

SECTION 09 90 00

INTERIOR PAINTS AND COATINGS

05/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100 (2015; Suppl 2002-2016) Documentation of the Threshold Limit Values and Biological Exposure Indices

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A13.1 (2015) Scheme for the Identification of Piping Systems

ASTM INTERNATIONAL (ASTM)

ASTM D235 (2002; R 2012) Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)

ASTM D523 (2014; R 2018) Standard Test Method for Specular Gloss

ASTM D2047 (2017) Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine

ASTM D4214 (2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films

ASTM D4263 (1983; R 2018) Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

ASTM D4444 (2013; R 2018) Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters

ASTM D6386 (2016) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

ASTM F1869 (2016) Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

MASTER PAINTERS INSTITUTE (MPI)

MPI 1	(2012) Aluminum Paint
MPI 4	(2012) Interior/Exterior Latex Block Filler
MPI 23	(2012) Primer, Metal, Surface Tolerant
MPI 31	(2012) Varnish, Polyurethane, Moisture Cured, Gloss (MPI Gloss Level 6)
MPI 39	(2012) Primer, Latex, for Interior Wood
MPI 44	(2012) Latex, Interior, (MPI Gloss Level 2)
MPI 45	(2012) Primer Sealer, Interior Alkyd
MPI 46	(2012) Undercoat, Enamel, Interior
MPI 47	(2012) Alkyd, Interior, Semi-Gloss (MPI Gloss Level 5)
MPI 48	(2012) Alkyd, Interior, Gloss (MPI Gloss Level 6-7)
MPI 49	(2012) Alkyd, Interior, Flat (MPI Gloss Level 1)
MPI 50	(2012) Primer Sealer, Latex, Interior
MPI 51	(2012) Alkyd, Interior, (MPI Gloss Level 3)2
MPI 52	(2012) Latex, Interior, (MPI Gloss Level 3)
MPI 54	(2012) Latex, Interior, Semi-Gloss (MPI Gloss Level 5)
MPI 56	(2012) Varnish, Interior, Polyurethane, Oil Modified, Gloss
MPI 57	(2012) Varnish, Interior, Polyurethane, Oil Modified, Satin
MPI 71	(2012) Varnish, Polyurethane, Moisture Cured, Flat (MPI Gloss Level 1)
MPI 72	(2012) Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)
MPI 77	(2012) Epoxy, Gloss
MPI 79	(2012) Primer, Alkyd, Anti-Corrosive for Metal
MPI 90	(2012) Stain, Semi-Transparent, for Interior Wood

MPI 95	(2012) Primer, Quick Dry, for Aluminum
MPI 107	(2012) Primer, Rust-Inhibitive, Water Based
MPI 116	(2012) Block Filler, Epoxy
MPI 138	(2012) Latex, Interior, High Performance Architectural, (MPI Gloss Level 2)
MPI 139	(2012) Latex, Interior, High Performance Architectural, (MPI Gloss Level 3)
MPI 140	(2012) Latex, Interior, High Performance Architectural, (MPI Gloss Level 4)
MPI 141	(2012) Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)
MPI 144	(2012) Latex, Interior, Institutional Low Odor/VOC, (MPI Gloss Level 2)
MPI 145	(2012) Latex, Interior, Institutional Low Odor/VOC, ( MPI Gloss Level 3)
MPI 146	(2012) Latex, Interior, Institutional Low Odor/VOC, (MPI Gloss Level 4)
MPI 147	(May 2016) Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (MPI Gloss Level 5)
MPI 151	(2012) Light Industrial Coating, Interior, Water Based (MPI Gloss Level 3)
MPI 153	(2012) Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)
MPI 154	(2012) Light Industrial Coating, Interior, Water Based, Gloss (MPI Gloss Level 6)

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage
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SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4	(2007; E 2004) Brush-Off Blast Cleaning
SSPC Guide 6	(2015) Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations
SSPC Guide 7	(2004; E 2004) Guide to the Disposal of Lead-Contaminated Surface Preparation Debris
SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals

SSPC PA Guide 3 (1982; E 1995) A Guide to Safety in Paint Application

SSPC SP 1 (2015) Solvent Cleaning

SSPC SP 2 (1982; E 2000; E 2004) Hand Tool Cleaning

SSPC SP 3 (1982; E 2004) Power Tool Cleaning

SSPC SP 6/NACE No.3 (2007) Commercial Blast Cleaning

SSPC SP 10/NACE No. 2 (2007) Near-White Blast Cleaning

SSPC SP 12/NACE No.5 (2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating

SSPC VIS 1 (2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

SSPC VIS 3 (2004) Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-PRF-680 (2010; Rev C; Notice 1 2015) Degreasing Solvent

MIL-STD-101 (2014; Rev C) Color Code for Pipelines and for Compressed Gas Cylinders

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24 (2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313 (2014; Rev E) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000 Air Contaminants

29 CFR 1910.1001 Asbestos

29 CFR 1910.1025 Lead

29 CFR 1926.62

Lead

UNDERWRITERS LABORATORIES (UL)

UL 2818

(2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submittals with an "AE" are for submittal to the Designer of Record. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. Provide all coats on a particular substrate from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

### SD-02 Shop Drawings

Piping Identification; G, RO

### SD-03 Product Data

Coating; G, AE

### SD-04 Samples

Color and Finish; G, AE

Mock-ups for replication of existing historical finishes to include: Stair Railings, Ballroom Columns, Stage Apron, Cornices and Ceiling Trims, and Typical Wall Coatings; G, RO, AE

### SD-07 Certificates

Applicator's Qualifications; G, RO

Qualification Testing laboratory for coatings; G, RO

Indoor Air Quality for Paints and Primers; S

Indoor Air Quality for Consolidated Latex Paints; S

### SD-08 Manufacturer's Instructions

Application Instructions

Mixing

Manufacturer's Safety Data Sheets; G, RO

SD-10 Operation and Maintenance Data

Coatings; G, RO

1.3 CERTIFICATES

1.3.1 Indoor Air Quality

Submit required indoor air quality certifications in one submittal package.

1.3.1.1 Paints and Coatings

Provide paint and coating products certified to meet indoor air quality requirements by **UL 2818** (Greenguard) Gold, **SCS** Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

1.4 APPLICATOR'S QUALIFICATIONS

1.4.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

~~1.4.2 SSPC QP 1 Certification~~

~~All contractors and subcontractors that perform surface preparation or coating application must be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) to the requirements of SSPC QP 1 prior to contract award, and must remain certified while accomplishing any surface preparation or coating application. If a contractor's or subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in contractor certification status.~~

1.5 QUALITY ASSURANCE

1.5.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph SAMPLING PROCEDURES. Test each chosen product as specified in the paragraph TESTING PROCEDURE. Remove products from the job site which do not conform, and replace with new products that conform to the referenced specification. Test replacement products that failed initial testing at no cost to the Government.

Another required testing is Batch Quality Conformance Testing to prove conformance of the manufacturer's paint to the specified MPI standard. This testing is accomplished before the materials are delivered to the job site. Provide testing for each paint product. Test paint products as specified in the paragraph "Testing Procedure".

1.5.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor will provide one quart samples of the selected paint materials. Take samples in the presence of the Contracting Officer, and label, and identify each sample. Provide labels in accordance with the paragraph PACKAGING, LABELING, AND STORAGE of this specification.

1.5.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. Include the backup data and summary of the test results within the qualification testing lab report. Provide a summary listing of all the reference specification requirements and the result of each test. Clearly indicate in the summary whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of

coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If MPI is chosen to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

#### 1.5.2 Replication of Historical Finishes Mock-Ups

Provide [Mock-ups for replication of existing historical finishes to include: Stair Railings, Ballroom Columns, Stage Apron, Cornices and Ceiling Trims, and Typical Wall Coatings](#) After samples are approved, and prior to starting installation, provide a minimum 8 foot by 8 foot mock-up or an area of the project designated by the COR for each substrate and for each color and type of wall coating, using the actual substrate materials. Use the approved mock-up as a standard of workmanship for installation within the facility. Submit at least 48 hour advance written notice to the Contracting Officer's Representative prior to mock-up installation.

### 1.6 REGULATORY REQUIREMENTS

#### 1.6.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

#### 1.6.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

#### 1.6.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

#### 1.6.4 Asbestos Content

Provide asbestos-free materials.

#### 1.6.5 Mercury Content

Provide materials free of mercury or mercury compounds.

#### 1.6.6 Silica

Provide abrasive blast media containing no free crystalline silica.

#### 1.6.7 Human Carcinogens

Provide materials that do not contain [ACGIH 0100](#) confirmed human carcinogens (A1) or suspected human carcinogens (A2).

#### 1.7 PACKAGING, LABELING, AND STORAGE

Provide paints in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Furnish pigmented paints in containers not larger than 5 gallons. Store paints and thinners in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

#### 1.8 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. Include in the Activity Hazard Analysis the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

##### 1.8.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

##### 1.8.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

- a. The applicable manufacturer's Safety Data Sheets (SDS) or local regulation.
- b. 29 CFR 1910.1000.
- c. ACGIH 0100, threshold limit values.
- d. The appropriate OSHA standard in 29 CFR 1910.1025 and 29 CFR 1926.62 for surface preparation on painted surfaces containing lead. Removal and disposal of coatings which contain lead is specified in Section 02 83 00 LEAD REMEDIATION. Additional guidance is given in SSPC Guide 6 and SSPC Guide 7. Refer to drawings for list of hazardous materials located on this project. Coordinate paint preparation activities with this specification section.
- e. The appropriate OSHA standards in 29 CFR 1910.1001 for surface preparation of painted surfaces containing asbestos. Removal and disposal of coatings which contain asbestos materials is specified in Section 02 82 00 ASBESTOS REMEDIATION. Refer to drawings for list of hazardous materials located on this project. Coordinate paint preparation activities with this specification section.

Submit manufacturer's Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in [FED-STD-313](#).

#### 1.9 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation. Isolate area of application from rest of building when applying high-emission paints or coatings.

##### 1.9.1 Coatings

Do not apply coating when air or substrate conditions are:

- a. Less than [5 degrees F](#) above dew point;
- b. Below [50 degrees F](#) or over [95 degrees F](#), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Do not, under any circumstances, violate the manufacturer's application recommendations.

##### 1.9.2 Post-Application

Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms. Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:

- a. Supply 100 percent outside air 24 hours a day.
- b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between [55 degrees F](#) and [85 degrees F](#) and humidity is between 30 percent and 60 percent.
- c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

#### 1.10 SCHEDULING

Allow paint, polyurethane, varnish, and wood stain installations to cure prior to the installation of materials that adsorb VOCs, including furniture and furnishings.

#### 1.11 COLOR SELECTION

Provide colors of finish coats as indicated or specified. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements. The integrity of the Replication of Historical Finishes must be maintained by standards set by COR approved mock-ups only.

Tint each coat progressively darker to enable confirmation of the number of coats.

Provide color, texture, and pattern of wall coating systems as indicated.

Refer to the Finish Schedule in the drawings for [color and finish](#). Submit

using finish codes noted on drawings.

#### 1.12 LOCATION AND SURFACE TYPE TO BE PAINTED

##### 1.12.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

- a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
- b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
- c. Existing coated surfaces that are damaged during performance of the work.

##### 1.12.1.1 Exterior Painting

Refer to specification Section 09 91 12 - EXTERIOR PAINTS AND COATINGS.

##### 1.12.1.2 Interior Painting

Includes new surfaces, existing uncoated surfaces, and existing coated surfaces of the building and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

- a. Exposed columns, girders, beams, joists, and metal deck; and
- b. Other contiguous surfaces.

##### 1.12.2 Painting Excluded

Do not paint the following unless indicated otherwise.

- a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.
- b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.
- c. Steel to be embedded in concrete.
- d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.
- e. Hardware, fittings, and other factory finished items.
- f. Do not paint surfaces in areas identified on the drawings to remain as-is.

##### 1.12.3 Mechanical and Electrical Painting

Includes field coating of interior new and existing surfaces.

- a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.
  - (1) Exposed piping, conduit, and ductwork;
  - (2) Supports, hangers, air grilles, and registers;
  - (3) Miscellaneous metalwork and insulation coverings.
- b. Do not paint the following, unless indicated otherwise:
  - (1) New zinc-coated, aluminum, and copper surfaces under insulation
  - (2) New aluminum jacket on piping
  - (3) New interior ferrous piping under insulation.

#### 1.12.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

- a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.
- b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands.

#### 1.12.4 Definitions and Abbreviations

##### 1.12.4.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

##### 1.12.4.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing must be accomplished by an MPI testing lab.

#### 1.12.4.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (such as metals, plastics, wood, paper, leather, cloth). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

#### 1.12.4.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

#### 1.12.4.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

#### 1.12.4.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

#### 1.12.4.7 EXT

MPI short term designation for an exterior coating system.

#### 1.12.4.8 INT

MPI short term designation for an interior coating system.

#### 1.12.4.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

#### 1.12.4.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

#### 1.12.4.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

#### 1.12.4.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with [ASTM D523](#). Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

#### 1.12.4.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

#### 1.12.4.14 Paint

See Coating definition.

#### 1.12.4.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

#### 1.12.4.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

## PART 2 PRODUCTS

### 2.1 MATERIALS

Conform to the [coating](#) specifications and standards referenced in PART 3. Submit product data sheets for specified [coatings](#) and solvents. Provide preprinted cleaning and maintenance instructions for all coating systems.

Submit Manufacturer's Instructions on Mixing: Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Provide certification of [Indoor Air Quality for paints and primers](#).

Provide certification of [Indoor Air Quality for consolidated latex paints](#).

## PART 3 EXECUTION

### 3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect hardware, hardware accessories, machined surfaces,

radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, reinstall removed items by workmen skilled in the trades. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

### 3.2 REPUTTYING AND REGLAZING

Remove cracked, loose, and defective putty or glazing compound on glazed sash and provide new putty or glazing compound. Where defective putty or glazing compound constitutes 30 percent or more of the putty at any one light, remove the glass and putty or glazing compound and reset the glass. Remove putty or glazing compound without damaging sash or glass. Clean rabbets to bare wood or metal and prime prior to reglazing. Provide linseed oil putty for wood sash. Patch surfaces to provide smooth transition between existing and new surfaces. Finish putty or glazing compound to a neat and true bead. Allow glazing compound time to cure, in accordance with manufacturer's recommendation, prior to coating application. Allow putty to set one week prior to coating application.

### 3.3 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Schedule cleaning so that dust and other contaminants will not fall on wet, newly painted surfaces. Spot-prime exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

#### 3.3.1 Additional Requirements for Preparation of Surfaces With Existing Coatings

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

- a. Test existing finishes for lead before sanding, scraping, or removing. If lead is present, refer to paragraph Toxic Materials.
- b. Wipe previously painted surfaces to receive solvent-based coatings, except stucco and similarly rough surfaces clean with a clean, dry cloth saturated with mineral spirits, [ASTM D235](#). Allow surface to dry. Wipe immediately preceding the application of the first coat of any coating, unless specified otherwise.
- c. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.
- d. The requirements specified are minimum. Comply also with the [application instructions](#) of the paint manufacturer.
- e. Thoroughly clean previously painted surfaces specified to be repainted or damaged during construction of all grease, dirt, dust or other foreign matter.

- f. Remove blistering, cracking, flaking and peeling or otherwise deteriorated coatings.
- g. Remove chalk so that when tested in accordance with [ASTM D4214](#), the chalk resistance rating is no less than 8.
- h. Roughen slick surfaces. Repair damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls with suitable material to match adjacent undamaged areas.
- i. Feather and sand smooth edges of chipped paint.
- j. Clean rusty metal surfaces as per SSPC requirements. Use solvent, mechanical, or chemical cleaning methods to provide surfaces suitable for painting.
- k. Provide new, proposed coatings that are compatible with existing coatings.

### 3.3.2 Existing Coated Surfaces with Minor Defects

Sand, spackle, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligating, chalking, and irregularities due to partial peeling of previous coatings. Remove chalking by sanding so that when tested in accordance with [ASTM D4214](#), the chalk rating is not less than 8.

### 3.3.3 Removal of Existing Coatings

Remove existing coatings from the following surfaces:

- a. Surfaces containing large areas of minor defects;
- b. Surfaces containing more than 20 percent peeling area; and
- c. Surfaces designated by the Contracting Officer, such as surfaces where rust shows through existing coatings.

### 3.3.4 Substrate Repair

- a. Repair substrate surface damaged during coating removal;
- b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and
- c. Clean and prime the substrate as specified.

## 3.4 PREPARATION OF METAL SURFACES

### 3.4.1 Existing and New Ferrous Surfaces

- a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with [SSPC SP 1](#) to remove oil and grease. Where shop coat is missing or damaged, clean according to [SSPC SP 2](#) or [SSPC SP 3](#), [SSPC SP 6/NACE No.3](#), or [SSPC SP 10/NACE No. 2](#). Brush-off blast remaining surface in accordance with [SSPC 7/NACE No.4](#). Use inhibitor as recommended by coating manufacturer to prevent

premature rusting. Protect shop-coated ferrous surfaces from corrosion by treating and touching up corroded areas immediately upon detection.

#### 3.4.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in [SSPC SP 2](#) and [SSPC SP 3](#). Use as a visual reference, photographs in [SSPC VIS 3](#) for the appearance of cleaned surfaces.

For abrasive blast cleaned surfaces, the requirements are stated in [SSPC 7/NACE No.4](#), [SSPC SP 6/NACE No.3](#), and [SSPC SP 10/NACE No. 2](#). Use as a visual reference, photographs in [SSPC VIS 1](#) for the appearance of cleaned surfaces.

#### 3.4.3 Galvanized Surfaces

- a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, or non-alkaline detergent solution in accordance with [SSPC SP 1](#). Completely remove coating by brush-off abrasive blast if the galvanized metal has been passivated or stabilized. Do not "passivate" or "stabilize" new galvanized steel to be coated. If the absence of hexavalent stain inhibitors is not documented, test as described in [ASTM D6386](#), Appendix X2, and remove by one of the methods described therein.
- b. Galvanized with Slight Coating Deterioration or with Little or No Rusting: Water jetting to [SSPC SP 12/NACE No.5](#) WJ3 to remove loose coating from surfaces with less than 20 percent coating deterioration and no blistering, peeling, or cracking. Use inhibitor as recommended by the coating manufacturer to prevent rusting.
- c. Galvanized With Severe Deteriorated Coating or Severe Rusting: Spot abrasive blast rusted areas as described for steel in [SSPC SP 6/NACE No.3](#).

#### 3.4.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

Surface Cleaning: Solvent clean in accordance with [SSPC SP 1](#) and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

#### 3.4.5 Terne-Coated Metal Surfaces

Solvent clean surfaces with mineral spirits, [ASTM D235](#). Wipe dry with clean, dry cloths.

#### 3.4.6 Existing Surfaces with a Bituminous or Mastic-Type Coating

Remove chalk, mildew, and other loose material by washing with a solution of  $1/2$  cup trisodium phosphate,  $1/4$  cup household detergent, one quart 5 percent sodium hypochlorite solution and 3 quarts of warm water.

### 3.5 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

#### 3.5.1 Concrete and Masonry

- a. Curing: Allow concrete, stucco and masonry surfaces to cure at least 30 days before painting, and concrete slab on grade to cure at least 90 days before painting.
- b. Surface Cleaning: Remove the following deleterious substances.
  - (1) Dirt, Chalking, Grease, and Oil: Wash new and existing uncoated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. Wash existing coated surfaces with a suitable detergent and rinse thoroughly. For large areas, water blasting may be used.
  - (2) Fungus and Mold: Wash new, existing coated, and existing uncoated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.
  - (3) Paint and Loose Particles: Remove by wire brushing.
  - (4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.
- c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.
- d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

#### 3.5.2 Gypsum Board, Plaster, and Stucco

- a. Surface Cleaning: Verify that plaster and stucco surfaces are free from loose matter and that gypsum board is dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.
- b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.
- c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D4263. Verify that new

plaster to be coated has a maximum moisture content of 8 percent, when measured in accordance with ASTM D4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

### 3.5.3 Existing Asbestos Cement Surfaces

Remove oily stains by solvent cleaning with mineral spirits, MIL-PRF-680 and ASTM D235. Remove loose dirt, dust, and other deleterious substances by brushing with a soft brush or rubbing with a dry cloth prior to application of the first coat material. Do not wire brush or clean using other abrasive methods. Verify surfaces are dry and clean prior to application of the coating.

## 3.6 PREPARATION OF WOOD AND PLYWOOD SURFACES

### 3.6.1 New, Existing Uncoated, and Existing Coated Plywood and Wood Surfaces, Except Floors:

- a. Clean wood surfaces of foreign matter.

Surface Cleaning: Verify that surfaces are free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood. Scrape to remove loose coatings. Lightly sand to roughen the entire area of previously enamel-coated wood surfaces.

- b. Removal of Fungus and Mold: Wash existing coated surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.
- c. Do not exceed 12 percent moisture content of the wood as measured by a moisture meter in accordance with ASTM D4444, Method A, unless otherwise authorized.
- d. Prime or touch up wood surfaces adjacent to surfaces to receive water-thinned paints before applying water-thinned paints.
- e. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.
- f. Cosmetic Repair of Minor Defects:
  - (1) Knots and Resinous Wood and Fire, Smoke, Water, and Color Marker Stained Existing Coated Surface: Prior to application of coating, cover knots and stains with two or more coats of 3-pound-cut shellac varnish, plasticized with 5 ounces of castor oil per gallon. Scrape away existing coatings from knotty areas, and sand before treating. Prime before applying any putty over shellacked area.
  - (2) Open Joints and Other Openings: Fill with whiting putty, linseed oil putty. Sand smooth after putty has dried.
  - (3) Checking: Where checking of the wood is present, sand the surface, wipe and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.

### 3.6.2 Wood Floor Surfaces, Natural Finish

- a. Initial Surface Cleaning: As specified in paragraph entitled "Surface Preparation."
- b. Existing Loose Boards and Shoe Molding: Before sanding, renail loose boards. Countersink nails and fill with an approved wood filler. Remove shoe molding before sanding and reinstall after completing other work. At Contractor's option, new shoe molding may be provided in lieu of reinstalling old. Provide new wood molding of the same size, wood species, and finish as the existing.
- c. Sanding and Scraping: Sanding of wood floors is specified in Section 09 64 29 WOOD STRIP AND PLANK FLOORING. Fill floors of oak or similar open-grain wood with wood filler recommended by the finish manufacturer and the excess filler removed.
- d. Final Cleaning: After sanding, sweep and vacuum floors clean. Do not walk on floors thereafter until specified sealer has been applied and is dry.

### 3.6.3 Interior Wood Surfaces, Stain Finish

Sand interior wood surfaces to receive stain. Fill oak and other open-grain wood to receive stain with a coat of wood filler not less than 8 hours before the application of stain; remove excess filler and sand the surface smooth.

## 3.7 APPLICATION

### 3.7.1 Coating Application

Comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint must show no signs of deterioration. Maintain uniform suspension of pigments during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Use rollers for applying paints and enamels of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Only apply paints, except water-thinned types to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Pay special attention to ensure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Apply each coat of paint so that dry film is of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Completely hide all blemishes.

Touch up damaged coatings before applying subsequent coats. Broom clean and clear dust from interior areas before and during the application of coating material.

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

- a. **Drying Time:** Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.
- b. **Primers, and Intermediate Coats:** Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Cover each preceding coat or surface completely by ensuring visually perceptible difference in shades of successive coats.
- c. **Finished Surfaces:** Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.
- d. **Thermosetting Paints:** Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

### 3.7.2 **Mixing** and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. Verify that the written permission includes quantities and types of thinners to use.

When thinning is allowed, thin paints immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner does not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning cannot cause the paint to exceed limits on volatile organic compounds. Do not mix paints of different manufacturers.

### 3.7.3 Two-Component Systems

Mix two-component systems in accordance with manufacturer's instructions. Follow recommendation by the manufacturer for any thinning of the first

coat to ensure proper penetration and sealing for each type of substrate.

#### 3.7.4 Coating Systems

- a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 3.	Interior Concrete Paint Table
Division 4.	Interior Concrete Masonry Units Paint Table
Division 5.	Interior Metal, Ferrous and Non-Ferrous Paint Table
Division 6.	Interior Wood Paint Table
Division 9:	Interior Plaster, Gypsum Board, Textured Surfaces Paint Table

- b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
- c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
- d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:
- (1) One coat of primer.
  - (2) One coat of undercoat or intermediate coat.
  - (3) One topcoat to match adjacent surfaces.
- e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

#### 3.8 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

- a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.
- b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.
- c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
- d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

- e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat. Overcoat these items with the specified ferrous-metal primer prior to application of finish coats.
- f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer **MPI 107**.

### 3.9 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Interior.

### 3.10 COATING SYSTEMS FOR WOOD AND PLYWOOD

- a. Apply coatings of Tables in Division 6 for Exterior and Interior.
- b. Prior to erection, apply two coats of specified primer to treat and prime wood and plywood surfaces which will be inaccessible after erection.
- c. Apply stains in accordance with manufacturer's printed instructions.
- d. Wood Floors to Receive Natural Finish: Thin first coat 2 to 1 using thinner recommended by coating manufacturer. Apply all coatings at rate of **300 to 350 square feet per gallon**. Apply second coat not less than 2 hours and not over 24 hours after first coat has been applied. Apply with lambs wool applicators or roller as recommended by coating manufacturer. Buff or lightly sand between intermediate coats as recommended by coating manufacturer's printed instructions. Final clear satin polish topcoat must meet requirements for slip resistance per **ASTM D2047**

### 3.11 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with **MIL-STD-101** and **ASME A13.1**. Place stenciling in clearly visible locations. On piping not covered by **MIL-STD-101** and **ASME A13.1**, stencil approved names or code letters, in letters a minimum of **1/2 inch** high for piping and a minimum of **2 inches** high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

### 3.12 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

### 3.13 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at

moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. Coordinate with manufacturer for take-back program. Set aside scrap to be returned to manufacturer for recycling into new product. When such a service is not available, contact local recyclers to reclaim the materials. Partially used containers to be sealed and returned to Government for reuse.

### 3.14 PAINT TABLES

All DFT's are minimum values. Use materials with a GPS green check mark having a minimum MPI "Environmentally Friendly" E3 rating based on VOC (EPA Method 24) content levels when equivalent products are available for the substrate to be applied. Acceptable products are listed in the MPI Green Approved Products List, available at <http://www.specifygreen.com/APL/ProductIdxByMPInum.asp>.

#### 3.14.1 Interior Paint Tables

##### DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. New and uncoated existing, and existing, previously painted Concrete, vertical surfaces, not specified otherwise:

###### 1. Latex

New; MPI INT 3.1A-G2 (Flat) / Existing; MPI RIN 3.1A-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 44	MPI 44

System DFT: 4 mils

New; MPI INT 3.1A-G3 (Eggshell) / Existing; MPI RIN 3.1A-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 52	MPI 52

System DFT: 4 mils

New; MPI INT 3.1A-G5 (Semigloss) / Existing; MPI RIN 3.1A-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 54	MPI 54

System DFT: 4 mils

###### 2. High Performance Architectural Latex

New; MPI INT 3.1C-G2 (Flat) / Existing; MPI RIN 3.1J-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 138	MPI 138

System DFT: 4 mils

New; MPI INT 3.1C-G3 (Eggshell) / Existing; MPI RIN 3.1J-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 139	MPI 139

System DFT: 4 mils

New; MPI INT 3.1C-G4 (satin)/ Existing; MPI RIN 3.1J-G4

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 140	MPI 140

System DFT: 4 mils

New; MPI INT 3.1C-G5 (Semigloss) / Existing; MPI RIN 3.1J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 141	MPI 141

System DFT: 4 mils

DIVISION 3: INTERIOR CONCRETE PAINT TABLE

3. Institutional Low Odor / Low VOC Latex

New; MPI INT 3.1M-G2 (Flat) / Existing; MPI RIN 3.1L-G2 (Flat)

Primer: Intermediate: Topcoat:  
MPI 50 MPI 144 MPI 144

System DFT: 4 mils

New; MPI INT 3.1M-G3 (Eggshell) / Existing; MPI RIN 3.1L-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 50 MPI 145 MPI 145

System DFT: 4 mils

New; MPI INT 3.1M-G4 (satin)/ Existing; MPI RIN 3.1L-G4

Primer: Intermediate: Topcoat:  
MPI 50 MPI 146 MPI 146

System DFT: 4 mils

New; MPI INT 3.1M-G5 (Semigloss) / Existing; MPI RIN 3.1L-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 50 MPI 147 MPI 147

System DFT: 4 mils

B. New and uncoated existing, and existing, previously painted Concrete in areas requiring a high degree of sanitation, and other high-humidity areas not otherwise specified except floors:

1. Waterborne Light Industrial Coating

New; MPI INT 3.1L-G3(Eggshell) / Existing; MPI RIN 3.1C-G3(Eggshell)

Primer: Intermediate: Topcoat:  
MPI 151 MPI 151 MPI 151

System DFT: 4.8 mils

New; MPI INT 3.1L-G5(Semigloss) / Existing; MPI RIN 3.1C-G5(Semigloss)

Primer: Intermediate: Topcoat:  
MPI 153 MPI 153 MPI 153

System DFT: 4.8 mils

2. Alkyd

New; MPI INT 3.1D-G3 (Eggshell) / Existing; RIN 3.1D-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 50 MPI 51 MPI 51

System DFT: 4.5 mils

MPI INT 3.1D-G5 (Semigloss) / Existing; RIN 3.1D-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 50 MPI 47 MPI 47

System DFT: 4.5 mils

3. Epoxy

New; MPI INT 3.1F-G6 (Gloss) / Existing; MPI RIN 3.1E-G6 (Gloss)

Primer: Intermediate: Topcoat:  
MPI 77 MPI 77 MPI 77

System DFT: 4 mils

Note: Primer may be reduced for penetration per manufacturer's instructions.

D. New and uncoated existing, and existing, previously painted concrete

DIVISION 3: INTERIOR CONCRETE PAINT TABLE  
walls and bottom of swimming pools:

Note: Primer may be reduced for penetration per manufacturer's instructions.

1. Epoxy

New; MPI INT 3.1F / Existing; MPI RIN 3.1E  
Primer: Intermediate: Topcoat:  
MPI 77 MPI 77 MPI 77  
System DFT: 4 mils

Note: Primer may be reduced for penetration per manufacturer's instructions.

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New and uncoated Existing Concrete masonry:

1. High Performance Architectural Latex

MPI INT 4.2D-G2 (Flat)  
Filler Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 138 MPI 138  
System DFT: 11 mils

MPI INT 4.2D-G3 (Eggshell)  
Filler Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 139 MPI 139  
System DFT: 11 mils

MPI INT 4.2D-G4 (Satin)  
Filler Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 140 MPI 140  
System DFT: 11 mils

MPI INT 4.2D-G5 (Semigloss)  
Filler Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 141 MPI 141  
System DFT: 11 mils

Fill all holes in masonry surface

2. Institutional Low Odor / Low VOC Latex

New; MPI INT 4.2E-G2 (Flat)  
Filler Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 144 MPI 144  
System DFT: 4 mils

New; MPI INT 4.2E-G3 (Eggshell)  
Filler Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 145 MPI 145  
System DFT: 4 mils

New; MPI INT 4.2E-G4 (Satin)  
Filler Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 146 MPI 146  
System DFT: 4 mils

New; MPI INT 4.2E-G5 (Semigloss)

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 147	MPI 147
System DFT:	4 mils		

B. Existing, previously painted Concrete masonry:

1. High Performance Architectural Latex

MPI RIN 4.2K-G2 (Flat)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 138 MPI 138  
System DFT: 4.5 mils

MPI RIN 4.2K-G3 (Eggshell)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 139 MPI 139  
System DFT: 4.5 mils

MPI RIN 4.2K-G4  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 140 MPI 140  
System DFT: 4.5 mils

MPI RIN 4.2K-G5 (Semigloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 141 MPI 141  
System DFT: 4.5 mils

2. Institutional Low Odor / Low VOC Latex

Existing; MPI RIN 4.2L-G2 (Flat)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 144 MPI 144  
System DFT: 4 mils

Existing; MPI RIN 4.2L-G3 (Eggshell)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 145 MPI 145  
System DFT: 4 mils

Existing; MPI RIN 4.2L-G4 (Satin)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 146 MPI 146  
System DFT: 4 mils

Existing; MPI RIN 4.2L-G5 (Semigloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 147 MPI 147  
System DFT: 4 mils

C. New and uncoated Existing Concrete masonry units in areas requiring a high degree of sanitation, and other high humidity areas unless otherwise specified:

1. Waterborne Light Industrial Coating

MPI INT 4.2K-G3(Eggshell)			
Filler:	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 151	MPI 151
System DFT:	11 mils		

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

MPI INT 4.2K-G5(Semigloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 153 MPI 153  
System DFT: 11 mils

MPI INT 4.2K-G6(Gloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 N/A MPI 154 MPI 154  
System DFT: 11 mils

Fill all holes in masonry surface

2. Alkyd

MPI INT 4.2N-G3 (Eggshell)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 MPI 50 MPI 51 MPI 51  
System DFT: 12 mils

MPI INT 4.2N-G5 (Semigloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 4 MPI 50 MPI 47 MPI 47  
System DFT: 12 mils

Fill all holes in masonry surface

3. Epoxy

MPI INT 4.2G-G6 (Gloss)  
Filler: Primer: Intermediate: Topcoat:  
MPI 116 N/A MPI 77 MPI 77  
System DFT: 10 mils

Fill all holes in masonry surface

D. Existing, previously painted, concrete masonry units in areas requiring  
a high degree of sanitation, and other high humidity areas unless  
otherwise specified:

1. Waterborne Light Industrial Coating

MPI RIN 4.2G-G3(Eggshell)  
Spot Primer: Intermediate: Topcoat:  
MPI 151 MPI 151 MPI 151  
System DFT: 4.5 mils

MPI RIN 4.2G-G5(Semigloss)  
Spot Primer: Intermediate: Topcoat:  
MPI 153 MPI 153 MPI 153  
System DFT: 4.5 mils

2. Alkyd

MPI RIN 4.2C-G3 (Eggshell)  
Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 51 MPI 51  
System DFT: 4.5 mils

MPI RIN 4.2C-G5 (Semigloss)

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

Spot Primer: Intermediate: Topcoat:  
MPI 50 MPI 47 MPI 47  
System DFT: 4.5 mils

3. Epoxy

MPI RIN 4.2D-G6 (Gloss)

Spot Primer: Intermediate: Topcoat:  
MPI 77 MPI 77 MPI 77  
System DFT: 5 mils

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, surfaces adjacent to painted surfaces match surrounding finish), exposed copper piping, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. High Performance Architectural Latex

MPI INT 5.1R-G2 (Flat)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 138 MPI 138  
System DFT: 5 mils

MPI INT 5.1R-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 139 MPI 139  
System DFT: 5 mils

MPI INT 5.1R-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 141 MPI 141  
System DFT: 5 mils

2. Alkyd

MPI INT 5.1E-G2 (Flat)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 49 MPI 49  
System DFT: 5.25 mils

MPI INT 5.1E-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 51 MPI 51  
System DFT: 5.25 mils

MPI INT 5.1E-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 47 MPI 47  
System DFT: 5.25 mils

MPI INT 5.1E-G6 (Gloss)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 48 MPI 48  
System DFT: 5.25 mils

B. Metal in areas requiring a high degree of sanitation, and other

INTERIOR STEEL / FERROUS SURFACES

high-humidity areas not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. Alkyd

MPI INT 5.1E-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 51 MPI 51

System DFT: 5.25 mils

MPI INT 5.1E-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 79 MPI 47 MPI 47

System DFT: 5.25 mils

2. Alkyd

MPI INT 5.1T-G3 (Eggshell) For hand tool cleaning

Primer: Intermediate: Topcoat:  
MPI 23 MPI 51 MPI 51

System DFT: 5.25 mils

MPI INT 5.1T-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 23 MPI 47 MPI 47

System DFT: 5.25 mils

C. Ferrous metal in concealed damp spaces or in exposed areas having unpainted adjacent surfaces as follows:

1. Aluminum Paint

MPI INT 5.1M

Primer: Intermediate: Topcoat:  
MPI 79 MPI 1 MPI 1

System DFT: 4.25 mils

D. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

1. High Performance Architectural Latex

MPI INT 5.4F-G2 (Flat)

Primer: Intermediate: Topcoat:  
MPI 95 MPI 138 MPI 138

System DFT: 5 mils

MPI INT 5.4F-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 95 MPI 139 MPI 139

System DFT: 5 mils

MPI INT 5.4F-G4 (Satin)

Primer: Intermediate: Topcoat:  
MPI 95 MPI 140 MPI 140

System DFT: 5 mils

MPI INT 5.4F-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 95 MPI 141 MPI 141

INTERIOR STEEL / FERROUS SURFACES

System DFT: 5 mils

2. Alkyd

MPI INT 5.4J-G2 (Flat)

Primer: Intermediate: Topcoat:  
MPI 95 MPI 49 MPI 49  
System DFT: 5 mils

MPI INT 5.4J-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 95 MPI 51 MPI 51  
System DFT: 5 mils

MPI INT 5.4J-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 95 MPI 47 MPI 47  
System DFT: 5 mils

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. New and Existing, uncoated wood and plywood not otherwise specified:

1. High Performance Architectural Latex

MPI INT 6.4S-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 139 MPI 139  
System DFT: 4.5 mils

MPI INT 6.4S-G4 (Satin)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 140 MPI 140  
System DFT: 4.5 mils

MPI INT 6.4S-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 141 MPI 141  
System DFT: 4.5 mils

2. Alkyd

MPI INT 6.4B-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 45 MPI 51 MPI 51  
System DFT: 4.5 mils

MPI INT 6.4B-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 45 MPI 47 MPI 47  
System DFT: 4.5 mils

3. Institutional Low Odor / Low VOC Latex

New; MPI INT 6.3V-G2 (Flat)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 144 MPI 144  
System DFT: 4 mils

New; MPI INT 6.3V-G3 (Eggshell)

DIVISION 6: INTERIOR WOOD PAINT TABLE

Primer: Intermediate: Topcoat:  
MPI 39 MPI 145 MPI 145  
System DFT: 4 mils

New; MPI INT 6.3V-G4

Primer: Intermediate: Topcoat:  
MPI 39 MPI 146 MPI 146  
System DFT: 4 mils

New; MPI INT 6.3V-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 147 MPI 147  
System DFT: 4 mils

B. Existing, previously painted Wood and plywood not otherwise specified:

1. High Performance Architectural Latex

MPI RIN 6.4B-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 46 MPI 139 MPI 139  
System DFT: 4.5 mils

MPI RIN 6.4B-G4 (Satin)

Primer: Intermediate: Topcoat:  
MPI 46 MPI 140 MPI 140  
System DFT: 4.5 mils

MPI RIN 6.4B-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 46 MPI 141 MPI 141  
System DFT: 4.5 mils

2. Alkyd

MPI RIN 6.4C-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 46 MPI 51 MPI 51  
System DFT: 4.5 mils

MPI RIN 6.4C-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 46 MPI 47 MPI 47  
System DFT: 4.5 mils

3. Institutional Low Odor / Low VOC Latex

Existing; MPI RIN 6.4D-G2 (Flat)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 144 MPI 144  
System DFT: 4 mils

Existing; MPI RIN 6.4D-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 145 MPI 145  
System DFT: 4 mils

Existing; MPI RIN 6.4D-G4

Primer: Intermediate: Topcoat:  
MPI 39 MPI 146 MPI 146  
System DFT: 4 mils

DIVISION 6: INTERIOR WOOD PAINT TABLE

Existing; MPI RIN 6.4D-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 39 MPI 147 MPI 147  
System DFT: 4 mils

C. New and Existing, previously finished or stained Wood and Plywood, except floors; natural finish or stained:

1. Natural finish, oil-modified polyurethane  
New; MPI INT 6.4J-G4 / Existing; MPI RIN 6.4L-G4  
Primer: Intermediate: Topcoat:  
MPI 57 MPI 57 MPI 57  
System DFT: 4 mils

New; MPI INT 6.4J-G6 (Gloss) / Existing; MPI RIN 6.4L-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 56 MPI 56 MPI 56  
System DFT: 4 mils

2. Stained, oil-modified polyurethane  
New; MPI INT 6.4E-G4 / Existing; MPI RIN 6.4G-G4  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 57 MPI 57 MPI 57  
System DFT: 4 mils

3. Stained, Moisture Cured Urethane  
New; MPI INT 6.4V-G2 (Flat) / Existing; MPI RIN 6.4V-G2 (Flat)  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 71 MPI 71 MPI 71  
System DFT: 4 mils

New; MPI INT 6.4V-G6 (Gloss) / Existing; MPI RIN 6.4V-G6 (Gloss)  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 31 MPI 31 MPI 31  
System DFT: 4 mils

D. New and Existing, previously finished or stained Wood Floors; Natural finish or stained:

1. Natural finish, oil-modified polyurethane  
New; MPI INT 6.5C-G6 (Gloss) / Existing; MPI RIN 6.5C-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 56 MPI 56 MPI 56  
System DFT: 4 mils

2. Natural finish, Moisture Cured Polyurethane  
New; MPI INT 6.5K-G6 (Gloss) / Existing; MPI RIN 6.5D-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 31 MPI 31 MPI 31  
System DFT: 4 mils

3. Stained, oil-modified polyurethane  
New; MPI INT 6.5B-G6 (Gloss) / Existing; MPI RIN 6.5B-G6 (Gloss)  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 56 MPI 56 MPI 56  
System DFT: 4 mils

DIVISION 6: INTERIOR WOOD PAINT TABLE

4. Stained, Moisture Cured Polyurethane

New; MPI INT 6.5J-G6 (Gloss) / Existing; MPI RIN 6.5L-G6 (Gloss)

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 31	MPI 31	MPI 31

System DFT: 4 mils

E. New and Existing, uncoated wood surfaces in areas requiring a high degree of sanitation, and other high humidity areas not otherwise specified.:

1. Waterborne Light Industrial

MPI INT 6.3P-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 153	MPI 153

System DFT: 4.5 mils

MPI INT 6.3P-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 154	MPI 154

System DFT: 4.5 mils

2. Alkyd

MPI INT 6.3B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 47	MPI 47

System DFT: 4.5 mils

MPI INT 6.3B-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 48	MPI 48

System DFT: 4.5 mils

G. Existing, previously painted wood surfaces in areas requiring a high degree of sanitation, and other high humidity areas not otherwise specified:

1. Waterborne Light Industrial Coating

MPI RIN 6.3P-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 46	MPI 153	MPI 153

System DFT: 4.5 mils

MPI RIN 6.3P-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 46	MPI 154	MPI 154

System DFT: 4.5 mils

2. Alkyd

MPI RIN 6.3B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 46	MPI 47	MPI 47

System DFT: 4.5 mils

MPI RIN 6.3B-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 46	MPI 48	MPI 48

System DFT: 4.5 mils

DIVISION 6: INTERIOR WOOD PAINT TABLE

H. New and Existing, previously finished or stained Wood Doors; Natural Finish or Stained:

1. Natural finish, oil-modified polyurethane  
New; MPI INT 6.3K-G4 / Existing; MPI RIN 6.3K-G4  
Primer: Intermediate: Topcoat:  
MPI 57 MPI 57 MPI 57  
System DFT: 4 mils

New; MPI INT 6.3K-G6 (Gloss) / Existing; MPI RIN 6.3K-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 56 MPI 56 MPI 56  
System DFT: 4 mils

Note: Sand between all coats per manufacturers recommendations.

2. Stained, oil-modified polyurethane  
New; MPI INT 6.3E-G4 / Existing; MPI RIN 6.3E-G4  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 57 MPI 57 MPI 57  
System DFT: 4 mils

New; MPI INT 6.3E-G6 (Gloss) / Existing; MPI RIN 6.3E-G6 (Gloss)  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 56 MPI 56 MPI 56  
System DFT: 4 mils

Note: Sand between all coats per manufacturers recommendations.

3. Stained, Moisture Cured Urethane  
New; MPI INT 6.4V-G2 (Flat) / Existing; MPI RIN 6.4V-G2 (Flat)  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 71 MPI 71 MPI 71  
System DFT: 4 mils

New; MPI INT 6.4V-G6 (Gloss) / Existing; MPI RIN 6.4V-G6 (Gloss)  
Stain: Primer: Intermediate: Topcoat:  
MPI 90 MPI 31 MPI 31 MPI 31  
System DFT: 4 mils

Note: Sand between all coats per manufacturers recommendations.

I. New and Existing, uncoated Wood Doors; Pigmented finish:

1. Alkyd  
New; MPI INT 6.3B-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 45 MPI 47 MPI 47  
System DFT: 4.5 mils

New; MPI INT 6.3B-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 45 MPI 48 MPI 48  
System DFT: 4.5 mils

Note: Sand between all coats per manufacturers recommendations.

2. Pigmented Polyurethane

DIVISION 6: INTERIOR WOOD PAINT TABLE

New; MPI INT 6.1E-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 72 MPI 72 MPI 72  
System DFT: 4.5 mils

Note: Sand between all coats per manufacturers recommendations.

J. Existing, previously painted Wood Doors; Pigmented finish:

1. Alkyd

New; MPI RIN 6.3B-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 46 MPI 47 MPI 47  
System DFT: 4.5 mils

New; MPI RIN 6.3B-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 46 MPI 48 MPI 48  
System DFT: 4.5 mils

Note: Sand between all coats per manufacturers recommendations.

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

A. New and Existing, previously painted Plaster and Wallboard not otherwise specified:

1. Latex

New; MPI INT 9.2A-G2 (Flat) / Existing; RIN 9.2A-G2 (Flat)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 44 MPI 44  
System DFT: 4 mils

New; MPI INT 9.2A-G3 (Eggshell) / Existing; RIN 9.2A-G3 (Eggshell)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 52 MPI 52  
System DFT: 4 mils

New; MPI INT 9.2A-G5 (Semigloss) / Existing; RIN 9.2A-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 54 MPI 54  
System DFT: 4 mils

2. High Performance Architectural Latex - High Traffic Areas

New; MPI INT 9.2B-G2 (Flat) / Existing; MPI RIN 9.2B-G2 (Flat)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 138 MPI 138  
System DFT: 4 mils

New; MPI INT 9.2B-G3 (Eggshell) / Existing; MPI RIN 9.2B-G3 (Eggshell)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 139 MPI 139  
System DFT: 4 mils

New; MPI INT 9.2B-G5 (Semigloss) / Existing; MPI RIN 9.2B-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 141 MPI 141

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

System DFT: 4 mils

3. Institutional Low Odor / Low VOC Latex

New; MPI INT 9.2M-G2 (Flat) / Existing; MPI RIN 9.2M-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 50 MPI 144 MPI 144

System DFT: 4 mils

New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 50 MPI 145 MPI 145

System DFT: 4 mils

New; MPI INT 9.2M-G4 (Satin) / Existing; MPI RIN 9.2M-G4 (Satin)

Primer: Intermediate: Topcoat:

MPI 50 MPI 146 MPI 146

System DFT: 4 mils

New; MPI INT 9.2M-G5 (Semigloss) / Existing; MPI RIN 9.2M-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 147 MPI 147

System DFT: 4 mils

B. New and Existing, previously painted Plaster and Wallboard in areas requiring a high degree of sanitation, and other high humidity areas not otherwise specified.:

1. Waterborne Light Industrial Coating

New; MPI INT 9.2L-G5 (Semigloss) / Existing; MPI RIN 9.2L-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 153 MPI 153

System DFT: 4 mils

2. Alkyd

New; MPI INT 9.2C-G5 (Semigloss) / Existing; MPI RIN 9.2C-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 47 MPI 47

System DFT: 4 mils

-- End of Section --

SECTION 10 56 13

STEEL SHELVING

04/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A536 (1984; R 2019; E 2019) Standard Specification for Ductile Iron Castings

ASTM D522/D522M (2017) Mandrel Bend Test of Attached Organic Coatings

ASTM D2794 (1993; R 2019) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

ASTM D3359 (2017) Standard Test Methods for Rating Adhesion by Tape Test

MATERIAL HANDLING INDUSTRY OF AMERICA (MHI)

MHI MH28.1 (1997) Specification: Industrial Steel Grade Shelving

1.2 DEFINITIONS

For the purposes of this specification the shelf category, "medium weight," "heavy weight," will be as follows. Load is given per shelf in pounds for evenly distributed load. This does not limit the shelf size, only the shelving category.

Minimum Evenly Distributed Load Per Shelf in Pounds		
Shelf Size	Type Medium Duty	Type Heavy Duty
18 by 36 in.	700	1300
18 by 48 in.	500	900

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook,

in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shelving Units; G, AE

SD-02 Shop Drawings

Dimensioned Rail Layouts with Field Dimensions; G, AE

Dimensioned Carriage Layouts; G, AE

Details of Shelving Units; G, AE

Installation Sequencing and Scheduling; G, AE

SD-03 Product Data

Shelving Units; G, RO

Accessories; G, RO

Installation instructions; G, RO

SD-04 Samples

Finishes; G, AE

SD-06 Test Reports

Shelving Units; G, RO

Finish; G, RO

1.4 SHOP DRAWINGS

Show fabrication, assembly, and installation details including descriptions of procedures and diagrams. Show complete extent of installation layout including clearances, spacing, and relation to adjacent construction in plan, elevation, and sections. Indicate clear exit and access aisle widths; access to concealed components; assemblies, connections, attachments, reinforcement, and anchorage; and deck details, edge conditions, and extent of finish flooring within area where units are to be installed.

- a. Show installation details at non-standard conditions. Furnish floor layouts, technical and installation manuals for every unit shipment with necessary dimensions for rail layout and system configuration at the project site. Include installed weight, load criteria, furnished specialties, and accessories.
- b. Provide layout, dimensions, and identification of each unit corresponding to sequence of installation and erection procedures. Specifically include the following:
  1. Dimensioned Rail Layouts with Field Dimensions: Location, position and configuration of tracks on all floors.
  2. Dimensioned Carriage Layouts: Plan layouts of positions of

carriages, including all required clearances.

3. **Details of Shelving Units:** Indicating method and configuration of installation in carriages.

- c. Provide location and details of anchorage devices to be embedded in or fastened to other construction.
- d. Provide installation schedule and complete erection procedures to ensure proper installation.

#### 1.5 PROJECT CONDITIONS

- a. **Field Measurements:** Verify mobile storage unit location by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- b. **Established Dimensions:** Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating mobile storage units. Coordinate construction to ensure actual dimensions correspond to established dimensions.

#### 1.6 INSTALLATION SEQUENCING AND SCHEDULING

- a. **Sequencing:** Coordinate storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.
- b. **Scheduling:** Plan installation to commence after finishing operations, including painting have been completed.
- c. **Built-In Items:** Provide components which must be built in at a time which causes no delays general progress of the Work.
- d. **Pre-installation Conference:** Schedule and conduct conference on project site to review methods and procedures for installing mobile storage units including, but not limited to, the following:
  - 1. Review project conditions and levelness of flooring and other preparatory work performed under other contracts.
  - 2. Review and verify structural loading limitations.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

Deliver materials in original packages, containers or bundles bearing the brand name and identification of the manufacturer. Store inside under cover. Protect surfaces from damage.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURED UNITS

**MHI MH28.1.** Provide shelving units indicated and at Heavy-Duty Capacity not to exceed capacities defined for carriages, wheels, rails and drive motors. Motorized High-Density Storage Shelving systems must be coordinated with Electrical for motorized carriages and field verified constraints of building. Provide shelving units designed for structural floor system capable of supporting live and dead loads required by prevailing building codes, including loads of storage units to be

installed. Provide a maximum allowable sub floor deflection of L/360 with Automatic Brake under specified mobile storage loads.. Provide units with base plates for floor anchorage when required. Provide wall connections for units over 8 feet 3 inches to top shelf. Minimum high-density shelving aisle width shall be no less than 36 inches between carriages. Typical unless noted otherwise, Shelving Units are to have Closed Tops, Base, Side, Intermediate and End panels. Single Sided Units to have Closed Backs, Double-Sided Units to have Open Backs. Refer to Furniture Location Plans for configurations.

## 2.2 FINISHES

Provide the shelving units in the manufacturer's standard colors. Clean metal by multiple stage phosphatizing and sealing process, for rust resistance and paint adhesion. Finish is to be archive quality, non-reactive, solvent-free, baked polyester powder coating and will have no potential off-gassing. Solvent based wet-spray paint finishes on any components in the entire installation are unacceptable.

Finishes for Metal Storage items as selected from Basis of Design manufacturers standards, are to be as follows or Equivalent;

- a. Museum Conservation Cabinets coded as XH6 in the Furniture Location Plans. Powder-Coat paint finish: Spacesaver - FW-Furniture White (15).
- b. Motorized High Density Storage coded as XH1.1, XH1.2, XH1.3, XH1.4, XH2.1, XH2.2 and XH2.3 in the Furniture Location Plans. Powder-Coat paint finish: Spacesaver - FW-Furniture White (15). Laminate Face Panels: Spacesaver - AF232 Natural Linen, Suede finish.

## 2.3 SOURCE QUALITY CONTROL

- a. MHI MH28.1, for tests of shelf capacity, lateral stability and shelf connections.
- b. Finish flexibility, ASTM D522/D522M, Method A, 1/8 inch diameter, 180 degree bend, no evidence of fracturing to the naked eye.
- c. Finish adhesion, ASTM D3359, Method B. There shall be no film removed by tape applied to 11 parallel cuts space 1/8 inch apart plus 11 similar cuts at right angles.
- d. Impact resistant finish, ASTM D2794, no loss of adhesion after direct and reverse impact equal to 1.5 times metal thickness in mm, expressed in inch pounds.

## 2.4 MUSEUM CONSERVATION CABINET (XH6)

Basis of Design Manufacturer or Equivalent: Spacesaver - Viking Metal Cabinets Model 395 - 94.5"W x 50"D x 79"H (181 cubic feet of storage).

- a. Extra large sealed heavy gauge steel conservation cabinet with reinforced four-way pallet welded base with removable front access cover and levelers. Hinged lift-off reinforced bi-fold doors for full open. Lockable doors with lever pull. Interior to include 4 - Adjustable Heavy-Duty multichannel full width shelves above, 4 - 5"H full width Flat File drawers with safety stops below. Provide cabinets with optional vents with sliding closures.

- b. NOTICE: Unit requires tight coordination with project renovation work to time installation of large components. Contractor to coordinate install with other work requiring larger openings with Storage Supplier. Unit typically fully welded, customized to be installed in pieces on site.

2.5 ~~N~~Motorized High-Density Storage System for Cold Storage Room  
(Stainless Rail/Wheels) - (XH1.1)

Basis of Design Manufacturer or Equivalent: Spacesaver - ActivRac 7P. Motorized Carriages for Cold Storage with recessed stainless steel rails and wheels in thermal insulated flooring troughs. Refer to drawings for configurations and sizes. Units require tight coordination with installation of the Cold Storage room insulation, Electrical provisions and finished floor. Contractor to coordinate installation of rails in recessed troughs by Storage Supplier. Refer to project drawings for details on recessed rails.

2.5.1 System Description

- a. General: The system consists of manufacturer's storage units mounted on manufacturer's track-guided carriages to form a compact storage system. System design permits access to any single aisle by moving units until the desired aisle is opened. The manufacturer's standard unit interlock system prevents units from being moved while the open aisle is occupied. The carriage/rail system provides uniform carriage movement along the total length of travel, even with unbalanced loads.
- b. Operating environment: Design options shall allow the carriage system to operate in the following environmental conditions.
  - 1. System controls shall operate at room temperatures between 32 F and 122 F.
  - 2. System controls shall operate at room temperature between 32 F and -20 F.
- c. Carriage System Design and Features: The carriage system consists of a formed structural steel frame with stainless steel wheels riding on stainless steel rails recessed and mounted to the floor, receiving silicon at anchor penetration points. Rails shall be types selected by the manufacturer to ensure smooth operation and self-centering of mobile storage units during travel without end play or binding. Rail types, quantities and spacing shall be selected by the manufacturer to suit installation conditions and requirements. All bearings used in the drive mechanism shall be permanently shielded and lubricated.
- d. Movement Controls: Provide a carriage control panel on the accessible (open) end of each movable carriage, located approx. 39 inches above the base, centered on the control panel. Minimum controls shall include directional control buttons, STOP/RESET push-button and a red reset light.
  - 1. System controls shall start motors on each movable carriage "sequentially" to minimize power demands and shall provide dynamic braking to provide smooth operation. No additional hardware shall be required to change between "sequential" and "block" movement. Maximum running speed shall be limited to 3.3 inches per second.
  - 2. Provide solid state controls and indicator lights for a visual indication of safety system operation. Provide each aisle with a

- programmable distance sensor to ensure proper timing for start/stop operation.
3. Pushing the directional control button on any mmovablecarriage adjacent to the desired aisle location in the direction away from the desired aisle location opens the system at the desired aisle. The selected aisle shall open automatically regardless of the position of the carriages. Manual Reset: The carriage control head will display a flashing red reset light at the newly opened aisle indicating that the aisle is locked open and requires resetting before another aisle can be opened. Provide for automatic lockout and manual reset of controls if selected aisle is not moved within a preset period of time.
  4. Controls shall feature back lit message indicating which aisle is in use (i.e. "Right Aisle in use" or "Left Aisle in use").
  5. Each control head shall be protected (shielded) by a 12 gauge cover guard.
- e. Drive System: The system shall be designed with a positive type motorized drive which minimizes end play and that carriages will stop without drifting. All system components shall be selected to ensure a smooth, even movement along the entire carriage length.
1. Each electric carriage shall be provided with a current limited fractional horsepower gear motor, connected to drive wheel assembly with a roller chain.
  2. System shall include a chain sprocket drive system to ensure that carriages move uniformly along the total length of travel, even with unbalanced loads.
  3. A tensioning device shall be provided on each chain drive (when applicable).
  4. All bearings used in the drive mechanism shall be permanently shielded and lubricated.
  5. System shall operate on 115 V.A.C. 50/60 hertz, 20 amp dedicated circuit provided by others, one per module.
  6. Rear or front mounted overhead mounted power pantograph distribution system to conceal all interconnecting wiring shall be available. (note: power distribution systems are dependent on type of shelving/storage equipment contact manufacturer for details).
- f. Safety Features:
1. Visual indicators shall provide verification that carriages are in the locked or unlocked mode.
  2. Two safety sweeps shall be provided in each aisle. A full-length infrared photoelectric safety sweep shall be provided to stop carriage movement if the sweep contacts an obstruction while in motion. Sweep must be equipped with OSHA approved safety demarcation tape.
  3. Infrared photoelectric aisle entry sensor system shall be provided to stop carriage movement if the system detects persons entering a closing aisle.
  4. Entire system shall be C-UL US system listed.
  5. A handheld rechargeable power pack shall be provided for emergency operations in case of primary power failure.
  6. Stop pushbutton shall be provided at each aisle control. A warning horn shall be provided whereupon activation of an aisle movement pushbutton it will sound for the first 3 seconds of carriage movement. A flashing yellow warning light is provided on the carriage ends that will flash during system movement.

### 2.5.2 System Operation

- a. Open an aisle with one-touch, user-friendly, directional operation (at the carriage mounted control or via optional infrared or RF remote control aboard a fork truck).
- b. Press a safety "Stop/Reset" button to immediately stop any moving carriage(s).
- c. Easily distinguish a systems operational status via the lighted indicators on each carriage.
- d. Be protected by in-aisle safety devices that stop carriage movement when a person or object (i.e., box, ladder, or fork truck) is detected.
- e. When carriages are in motion, any safety activation (photo sweeps and aisle entry sensors) will stop the aisle from closing on that aisle and the mobile carriage LED indicators will illuminate flashing red on both sides of the aisle where the safety was activated.
- f. Depressing any "Stop/Reset" button during carriage movement will bring all carriages to a stop.
- g. After carriages complete their movement the open aisle will be locked out and the control head indicator on either side of the open aisle will illuminate "Aisle in Use" its now safe to enter the aisle.

### 2.5.3 Manufactured Components

- a. Rails:
  1. RECESSED MOUNT: Rail shall be 17-4PH Stainless Steel bar 4.00" wide x 3/8" high with smooth finish. Rail shall disperse the wheel point loads to structural slab. Rail shall have two permanently mounted floor anchors maximum 15" on center. Rail shall be installed recessed into concrete slab, flush to top of concrete slab, and laid in a manor such that rail joints are staggered across all adjacent rail runs. Rail and carriage design allows concrete slab to be unlevel at the following maximum variation of 3/16" over any 2 (0.6m) rail run and 1/4" maximum variation over any 10 ail run.
- b. Mobile Carriages:
  1. Assembled structural steel carriage base will have a minimum capacity of 7,000 lbs. Each wheel assembly shall be equipped with two wheels, minimum 5" diameter steel wheels. Wheels are equipped with two permanently lubricated and shielded radial ball bearings. Wheel capacity 3,500 lbs each. Wheels have solid steel axles of 1 inch in diameter. Wheels shall be dual flange, all wheel guided. All carriage sections between wheel assemblies have integral cross bracing to maintain accepted tolerances for function of systems. Side profiles shall provide and maintain wheel assembly alignment and squareness. These profiles shall be pre-drilled at the factory but are bolted, and assembled on the job site as integral carriage members.
  2. Structural steel side profiles shall be minimum 5.084" high, 10 gauge.

3. Wheels: Provide precision machined and balanced units with permanently shielded and lubricated bearings.
4. Provide manufacturer's design movable carriages fabricated or bolted steel construction. Galvanized structural components and/or riveted carriages are unacceptable.

c. Drive / Guide System:

1. Design: Provide drive system which prevents carriage whipping, binding and excessive wheel/rail wear under normal operation.
2. Drive: Line shaft driven carriages, all wheels on one side of carriage shall drive.
3. Shafts: Solid steel tube.
4. Shaft Connections: Secured couplings.
5. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.

d. Power and Controls:

1. System power requirements - 120 VAC single phase input. Powered carriages shall be equipped with 1/8 HP; 90-volt DC gear motors.
2. Multiple carriages shall be moved with a single activation of a carriage control and/or via an infrared or RF remote. Each carriage shall be equipped with one or more 1/8 HP, 90-volt DC gear motors, depending on load rating. Each independent drive shall be synchronous and current limiting to maintain proper alignment through closed loop motor feedback and control on all individual motors within the carriage regardless of length or weight load and eliminate racking and binding. Motor and motor controllers shall provide for soft-start/soft-stop movement, current limiting, and automatic time-out. Carriage movement to be selectable between sequential to minimize power demands on start-up, or block movement for faster access Motors and power train shall provide for maximum carriage travel speed of 3 inches per second. All power transfer to wheels to be done by chain drive. Power to mobile units provided by an overhead buss bar system. Communication between carriages is provided by overhead cable festoon. Power supply to be provided by others.

2.6 Motorized High-Density Storage System - (XH1.2, XH1.3, XH1.4, XH2.1, XH2.2 and XH2.3)

Basis of Design Manufacturer or Equivalent: Spacesaver - Eclipse Powered Mobile System. Refer to drawings for configurations and sizes. Contractor to coordinate installation of recessed rails by Storage Supplier with Structural work and concrete topping. Refer to project drawings for details on recessed rails and configurations of shelving..

2.6.1 System Description

- a. General: The system consists of Spacesaver manufactured storage units mounted on manufacturer's track-guided carriages to form a compact storage system. System design permits access to any single aisle by moving units until the desired aisle is opened. The manufacturer's standard unit interlock system prevents units from being moved while the open aisle is occupied. The carriage/rail system provides uniform carriage movement along the total length of travel with the "Syncro-Guide" drive system, even with unbalanced loads. Therefore,

Line Shaft Driven carriages are not permitted.

- b. Carriage System Design and Features: The carriage system consists of a formed structural steel frame with hardened steel wheels riding on steel rails surface mounted to the floor. Rails shall be types selected by the manufacturer to ensure smooth operation and self-centering of mobile storage units during travel without end play or binding. Rail types, quantities and spacing shall be selected by the manufacturer to suit installation conditions and requirements. All bearings used in the drive mechanism shall be permanently shielded and lubricated.
- c. Movement Controls: Provide a carriage control panel on the accessible (open) end of each moveable carriage, located 44 inches (1118 MM) above the base, centered on the face panel. Minimum controls shall include directional control buttons/icons, STOP/RESET push-button/icon and a red reset light/icon.
  1. System controls shall start motors on each movable carriage sequentially" to minimize power demands and shall provide dynamic braking to provide smooth operation. No additional hardware shall be required to change between "sequential" and "block" movement. Maximum running speed shall be limited to 3.3 inches per second.
  2. Provide solid state controls and indicator lights/icons for a visual indication of safety system operation. Provide each aisle with a programmable distance sensor to ensure proper timing for start/stop operation.
  3. Pushing the directional control button/icon on any moveable carriage adjacent to the desired aisle location in the direction away from the desired aisle location opens the system at the desired aisle. The selected aisle shall open automatically regardless of the position of the carriages. Manual Reset: The carriage control head will display a flashing red reset light/icon at the newly opened aisle indicating that the aisle is locked open and requires resetting before another aisle can be opened. Provide for automatic lockout and manual reset of controls if selected aisle is not moved within a preset period of time. Automatic Reset: The carriage control heads will display a constant green light, or green arrow icon, at all carriages indicating that the system is ready for the next aisle access.
  4. Controls shall feature safety activated message and direction indicator designating which aisle safety was activated or back lit message indicating which aisle is in use (i.e. "Right Aisle in use" or "Left Aisle in use").
- d. Drive System: The system shall be designed with a positive type motorized drive which minimizes end play and that carriages will stop without drifting. All system components shall be selected to ensure a smooth, even movement along the entire carriage length.
  1. Each electric carriage shall be provided with a current limited fractional horsepower gear motor, connected to drive wheel assembly with a roller chain.
  2. System shall include a chain sprocket drive system to ensure that carriages move uniformly along the total length of travel, even with unbalanced loads.
  3. A tensioning device shall be provided on each chain drive (when applicable).
  4. All bearings used in the drive mechanism shall be permanently

shielded and lubricated.

5. System shall operate on 115 V.A.C. 50/60 hertz, 20 amp dedicated circuit provided by others, one per module.
6. Overhead mounted power pantograph distribution system shall conceal all interconnecting wiring.

e. Safety Features:

1. Visual indicators/icons shall provide verification that carriages are in the locked or unlocked mode.
2. Two Infra Red Safety sweeps shall be provided in each aisle. Full-length infrared photoelectric safety sweeps shall be provided to stop carriage movement if the sweep contacts an obstruction while in motion. Sweep must be equipped with OSHA approved safety demarcation tape.
3. Entire system shall be C-UL US system listed.
4. Infrared photoelectric aisle entry sensor system shall be provided to stop carriage movement if the system detects persons entering a closing aisle.
5. A handheld rechargeable power pack shall be provided for emergency operations in case of primary power failure.

2.6.2 Grout

- a. General: Provide non-shrink, non-staining hydraulic cement compound conforming to the following requirements, based on the performance of the test specimens at room temperature and in laboratory air, as stated by the grout manufacturer.

1. Linear Movement: No shrinkage while setting; maximum expansion limited to .002 inches per linear inch.
2. Compressive Strength: Based on two inch cubes made following ASTM standards, tested on a Balding-Southward machine of 60,000 pounds capacity, meet or exceed the following:

- a) Age: 1 hour - 4,500 psi  
7 days - 8,000 psi

2.6.3 Manufactured Components

- a. Rails: General: Provide manufacturer's standard design units with the following properties:

1. Material: ASTM/AISI Type 1035 or 1045 steel, manufacturers selection.
2. Capacity: 1,000 pounds per lineal foot of carriage.
3. Minimum Contact Surface: 5/8 inch wide.
4. Provide rail sections in minimum 6 foot lengths.
5. Rail configuration shall permit attachment to top of structural floor system with provision for leveling rails to compensate for variations in floor surface level.
6. Provide rail connections designed to provide horizontal and vertical continuity between rail sections, to gradually transfer the concentrated wheel point load to and from adjoining rail sections. Butt joints without connections are not permitted.
7. Once rails are leveled, they shall be supported the full length with the specified grout.

- b. Carriages:

1. Provide manufacturer's design movable carriages fabricated of welded steel construction. Galvanized structural components and/or riveted carriages are unacceptable. 1,000 pound per foot minimum capacity.
2. Provide fixed carriages of same construction and height as the movable carriages, anchored to rails. Setting fixed shelving directly on floors is not permitted.
3. When required, provide bolted carriage splices designed to maintain proper unit alignment and weight load distribution.
4. Design carriages to allow the shelving uprights to recess and interlock into the carriages a minimum of 3/4 inch. Top mount carriages are unacceptable.
5. Provide each carriage with two wheels per rail.

c. Drive / Guide System:

1. Design: Provide drive system which prevents carriage whipping, binding and excessive wheel/rail wear under normal operation.
  - a. Synchronized drives are required - a minimum of one wheel assembly driving both sides of carriage at center location required. Drive shaft shall exhibit no play or looseness over the entire length of that assembly.
2. Shafts: Solid steel rod or tube.
3. Shaft Connections: Secured couplings.
4. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.

d. Wheels:

1. Materials: Type 1045 solid steel **ASTM A536** specification 65/45/12 machined ductile iron. Minimum load capacity per wheel: 3200 lbs.
2. Size: Minimum 5 inches outside diameter drive wheels.
3. Guides: Determined by manufacturer; minimum 2 locations.

e. Motors:

1. Type: 90VDC

f. Face Panels:

1. Materials: Steel with factory applied laminate panels.
2. Finishes: Selected from manufacturers standard available colors and patterns.
3. End panels must cover the full height and width of shelving.
4. Edgings: Provide preformed edging, color-matched to unit colors selected.

PART 3 EXECUTION

3.1 EXAMINATION

- a. Examine floor surfaces, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of mobile storage units.

- b. Verify that building structural system is adequate for installing mobile storage units at locations indicated on approved shop drawings, ensure that recesses for rails in floor are at proper spacing and depths.
- c. Verify that intended installation locations of mobile storage units will not interfere with nor block established required exit paths or similar means of egress once units are installed.
- d. Verify that adequate capacity permanent power sources have been installed at locations indicated on approved shop drawings.
- e. Prepare written report, endorsed by Installer, listing conditions detrimental to proper performance of mobile storage units, once installed.
- f. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

#### a. Rails:

1. Lay out rails using full-length units to the maximum extent possible. Use cut lengths only at ends to attain total length required. Locate and position properly, following dimensions indicated on approved shop drawings. Verify thickness of finished floor materials to be installed and install level 1/16 inch above finished floor surfaces.
2. Verify level, allowing for a minimum 1/4 inch of grout under high points. Position and support rails so that no movement occurs during grouting.
3. Set rails in full grout bed, completely filling any voids entire length of all rails including rail connectors. Trim up sides flush with rails to ensure proper load transfer from rail to supporting floor. Using shims in lieu of full grouting is not permitted.
4. Installation Tolerances: Do not exceed levelness of installed rails listed below:
  - a. Maximum Variation From True Level Within Any Module: 3/32 inch.
  - b. Maximum Variation Between Adjacent (Parallel) Rails: 1/16 inch, perpendicular to rail direction.
  - c. Maximum Variation In Height: 1/32 inch, measured along any 10 foot rail length.
5. Verify rail position and level; anchor to structural floor system with anchor type and spacings indicated on approved shop drawings.

#### b. Shelving Units Installation:

1. General: Follow layout and details shown on approved shop drawings and manufacturer's printed [installation instructions](#). Position units level, plumb; at proper location relative to adjoining units and related work.
2. Carriages:
  - a. Place movable carriages on rails. Ensure that all wheels track properly and centering wheels are properly seated on centering

rails. Fasten multiple carriage units together to form single movable base where required.

b. Position fixed carriage units to align with movable units; make final leveling adjustments with leveling screws.

3. Shelving Units:

a. Permanently fasten shelving units to fixed and movable carriages with vibration-proof fasteners.

b. Stabilize shelving units following manufacturer's written instructions. Reinforce shelving units to withstand the stress of movement where required and specified.

4. Wiring:

a. Make final control wiring connections between modules under single control.

b. Test wiring for continuity and proper connections with regulated field power supply before making final power connections. Final connection to units shall be provided by electrician.

c. Test system operation by cycling all units through complete operations sequences.

3.3 FIELD QUALITY CONTROL

a. Verify shelving/racking unit alignment and plumb after installation. Correct if required following manufacturers instructions.

b. Remove components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Replace with new matching units, installed as specified and in manner to eliminate evidence of replacement.

3.4 ADJUSTING

Adjust components and accessories to provide smoothly operating, visually acceptable installation.

3.5 CLEANING

Immediately upon completion of installation, clear components and surfaces. Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

3.6 DEMONSTRATION AND TRAINING

a. Schedule and conduct demonstration of installed equipment and features with User's personnel.

b. Schedule and conduct maintenance training with User's maintenance personnel. Training session should include lecture and demonstration of all maintenance and repair procedures that end user personnel would normally perform.

3.7 PROTECTION

Protect system against damage during remainder of construction period.

West Point, NY  
Cullum Hall

Contract #W912DS-19-C0031

Provide additional protection needed to ensure that system will be without damage or deterioration at time of substantial completion.

-- End of Section --