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DIVISION 09 - FINISHES

SECTION 09960

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04/05

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SECTION 09960

HIGH-PERFORMANCE COATINGS
04/05

NOTE: Delete, revise, or add to the text in this
section to cover project requirements. Notes are
for designer information and will not appear in the
final project specification.

This section covers special coatings as required for
harsh indoor locations or operations (any area
subjected to chemical and/or abrasive action), and
all outdoor installations..

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be
manually edited except to add new references.
References not used in the text will automatically
be deleted from this section of the project
specification.

The publications listed below form a part of this section to the extent
referenced:

ASTM INTERNATIONAL (ASTM)

ASTM E 380 (2002) American National Standard for Use
of the International System of Units (SI)
The Modernized Metric System

MASTER PAINTERS INSTITUTE (MPI)

MPI (2002) Architectural Painting
Specification Manual

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 7 (2000) Brush-Off Blast Cleaning (NACE-No.
4)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

QPL-TNT-AP-28 (2004) Paint, Aluminum, Heat Resisting

(1200 Degrees F)

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Air Force, NASA, and Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Air Force, NASA, and Navy projects.

Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-01 Preconstruction Submittals

Submit Material, Equipment and Fixture List in accordance with paragraph entitled, "Delivery, Handling and Storage," of this section.

SD-03 Product Data

Submit manufacturer's catalog data for the following items including manufacturer's name and identification. Data shall include detailed analysis of each special coating material required for the project, with all the coating constituents measured as percentages of the total weight of the coating. Manufacturer's data concerning application, thinning, and average

coverage per gallon liter shall be included.

Heat-Resistant Coatings
Epoxy Coatings
Polyurethane Coatings
Chlorinated-Rubber Coatings

SD-04 Samples

Submit sample Color Chips in accordance with paragraph entitled, "Delivery, Handling and Storage," of this section.

SD-07 Certificates

Submit certificates for following items showing conformance with the referenced standards contained in this section.

Heat-Resistant Coatings
Epoxy Coatings
Polyurethane Coatings
Chlorinated-Rubber Coatings

1.3 DELIVERY, HANDLING AND STORAGE

Special coating materials must be delivered to the project in their original containers bearing manufacturer's name, descriptive label, and coating formulations. Provide new and unopened containers.

Special coating materials must be stored in tightly closed containers in a covered, well-ventilated area where they will not be exposed to excessive heat, fumes, sparks, flame, or direct sunlight. Protect water-based coatings against freezing.

Solvents, thinners, and equipment cleaners must be stored with the same care as the coating materials with ambient temperatures continuously maintained at a minimum 45 degrees F 7 degrees C.

Submit Material, Equipment and Fixture List consisting of a list of proposed equipment to be used in performance of construction work.

Submit three color chips 3 inch by 4 inch 75 millimeter by 100 millimeter or manufacture pull-down of each finish color and gloss as scheduled.

1.4 FIELD TESTS

Government may take dry-film tests from time to time on finished surfaces. Apply additional coatings to surfaces where there is less than the minimum specified dry-film thickness.

1.5 PROTECTIONS AND SAFETY PRECAUTIONS

Protect adjacent materials and equipment against damage from spillage, dripping, and spatter of coating materials. Building materials and equipment must be left clean and with all damaged surfaces corrected. Provide "WET PAINT" signs to indicate newly painted surfaces.

Provide forced ventilation for interior spaces during application and drying of coatings to prevent the buildup of toxic or explosive concentrations of solvent vapors.

Provide fire extinguishers of the required quantity and correct type to combat flammable liquid fires.

Dispose of rags that are used to wipe up coating materials, solvents, and thinners by drenching them with water and placing in a covered metal container.

1.6 QUALITY ASSURANCE

Comply with Master Painters Institute (MPI) Standards indicated and listed in "MPI Approved Products List." Comply with the requirements in "MPI Architectural Painting Specification Manual" before any project is started.

PART 2 PRODUCTS

2.1 HEAT-RESISTANT COATINGS

NOTE: Heat-resistant coatings are divided into four categories, with upper temperature limits of 400 degrees F, 600 degrees F, 800 degrees F and 1,200 degrees F 204 degrees C, 316 degrees C, 427 degrees C and 649 degrees C.

Coatings above 1,200 degrees F 649 degrees C must be ceramic coatings. Generally, coatings applied to substrates where surface temperatures vary radically, will not have a long life span due to vehicle solid degradation and thermoshock of the metallic pigments. In areas such as this, flame deposition of sacrificial metal coatings must be considered.

2.1.1 Category 1, 50 to 400 Degrees F 10 to 204 Degrees C

NOTE: Use the following for ferrous surfaces where surface temperature will not exceed 400 degrees F 204 degrees C.

Coatings for surface temperatures not exceeding 400 degrees F 204 degrees C must be alkyd resin-based material using ASTM E 380. Apply a minimum two coats of coating with a dry-film thickness of a minimum 4 mils 0.1 millimeter.

First coat must be an epoxy zinc primer conforming to MPI, No. 20 with the resin solids and zinc pigment not less than 80 percent of the total weight of the material.

White and color pigmented finish coats must be an alkyd resin-based material with the resin solids and pigments not less than 85 percent of the total weight of the material. Pigments must be heat-stable materials, formulated to colors as scheduled.

Black-pigmented finish coats must be an alkyd resin, carbon-black pigmented material with resin solids and pigments not less than 50 percent of the

total weight of the material.

Aluminum pigmented finish coats must be an alkyd resin-based material with resin solids and pigments not less than 50 percent of the total weight of the material.

2.1.2 Category 2, 300 to 600 Degrees F 149 to 316 Degrees C

**NOTE: Use the following for ferrous surfaces where
surface temperature will not exceed 600 degrees F
316 degrees C.**

Coatings for surface temperatures not exceeding 600 degrees F 316 degrees C must be based on modified silicone and silicone-based resins. Coatings must be applied in not less than two coats with a dry-film thickness of not less than 3 mils 0.07 millimeter.

Provide a silicone-based resin zinc-pigmented material with the resin solids and zinc pigment for the first coat not less than 80 percent of the total weight of the material.

Color pigmented finish coats must be silicone-based resin material with the resin solids and pigments not less than 80 percent of the total weight of the material. Pigments must be heat-stable materials, formulated to colors as scheduled.

Black-pigmented finish coat must be a silicone-based resin carbon-black pigmented material with resin solids and pigments not less than 50 percent of the total weight of the material.

Aluminum-pigmented finish coats must be modified, silicone-based-resin material with the resin solids and pigments not less than 50 percent of the total weight of the material.

2.1.3 Category 3, 600 to 800 Degrees F 316 to 427 Degrees C

**NOTE: Use the following for ferrous surfaces where
surface temperature will not exceed 800 degrees F
427 degrees C.**

Provide a modified silicone or a silicone-based material of coating for surface temperatures not exceeding 800 degrees F 427 degrees C. Apply a minimum two coats with a dry-film thickness of a minimum 3 mils 0.07 millimeter.

Provide a silicone-based resin, zinc-pigmented material first coat with the resin solids and zinc pigment for the first coat not less than 80 percent of the total weight of the material.

Black-pigmented finish coat must be a silicone-based resin, carbon-black pigmented material with resin solids and pigments not less than 50 percent of the total weight of the material.

Aluminum-pigmented finish coat must be a modified, silicone-based-resin material with the resin solids and pigments not less than 50 percent of the

total weight of the material.

2.1.4 Category 4, 800 to 1,200 Degrees F 427 to 649 Degrees C

**NOTE: Use the following for ferrous surfaces where
surface temperature will not exceed 1,200 degrees F
649 degrees C.**

Coatings for surface temperatures not exceeding 1,200 degrees F 649 degrees C must be an aluminum-pigmented, silicone-resin-based material using ASTM E 380 and conforming to QPL-TNT-AP-28, as modified.

Apply a minimum two coats with a dry-film thickness of a minimum 2 mils 0.05 millimeter.

Coating pigment must contain a minimum of 28 percent aluminum based on the total weight of the material. Vehicle must contain a minimum of 22 percent silicone resin and a maximum of 49 percent of volatile thinners and driers based on the total weight of the material.

2.2 EPOXY COATINGS

**NOTE: Epoxy resin coatings must be used where
surfaces to be coated require high corrosion
resistance, chemical resistance, bond strength, UV
resistance, and toughness.**

**Amine-cured epoxy coatings have higher resistance to
chemical attack and better color retention than
polyamide-cured epoxy coatings. Polyamide-cured
epoxy coatings have higher water resistance and bond
strength than amine-cured coatings.**

2.2.1 General

Conform to MPI, No. 116 for epoxy coatings and epoxy block filler, as modified.

**NOTE: Dry-film thickness given must be considered
minimum and may be revised as required to suit
conditions and surface use.**

Vehicle resins for finish coats must be based on a polyamide-cured, epoxy-resin material. Apply finish coats with a dry-film thickness of not less than 4 mils 0.1 millimeter per coat. Finish color and gloss must be as indicated.

2.2.2 Concrete Surface Coatings

Apply a [epoxy coating system in conformance with MPI, No. 77] [water-based epoxy coating system in conformance with MPI, No. 115] for vertical concrete surfaces. Apply an epoxy slip-resistant deck coating system in conformance with MPI, No. 82. Prime coat must fill concrete surface pores

with a total dry-film thickness of not less than 2 mils 0.05 millimeter.

2.2.3 Masonry Surfaces Coatings

Apply a [Water-Based, Light-Industrial Coating System in conformance with MPI, No. 110] [Epoxy Coating System in conformance with MPI, No. 77] [Water-Based Epoxy Coating System in conformance with MPI, No. 115] [Polyurethane, Pigmented, Over Epoxy Coating System in conformance with MPI, No. 72]. Block filler must fill surface pores with a total dry-film thickness of not less than 7 mils 0.2 millimeter.

2.2.4 Ferrous and Galvanized Metal Surface Coatings

Coatings on ferrous and galvanized metal surfaces must be a prime coat and not less than two finish coats. Comply with MPI, No. 101 for an epoxy zinc primer with a metallic-zinc pigment for the substrate to be coated and the end use of the coated surface. Resin solids and zinc pigment must not be less than 80 percent of the total weight of the coating material. Apply prime coat with a total dry-film thickness of not less than 4 mils 0.1 millimeter. Provide an epoxy-based finished coat as specified.

2.2.5 Aluminum Surface Coatings

Apply an Epoxy Coating System in conformance with MPI, No. 80 and MPI, No. 77. Apply prime coat with a total dry-film thickness of not less than 4 mils 0.1 millimeter

2.3 POLYURETHANE COATINGS

NOTE: Polyurethane-based coatings must be used where surfaces to be coated require high abrasion resistance, good flexibility and chemical resistance, UV resistance, and must be a two-part, prepolymer, catalytic-cured resin material.

The two-part prepolymer, catalytic-cured, resin based materials must be used for heavy-duty coatings where abrasion resistance and chemical resistance are required. Catalytic-cured resins are formulated as clear coatings and in a limited range of pigmented coatings.

2.3.1 General

Polyurethane coatings must use ASTM E 380 and conform to MPI for each substrates indicated.

NOTE: Dry-film thickness given must be considered minimum and may be revised as required.

Vehicle resins for finish coats must be based on a two-part, prepolymer, catalytic-cured, polyurethane material. Apply catalytic-cured coatings with a total dry-film thickness of not less than 10 mils 0.25 millimeter per coat. Indicate finish color and gloss on the schedules.

2.3.2 Concrete Surface Coatings

NOTE: Policy is to avoid coating of exposed concrete unless it is considered aesthetically desirable.

Apply a [Polyurethane, Pigmented Coating System in conformance with MPI, No. 72 and MPI, No. 80] [Polyurethane, Clear, Two-Component Coating System in conformance with MPI, No. 78]. Prime coat must fill surface pores with a total dry-film thickness of not less than 2 mils 0.05 millimeter. Finish coats must be a polyurethane-based material as specified.

2.3.3 Masonry Surface Coatings

Apply a Polyurethane, Clear, Two-Component Coating System in conformance with MPI, No. 78. Block filler must fill surface pores with a total dry-film thickness of not less than 7 mils 0.2 millimeter. Finish coats must be a polyurethane-based material as specified.

2.3.4 Ferrous and Galvanized Metal Surface Coatings

Apply a [Polyurethane, Pigmented Coating System in conformance with MPI, No. 72, MPI, No. 77, and MPI, No. 101] [High-Performance Architectural Latex Coating System in conformance with MPI, No. 134, MPI, No. 138, and MPI, No. 140]. Apply prime coat with a dry-film thickness of not less than 2 mils 0.05 millimeter. Finish coats must be a polyurethane-based material as specified.

2.3.5 Aluminum Surface Coatings

Apply a water base, light industrial coating system in conformance with [MPI, No. 95] [MPI, No. 77 and MPI, No. 80 for epoxy coating] [MPI, No. 80 for polyurethane] coats on aluminum surfaces. Prime coat must use ASTM E 380 and or a polyurethane-resin material as recommended by the coating manufacturer for the substrate to be coated and the end use of the coated surfaces. Apply prime coat with a dry-film thickness of not less than 2 mils 0.05 millimeter. Finish coats must be a polyurethane-based material as specified.

2.3.6 Wood Surface Coatings

Apply a [pigmented polyurethane coating in conformance with MPI, No. 72] [clear polyurethane two-component coating in conformance with MPI, No. 13 and MPI, No. 78]. Apply prime coat with a dry-film thickness of not less than 5 mils 0.12 millimeter. Finish coats must be a polyurethane-based material as specified.

2.4 CHLORINATED-RUBBER COATINGS

NOTE: Chlorinated-rubber-based coatings must be used where surface to be coated requires high resistance to water, salt spray, moist gases, and inorganic acids at 75 degrees F 24 degrees C.

Chlorinated rubber resins cannot be used in the unmodified state; they tend to be deteriorated by

heat and ultraviolet light. Chlorinated-rubber resins are generally modified with phenolic resins.

Chlorinated rubber coatings must be based on modified, chlorinated-rubber, phenolic-resin materials. Coatings are formulated as grey and white coating with a wide range of tints for white base material.

2.4.1 General

NOTE: Dry-film thickness given shall be considered minimum and may be revised to suit conditions and surface use.

Vehicle resins for finish coats must be based on a modified, chlorinated-rubber, phenolic-resin material. Coating material must contain not less than 20 percent chlorinated rubber resin, based on the total weight of the material. Apply finish coats with a dry-film thickness of not less than 3 mils 0.07 millimeter per coat. Finish coating color must be as indicated.

2.4.2 Concrete Surface Coatings

NOTE: Policy is to avoid coating of exposed concrete unless it is considered aesthetically desirable.

Apply a minimum three coats on concrete surfaces. Prime coat must be based on a chlorinated-rubber resin material as recommended by the coating manufacturer for the substrate to be coated and the end use of the coated surfaces. Prime coat must fill concrete surface pores with a total film thickness of not less than 2 mils 0.05 millimeter. Finish coats must be chlorinated-rubber-based coatings as specified.

2.4.3 Masonry Surface Coatings

Apply a minimum two finished coats on masonry surfaces must be a masonry block filler. Block filler must be based on an epoxy-ester resin material as recommended by the coating manufacturer for the substrate to be coated and the end use of the coated surface. Block filler must fill surface pores with a total film thickness of not less than 7 mils 0.2 millimeter. Finish coats must be chlorinated-rubber-based coatings as specified.

2.4.4 Ferrous and Galvanized Metal Surface Coatings

Apply a minimum two coats of high performance architectural latex coating in conformance with MPI, No. 79 on ferrous and galvanized metal surfaces. Apply prime coat with a dry-film thickness of not less than 3 mils 0.07 millimeter. Finish coats must be chlorinated rubber-based coatings as specified.

2.4.5 Aluminum Surface Coatings

Apply a minimum three coats of quick drying primer for aluminum surfaces. Prime coat must conform to ASTM E 380 and MPI, No. 80 for aluminum coating system.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

3.1.1 Concrete Surfaces

Conform to MPI for substrates indicated. Remove plates, machined surfaces, and similar items already in place that are not to be coated. Provide surface-applied protection before surface preparation and coating where removal is impractical or impossible. After completing coating operations, reinstall items that were removed.

Clean dirt, oil, grease, and incompatible paints from substrates to ensure bonding. Coordination of shop-applied prime coats with high-performance coatings is critical. Remove incompatible primers. Reprime substrate with compatible primers as required to produce coating systems indicated.

3.1.1.1 Concrete Substrates

Remove release agents, curing compounds, efflorescence, and chalk. Maximum Moisture Content of concrete is 12 percent. Moisture content must be measured with electronic moisture meter.

Clean surfaces with pressurized water. Use pressure range of [1500 to 4000 psi 10 350 to 27 580 kPa at 6 inch to 12 inch 150 mm to 300 mm] [4000 to 10,000 psi 27 580 to 68 950 kPa].

Comply with SSPC SP 7 (NACE No. 4), "Brush-Off Blast Cleaning" for abrasive cleaning.

3.1.1.2 Clay Masonry Substrates

Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

Clean surfaces with pressurized water. Use pressure range of [100 to 600 psi 690 to 4140 kPa] [1500 to 4000 psi 10 350 to 27 580 kPa] at 6 inch to 12 inch 150 to 300 mm.

NOTE: Delete paragraph below if primers are shop
applied and will not be removed in the field.

3.1.1.3 Steel Substrates

Remove rust and loose mill scale. Clean using methods recommended in writing by coating manufacturer. Conform to SSPC SP 7 (NACE No. 4) for blast cleaning.

NOTE: Galvanized-metal substrates should not be

chromate passivated (commercially known as "bonderized"). If galvanized metal is chromate passivated, consult manufacturers for appropriate surface preparation and primers.

3.1.1.4 Galvanized-Metal Substrates

Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.1.1.5 Aluminum Substrates

Remove surface oxidation.

3.1.1.6 Wood Substrates

Prep substrates by scraping and cleaning small, dry, seasoned knot. Sand surfaces smooth. Apply a thin coat of knot sealer before applying an interior latex-based wood primer. Prime edges, ends, faces, undersides, and back sides of wood. After priming, fill holes and crevices to the finished surface with putty or plastic wood filler. After finished surface is dry, smooth surface by sanding. For a finished product.

3.2 COATING MATERIAL PREPARATION

3.2.1 General

Mix and prepare coating materials in accordance with the coating manufacturer's printed instructions for the particular material and coat to be applied. Keep materials which are not in actual use in closed containers.

Coating materials that have been mixed with an automatic shaker must be allowed to stand to let air bubbles escape, then given a final hand mixing before application. Stir materials so as to produce a mixture of uniform density. Stir at frequent intervals during application to prevent skinning. Do not stir film which may form on the surface of the material. Remove film and strain, if necessary.

3.2.2 Thinning

Thinning must be done in accordance with coating manufacturer's printed directions for the particular material and coat.

3.2.3 Tinting

Prime and intermediate coats of paint must be a slightly different tint from the finish coat to facilitate identification of each coat. Tinting must be done by the coating manufacturer and clearly identified as to color and coat.

3.3 APPLICATION OF COATING MATERIALS

3.3.1 General

Do not perform exterior painting in damp or rainy weather. Interior painting must not be allowed until the building is enclosed and has

thoroughly dried out. Do not allow painting below 50 degrees F 10 degrees C and above 95 degrees F 35 degrees C. Painting application must be in accordance with the coating manufacturer's recommendations, and as specified.

Application of coatings must be done by skilled applicators. Apply coatings to clean and properly prepared surfaces. Apply coatings carefully with clean, high-quality application equipment. Allow sufficient time between coats to ensure complete drying and curing. Surfaces must be sanded and dusted between coatings, as required, to produce a surface free of visible defects. High gloss coatings and clear finishes must be lightly sanded between coats to ensure bond of following coats.

Apply coats to the surfaces in an even film. Do not accept cloudiness, spotting, holidays, laps, application marks, runs, sags, and other similar surface imperfections. Remove defective coating applications and recoat as directed.

Coating lines such as wainscots must be sharp, true, and well-defined. Tape may be used to establish coating lines, providing tape is removed before ragging or sawtooth edges form.

Surfaces, including edges, corners, crevices, welds, and other similar changes in surface plane, must receive a dry-film thickness not less than specified.

3.3.2 Brush Application

Brushes must be clean and the proper size and type for high-quality application of the specified coating materials. Slow-dry coatings must be brushed out. Quick-dry coatings must be brushed only enough to spread out evenly.

3.3.3 Roller Application

Roller covers must be clean and of the proper nap length, nap texture, and material for high-quality application of the specified coating materials.

Roller application must be done carefully and must be equivalent in all respects to the same coats applied by high-quality brush application.

3.3.4 Spray Application

[Do not allow spray application of coatings.]

[Spray application equipment must be limited to airless-spray equipment and electrostatic-spray equipment. Equipment must be clean and operated by workmen skilled in high quality application of coating materials.]

Spray application of coatings must be limited to finish coats on metal frame works, siding, decking, wire mesh, and other surfaces where hand work would be inferior. Sprayed coatings must be carefully applied and equivalent in all respects to the same coats applied by high quality brush application. Each spray coat must be permitted to cure before the succeeding coat is applied. Do not permit doubling back with application equipment, for the purpose of building up film thickness of two coats in one operation.

Surfaces adjacent to areas to be spray coated shall be covered to prevent

damage from overspray, coating rebound, and spray drift.]

3.4 ACCEPTANCE PROVISIONS

3.4.1 Repairing

Remove damaged and unacceptable portions of completed work and replace with new work to match adjacent surfaces at no additional cost to the Government.

3.4.2 Cleaning

At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

Application equipment must be cleaned promptly and thoroughly with a suitable solvent after each use and stored in a clean, covered, well-ventilated container.

Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

-- End of Section --