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USACE / NAVFAC / AFCEA / NASA                      UFGS-03 62 16 (June 2006)  
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Preparing Activity:    NASA                      Superseding  
   UFGS-03 62 16 (April 2006)  
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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 9 October 2006

Latest change not indicated by CHG tags

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SECTION 03 62 16

METALLIC NON-SHRINK GROUTING  
06/06

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers 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.

Drawings must indicate areas of application.

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).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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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 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 C 150 (2005) Standard Specification for Portland Cement

ASTM C 33 (2003) Standard Specification for Concrete Aggregates

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. 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.

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

#### SD-01 Preconstruction Submittals

Submit [Concrete and Grouting Placement and an Inspection Plan](#) in accordance with paragraph entitled, "Concrete Placement/Inspection Plan," of this section.

#### SD-04 Samples

Contractor is responsible for furnishing samples of materials and copies of instructions from the manufacturer for the expansive admixture at least 45 calendar days prior to start of grout operations.

[Aggregates](#)  
[Expansive Admixtures](#)

#### SD-06 Test Reports

Provide test reports for the following tests in accordance with paragraph entitled, "Expansive Grout," of this section.

[Expansion](#)  
[Compressive Strength](#)

Submit [Inspection Reports](#) for the following items in accordance with paragraph entitled, "Expansive Grout," of this section.

[Expansive Grout](#)  
[Portland Cement](#)

#### SD-07 Certificates

Provide certificates for the following items showing conformance with referenced standards contained in this section.

[Portland Cement](#)  
[Expansive Admixtures](#)  
[Expansive Grout](#)  
[Aggregates](#)

### 1.3 CONCRETE AND GROUTING PLACEMENT/INSPECTION PLAN

The Contractor is responsible for providing [Concrete and Grouting Placement and an Inspection Plan](#) showing details of proposed methods of application, and instructions of the manufacturer of the expansive admixture at least 45 calendar days prior to the start of expansive concreting operations.

## PART 2 PRODUCTS

### 2.1 PORTLAND CEMENT

Conform to [ASTM C 150](#) for Cement, Type I.

### 2.2 AGGREGATES

Conform to [ASTM C 33](#) for aggregates and the gradation as directed.

### 2.3 WATER

Provide potable water.

### 2.4 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.]

### 2.5 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  
until either the aggregate has been completely  
oxidized or until the grout, in place, 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  
until either 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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The Contractor is responsible for providing [Inspection Reports](#) for  
Expansive Grout and Portland Cement. These reports must include a copy of  
records of inspections and tests as well as the records of corrective  
action taken. These reports must also include descriptions of preparation

of cavities for placement of grout and concrete; proper mixing, placement, and curing of grout and concrete; and methods of preventing discoloration.

[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.]

When tested, expansive grout must meet the following performance requirements:

Expansion: 28 calendar days - Percent maximum: 0.4  
- Percent minimum: 0.03

Compressive Strength: 27.6 Megapascal 4,000 psi

## PART 3 EXECUTION

### 3.1 PREPARATION

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NOTE: Verify that the section referenced below is  
included in specification.  
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Prepare cavities to receive grout for grouting by cleaning away foreign matter, laitance, and free water and by saturation of contact surfaces of concrete and masonry for not less than 24 hours before grout application.

Fill blind cavities by pressure injection under controlled venting. Start injection and continue with the vent open until waste grout expelled through vent has the same consistency; the vent must then be blocked and pressure built up to 413 kilopascal 60 psi gage, except that lower pressures must be used wherever damage to construction may result.

### 3.2 PLACING GROUT

Expansive concrete must be either poured-in-place by conventional methods or prepacked aggregate with expansive grout pressure-injected, as best suited to the particular application. Minimum 28-day strength of concrete must be 27.6 Megapascal 4,000 psi. Prepare surfaces to receive concrete as specified for expansive grout.

### 3.3 PREVENTION OF DISCOLORATION

Where Type M expansive admixture is used, make provisions to prevent discoloration of exposed surfaces of concrete, grout, or adjacent construction. Exposed surface must be depressed a minimum of 13 millimeter 1/2 inch, deeply scored for bond, and plastered over after curing with preshrunk mortar. Compose latter of 1 part Portland Cement and 2.5 parts sand (by volume) with not more than 17 liter of water per 42.6 kilogram 4.5

gallons of water per 94 pound sack of cement. Mix ingredients without the addition of any ingredient after a shrinkage period of 0.5 hour in hot weather to 1 hour in cold weather. Finish surface of plaster to blend with adjacent concrete.

-- End of Section --