
USACE / NAVFAC / AFCEA / NASA UFGS-09 97 13.00 40 (July 2007)

Preparing Activity: NASA Superseding
UFGS-09 97 13.00 40 (July 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2010

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SECTION 09 97 13.00 40

STEEL COATINGS

07/07

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

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 and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS 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 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 C 920 (2008) Standard Specification for Elastomeric Joint Sealants

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC AB 1 (1991; E 2004) Mineral and Slag Abrasives

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

SSPC SP 1 (1982; E 2004) Solvent Cleaning

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

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

1.2 SUBMITTALS

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. Submittals should be kept to the minimum required for adequate quality control.

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 Navy,

Air Force, and NASA projects.

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" 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.] Submit the following in accordance with Section 01 33 00
SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists shall be submitted in
accordance with paragraph entitled, "General," of this section.

A Safety Plan shall be submitted in accordance with paragraph
entitled, "General," of this section.

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following
items:

Abrasive Blasting Material
Sealant Compound
Inorganic Zinc
Inhibitive Polyamide Epoxy
Aliphatic Polyurethane

SD-04 Samples

Manufacturer's Standard Color Charts shall be submitted in
accordance with paragraph entitled, "General," of this section.

Inspection Forms shall be submitted in accordance with paragraph
entitled, "Inspection," of this section.

SD-05 Design Data

Mix Designs shall be submitted in accordance with paragraph
entitled, "General," of this section.

Inorganic Zinc
Inhibitive Polyamide Epoxy
Aliphatic Polyurethane

SD-06 Test Reports

Inspection reports shall be submitted for protective coating
systems in accordance with paragraph entitled, "Inspection," of
this section.

SD-07 Certificates

Certificates shall be submitted for following items showing

conformance with the referenced standards contained in this section.

Abrasive Blasting Material
Sealant Compound
Inorganic Zinc Coating
Inhibitive Polyamide Epoxy
Aliphatic Polyurethane

SD-08 Manufacturer's Instructions

Manufacturer's instructions shall be submitted for **Protective Coatings** including details of thinning, mixing, handling, and application.

1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered in their original, unopened containers bearing the manufacturer's name, shelf-life, product identification, and batch number.

Coatings, thinners, and cleaners shall be stored in tightly closed containers in a covered, well-ventilated area where they will be protected from exposure to extreme cold or heat, sparks, flame, direct sunlight, or rainfall. Manufacturer's instructions for storage limitations shall be followed.

1.4 GENERAL

A **Safety Plan** shall be submitted for protective coating systems in accordance with OSHA regulations.

Material, Equipment, and Fixture Lists shall be submitted for manufacturer's style or catalog numbers, specification and drawing reference numbers and warranty information for the Protective Coatings Systems fabrication site.

Manufacturer's Standard Color Charts shall be submitted showing manufacturer's standard finish colors.

Mix Designs shall be submitted for each type of protective coating including a complete list of ingredients and admixtures. Applicable test report shall verify that the mix has been successfully tested and meets design requirements.

PART 2 PRODUCTS

2.1 ABRASIVE BLASTING MATERIAL

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 Type CE, continuous flow, abrasive blast supplied air respirator shall be used.

Abrasive blasting materials shall be per [SSPC Painting Manual](#), Chapter 2.4, and [SSPC AB 1](#).

2.2 SEALANT COMPOUND

Sealant shall be a self-curing, single component, polysulfide-rubber type conforming to [ASTM C 920](#). Sealant shall be gray in color and capable of being applied into the joint with a calking gun.

2.3 PROTECTIVE COATINGS

2.3.1 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 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 shall consist of [inorganic zinc](#) only [, no top coat unless specified]. Inorganic zinc shall be selected from the following listing. Coatings, thinners, and cleaners shall be the product of one manufacturer.

Coating System No. 2 shall consist of inorganic zinc first coat, [inhibitive polyamide epoxy](#) intermediate coat, and [aliphatic polyurethane](#) finish coat. Coatings shall be selected from the following listing and all coatings, thinners, and cleaners shall be the product of the same manufacturer. Each successive coating shall be of a contrasting color to provide a visual assurance of complete coverage.

[Coating System No. 3 [_____]]

COATING SYSTEMS

| <u>INORGANIC ZINC</u> | <u>INHIBITIVE POLYAMIDE EPOXY</u> | <u>ALIPHATIC POLYURETHANE</u> | <u>MANUFACTURER</u> |
|-----------------------|---------------------------------------|-----------------------------------|---|
| Dimetcote 9 | Amercoat 370 | Amercoat 450HS | Ameron International 201 N. Berry Street Brea, CA 92621 714/529-1951 |
| Carbo Zinc 11 | Carboguard 893 | Carbothane 134HG | Carboline Company |

COATING SYSTEMS

| <u>INORGANIC ZINC</u> | <u>INHIBITIVE POLYAMIDE EPOXY</u> | <u>ALIPHATIC POLYURETHANE</u> | <u>MANUFACTURER</u> |
|-----------------------|---------------------------------------|---------------------------------------|---|
| | | | 350 Hanley Industrial Court St. Louis, MO 63144 800/848-4645 Ext. 2557 |
| Catha-Coat 304V | Devran 201 | Devthane 369 | ICI-DEVOE 925 Euclid Ave. Cleveland, OH 44115 216/344-8798 |
| 347-Y-912 | 525-333 or 71125P | Imron 333 | DuPont Company DuPont Building 1007 Market Street Wilmington, DE 19898 800/441-7515 |
| Porter Zinc 3200 | Porter Glaze 4400 High Build | Porterthane 9000 Glass Urethane | Porter Paint Company 400 South 13th Street Louisville, KY 40203 800/332-6270 |

PART 3 EXECUTION

3.1 SURFACE PREPARATION

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.

3.1.1 General

NOTE: Faying surfaces and grounding connection areas shall be 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.

Faying surfaces that will become inaccessible after installation shall be abrasive blasted and coated with inorganic zinc only, prior to installation.

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

Surfaces to be welded shall be left uncoated. Welded areas shall then be masked and touched up.

Prepared surfaces shall be coated within 6 hours after completion of surface preparation and before rusting or recontamination occurs. Surfaces not coated within 6 hours or which show rusting or contamination, regardless of the length of time after preparation, shall be reprepared.

Surface preparation and coating operations shall be sequenced so that freshly applied coatings will not be contaminated by dust or foreign matter.

Surfaces shall be inspected and degreased as required prior to subsequent surface preparation and the application of protective coatings. Degreasing shall be by solvent cleaning, detergent washing, or steam cleaning.

SSPC SP 1 shall apply for solvent cleaning.

3.1.2 Abrasive Blasting (AB)

Abrasive blasting shall conform to SSPC SP 10/NACE No. 2 and SSPC Painting Manual.

Compressed air used for abrasive blasting shall be free of moisture and oil.

Surfaces not to be blasted are:

Galvanized steel and prefinished surfaces except when specified to be blast-cleaned in the coating schedule

Piston rods and bearing surfaces

A minimum nozzle pressure of 620 kilopascal 90 pounds per square inch shall be maintained.

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

Blast cleaning shall achieve 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.

Rust and corrosion shall be removed from pits and depressions.

Abrasive blast aggregate shall not be reused.

All traces of abrasive residue and dust shall be removed from the surface, leaving it clean and dry.

3.1.3 Mechanical Cleaning (MC)

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

3.2 COATING APPLICATION

3.2.1 General Requirements

Manufacturer's instructions for thinning, mixing, handling, and applying products shall be considered a part of this specification. In the event of conflict between the requirements of this specification and the

manufacturer's recommendations, this specification shall take precedence.

Compressed air used for spraying coatings shall be free of moisture and oil.

Each coat of material applied shall be 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.

No coating shall be applied when rain is imminent or when the temperature or humidity is outside the limits recommended by the coating manufacturer.

Surface temperature shall be at least 3 degrees C 5 degrees F above the dew point.

Coatings shall be thoroughly worked into all joints, crevices, and open spaces. Special attention shall be paid to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure proper coverage and thickness.

Newly coated surfaces shall be adequately protected from damage.

Coatings shall be applied by airless or conventional spray. Airless spraying shall be used for uniform large surface areas. Conventional spraying shall be used 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

Material shall be stirred thoroughly using an instrument that will not induce air into coating.

Mixed material shall be strained through a 250- to 600- micrometer 30- to 60-mesh screen.

Continuous slow agitation of the material shall be provided during application of inorganic zinc coating, maintain uniform suspension. Continuous rapid agitation shall be avoided.

Material shall be thinned for workability and improved spray characteristics only.

Material shall be applied in even, parallel passes, overlapping 50 percent. Special attention shall be paid to welds, cutouts, sharp edges, rivets, crevices, and bolts to ensure proper coverage and thickness.

3.2.3 Dry-Film Thickness (DFT)

Coatings shall be applied to the following dry-film thicknesses:

Coating System No. 1:

- [a. 0.076 to 0.152 millimeter, 3 to 6 mils, inorganic zinc, as specified in Coating Schedule.]
- [b. Top coat [_____] 0.051 to 0.102 millimeter 2 to 4 mils]
- [c. Second coat, inorganic zinc, 0.051 to 0.102 millimeter 2 to 4 mils
]

- a. Inorganic primer zinc: 0.060 to 0.102 millimeter 2.5 to 4 mils
- b. Inhibitive polyamide epoxy, second coat: 0.051 to 0.0102 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

[Coating System No. 3: When dry through (dry to handle), the film thickness shall be checked with a calibrated nondestructive dry-film thickness gage. If less than specified thickness, additional material shall be applied as required. Proper DFT for the inorganic zinc coating shall be obtained in a single application which may consist of multiple passes, while coating is still wet.]

3.3 TOUCH-UP

Abrasions that occurred during shipment or erection shall be touched up as follows:

- a. Surface preparation and coating application shall conform to the manufacturer's instructions.
- b. Inorganic zinc shall be used for touch-up and repair of inorganic zinc and hot-dip galvanizing.
- c. Inhibitive polyamide epoxy and aliphatic polyurethane shall be used for touch-up and repair of coating system No. 2.

3.4 SEALANT COMPOUND APPLICATION

For Coating System No. 1, calking shall be accomplished after application and cure of inorganic zinc coating.

For Coating System No. 2, calking shall be accomplished after application and cure of inhibitive epoxy coat and prior to aliphatic polyurethane coat.

Exterior joints shall be calked, 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 (Foam filler backup shall be used as required.)
- f. Hot-dipped galvanized vent holes

3.5 INSPECTION

On-site work as described herein shall be 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, the Contractor shall provide full inspection by NACE Certified Coating Inspector. Inspector shall be present at the pre-work conference to address necessary clarification of inspection and specification requirements. Apparent deviation from the specified requirements or any out of tolerance condition shall be immediately reported to the Contracting Officer for determination of corrective action. Submit inspection reports performed by the Coating Inspector.

Inspection Forms shall be submitted at the pre-work conference which shall be used by the Coating Inspector and forwarded to the Contracting Officer prior to delivery of the coated work to the job site.

3.6 COATING SCHEDULE

**NOTE: Designer shall prepare the coating schedule
and provide the information shown below. No finish
color is required for Coating System No. 1.**

| <u>SURFACE</u> <u>DESCRIPTION</u> | <u>SURFACE</u> <u>PREPARATION</u> | <u>COATING</u> <u>SYSTEM</u> | <u>FINISH COLOR</u> <u>FOR COATING</u> <u>SYSTEM NO. 2</u> | <u>DRY FILM THICK-</u> <u>NESS, PRIMER</u> <u>COAT, <u>MM</u> <u>MILS</u></u> |
|--------------------------------------|--------------------------------------|---------------------------------|--|---|
| [_____] | [_____] | [1] [2] | [red] [green] | [.076-.127] [.102-.152] [3-5] [4-6] |
| | [_____] | [_____] | [_____] | |

-- End of Section --