UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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02/18

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USACE / NAVFAC / AFCEC / NASA | **UFGS-03 62 16 (February 2018)**

Preparing Activity: NASA | **Superseding UFGS-03 62 16 (May 2015)**

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SECTION 03 62 16

METALLIC NON-SHRINK GROUTING
02/18

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NOTE: This guide specification covers the requirements for the material and application of expansive grout to ensure structural integrity of construction.

Associated work found in other sections includes preparation of surfaces to receive grout. Indicate areas of application on the drawings.

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

****

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 211.5R	(2014) Guide for Submittal of Concrete Proportions
ACI 214R	(2011) Evaluation of Strength Test Results of Concrete
ACI 311.4R	(2005) Guide for Concrete Inspection
ACI MCP SET	(2017) Manual of Concrete Practice

ASTM INTERNATIONAL (ASTM)

ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C150/C150M	(2020) Standard Specification for Portland Cement
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

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-01 Preconstruction Submittals

Grout Placement and Inspection Reports; G[, [____]]

SD-04 Samples

Aggregates; G[, [____]]

Expansive Admixtures; G[, [____]]

SD-06 Test Reports

Expansion; G[, [____]]

Compressive Strength; G[, [____]]

Grout Placement and Inspection Reports; G[, [____]]

Expansive Grout; G[, [____]]

Portland Cement; G[, [____]]

SD-07 Certificates

Portland Cement; G[, [____]]

Expansive Admixtures; G[, [____]]

Expansive Grout; G[, [____]]

Aggregates; G[, [____]]

1.3 QUALITY CONTROL

1.3.1 Grout Placement Plan and Inspection Reports

Provide examples of grout placement and inspection reports in accordance with ACI 214R, ACI 211.5R, ACI 311.4R and ACI MCP SET. Show details of proposed methods of application, with written instructions from the manufacturer for the use of expansive admixture at least [45] [_____] calendar days before the start of expansive concrete operations.

Include a copy of records of inspections and tests, as well as the records of corrective action taken. Include descriptions of preparation of cavities for placement of grout; and proper mixing, placement, and curing of grout with methods of preventing discoloration.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Portland Cement

Provide portland cement grout conforming to ASTM C150/C150M for Cement, Type I.

2.1.2 Aggregates

Submit samples conforming to ASTM C33/C33M for aggregates and the gradation as directed.

2.1.3 Water

Provide potable water.

2.1.4 Expansive Admixtures

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NOTE: Select one of next two paragraphs, depending on type of expansive admixture required.

Select the first paragraph for Type A expansive grout, described below.

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[Use admixture consisting of an oxidizable metallic aggregate.

][Use admixture consisting of a metallic aluminum powder.

] Submit samples to the Contracting Officer before commencement of work for review and acceptance.

2.1.5 Expansive Grout

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NOTE: Select one of the following two paragraphs, depending on the type of grout required. Last paragraph is applicable to either selection. Types are described as follows:

Type A grout derives its expansive properties from

oxidation of metallic aggregate. Oxidation and consequent expansion may be expected to continue either until the aggregate has been completely oxidized or until the grout, in plane, has been sealed off from further contact with oxygen.

Type B grout derives its expansive properties from the liberation of gas into the mixture during and after mixing. Chemical reaction causes evolution of hydrogen gas. Expansion may be expected to continue either until the gas-liberating mechanism has been exhausted or until the mixture has solidified to such an extent that the tendency for evolving gas to expand is effectively resisted by the stiffness of the grout.

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[Provide Type A grout containing an oxidizable metallic aggregate and an oxidation-promoting ingredient. Conform to the manufacturer's printed instructions.

][Provide Type B grout containing a metallic aluminum powder with alkali hydroxides in solution. Do not exceed 1 teaspoon per bag of cement for the quantity of aluminum powder.

]PART 3 EXECUTION

3.1 PREPARATION

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NOTE: Verify that the section cited below is included in specification.

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Prepare cavities for grouting by cleaning away foreign matter, laitance, dirt, grease, or oil. Clean all contact surfaces of concrete and masonry no less than 24 hours before grout application.

3.1.1 Mixing

Mix grout ingredients for both cementitious grout and epoxy grout in accordance with the manufacturer's written mixing instructions and recommendations.

Mix grout materials in proper mechanical mixers.

Mix grout as close to the work area as possible.

3.2 APPLICATION

3.2.1 Placing Grout

Place grout in accordance with the manufacturer's written installation instructions and recommendations. Do not use grout that has begun to set or if more than 1 hour has elapsed after initial mixing.

Fill blind cavities by pressure injection under controlled venting. Start injection and continue with the vent open until waste grout is expelled through the vent with the same consistency. Then block the vent for

pressurization to 413 kilopascal 60 psi. Use lower pressures when damage to construction may result.

3.3 FIELD QUALITY CONTROL

Provide testing and submit test reports in accordance with ASTM C1107/C1107M for the expansive grout to meet the following performance requirements:

Expansion: 28 calendar days - Percent maximum: 0.3

- Percent minimum: 0.0

Compressive Strength: 34 [_____] Megapascal 5,000 [_____] psi

3.4 PROTECTION

Protect freshly placed grout from premature drying and excessive cold or hot temperatures. Comply with manufacturer's requirements for cold-weather and hot-weather protection during curing.

-- End of Section --