UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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LIGHT REFLECTIVE NONFERROUS METALLIC AGGREGATE FLOOR SYSTEM

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USACE / NAVFAC / AFCEC / NASA **UFGS-03 53 14.00 20 (February 2010)**

Preparing Activity: NAVFAC **Superseding UFGS-03 53 14.00 20 (April 2006)**

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SECTION 03 53 14.00 20

LIGHT REFLECTIVE NONFERROUS METALLIC AGGREGATE FLOOR SYSTEM
02/10

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NOTE: This guide specification covers the requirements for light reflective, non-oxidizing, dry shake surface hardener for concrete hangar floor finish.

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.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 305R	(2010) Guide to Hot Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI 308R	(2016) Guide to Curing Concrete

ASTM INTERNATIONAL (ASTM)

ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C779/C779M	(2019) Abrasion Resistance of Horizontal Concrete Surfaces
ASTM C944/C944M	(2019) Standard Test Method for Abrasion Resistance of Concrete or Mortar Surfaces by the Rotating-Cutter Method
ASTM C1315	(2011) Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

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, 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.

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.

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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-03 Product Data

Non-oxidizing metallic aggregate surface hardener; G[, [_____]]

SD-04 Samples

Sample installation

Material sample

SD-07 Certificates

Statement of alternates; G[, [_____]]

1.2.1 Sample Installation

A minimum of 100 square feet of the [hangar] [_____] floor slab shall be finished in a location as directed by the Contracting Officer. Color, texture and installation procedures are of prime importance. After approval by the Contracting Officer, the Contractor shall maintain the same controls and procedures throughout the installation process. Before acceptance, all work will be compared to the sample area.

1.2.2 Material Sample

Samples of materials, color, and finish type shall be submitted to the Contracting Officer for approval.

1.2.3 Alternates

Submittals for an alternate product shall contain the following from an independent laboratory. Unit weight, abrasion resistance test in accordance with ASTM C944/C944M and ASTM C779/C779M. Any product submitted, whose warranty contains a disclaimer limiting liability to the purchase price of the material, will be disqualified.

1.3 DELIVERY AND STORAGE

Product shall be delivered in sealed moisture resistant packages. Protect packages from damage. Store in an enclosed area. Contractor shall replace damaged packages with new packages. Manufacturer's information regarding date of manufacture, shelf life and date of purchase shall be provided no later than the date delivered on site. Products shall be identifiable by lot numbers.

1.4 WARRANTY

The manufacturer shall provide a standard warranty stating that the material is free of defects and that when used by competent persons in accordance with current published recommendations, the product will perform as specified herein. The manufacturer's standard warranty shall not contain any disclaimers, limiting their responsibility to the purchase price of the material. The manufacturer shall state in the warranty that they shall be willing to contribute to replacing defective materials, as determined by accepted test methods.

1.5 QUALITY CONTROL

The Contractor shall hold a meeting to review the detailed requirements for the floor, including the concrete mix design, placing techniques, finishing techniques including surface levelness, floor hardener application procedures, curing and the equipment required for these procedures.

The pre-slab meeting agenda shall be prepared by the Contractor and submitted to the attendees at least one week in advance of the meeting.

All parties involved in the floor system installation shall be required to attend. The Architect-Engineer's representative and the manufacturer's technical representative shall be present at the conference. The Contractor shall notify both at least 10 days prior to the scheduled date of the conference.

Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed by him to all parties concerned within five days of the meeting.

PART 2 PRODUCTS

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NOTE: Coordination must be provided with the person editing Section 03 30 00, CAST-IN-PLACE CONCRETE to ensure requirements of ACI 117, ACI 212.3R, ACI 301/301M, ACI 302.1R, ACI 304R, ACI 318 and ACI 318M are included.

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2.1 CONCRETE

Concrete materials shall be as specified in Section 03 30 00 CAST-IN-PLACE CONCRETE, in addition to items required by this section and the following:

The concrete mix, including admixtures and plasticizers, shall be in strict compliance with the aggregate surface hardener manufacturer's recommendations and shall be approved by the Contracting Officer and the

manufacturer's technical representative prior to the placement of concrete.

2.2 NON-FERROUS, NON-OXIDIZING METALLIC AGGREGATE, DRY-SHAKE SURFACE HARDENER

The surface hardener system shall consist of specially processed, non-ferrous, malleable, non-oxidizing, metallic aggregates, specially graded cementitious binder, plasticizer, and water-reducing admixtures, formulated and processed under the stringent quality control of the manufacturer. "Lumiplate" as manufactured by ChemRex, a subsidiary of Master Builder Technologies and "Diamond Plate" as manufactured by The Euclid Chemical Company comply with these specifications. The hardener shall be proportioned and sealed in standard moisture-resistant bags. The manufacturer shall guarantee their aggregate to be free of rust, corrosive materials, oil, petroleum, or other water-base materials, when delivered. The manufacturer shall replace any material found to contain any such materials, or any other material which is deemed unsatisfactory. The manufacturer shall provide a full-time technical representative, qualified in designing and adjusting concrete mixes, to assist in the application of the aggregate surface hardener system.

2.3 SURFACE EVAPORATION RETARDANT

A mono molecular surface evaporation retardant film, as recommended by ACI 305R and ACI 308R, shall be provided for use under drying conditions, due to high concrete and/or ambient temperatures, low humidity, high winds, and so forth. This includes work in heated interiors during cold weather, to aid in the maintaining of concrete moisture during the early placement stages of plastic concrete. Retarder shall be certified by the manufacturer to be compatible with the surface hardener and shall be provided in accordance with the manufacturer's recommendations.

2.4 CURING AND SEALING

Curing and sealing materials and procedures shall be as recommended by the manufacturer of the aggregate surface hardener system and shall comply with ASTM C309 or ASTM C1315.

PART 3 EXECUTION

3.1 CONCRETE PLACEMENT

For concrete placement, refer to Section 03 30 00 CAST-IN-PLACE CONCRETE in addition to items required by this section and the following:

a. Maximum slump shall be 127 mm 5 inches, when peak ambient temperatures are anticipated to be in excess of 18.33 degrees Celsius 65 degrees Fahrenheit, and shall be no greater than 96.2 mm 4 inches, when such temperatures are below 29.4 degrees Celsius 85 degrees Fahrenheit. Water reducing admixtures can be used to aid in workability without affecting dry shake hardener.

b. Maximum total air content shall not exceed 3 percent.

c. Calcium chloride or set accelerating admixtures, containing calcium chloride, shall not be used.

d. Water-reducing admixture shall be used. Provider must certify that the water reducer will not contribute to or cause increased air

content.

Place base slab between screed points to minimize handling. Move concrete into place with square-tapped shovels; do not use rakes. Vibrators, when used, shall be inserted and withdrawn vertically. Concrete shall be struck to the specified level. Concrete shall be further leveled and consolidated with wood bull float or wood darby. This shall be completed before free moisture rises to the surface (bleeding). Floating shall begin adjacent to columns, forms, and walls

3.1.1 Application of Surface Hardener

Apply first shake to floated concrete adjacent to forms, entry ways, columns and walls, where moisture will be lost first. Apply two-thirds of the specified total shake immediately following the floating of total area. Material shall be applied at a minimum rate of 9.76 kg/square meter 2 pounds per square foot of slab. Bleed water shall not be present during or following the application of this shake. Distribute Evenly. DO NOT THROW THE SHAKE. Wood bull floats can be used as soon as the shake has absorbed moisture (indicated by the darkening of the surface). Float just sufficiently to bring moisture from base slab through the shake. Finishing machines with float blades shall be used to "open" the surface, prior to the application of the remaining one-third of the total specified shake, and shall be used to incorporate this second shake. Surface shall be further compacted by a second mechanical floating, if time and setting characteristics of the concrete will allow, without removing of the cement surface paste from the metallic aggregate system. AT NO TIME SHALL WATER BE ADDED TO THE SURFACE. As surface further stiffens, indicated by loss of sheen, it shall be hand or mechanically troweled with blades relatively flat. Trowel blades should be run as slowly as possible, to achieve the desired finish. Excessive trowel blade speed will "burn" or darken the floor surface resulting in a possible loss of the desired even surface color. All marks and pinholes shall be removed in the raised trowel operation. DO NOT OVER FINISH. Do not burnish trowel. Type or texture of surface shall conform to job mock-up.

3.1.2 Field Service

During the initial periods of installation, manufacturer of surface hardener shall provide, at no cost, the service of a trained, full-time employee of the manufacturer, to aid in securing the proper use of all prescribed floor finish products. A minimum of 21 days notice shall be given by the Contractor, to the manufacturer, to arrange a "pre-job conference, related to application procedures, and a minimum of 7 days notice shall be given, prior to installation of the product. At discretion of the Contracting Officer, the manufacturer shall videotape pre-job conference and random placement of surface hardener. Video tape shall be supplied by the Contractor. Original video tape shall be delivered to the Contracting Officer, upon completion of the finish operations.

3.1.3 Curing and Protection (Water Based Wax Emulsion)

Refer to ACI 308.1. Floors, finished with the non-rusting, metallic-aggregate surface hardener, shall be cured as recommended by the manufacturer of the surface hardener. When high efficiency membrane curing compound is recommended, apply the membrane curing compound immediately after the floor surface has hardened sufficiently, so surface will not be marred by the application. Compound shall be applied

uniformly, over the entire surface, to meet the required moisture retention of ASTM C1315, at a maximum rate of 6.136 square meters per liter250 square feet per gallon. When dry, the coating shall be protected from droppings of plaster, paint, dirt, and other debris, by a covering of scuff-proof building paper. Adequate provision shall be made for maintaining the concrete temperature at 10 degrees Celsius 50 degrees Fahrenheit, or above during the curing period. Floor shall remain covered and be kept free of traffic and loads for at least 10 days after completion. At the direction of the Contracting Officer, the curing compound shall be removed between 2 and 4 weeks after placement.

3.2 Cleaning and Surface Preparation

After the aggregate surface hardener system has cured for 28 days, the Contractor shall clean and buff the floor surfaces in accordance with the manufacturer's recommendations. The cleaning and surface preparation shall be performed to remove projections that permit soil and foreign bodies to embed into the floor and to permit easier cleaning of a less porous, more densified concrete surface.

-- End of Section --