownership or management of the building. Seniority shall not be broken except by discharge for cause, resignation or layoff for more than one year (two years in the case of employees with ten or more years of service). The Employer shall post a seniority list in each building in a place accessible to all employees. Said list shall contain the names of all employees who have seniority as provided for herein and their respective seniority date; and shall be updated quarterly including a date prior to vacation scheduling. Employees hired on the same date in a building shall have their seniority order determined by overall industry seniority, defined as continuous years of service as a bargaining unit member under this Agreement. If a tie still exists, it shall be broken by whose date of birth is earlier in the year. A copy of the seniority list shall be made available to the Union upon request.

Nothing contained in this Agreement shall be deemed to restrict the Employer's right to temporarily assign employees among two or more buildings covered by collective bargaining agreements with the Union to which the same employer is signatory; provided, that such temporary assignments shall have no effect upon the employee's seniority, and employees shall, during the period of such temporary assignments, continue to retain and accrue seniority and benefit eligibility as if they had not been temporarily assigned; provided further that such temporary assignment shall not be used for vacation replacement purposes during the months of May through September.

Section 2. When it becomes necessary to reduce the working force, the last person hired shall be laid off first provided the employees to be retained have the ability to be trained to perform the available work; and the employee whose job assignment has been eliminated or combined shall be placed on the job assignment held by the least senior employee whose job assignment the impacted employee is capable of performing with minimal training. If the employee displaced by such reassignment is not the least senior employee in the building, he or she shall be placed on the job assignment held by the least senior employee in the building, provided he or she is capable of performing that job assignment with minimal training. Employees who cannot be placed on active job assignments in accordance with the foregoing

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shall be laid off. If the working force is thereafter increased, employees with seniority shall be recalled in the reverse order in which they were laid off, subject to the employee's qualifications to perform the work for which they are being recalled. The Employer shall give not less than one (1) week's notice of recall in writing to the employee's last known address. A failure to report for work prior to expiration of such notice period shall result in the loss of all seniority rights under this Agreement. No notice of recall need be given in cases where the Employer and the Union agree to waive notice because it is apparent to them the particular employee will not return.

Section 3. Whenever a vacancy occurs in any job covered by this Agreement, said job shall be posted for bidding in a conspicuous place and all employees may apply for the job. The posting shall contain a full description of the job duties, starting time and rate of pay. Seniority shall be the governing factor in filling the vacancy provided the employee has the ability to be trained to perform the job. For any vacancy not filled pursuant to the foregoing posting procedure, the Employer shall offer the position to qualified replacement employees who are then working in the Employer's building before hiring new employees to fill the vacancy.

Section 4. Selection and preference as to the time of taking vacations shall be granted to employees on the basis of seniority, except that a building may depart from seniority in vacation scheduling where it is required in order to maintain normal operations of the building, in which event the Union shall be notified as soon as possible of the departure from seniority.

Section 5. Union stewards shall have super-seniority for purposes of layoff and recall under Section 2 of this Article.

ARTICLE XVII LEAVES OF ABSENCE

Section 1. The Employer shall grant a leave of absence in writing because of illness or disability, substantiated by medical approval, upon the following schedule: under one year seniority, no leave; one year to three year's seniority, six months' leave; three years to five year's seniority, nine months' leave; after five years seniority, one year leave. By agreement between the Employer and the Union, employment of an employee on such leave of absence may be terminated. Upon return from such leaves, the employee shall return to the assignment previously being performed by the employee or in the event such assignment no longer exists, a substantially comparable position, consistent with the returning employee's seniority in relation to that of the employees working in the building at the time of return from leave. Once an employee exhausts the leave pursuant to the schedule set forth above, he or she is not entitled to additional leave until after having worked continuously for additional twelve (12) months. If an employee would also qualify for FMLA leave and completes the appropriate FMLA paperwork, then FMLA leave will run concurrently with any leave taken in this Article.

Section 2. The Employer shall not unreasonably withhold the granting of a personal leave of absence submitted in writing for reasons other than illness or disability of up to fourteen (14) days after two (2) years and up to ninety (90) days after five (5) years of seniority. The Employer shall not be required to grant a personal leave of absence until after twenty-one (21) months have expired since an employee's previous personal leave of absence. Failure to return to work without justifiable cause following a personal leave of absence will be grounds for termination.

Section 3. An employee selected to represent the Union at conventions, conferences, collective bargaining, grievance and arbitration proceedings or for other Union business shall be granted unpaid union leaves of absence for the period required to fully carry out said business, but in no case shall the leave last longer in duration than one (1) year. The Union shall give written notice of such leaves at least four (4) working days in advance, including the expected dates and duration of such leaves. Any leave of

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one (1) year under this Section shall necessitate that the employee work six (6) consecutive months back on the job before being granted new leave. If the Union requires an extension of the duration of the leave, it shall provide notice of the extension, including duration of the extension, one (1) week prior to the initial ending date of the leave.

Section 4. During all such leaves of absence provided for in this Article, seniority shall continue to accumulate and accrue. By agreement between the Employer and the Union, employment of an employee on such leave of absence may be terminated.

Section 5. The provisions of the Family Medical Leave Act, where more favorable, shall supersede the provisions of this Article.

ARTICLE XVIII STRIKES, LOCKOUTS, PICKETING

Section 1. During the term of this Agreement, there shall be no strikes, lockouts or picketing, nor shall there be any demonstrations or rallies of any kind inside any building, nor shall there be any handout or distribution of handbills or leaflets of any kind in any areas of the buildings, except janitorial break rooms, without the Employer's consent.

Section 2. No action or suit of any kind or description shall lie by the Association or any member thereof against the Union, or any officers, representative or agent thereof, because of a strike, work stoppage or picketing in violation of this Agreement if:

(a) The Union has not authorized or instigated the strike, work stoppage or picketing,

(b) The Union promptly denounces such strike, work stoppage or picketing and makes an earnest effort to terminate the same within a period of five days.

Section 3. Refusal of any employee to cross a picket line established or maintained by a recognized labor organization shall not be grounds for discharge or disciplinary action provided that the Union has given the Employer at least 48 hours advanced written notice that there is a picket line which might be honored by bargaining unit employees.

ARTICLE XIX GRIEVANCE PROCEDURE AND ARBITRATION

Section 1. The procedure for handling a grievance pertaining to any difference or dispute which may arise under this Agreement shall be as follows:

STEP I

The aggrieved employee, accompanied by the steward, if the employee desires, shall consult with the employee's foreman or immediate supervisor. If a group of employees are involved in the grievance, the steward shall represent the employees. In any event, since it is in the best interest of all concerned that a grievance be promptly and expeditiously resolved, an aggrieved employee and/or the steward of the employee or employees involved, shall present such grievance within ten (10) working days following the event which gives rise to its occurrence, or after such employee and/or the steward of the employee or employees involved first acquired knowledge concerning such event.

STEP II

If the matter is not settled in the first step and the Union wishes to further pursue it, the grievance shall be reduced to writing and presented to the building manager and, where applicable, the contractor within thirty (30) calendar days following the event which gave rise to its occurrence or after the employee or

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employees involved first acquired knowledge concerning such event. The foreman or immediate supervisor, together with the aggrieved employee, the steward, and a Union Representative shall discuss the grievance with the building manager and the contractor. The building manager or contractor shall give his or her written answer within fifteen (15) calendar days after receipt of the written grievance.

STEP III

If the matter is not settled in the second step and the Union wishes to further pursue it, the Union shall, within fifteen (15) calendar days following its receipt of the building manager's or contractor's written answer, present the Association with a written request that the grievance be referred to a hearing before a Labor-Management Committee comprised of two members of the Association's Labor Relations Committee and two representatives of the Union, which shall meet once each month at an established time and place. The Union may present such notice to the Association within seven (7) days in the case of workload grievances alleging violations of Article XI or Article XXI of this Agreement. In such circumstances, the Labor-Management Committee shall make best efforts to hear such grievances in an expedited manner. All written grievances shall specify the provision within the article(s) and section(s) of the agreement allegedly violated. The Union shall provide details of the facts that supported each violation. The Labor-Management Committee shall meet with the grievant (if requested by the Union), the building manager and, where applicable, the contractor. After hearing the positions of the parties, the Labor-Management Committee shall endeavor to determine whether or not the Employer or, where applicable, the contractor has violated the Agreement as alleged in a timely grievance and, if the Committee determines that it has, what the remedy should be. The Labor-Management Committee, in discipline and discharge cases, shall consider the employee's prior disciplinary record, including providing appropriate weight based on severity and dates of past occurrences, in evaluating whether there is just cause for discipline or discharge at issue. The Labor-Management Committee may, by unanimous agreement, refuse to consider any documents which have not been presented to the Association for distribution to the members of the Committee prior to the scheduled date of the hearing. All decisions by the Labor-Management Committee shall require a unanimous agreement by all members of the Committee and such decisions shall be reduced to writing and shall be final and binding upon the Employer or, where applicable, the contractor, the employee(s) involved and the Union. In the event there is not a unanimous agreement, the matter shall be considered unresolved for purposes of Section 2 of this Article.

Unreasonable Workload Grievances. If they are not resolved in Step II within seven (7) calendar days following their presentation, grievances protesting disciplinary action because of failure to perform assigned work which allege that such failure was caused by the imposition of an unreasonable work load in violation of Article XI, Section 7 may be appealed by the Union to a Special Workload Committee comprised of two members of the Association's Labor Relations Committee and two representatives of the Union. The Special Workload Committee shall meet promptly with the grievant, the building manager and, where applicable, the contractor and endeavor to resolve the matter in a way acceptable to the Association and the Union. If the Special Workload Committee does not resolve the grievance at this meeting, the Union may demand that the matter be arbitrated, in the manner set forth in Section 2 of this Article.

Section 2. If the matter is not resolved in the third step and the Union wishes to further pursue it, the Union shall, within ten (10) calendar days after the grievance was heard by the Labor-Management Committee at the third step, serve a written demand for arbitration upon the Employer or, where applicable, the contractor. The Union's representative will contact the Employer, or, where applicable, the contractor, within such ten (10) day period and propose an arbitrator. The Union's failure to do so shall result in the grievance being waived. The parties shall select an arbitrator within forty-five (45) calendar days of the demand for arbitration. The grievance shall thereafter be submitted to an arbitrator

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who shall be selected by mutual agreement of the Employer or, where applicable, the contractor and the Union from the following panel (which may be added to hereafter upon agreement of the parties);

EDWIN BENN
STEVEN BIERIG
BRIAN CLAUSS
MARTIN MALIN
ROBERT PERKOVICH
JEANNE VONHOF
JACALYN ZIMMERMAN

If the parties are unable to immediately agree upon an arbitrator,, the parties shall alternately, strike one name from said list, and the last remaining name shall be the arbitrator selected to hear and decide the grievance. The compensation of the said arbitrator shall be paid one-half by the Employer or, where applicable, the contractor and one-half by the Union.

Section 3. The Union shall be required to notify BOMA of all cases that it takes to arbitration within ten (10) calendar days of making a demand for arbitration and shall further be required to provide BOMA with copies of all arbitration decisions rendered pursuant to this Agreement within ten (10) calendar days of receiving the decision.

Section 4. The award or decision of the arbitrator shall be final and binding upon the Employer and employee(s) involved, and the Union. The arbitrator shall not have the authority to add to, subtract from or alter the provisions of this Agreement.

Section 5. If any Employer who is a party to this Agreement refuses to abide by an arbitration award made under this Article or refuses to abide by a written decision signed by representatives of the Employer and the Union which resolves any difference or dispute arising under this Agreement, the Union shall be relieved from the obligation of Article XVIII as to such Employer.

Section 6. Grievances which are not presented or appealed within the time limits set forth in Sections 1 and 2 shall be considered withdrawn and abandoned. If there is not a timely answer to a grievance by the building manager or contractor in the second step of the grievance procedure, the grievance shall be automatically advanced to the third step.

ARTICLE XX JOINT COMMITTEE ON SAFETY AND SECURITY

The Employer and the Union share a concern for the personal safety of janitorial employees during their work time in the buildings and in their travel to and from their work. Accordingly, a Joint Committee on Safety and Security is established consisting of three (3) members from the Union and three (3) members from the Association.

Such Joint Committee will work in cooperation with appropriate, City, County, State and Federal agencies in an effort to improve the security of employees during their travel to and from work and within particular buildings, in an effort to improve the security of employees at work, and to improve the relationship between Employers and the Union in dealing with problems of safety and security.

The Employer and Union share a concern for the safety of all janitorial employees in the event of emergencies within the buildings in which they work. The Employer shall comply with the City of Chicago's Emergency Procedures Ordinance for High Rise Buildings with respect to emergency, safety and evacuation procedures.

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ARTICLE XXI JANITORIAL CONTRACTORS

The Employer, during the life of this Agreement, shall not contract for all or any part of the work being performed by employees in the bargaining unit covered by this Agreement unless all employees currently employed shall be employed by any contractor or subcontractor as a condition of any contract or subcontract granted or permitted by the Employer; provided, however, that the Employer's chosen contractor shall have the right to establish and apply reasonable employment criteria and decline to employ any individual who fails to meet such criteria; and provided further that the Employer's chosen contractor shall have the right to adjust employee work assignments and/or reduce the working force to reflect changes in cleaning specifications and occupancy within the building and/or to accomplish legitimate operating efficiencies, so long as (1) such changes or adjustments have been approved by the Employer; (2) such changes or adjustments do not result in the imposition of unreasonable work loads upon the employees of the contractor working in the building; (3) the Union is given at least ten (10) days prior written notice of any planned reduction in the working force; and (4) upon adjustment, any description regarding the adjustment shall be given in Polish or Spanish if the employee does not speak English, and the Union agrees that, where such conditions have been met, it shall not attempt to bar or limit the exercise of such rights by the Employer's chosen contractor in the building covered by this Agreement.

The Employer and the Union agree that in those situations where the chosen contractor seeks to employ background checks to screen existing employees in the building, it may do so only if the background checks are requested by the building owner or manager and the Union is notified before the background checks are implemented. In addition, if any employee is terminated as a result of such background checks, his or her termination will be subject to the grievance procedure.

The Employer and the Union agree that, while drug testing would be considered a reasonable criterion for initial employment under Article XXI, nothing contained herein would be deemed to permit the contractor to utilize recurring drug testing thereafter.

Except that, the Employer and the Union agree that in specific situations where a tenant of the Employer requests in writing drug testing of bargaining unit employees who will be cleaning the tenant's space, the Employer or its chosen contractor shall have the right to drug test the affected employees, however nothing contained herein would be deemed to permit the contractor to utilize recurring drug testing thereafter. The Union shall have a right to get a copy of the written request prior to testing.

In the event that the Employer subcontracts to a janitorial contractor that does not have a collective bargaining agreement with the Union, the Employer shall require that said contractor provide wages and benefits to its employees of at least an equivalent cost to those borne by Employers pursuant to this Agreement.

In the event that the Employer subcontracts to a contractor which is a party to a collective bargaining agreement with the Union, the terms and conditions of this Agreement shall be the only terms and conditions applicable to said contractor and its employees working in the Employer's building notwithstanding the particular terms and conditions contained in the collective bargaining agreement between the Union and such contractor. Grievances alleging that a contractor is not faithfully observing the terms of this Agreement shall be processed in accordance with the grievance and arbitration procedures set forth in Article XIX. If it is determined in a written decision by the Labor-Management Committee in the third step or, if there is no such decision, in subsequent arbitration proceedings between the Union and the contractor that the grievance is well founded and the contractor thereafter refuses to implement the remedy imposed, the contract between the contractor and the Employer shall be terminated within sixty (60) calendar days after written notice by the Union to the Employer, unless, in the interim, it

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is shown that the contractor has begun providing wages and benefits to its employees of at least an equivalent cost to those borne by Employer pursuant to this Agreement and has compensated its employees for the difference dating from the date the contractor began providing janitorial services to the Employer.

ARTICLE XXII MULTI-PURPOSE BUILDINGS

In buildings used for more than one purpose, this Agreement shall apply only to janitorial employees who are employed in the office building portion of such building.

ARTICLE XXIII UNION ACTIVITIES IN BUILDINGS

Section 1. The Employer shall permit the posting of Union bulletins in janitorial quarters and shall permit Union stewards reasonable freedom to perform their duties during working hours. Duly accredited representatives of the Union shall have reasonable access to timecards or sign in sheets for the current day applicable to employees covered by this Agreement.

Section 2. Duly accredited representatives of the Union may enter the building of the Employer during the working hours to observe working conditions and to confer with the employees under circumstances that are not disruptive to working schedules. When a Union Business Representative enters a building after normal business hours, he or she will register and identify himself or herself to building security, abide by security rules and contact the night supervisor. In the event the supervisor cannot be contacted and twenty (20) minutes have elapsed, the representative of the Union may proceed to confer with an employee or employees.

ARTICLE XXIV ELECTION TO ADOPT OR WITHDRAW FROM CONTRACT

Regular members of the Association, other than those listed in Schedule "A" who, at the effective date or during the term hereof, elect to adopt this Agreement, shall notify the Association to that effect. It is understood that any Employer may be a party to this Agreement with respect to the building or buildings designated by said Employer without obligation on the part of said Employer as to any other building owned, managed or controlled by it. Notice of election to adopt this Agreement shall be made by members of the Association in writing and the Association in turn shall notify the Union. Such notice shall state the name and location of the building to which the election applies and the name of the Employer. In like manner, the Association shall notify the Union when any building ceases to be represented in the regular membership of the Association.

Withdrawal from membership in the Association does not release the building from its obligations under this Agreement. If any building, which is paying its employees wages higher than those provided in this Agreement, desires to adopt same, it shall not reduce such higher wages during the life of this Agreement.

ARTICLE XXV JURY SERVICE

The Employer shall compensate the employee for the difference between the pay which such employee would normally receive, excluding overtime, and the amount received for jury service. It shall be the employee's responsibility to present evidence to the Employer of his or her notice of jury duty and the length of time he or she served on such jury prior to being compensated.

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ARTICLE XXVI MISCELLANEOUS PROVISIONS

Section 1. If any employer shall list job vacancies with an employment agency, said employer shall pay all the cost and charges of such agency.

Section 2. If any law now existing or hereafter enacted, or any proclamation, regulation or edict of any national or state official or agency shall invalidate any portion of this Agreement, the entire Agreement shall not thereby be invalidated and either party hereto, upon request, may reopen for negotiation the invalidated portion. In the event agreement thereon cannot be reached within 30 days, either party may submit the matter to arbitration as herein provided.

Section 3. This Agreement shall be construed as divisible as to each building and the failure of any building to abide by the terms hereof shall not operate to terminate this Agreement as to any other building. No breach of this Agreement by an Employer shall operate to subject the Association or any other Employer to any legal liability.

Section 4. Neither the Employer nor the Union will discriminate against applicants or employees with regard to employment, tenure or any other term or condition of employment in violation of any applicable law. Employees and management representatives will be treated with respect and dignity by all parties to this Agreement.

Section 5. Although this Agreement states essential provisions covering wages, hours and working conditions applicable to all covered employees and buildings (Employers), it does not state each privilege, rule of the shop or working condition which employees in a particular building have enjoyed under the prior agreement or the particular working conditions actually in effect in each such building. The current Employer shall not use this Agreement as a reason for reducing or eliminating a beneficial working condition, rule of the shop or privilege, but the union shall not oppose any reasonable reduction or elimination of same.

Section 6. BOMA/Chicago and the Union shall meet to form the SEIU Local 1 & BOMA/Chicago Training and Legal Fund ("Fund") no later than September 1, 2024. Such Fund shall be represented by three (3) BOMA/Chicago and three (3) Union Trustees appointed by each party. The Fund shall be responsible for all formation and establishment costs. On May 1, 2025, the Employer shall contribute to the Fund lump sum equal to two hundred twenty-eight dollars (\$228) multiplied by the number of the Employer's active full-time employees covered under this Agreement as of April 1, 2025. On May 1, 2026, the Employer shall contribute to the Fund lump sum equal to two hundred twenty-eight dollars (\$228) multiplied by the number of the Employer's active full-time employees covered under this Agreement as of April 1, 2026. Retention of this section 6 shall be subject to collective bargaining at the end of this current Agreement.

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ARTICLE XXVII DURATION - REOPENING

This Agreement becomes effective April 8, 2024 and shall remain in full force and effect through April 4, 2027. For its duration, the parties hereto waive further collective bargaining on all appropriate subjects of bargaining, whether or not mentioned herein, except that this Agreement may be reopened for the limited purpose of making such changes as are required by the Employee Retirement Income Security Act as subsequently construed by courts or appropriate governmental agencies.

Executed at Chicago, Illinois this 23rd day of April, 2024.

**BUILDING OWNERS AND MANAGERS
ASSOCIATION OF CHICAGO**



Farzin Parang
Executive Director

**BUILDING SERVICE DIVISION,
SERVICE EMPLOYEES INTERNATIONAL
UNION, LOCAL 1**



Genie Kastrup
President

BOMA/CHICAGO - LOCAL 1 - 2024 JANITORIAL AGREEMENT

**LETTER OF AGREEMENT BETWEEN BUILDING OWNERS AND MANAGERS
ASSOCIATION OF CHICAGO AND SERVICE EMPLOYEES INTERNATIONAL
UNION, LOCAL 1 REGARDING JANITORIAL EMPLOYEES**

This Memorandum of Understanding is entered into between SEIU Local 1 ("Union") and Building Owners and Managers Association of Chicago ("BOMA/Chicago"). The Union and BOMA/Chicago are parties to a collective bargaining agreement covering janitorial employees dated April 8, 2024 through April 4, 2027 (the "BOMA/Chicago CBA").

Whereas, the parties to the BOMA/Chicago CBA recognize the shortcomings of the current system of vacation payout during instances of transition between contractors in buildings; namely, the disruption caused to employees who do not receive full vacation pay when taking vacation time in the year after a new contractor begins work in a building, and the tendency for contractors to use different calculations in determining how much vacation is paid out at the time of the contractor's service contract ending, and:

Whereas both of these issues often result in costly and time-consuming grievances and loss of pay for employees:

Therefore, the parties have agreed to the following:

The parties agree to form a working group, made up of no more than five (5) participants from each party, to convene no later than October 1, 2024 with the express purpose of analyzing market-wide practices around contractor bidding and vacation accrual. The goal of the working group shall be to adopt a new system wherein employees are not paid vacation accrual upon a change of contractors but are paid full vacation pay at the time of their actual vacations.

BUILDING MANAGERS AND OWNER ASSOCIATION OF CHICAGO

By: 

Farzin Parang, Executive Director

Dated: April 23, 2024

SERVICE EMPLOYEES INTERNATIONAL UNION, LOCAL 1

By: 

Genie Kastrop, President

Dated: 4/23/24

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SCHEDULE "A"

Section 1. The foregoing agreement in its entirety shall apply to the following member buildings:

The parties hereto acknowledge that this Schedule A forms a part of the Agreement between the Association and the Union executed at Chicago, Illinois this 23rd day of April, 2024.

BUILDING OWNERS AND MANAGERS
ASSOCIATION OF CHICAGO



Farzin Parang
Executive Director

BUILDING SERVICE DIVISION,
SERVICE EMPLOYEES INTERNATIONAL
UNION, LOCAL 1



Genie Kastrup
President

BOMA/Chicago Member Signatories – 2024 Janitors Agreement

Building Address

Building Address

1 N Dearborn

117 N Clinton

1 N Franklin

120 N LaSalle

1 N LaSalle

120 S LaSalle

1 N State

120 S Riverside Plaza

1 N Wacker

121 W Wacker

1 S Dearborn

122 S Michigan

1 S Wacker

1229 W Concord

10 S LaSalle

123 N Wacker

10 S Riverside Plaza

125 S Clark

100 N Riverside Plaza

125 S Wacker

100 S Wacker

130 E Randolph

1000 W Fulton

131 S Dearborn

101 N Wacker

1330 W Fulton

108 N State

1375 W Fulton

110 N Wacker

140 S Dearborn

111 N Canal

141 W Jackson

111 S Wacker

142 E Ontario

111 W Illinois

145 S Wells

111 W Jackson

150 N Michigan

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150 N Riverside Plaza	2111 W Roosevelt
150 N Wacker	215 N Peoria
150 S Wacker	222 S Riverside Plaza
151 N Franklin	222 W Adams
1515 W Webster	224 S Michigan
155 N Wacker	225 N Michigan
161 N Clark	225 W Wacker
167 N Green	225 W Washington
175 W Jackson	227 W Monroe
180 N LaSalle	230 W Monroe
181 W Madison	233 S Wacker
190 N State	24 E Washington
190 S LaSalle	25 E Jackson
191 N Wacker	25 E Washington
2 N LaSalle	250 S Wacker
2 N Riverside Plaza	29 N Wacker
20 N Clark	30 N LaSalle
20 N Michigan	300 E Randolph
20 N Wacker	300 N LaSalle
20 S Clark	300 S Riverside Plaza
20 W Kinzie	300 S Wacker
200 E Randolph	303 E Wacker
200 S Wacker	303 W Madison
200 W Adams	307 N Michigan
200 W Jackson	311 S Wacker
200 W Madison	311 W Monroe
200 W Monroe	320 N Sangamon
203 N LaSalle	320 S Canal
205 N Michigan	321 N Clark
208 S LaSalle	33 N LaSalle
209 S LaSalle	330 N Wabash
210 N Carpenter	332 S Michigan
211 W Wacker	333 N Green

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333 N Michigan	550 W Adams
333 S Wabash	550 W Van Buren
333 W Wacker	550 W Washington
333 W Wolf Point Plaza	564 W Randolph
345 N Morgan	567 W Lake
35 E Wacker	6 W Hubbard
35 W Wacker	600 W Chicago
353 N Clark	625 N Michigan
36 S Wabash	625 W Adams
400 N Aberdeen	626 W Jackson
400-410 N Michigan	633 N Saint Clair
401 N Michigan	645 N Michigan
425 S Financial Place	680 N Lake Shore
430 N Michigan	69 W Washington
433 W Van Buren	70 W Madison
444 N Michigan	71 S Wacker
444 W Lake	730 N Michigan
450 N Cityfront Plaza	737 N Michigan
455 N Cityfront Plaza	77 W Wacker
500 N Michigan	77 W Washington
500 W Jackson	800 W Fulton
500 W Madison	820 W Jackson
515 N State	8410- 8420-8430 W Bryn Mawr
525 S State	850 W Jackson
525 W Van Buren	8600 W Bryn Mawr
53 W Jackson	875 N Michigan
540 W Madison	8750-8770 W Bryn Mawr
55 E Monroe	900 N Michigan
55 W Monroe	980 N Michigan
55 W Wacker	