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USACE / NAVFAC / AFCEC / NASA UFGS-09 97 13.00 40 (November 2014)  
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Preparing Activity: NASA Superseding  
UFGS-09 97 13.00 40 (July 2007)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2018

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11/14

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SECTION 09 97 13.00 40

### STEEL COATINGS

11/14

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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 item(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).

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## PART 1 GENERAL

### 1.1 REFERENCES

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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.

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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 (2014a) Standard Specification for Elastomeric Joint Sealants

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC AB 1 (2015; E 2017) Mineral and Slag Abrasives

SSPC Painting Manual (2002) Good Painting Practice, Steel Structures Painting Manual, Volume 1

SSPC SP 1 (2015) Solvent Cleaning

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

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

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

29 CFR 1910.1000 Air Contaminants

29 CFR 1910.134 Respiratory Protection

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated 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 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 Navy, Air Force, and NASA projects.

Use the "S" Classification only in SD-11 Closeout Submittals. An "S" following a submittal item indicates that the submittal is required for the Sustainability eNotebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

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

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. 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

Material, Equipment, and Fixture Lists[; G[, [\_\_\_\_]]]

A 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

Mix Designs[; G[, [\_\_\_\_]]]

Inorganic Zinc[; G[, [\_\_\_\_]]]

Inhibitive Polyamide Epoxy[; G[, [\_\_\_\_]]]

Aliphatic Polyurethane[; G[, [\_\_\_\_]]]

#### SD-06 Test Reports

Inspection Reports[; G[, [\_\_\_\_]]]

Test Reports[; G[, [\_\_\_\_]]]

#### SD-07 Certificates

Abrasive Blasting Material[; G[, [\_\_\_\_]]]

Sealant Compound[; G[, [\_\_\_\_]]]

Inorganic Zinc Coating[; G[, [\_\_\_\_]]]

Inhibitive Polyamide Epoxy[; G[, [\_\_\_\_]]]

Aliphatic Polyurethane[; G[, [\_\_\_\_]]]

#### SD-08 Manufacturer's Instructions

Protective Coatings[; G[, [\_\_\_\_]]]

#### SD-11 Closeout Submittals

Warranty[; G[, [\_\_\_\_]]]

### 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, shelf-life, 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.

### 1.5 WARRANTY

Provide a Manufacturer's warranty for each coating used.

## PART 2 PRODUCTS

Submit a material, equipment, and fixture lists for manufacturer's style or catalog numbers, specification and drawing reference numbers and warranty information for the protective coatings systems fabrication site.

## 2.1 MATERIALS

### 2.1.1 Abrasive Blasting Material

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**NOTE:** When abrasive blasting with silica sand is performed, protective equipment required by NIOSH (National Institute for Occupational Safety and Health) must be used, to assure safety.

The only respirator suitable for use when using silica sand is Type CE, pressure-demand, abrasive blast supplied air respirator, with a protection factor of 2000.

When silica sand is not used as the blasting agent, and when a protection factor of 25 (loose fit hood/helmet) will provide adequate protection then use a Type CE, continuous flow, abrasive blast supplied air respirator.

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Ensure abrasive blasting materials conforms to SSPC Painting Manual, Chapter 2.4, and SSPC AB 1.

### 2.1.2 Sealant Compound

Sealant is a self-curing, single component, polysulfide-rubber type 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

Submit mix designs for each type of protective coating including a complete list of ingredients and admixtures. Submit applicable test reports verifying that the mix has been successfully tested and meets design requirements.

#### 2.1.3.1 Coating Systems

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**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.

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The following two coating systems 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 the following listing. Ensure coatings, thinners, and cleaners are the product of one manufacturer.

Coating System No. 2 consists of an inorganic zinc first coat, inhibitive polyamide epoxy intermediate coat, and aliphatic polyurethane finish coat.

Select coatings from the following listing. Ensure all coatings, thinners, and cleaners are the product of the same manufacturer. Ensure each successive coating is a contrasting color to provide a visual assurance of complete coverage.

[ Coating System No. 3 [\_\_\_\_\_] ]

]

| COATING SYSTEMS       |                                       |                                    |  |
|-----------------------|---------------------------------------|------------------------------------|--|
| <u>INORGANIC ZINC</u> | <u>INHIBITIVE POLYAMIDE<br/>EPOXY</u> | <u>ALIPHATIC<br/>POLYURETHANE</u>  | <u>MANUFACTURER</u>  |
| Dimetcote 9           | Amercoat 370                          | Amercoat 450HS                     | PPG<br>One PPG Place<br>Pittsburgh, PA 15272<br>412/434-3131   |
| CarboZinc 11          | Carboguard 893                        | Carbothane 134HG                   | Carboline Company<br>350 Hanley<br>Industrial Court<br>St. Louis, MO 63144<br>800/848-4645 Ext. 2557 |
| Catha-Coat 304V       | Devran 201H                           | Devthane 359                       | ICI-DEVOE<br>925 Euclid Ave.<br>Cleveland, OH<br>44115<br>216/344-8798                               |
| Ganicin 3.4 IOZ       | Corlar 3.2 PR or<br>Corlar 2.1PR      | Imron 3.5 HG                       | DuPont Company<br>DuPont Building<br>1007 Market Street<br>Wilmington, DE 19898<br>800/441-7515      |
| Porter Zinc 3200      | Porter Glaze 4400<br>High Build       | Porterthane 9000<br>Gloss Urethane | Porter Paint Company<br>400 South 13th Street<br>Louisville, KY 40203<br>800/332-6270                |

### PART 3 EXECUTION

#### 3.1 PREPARATION

##### 3.1.1 Coating Hazards

Ensure that employees are trained in all aspects of 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 which exceed concentrations in 29 CFR 1910.1000. Comply with respiratory protection requirements in 29 CFR 1910.134.



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NOTE: Specify in the coating schedule under  
"Surface Preparation" either AB (abrasive blast) or  
MC (mechanical cleaning). Mechanical cleaning is  
used only when abrasive blasting is prohibited in  
the area of work of surface preparation. SSPC Paint  
Manual should be followed.  
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### 3.1.2 Surface Preparation

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

Surfaces that are part of slip-critical joints are [abrasive blasted]  
[mechanically cleaned coated with inorganic zinc] prior to installation.

Leave surfaces to be welded uncoated. Welded areas are then masked and  
touched up.

Coat prepared surfaces within 6 hours after completion of surface  
preparation and before rusting or recontamination occurs. Re-prepare  
surfaces not coated within 6 hours or which 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.

Inspect and degrease surfaces as required prior to subsequent surface  
preparation and the application of protective coatings. Degreasing is by  
solvent cleaning, detergent washing, or steam cleaning. SSPC SP 1 applies  
for solvent cleaning.

### 3.1.3 Abrasive Blasting (AB)

Ensure abrasive blasting conforms to SSPC SP 10/NACE No. 2 and  
SSPC Painting Manual.

Ensure compressed air used for abrasive blasting is free of moisture and  
oil.

Surfaces not to be blasted are:

- a. Galvanized steel and prefinished surfaces except when specified to be  
blast-cleaned in the coating schedule
- b. Piston rods and bearing surfaces

Maintain a minimum nozzle pressure of 620 kilopascal 90 pounds per square  
inch.

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

Ensure blast cleaning achieves a 0.025 to 0.050 millimeter 1-to 2-mil anchor profile as indicated by a surface profile comparator, replica tape, or similar device.

Remove rust and corrosion from pits and depressions.

Do not reuse abrasive blast aggregate.

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

#### 3.1.4 Mechanical Cleaning (MC)

Where mechanical cleaning is specified in the coating schedule [for existing surfaces] [and AB is prohibited], use needle scalers or abrasive disks or wheels in accordance with SSPC SP 3, leaving the surface cleanliness equivalent to near-white metal (SSPC SP 10/NACE No. 2).

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

Ensure each coat of material applied is free from runs; sags; blisters; bubbles; mud cracking; variations in color, gloss, and texture; holidays (missed areas); excessive film build; 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 the surface temperature is at least 3 degrees C 5 degrees F above the dew point.

Work coatings thoroughly into all joints, crevices, and open spaces. Pay special attention to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure proper coverage and thickness.

Protect newly coated surfaces from damage.

Apply coatings by airless or conventional spray. Use airless spraying for uniform large surface areas. Use conventional spraying for small areas of intricate configuration and for touchup. During application of inorganic zinc coating, maintain uniform suspension.

#### 3.2.2 Mixing and Application Procedures

Stir material thoroughly using an instrument that does not induce air into

coating.

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

Provide continuous slow agitation of the material during application of inorganic zinc coating, maintain uniform suspension. Avoid continuous rapid agitation.

Thin material for workability and improved spray characteristics only.

Apply material in even, parallel passes, overlapping 50 percent. Pay special attention to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure proper coverage and thickness.

### 3.2.3 Dry-Film Thickness (DFT)

Apply coatings to the following dry-film thicknesses:

#### Coating System No. 1:

- a. Inorganic primer zinc: 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: When thoroughly dry (dry to handle), check the film thickness with a calibrated nondestructive dry-film thickness gage. If less than specified thickness, apply additional material as required. Obtain proper DFT for the inorganic zinc coating in a single application which may consist of multiple passes, while coating is still wet.

### ]3.2.4 Touch-Up

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

- a. Ensure surface preparation and coating application conforms to the manufacturer's instructions.
- b. Use inorganic zinc for touch-up and repair of inorganic zinc and hot-dip galvanizing.
- 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, accomplish caulking after application and cure of inorganic zinc coating.

For Coating System No. 2, accomplish caulking after application and cure of inhibitive epoxy coat and prior to 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

On-site work as described herein is inspected for compliance with this specification by a NACE (National Association of Corrosion Engineers) Certified Coating Inspector provided by the [Contracting Officer] [Contractor].

For all protective coatings applied off-site locations, provide full inspection by NACE Certified Coating Inspector. Ensure the inspector is present at the pre-work 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. Submit the inspection reports performed by the Coating Inspector.

#### 3.3.2 Inspection Forms

Submit inspection forms at the pre-work conference which are used by the Coating Inspector and forwarded to the Contracting Officer prior to delivery of the coated work to the job site.

### 3.4 SCHEDULES

#### 3.4.1 Coating Schedule

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**NOTE: Prepare the coating schedule and provide the information shown below. No finish color is required for Coating System No. 1.**  
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| <u>SURFACE<br/>DESCRIPTION</u> | <u>SURFACE<br/>PREPARATION</u> | <u>COATING<br/>SYSTEM</u> | FINISH COLOR FOR<br><u>COATING SYSTEM</u><br><u>NO. 2</u> | DRY FILM THICKNESS,<br>PRIMER<br><u>COAT, MM MILS</u> |
|--------------------------------|--------------------------------|---------------------------|---|---|
| [_____]                        | [_____]                        | [1] [2]                   | [red] [green]   | [.076-.127]<br>[.102-.152]<br>[3-5] [4-6]             |
|                                | [_____]                        | [_____]                   | [_____]   |   |

-- End of Section --