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USACE / NAVFAC / AFCEC **UFGS-07 17 00 (August 2025)**

Preparing Activity: NAVFAC **Superseding**
UFGS-07 17 00 (February 2016)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2025
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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 17 00

BENTONITE WATERPROOFING

08/25

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SECTION 07 17 00

BENTONITE WATERPROOFING
08/25

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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 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)
ASTM D3776/D3776M	(2020) Standard Test Methods for Mass Per Unit Area (Weight) of Fabric
ASTM D4833/D4833M	(2007; R 2020) Standard Test Method forIndex Puncture Resistance of Geomembranes and Related Products
ASTM D5084	(2016a) Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D5385/D5385M	(2025) Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
ASTM D5891/D5891M	(2025) Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners

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 and Air Force 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.
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NOTE: If sustainable bentonite 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. Submittals not having a "G" or "S" classification are 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 Membrane; 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. Store products and accessories in weather protected environment, clear of ground and moisture, within temperature ranges recommended by manufacturer. Protect from construction operation related damage, as well as damage from weather, excessive temperatures, and prolonged sunlight. Do not place or store bentonite materials in wet areas or during precipitation. Provide cover, top and all sides, for materials stored on-site, allowing for adequate ventilation. 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.

1.4 ENVIRONMENTAL REQUIREMENTS

Perform work only when existing and forecasted weather conditions are within the guidelines established by the manufacturer of the waterproofing materials. Do not apply waterproofing materials in areas of standing or active water; or over ice and snow. Do not install waterproofing during rain, mist or heavy fog. If rain, mist or snow is anticipated before the membrane is compacted below-grade, cover any exposed bentonite or seams with minimum 6 mil polyethylene sheet. Should the bentonite waterproofing materials be subjected to pre-hydration as a result of prolonged immersion, inspection of the material and written acceptance from the manufacturer is required prior to concrete or backfill placement.

1.5 WARRANTY

Upon installation completion and acceptance of the work, the waterproofing materials manufacturer will provide to the project Owner, a written [5][10] year non-prorated warranty, covering both materials and labor.

PART 2 PRODUCTS

2.1 BENTONITE MATERIALS

2.1.1 Bulk Granular Bentonite

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

2.1.2 Sodium Bentonite Properties

Provide material meeting the following requirements:

Property	Typical Value
Free Swell (cc/2gm)	20 plus or minus 4 cc
Fluid Loss ASTM D5891/D5891M	less than 18 ml
Permeability ASTM D5084	5 X 10-9 cm/sec

2.1.3 Bentonite Membrane

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NOTE: Depending on the type of soil, a HDPE liner may be required on one side. If soil testing requires, include last bracketed statement. If standard membrane can be used, delete the bracketed statement.

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Provide membrane with interlocking needle-punched geotextiles encapsulating bentonite material with a minimum of 4.9 kilograms 1 pound of evenly distributed bentonite granules per square meter foot[with an integrated polymeric sheet liner on one side]. Provide bentonite membrane with a minimum width of 1200 mm 48 inches by minimum dry thickness of 5 mm 3/16 inch. Membrane must have the following performance properties:

Property	Test Method	Nominal Value
Bentonite Mass Per Unit Area	ASTM D3776/D3776M	4.8 kg/sqm 1.0 lb/sqft
Hydrostatic Pressure Resistance	ASTM D5385/D5385M	70 m 231 ft.
Puncture Resistance	ASTM D4833/D4833M	Not less than 445 N 100 lbs.

2.1.4 Bentonite Mastic

Trowelable consistency, bentonite compound, specifically formulated for application at joints and penetrations.

2.1.5 Bentonite Tubes

Water soluble tube container filled with active granular sodium bentonite.

[2.1.6 Seam Tape

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NOTE: Seam tape is used with membrane that has a HDPE liner. If standard, delete the seam tape.

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Seam tape with butyl rubber adhesive, polyethylene backing, and release liner used with membrane that has an integrated polymeric sheet liner for taping overlapped membrane edges.

]PART 3 EXECUTION

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NOTE: Include other accessories as necessary for below grade applications such as termination bar for horizontal and vertical termination details, composite drain board, and drainage piping. Include installation requirements in PART 3 as applicable.
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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. Fill voids and other defects greater than 6 mm 1/4 inch in depth. 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 membrane.]

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 membrane[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. Protect bentonite material from wetting prior to permanent placement. Install a continuous layer of waterproofing membrane with ends and edges lapped a minimum of 127 mm 4 inches. Stagger end joints, seal laps and treat fastener penetrations in accordance with manufacturer's written instructions.[Cover the entire footing and overlap waterproofing membrane from underslab work a minimum of 150 mm 6 in.][Apply Bentonite Mastic around penetrations and form continuous 50 mm 2 inch wide cant at intersection of footings and walls with mastic.] Secure membrane with washer headed fasteners in accordance with manufacturer's printed instructions. Install specified control joint treatments prior to the installation of the bentonite membrane system. Follow manufacturer's instructions for application of membrane over control joints. Thoroughly pack through-wall openings and penetrations with bentonite mastic, bulk granular bentonite, or both, prior to placement of bentonite membrane. Inspect finished bentonite membrane installation and repair any damaged material prior to backfill placement.

3.3 PROTECTION

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

-- End of Section --