UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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USACE / NAVFAC / AFCEC / NASA	**UFGS-07 17 00 (February 2016)**

Preparing Activity: NAVFAC	**Superseding**
	UFGS-07 17 00 (April 2006)

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SECTION 07 17 00

BENTONITE WATERPROOFING
02/16

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NOTE: This guide specification covers the requirements for bentonite waterproofing.

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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Note: Where local practice and experience indicate, or where International Code Council (ICC), International Building Code (IBC), section Dampproofing and Waterproofing allows, that a high degree of protection against hydrostatic pressure has been obtained with bentonite waterproofing, it may be used as an alternative to a multi-ply membrane waterproofing system as specified in Section 07 12 00 BUILT-UP BITUMINOUS WATERPROOFING.

Where groundwater investigation required by IBC Section 1803.5.4 indicates that a hydrostatic pressure condition exists, and the design does not include a groundwater control system as described in IBC Section 1805.1.3, waterproof walls and floors in accordance with 1805.3 which requires a multi-ply membrane waterproofing system as specified in Section 07 13 53 ELASTOMERIC SHEET 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

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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.

ASTM INTERNATIONAL (ASTM)

ASTM D217	(2019b) Standard Test Methods for Cone Penetration of Lubricating Grease
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)

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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NOTE: If sustainable bentonite panel materials are available, choose bracketed option.

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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

Bentonite Materials; G[, [_____]]

Bentonite Panels; G[, [_____]]

Accessories; G[, [_____]]

SD-08 Manufacturer's Instructions

Application

Protection

Corrections Procedures; G[, [_____]]

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle bentonite waterproofing materials in original manufacturer's packaging and in strict accordance with manufacturer's printed instructions. Do not place or store bentonite materials in wet areas or during precipitation. Protect materials and accessories from moisture. Remove and replace products that show evidence of exposure to moisture prior to completion of installation. Remove materials which show evidence of damage, deterioration, or contamination.

Provide bentonite products and containers with manufacturer's labels intact and identifying all materials.

PART 2 PRODUCTS

2.1 BENTONITE MATERIALS

2.1.1 Bulk Bentonite

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 Properties

Provide material meeting the following requirements:

2.1.2.1 Free Swell Rating

Two grams of granular bentonite sifted into deionized water must 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 plus/minus 3.0
Alumina	19.5 plus/minus 1.5
Iron oxide	5.0 plus/minus 1.0
Magnesia	2.8 plus/minus 0.4
Soda and potash oxides	2.4 plus/minus 0.7
Calcium oxide	0.6 plus/minus 0.5
Molecular water	6.1 plus/minus 0.6
Minor	2.6 plus/minus 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 1 pound of evenly distributed bentonite per square meter foot. Provide bentonite panels

with a minimum thickness of 1200 mm 48 inches square by minimum dry thickness of 5 mm 3/16 inch.

2.1.4 Bentonite Mineral Based Gel

Provide material in accordance with ASTM D217 for a worked penetration range of 215 to 275. Provide gel with a minimum of 45 percent controlled, partially hydrated, high swelling sodium bentonite by weight with a 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, eliminate irregularities and remove loose and foreign material.[Remove form tie rods.][Point cracks and honeycombs in concrete surfaces. Make surfaces of finished patches 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 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, granular bentonite, or both, prior to placement of bentonite panels.

3.3 PROTECTION

Protect bentonite panels during backfilling and compaction in accordance with manufacturer's printed instructions. If backfill is not immediately applied, protect panels from precipitation by completely covering exposed panels with polyethylene; remove polyethylene immediately prior to backfilling. Replace damaged panels with new panels before and during backfilling and compaction.

3.4 BACKFILL

Backfill with smooth and uniform material with no sharp projections. Compact backfill to at least 85 percent of ASTM D1557 maximum density. Ensure backfill material is not contaminated with salt or other materials that could prevent bentonite from hydrating.

3.5 CORRECTIONS

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

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