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**USACE / NAVFAC / AFCESA / NASA** **UFGS-07 17 00 (April 2006)**

**Preparing Activity: NAVFAC** **Replacing without change UFGS-07170 (September 1999)**

**UNIFIED FACILITIES GUIDE SPECIFICATIONS**

**References are in agreement with UMRL dated 1 April 2006**
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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

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BENTONITE WATERPROOFING

**04/06**



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SECTION 07 17 00

BENTONITE WATERPROOFING
04/06

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NOTE: This guide specification covers the requirements for bentonite water proofing.

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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NOTE: Where local practice and experience indicate that a high degree of protection against hydrostatic pressure has been obtained with bentonite waterproofing, it may be used as an alternative to five-ply membrane waterproofing as specified in Section 07121N BUILT-UP BITUMINOUS WATERPROOFING.
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NOTE: On the project drawings, show:

1. Location and extent of bentonite waterproofing.

2. Locations of construction joints and pipe conduit or similar through-wall openings.
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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 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 D 1557 | (2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.)) |
| ASTM D 217 | (2002) Cone Penetration of Lubricating Grease |

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.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-08 Manufacturer's Instructions

Application

Protection

Corrections

1.3 DELIVERY, STORAGE, AND HANDLING

Do not place bentonite waterproofing materials in flooded areas or during precipitation. Provide bentonite panels and containers with manufacturer's labels intact, identifying the materials. Keep materials dry prior to use with polyethylene or canvas covering for sides and top and chocks or skids underneath, of sufficient height to maintain separation from ground water. Protect materials from moisture. Remove materials which show evidence of damage, deterioration, or contamination.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Bulk and Panel

Provide high-swelling, sodium bentonite containing a minimum of 90 percent montmorillonite and a maximum of 10 percent unaltered volcanic ash or other native sediments.

2.1.2 Bentonite

Provide material meeting the following requirements:

2.1.2.1 Free Swell Rating

Two grams of granular bentonite sifted into deionized water shall swell to occupy a minimum volume of 16 cubic centimeters.

2.1.2.2 Active Ingredient

Hydrous silicate of alumina, composed of the following chemical percentages and their allowable deviations:

| | |
|---|---|
| Silica | 61.0 +- 3.0 |
| Alumina | 19.5 +- 1.5 |
| Iron oxide | 5.0 +- 1.0 |
| Magnesia | 2.8 +- 0.4 |
| Soda and potash oxides | 2.4 +- 0.7 |
| Calcium oxide | 0.6 +- 0.5 |
| Molecular water | 6.1 +- 0.6 |
| Minor | 2.6 +- 0.6 |

2.1.3 Bentonite Panels

Provide panels containing bentonite material sealed between two layers of absorbent material, with a minimum of 4.9 kilograms one pound of evenly distributed bentonite per square meter foot. The bentonite panels shall be 1200 mm 48 inches square by a minimum of 5 mm 3/16 inch thick, in dry state.

2.1.4 Bentonite Mineral-Base Jelly

Provide material meeting requirements of ASTM D 217 for a worked penetration range of 215 to 275. Jelly shall contain 45 percent controlled, partially hydrated, high-swelling sodium bentonite by weight with minimum pH. of 8.8, no free water, and 25 percent or more residual swell.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Examine surfaces prior to treatment, eliminating irregularities and removing loose and foreign material. [Remove form tie rods.] [Point cracks and honeycombs in concrete surfaces. Surfaces of finished patches shall be flush with adjacent concrete surfaces.] [Allow cement mortar to dry for minimum of 72 hours prior to application of bentonite panels.]

3.2 APPLICATION

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**NOTE: Verify that location and extent of bentonite waterproofing, and location of construction joints and pipe conduit or similar through-wall openings are shown on the project drawings regardless of which option is chosen. Expansion joints will require additional detailing and their watertightness is the responsibility of the designer.**
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Apply bentonite waterproofing [on exterior surfaces of below grade [masonry] [and] [concrete] walls [and wall footings]] [and] [under [concrete slabs,] [pile caps,] [grade beams,] [footings,] [elevator pits]] [and] [against bulkhead walls] [where indicated], in accordance with manufacturer's printed instructions. Securely fasten panels over all construction joints and all expansion joints. Thoroughly pack all through-wall openings and penetrations with bentonite gel or granular

bentonite, or both, prior to placement of bentonite panels.

## 3.3 PROTECTION

Provide protection to bentonite panels during backfilling and compaction as recommended by manufacturer of bentonite materials. If backfill is not immediately applied, protect panels against precipitation by covering temporarily with polyethylene. Replace damaged panels with new panels before and during backfilling and compaction. Compact backfill to at least 85 percent of ASTM D 1557 maximum density.

## 3.4 CORRECTIONS

Repair leaks and defective areas in accordance with manufacturer's recommendations.

-- End of Section --