Preparing Activity: NASA Superseding
UFGS-09 97 13.00 40 (November 2014)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 09 97 13.00 40

STEEL COATINGS
11/19

NOTE: This guide specification covers the requirements for coating systems, materials, surface preparation, and application of protective coatings on carbon steel.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also

use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

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 C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM D4417	(2021) Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

MASTER PAINTERS INSTITUTE (MPI)

MPI 19	(2012) Primer, Zinc Rich, Inorganic

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC AB 1	(2015; E 2017) Mineral and Slag Abrasives
SSPC AB 2	(2015; E 2016) Cleanliness of Recycled Ferrous Metallic Abrasive
SSPC AB 3	(2003; E 2004) Ferrous Metallic Abrasive
SSPC PA 2	(2015; E 2018) Procedure for Determining Conformance to Dry Coating Thickness Requirements
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 10/NACE No. 2	(2015) Near-White Blast Cleaning
SSPC SP 11	(2020) Surface Preparation Standard No. 11 - Power Tool Cleaning to Bare Metal

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595	(Rev C; Notice 1) Colors Used in Government Procurement

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

29 CFR 1910.134	Respiratory Protection
29 CFR 1910.1000	Air Contaminants

1.2 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters 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 Navy, Air Force, and NASA projects.

Use the "S" Classification only in SD-11 Closeout Submittals. The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Inspection Forms; G[, [____]]

Safety Plan; G[, [____]]

SD-03 Product Data

Abrasive Blasting Material; G[, [____]]

Sealant Compound; G[, [____]]

Inorganic Zinc; G[, [____]]

Inhibitive Polyamide Epoxy; G[, [____]]

Aliphatic Polyurethane; G[, [____]]

SD-04 Samples

Manufacturer's Standard Color Charts; G[, [____]]

Inspection Forms; G[, [____]]

SD-05 Design Data

Inorganic Zinc; G[, [____]]

Inhibitive Polyamide Epoxy; G[, [____]]

Aliphatic Polyurethane; G[, [____]]

SD-06 Test Reports

Inspection Reports; G[, [____]]

SD-07 Certificates

Abrasive Blasting Material

Sealant Compound

Inhibitive Polyamide Epoxy

Aliphatic Polyurethane

SD-08 Manufacturer's Instructions

Protective Coatings

1.3 QUALITY CONTROL

Submit a safety plan for protective coating systems in accordance with OSHA regulations.

Submit manufacturer's standard color charts showing manufacturer's standard finish colors.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials in their original, unopened containers bearing the manufacturer's name, date of manufacture, product identification, and batch number.

Store coatings, thinners, and cleaners in tightly closed containers in a covered, well-ventilated area; protected from exposure to extreme cold or heat, sparks, flame, direct sunlight, or rainfall. Follow manufacturer's instructions for storage limitations.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Abrasive Blasting Material

****

NOTE: When abrasive blasting performed, protective equipment required by the Occupational Safety and Health Administration (OSHA) must be used, to ensure safety.

****

Ensure that abrasive blasting materials conform to SSPC AB 1, SSPC AB 2, and SSPC AB 3.

2.1.2 Sealant Compound

Sealant is a self-curing, single-component, polysulfide-rubber, conforming to ASTM C920. Provide a sealant gray in color and capable of being applied into the joint with a caulking gun.

2.1.3 Protective Coatings

2.1.3.1 Coating Systems

****

NOTE: Delete the inapplicable paragraph if only one coating system is used. Coating System No. 1 is defined as acceptable for normal atmospheric conditions with no top coat required. If desired, top coat may be specified. Coating System No. 2 is advantageous on and around acidic environments.

****

The following two coating system definitions are to be specified for use on the surfaces listed in the Coating Schedule of this section, and as directed.

Coating System No. 1 consists of inorganic zinc only [, no top coat unless specified]. Select inorganic zinc from MPI 19. Ensure that coatings, thinners, and cleaners are the product of one manufacturer.

Coating System No. 2 consists of an inorganic zinc first coat, with an inhibitive polyamide epoxy intermediate coat, and an aliphatic polyurethane finish coat. Select coatings from the following listing. Ensure that all coatings, thinners, and cleaners are the product of the same manufacturer. Ensure that each successive coating is a contrasting color to provide a visual assurance of complete coverage.

****

NOTE: Use Coating System No. 3 for severe, corrosive service applications.

****

[Coating System No. 3 [_____]

]

COATING SYSTEMS			
INORGANIC ZINC	INHIBITIVE POLYAMIDE EPOXY	ALIPHATIC POLYURETHANE	MANUFACTURER
Dimetcote 9 Metalhide 1001	Amercoat 370	Amercoat 450HS	PPG One PPG Place Pittsburgh, PA 15272 412/434-3131
CarboZinc 11	Carboguard 893	Carbothane 134HS	Carboline Company 2150 Schuetz Road St. Louis, MO 63146 314-644-1000
CathaCoat 304V CathaCoat 304K CathaCoat 304L	Devran 201 H	Devthane 379	International Paint LLC/ Devoe Coatings 6001 Antoine Drive Houston, TX 77091 (713) 682-1711 (800) 654-2616
ZincClad II	Macropoxy 646-100	Hi-Solids Poly-CA	Sherwin-Williams Company 101 Prospect Avenue N.W. Cleveland, OH 44115 (800) 336-1110

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Coating Hazards

Ensure that employees are trained in the safety plan. Specified coatings may have potential health hazards if ingested or improperly handled. Follow the coating manufacturer's written safety precautions throughout mixing, application, and curing of the coatings. During all cleaning, cleanup, surface preparation, and paint application phases, ensure that employees are protected from toxic and hazardous chemical agents that exceed concentrations in 29 CFR 1910.1000. Comply with respiratory protection requirements in 29 CFR 1910.134.

****

NOTE: Specify in the coating schedule under "Surface Preparation" either AB (abrasive blast) or MC (power tool cleaning). Power tool cleaning is used only when abrasive blasting is prohibited in the area of work of surface preparation. Follow the SSPC Paint Manual.

****

3.1.2 Surface Preparation

****

NOTE: Faying surfaces and grounding connection areas remain unpainted. Check with structural or electrical engineer for possible locations of such areas on the project drawings. Modify the following paragraphs, as required, to identify these areas.
****

For faying surfaces that become inaccessible after installation, abrasive-blast and coat with inorganic zinc only, before installation.

Clean surfaces that are part of slip-critical joints [according to SSPC SP10 (abrasive blasting) or SSPC SP 11 (power tool cleaning)] [according to SSPC SP10 (abrasive blasting) or SSPC SP 11 (power tool cleaning) and coated with MPI 19 (inorganic zinc)] before installation.

Do not apply coatings to areas to be welded. After welding is completed, conduct the required surface preparation to the weld and any adjacent areas damaged by the welding operation, and feather in the required coating system.

Within 6 hours after completion of surface preparation and before rusting or recontamination occurs, clean prepared surfaces of abrasive residue, dust, and other contaminants and give the surface the first coat of paint. Re-prepare surfaces not coated within 6 hours or that show rusting or contamination, regardless of the length of time after preparation.

Sequence surface preparation and coating operations so that freshly applied coatings are not contaminated by dust or foreign matter.

Degrease surfaces as required in accordance with SSPC SP 1 before surface preparation and the application of protective coatings. Degreasing is by solvent cleaning, detergent washing, or steam cleaning.

3.1.3 Abrasive Blasting (AB)

Dry abrasive blast all surfaces to be coated in accordance with the requirements of SSPC SP 10/NACE No. 2. Round sharp edges of sheered members and remove weld slag, weld spatter, and foreign matter from surfaces to be coated prior to abrasive blasting. The blast profile, unless otherwise specified, is 0.038 to 0.063 mm1.5 to 2.5 mils as measured by ASTM D4417, Method C. Use appropriate abrasive blast media to produce the desired surface profile and to give an angular anchor tooth pattern

Remove weld slag, weld spatter, and foreign matter from surfaces to be coated before abrasive blasting using mechanical methods as specified.

Remove all traces of abrasive residue and dust from the surface, leaving it clean and dry.

Surfaces not to be blasted are:

a. Galvanized steel and non-ferrous or prefinished surfaces except when specified to be blast-cleaned in the coating schedule

b. Piston rods and bearing surfaces

c. [_____]

3.1.4 Power Tool Cleaning

Where specified, conduct power tool cleaning in accordance with the requirements of SSPC SP 11.

3.2 APPLICATION

3.2.1 General Requirements

Manufacturer's instructions for thinning, mixing, handling, and applying products are considered a part of this specification. In the event of conflict between the requirements of this specification and the manufacturer's recommendations, this specification takes precedence.

Ensure that compressed air used for spraying coatings remains free of moisture and oil.

Ensure that each coat of applied material is free of runs; sags; blisters; bubbles; mud cracking; variations in color, gloss, and texture; holidays (missed areas); excessive film buildup; foreign contaminants; and dry overspray.

Do not apply coating when rain is imminent or when the temperature or humidity is outside the limits recommended by the coating manufacturer.

Ensure that the surface temperature is at least 3 degrees C 5 degrees F above the dew point.

Apply coatings by airless or conventional spray. Use airless spray only for large, simply configured surfaces. Brush application is permitted only for striping and in areas that are otherwise inaccessible for spray application.

Protect newly coated surfaces from damage.

3.2.2 Mixing and Application Procedures

Mix multi-component paints according to the manufacturer's instructions. Use power agitation in a manner that does not introduce air into the mixed coating

Strain mixed material through a 250- to 600- micrometer 30- to 60-mesh screen.

Continuously stir the inorganic zinc primer during application at a rate that will prevent the zinc from settling but will not introduce air into the material

Use brushes to work coatings thoroughly into joints, rough welds, crevices and around rivets and bolts. Pay special attention to cutouts, sharp edges, and irregular surfaces to ensure complete coverage and recommended thickness.

Measure the final dry film thickness after each coat in accordance with SSPC PA 2. Make all measurements with a Type 2 gauge having an accuracy of 3 percent or better. Ensure the coating measurements meet the Level 1 thickness restrictions and are in compliance with the manufacturer's recommended minimum and maximum requirements. Repair areas of non-compliance by adding additional paint or mechanically removing the

excess paint prior to the application of the succeeding coat.

3.2.3 Coating Systems

Coating System No. 1:

Inorganic zinc primer: 0.060 to 0.102 millimeter[2.5 to 4 mils][3 to 6 mils,] inorganic zinc, as specified in Coating Schedule.

Coating System No. 2:

a. Inorganic zinc primer: 0.060 to 0.102 millimeter[2.5 to 4 mils][3 to 6 mils,] inorganic zinc, as specified in Coating Schedule.

b. Inhibitive polyamide epoxy, second coat: 0.051 to 0.0102 millimeter 2 to 4 mils.[Top coat [_____] 0.051 to 0.102 millimeter 2 to 4 mils.]

c. Aliphatic polyurethane, third coat: 0.051 to 0.0102 millimeter 2 to 4 mils, but sufficient to hide previous coat [Second coat, inorganic zinc, 0.051 to 0.102 millimeter 2 to 4 mils.]

[Coating System No. 3: [_____]

]3.2.4 Touch-Up

Touch up abrasions that occurred during shipment or erection as follows:

a. If the substrate is showing any corrosion, the restore the required surface profile by spot blasting, and the entire coating system replaced at that location

b. If the substrate is not corroding, prepare and coat the area in accordance with the manufacturer's guidance, feathering each coat into the existing coat to provide a smooth appearance.

c. Use inhibitive polyamide epoxy and aliphatic polyurethane for touch-up and repair of Coating System No. 2.

3.2.5 Sealant Compound Application

For Coating System No. 1, proceed with caulking after application and cure of inorganic zinc coating.

For Coating System No. 2, proceed with caulking after application and cure of inhibitive epoxy coat and before aliphatic polyurethane coat.

Caulk exterior joints, including, but not limited to, the following:

a. Perimeter of faying and bearing surfaces of structural members

b. Joints in members between intermittent welds

c. Perimeter of bearing surfaces between floor plates and supporting members (inside, outside, top, and bottom)

d. Stair treads, where joined to channel stringers

e. Openings of 13 millimeter 1/2 inch or smaller (Use foam filler backup as required.)

f. Hot-dipped galvanized vent holes

3.3 FIELD QUALITY CONTROL

3.3.1 Inspection

3.3.1.1 Inspection Forms

At the pre-work conference, provide sample inspection forms to be completed by the Coating Inspector and submitted to the Contracting Officer.

3.3.1.2 Coating Inspector

Work is inspected for compliance by a [Contracting Officer] [Contractor] provided [NACE CIP Level 2 inspector] [SPCC PCI Level 2 inspector] [_____]. Submit the completed Coating Inspectorinspection reports [_____] [every week] [at the completion of the project].

For all protective coatings applied at off-site locations, provide full inspection by a NACE certified Coating Inspector. Ensure that the inspector is present at the prework conference to address necessary clarification of inspection and specification requirements. Report immediately any apparent deviation from the specified requirements or any out-of-tolerance condition to the Contracting Officer for determination of corrective action.

3.4 SCHEDULES

3.4.1 Coating Schedule

****

NOTE: Prepare the coating schedule and provide the information shown below. No finish color is required for Coating System No. 1. Alternate coating systems can be specified. Select such systems with alternate System Number designations.

****

SURFACE DESCRIPTION	SURFACE PREPARATION	FIRST COAT	SECOND COAT	THIRD COAT
Items or surfaces to be coated: [_____]	Near white metal blast cleaning	MPI #19	MPI #108 Finish Color: [_____]	MPI #72 Finish Color: [_____]
Items or surfaces to be coated: [_____]	Near white metal blast cleaning	MPI #19	[_____]	[_____]

Finish color as according to FED-STD-595.

-- End of Section --