

GUIDE SPECIFICATION FOR CLAY-TITE™: BENTONITE WATERPROOFING MEMBRANE

SECTION 07 17 16

BENTONITE COMPOSITE SHEET WATERPROOFING

Specifier Notes: This guide specification is written according to the Construction Specifications Institute (CSI) MasterFormat. The section must be carefully reviewed and edited by the architect or engineer to meet the requirements of the project. Coordinate this section with other specification sections and drawings.

Specifier Notes: CLAY-TITE is a dual layer waterproofing consisting of virgin HDPE (20 mil), sodium bentonite, and a protective layer consisting of a non-woven polypropylene. The HDPE provides the first layer of waterproofing, while the bentonite's self-sealing capabilities ensure positive puncture protection under hydrostatic conditions. The polypropylene fabric protects the bentonite from direct installation of shotcrete.

CLAY-TITE is designed for use below-grade. CLAY-TITE is equally effective in installations where the waterproofing is pre-applied prior to pouring of the concrete or when used for standard applications. CLAY-TITE can be used in both vertical and horizontal applications.

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Installation of bentonite composite sheet waterproofing membrane.
 - 1. Blindside installation.
 - 2. Backfilled wall installation.
 - 3. Underslab installation.

1.02 RELATED SECTIONS

Specifier Notes: Edit the list of related sections as required for the project. List other sections dealing with work directly related to this section.

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 07 13 26 – Self-Adhering Sheet Waterproofing.
- C. Section 07 21 00 – Thermal Insulation.
- D. Section 07 60 00 – Flashing and Sheet Metal.
- E. Section 07 92 00 – Joint Sealants.
- F. Section 31 50 00 – Excavation Support and Protection.
- G. Section 33 46 00 – Sub-drainage.

1.03 REFERENCES

- A. ACI 302.1R.17 – Guide for Concrete Floor and Slab Construction.
- B. ASTM D638: Standard Test Method for Tensile Properties of Plastics.

- C. ASTM D746: Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
- D. ASTM D751: Standard Test Method for Coated Fabrics.
- E. ASTM D1970: Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- F. ASTM E96 (Method B): Standard Test Methods for Water Vapor Transmission of Materials.
- G. ASTM E154: Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.04 QUALITY ASSURANCE

- A. Contractor will provide the proper equipment, manpower, and supervision at the jobsite to install the membrane in compliance with the project plans and specifications.
- B. Installation must be carried out by an experienced contractor with an adequate number of skilled personnel, experienced in the application of bentonite waterproofing membrane applications.
- C. Maintain a record of the batch numbers of all materials supplied for this project.

1.05 PRE-CONSTRUCTION MEETING

- A. Convene [one] [____], week [____] prior to commencing work of this section, in accordance with Section 1.04 - Quality Assurance, meeting with manufacturer's technical representative, General Contractor and Site Engineer to review the installation procedures.

1.06 SUBMITTALS

- A. Comply with Section 01 33 00 - Submittal Procedures.
- B. Submit manufacturer's product data and application instructions.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean, dry area in accordance with manufacturer's instructions.
- C. Protect materials during handling and application to prevent damage or contamination.
- D. Protect membrane from any moisture to avoid hydration prior to installation.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install product over areas where standing ice or water is present.
- B. Do not install product in areas exposed to high sodium levels.
- C. Do not install product during rain, mist or heavy fog.
- C. Install product in situations where a minimum 24 lb./ft.² (118 kg/m²) compression/compaction can be achieved.

Specifier Notes: This guide specification is written around CLAY-TITE waterproofing membrane. In areas where the ground water has a high sodium level, such as sea water or brackish water, CLAY-TITE HSR is available to be used in this installation. It is advisable to contact W. R. MEADOWS Technical Services prior to installation. In addition, a water sample may be required to determine the suitability of the membrane for use in specific conditions.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. W. R. MEADOWS®, INC., PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976. (847) 683-4500. Fax (847) 683-4544. Website: www.wrmeadows.com.

2.02 MATERIALS

- A. Bentonite Waterproofing Membrane: Composite membrane consisting of a 20 mil (0.5 mm) thick, virgin HDPE liner bonded with up to 1.0 lb./ft.² (4.9 kg/m²) layer of sodium bentonite and a non-woven polypropylene protective layer.
1. Performance Based Spec: Bentonite waterproofing membrane shall have the following properties as determined by laboratory testing:
- a. Weight: 1.0 lb./ft.² (4.9 kg/m²)
 - b. Low Temperature Flexibility, ASTM D1970: Pass
 - c. Resistance to Hydrostatic Head, ASTM D751, Procedure A: 174' (52.9 m) of water.
 - d. Percent Elongation at Break, ASTM D638, Type I: >700%.
 - e. Tensile Strength (membrane), ASTM D638: MD 3660 psi (25.2 MPa)
TD 3650 psi (25.2 MPa)
 - f. Crack Bridging: 3/8" (9.6 mm).
 - g. Puncture Resistance, ASTM E154: >177 lb. (>77.3 kg).
 - h. Freeze/Thaw Resistance: No effect.
2. Proprietary Based Spec:
- a. CLAY-TITE Bentonite Waterproofing Membrane by W. R. MEADOWS.

2.03 ACCESSORY MATERIALS

- A. Bentonite Mastic: Pliable yet expandable mastic containing bentonite for filling penetrations, voids, honey-combs, tie-backs, and spalled concrete. To be used below the water table or when temperatures are going to be below 40° F (4° C). CLAY-TITE MASTIC by W. R. MEADOWS.
- B. Water-Based Adhesive: Adhesive containing 15 - 20% emulsified bentonite for seams/waterstop to be used when above the water table and temperatures are above 40° F (4° C). CLAY-TITE ADHESIVE by W. R. MEADOWS.
- C. Waterstop
- 1. Regular version waterstop containing bentonite. WATERSTOP EC by W. R. MEADOWS.
 - 2. Waterstop containing hydrophilic rubber and bentonite for use in applications below the water table. WATERSTOP EC PLUS by W. R. MEADOWS.
- D. Granular Bentonite Pack: Granular bentonite for use as fill, a cant along horizontal-to-vertical transitions, and other loose bentonite applications. CLAY-TITE GRANULAR PACK by W. R. MEADOWS.
- E. Rolled Matrix Drainage System: MEL-DRAIN™ by W. R. MEADOWS.
- F. Termination bar for mechanical fastening: TERMINATION BAR by W. R. MEADOWS.

- G. Overlap Tape for backfilled wall installation: 6" (150 mm) self-adhesive, reinforced bituminous tape. PMPC TAPE by W. R. MEADOWS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive membrane. Notify architect if surfaces are not acceptable. Do not begin surface preparation or installation until unacceptable conditions have been corrected.

3.02 GENERAL SURFACE PREPARATION

- A. Inspect all surfaces for any conditions detrimental to the proper completion of the work.
- B. Ensures surfaces are structurally sound.
- C. Remove debris or any other foreign material that could damage the membrane.

3.03 VERTICAL BLINDSIDE WATERPROOFING

A. SURFACE PREPARATION

1. WOOD LAGGING WITH STEEL PILES

- a. Be sure all lagging board nails are pounded flush or removed.
- b. Remove all sharp protrusions, mud, debris, ice, or any other materials that will affect the membrane's performance.
- c. Fill or cover any irregularities and voids between lagging board exceeding 1" (25 mm) using bentonite mastic, concrete grout, patching mortar, or treated plywood.
- d. Cover lagging boards and soldier piles vertically with drainage board installed according to written installation instructions.

2. CAISSONS

- a. Install the bentonite membrane directly onto the augured caissons if they are smooth.
- b. Remove any sharp protrusions.
- c. Fill any depressed areas between each pile with a concrete grout.
- d. Install a minimum 3/4" (19.1 mm) pressure treated plywood if the augured caissons are rough and irregular.
- e. Fill the void behind the plywood with sand, aggregate, or grout.

Specifier Notes: Plywood selection and installation shall be determined by the project engineer.
--

3. SHEET PILING

- a. Remove all sharp protrusions, where the bentonite waterproofing membrane is going to be in direct contact.
- b. Install a minimum 3/4" (19.1 mm) pressure-treated plywood in areas where the membrane is going to span the sheet piling.
- c. Fill the void behind the plywood with sand, aggregate, or grout.

4. SHOTCRETE

- a. Remove all sharp protrusions, mud, debris, ice, or any other materials that will affect the membrane's performance.
- b. Fill or cover any voids or irregularities exceeding 2" (50 mm) using a concrete grout or patching mortar.

5. SLURRY WALL

- a. Remove all sharp protrusions, mud, debris, ice, or any other materials that will affect the membrane's performance.

- b. Fill or cover any voids or irregularities exceeding 2" (50 mm) using a concrete grout or patching mortar.

B. INSTALLATION OF DRAINAGE BOARD

Specifier Notes: Select the soil retention system that is to be used for blindside installation of CLAY-TITE and delete the other sections. W. R. MEADOWS always recommends the use of MEL-DRAIN drainage board for all vertical installations of CLAY-TITE waterproofing membrane. Use of CLAY-TITE without MEL-DRAIN is at the discretion of the architect or engineer.

1. Unroll drainage board with the fabric face of the drainage board against the soil retention system.
2. Mechanically fasten the drainage board at the top side at 12" (300 mm) o.c. with a suitable mechanical fastening system that is compatible with the substrate.
3. Adhere remainder of drainage board with mastic compatible with this installation.
4. Overlap the flat side core lip with second sheet of drainage board to provide a continuous drainage layer (shingle fashion). Ensure excess filter fabric is overlapped with this next sheet.

C. PENETRATIONS

1. Fill voids with concrete grout or bentonite mastic and trowel around penetration ensuring all areas are completely filled.
2. Cut strips of the bentonite waterproofing membrane 6" (152.4 mm) wide and cut flanges across this strip to aid in wrapping the strip around the penetration.
3. Install this strip according to manufacturers' installation instructions and fasten into place.
4. Install bentonite waterstop around penetration and press into the bentonite waterproofing membrane.

D. TIE-BACKS/SOIL NAILS

Specifier Notes: It is recommended to fully box out around the tieback or soil nail to ensure continuity of waterproofing in these areas. In the instance that this is not able to be done based on project requirements, or under direction from the architect or engineer, then the area needs to be addressed using the following procedure.

1. Fill voids with concrete grout or bentonite mastic so that all areas are completely filled.
2. Fully cover the tieback or soil nail with bentonite mastic and then completely cover the area with the bentonite waterproofing membrane.
3. Install bentonite waterstop around penetration and press into the bentonite waterproofing membrane.

E. CONSTRUCTION JOINTS

Specifier Notes: Construction joints are to be treated with either WATERSTOP EC or WATERSTOP EC PLUS. WATERSTOP EC PLUS can be used in all installations; however, it is essential for use in areas that will be below the water table.

1. Apply bentonite mastic in all areas to receive bentonite waterstop.
2. Remove release paper to expose adhesive on the bentonite waterstop.
3. Install bentonite waterstop a minimum of 2" (50 mm) from face of wall and press into place.
4. Fasten with nails and washers every 12" O.C.
5. Butt ends of the waterstop together for subsequent applications.

F. INSTALLATION OF BENTONITE WATERPROOFING MEMBRANE

1. Orient the bentonite waterproofing membrane so that the bentonite side is towards the concrete pour and the HDPE side is towards the drainage board or soil retention system.
2. Mechanically affix the bentonite waterproofing across the top every 20" (500 mm) O.C.
3. Lap all seams so that they are shingled and overlap a minimum of 4" (101.6 mm).
4. Locate all seams a minimum of 12" (300 mm) from all inside and outside corners.
5. Nail all seams every 24" (600 mm) O.C. with nail and washer.
6. Staple in between nails every 6" (150 mm) O.C.
7. Apply bentonite mastic over all fasteners.
8. Terminate bentonite waterproofing at the top of the soil retention system by folding over and tacking into place.

G. CONCRETE PLACEMENT

1. Repair any damaged areas of the bentonite waterproofing membrane according to manufacturers' membrane repair procedure.
2. Confirm all detailing has been completed to ensure continuity.
3. Pour concrete against the form rather than the membrane at a height no greater than 4' (1.2 m).
4. For shotcrete installations, build the wall up in 4' (1.2 m) lifts and ensure the shotcrete is not sprayed directly into the seams.
5. Place concrete so that a minimum compression/compaction of 24 lb./ft.² (118 kg/m²) is achieved.

3.04 BACKFILLED CONCRETE WALL WATERPROOFING

A. SURFACE PREPARATION

1. Protect adjacent surfaces not designated to receive waterproofing.
2. Remove all sharp protrusions, mud, debris, ice, or any other materials that will affect the membrane's performance.
3. Fill or cover any voids or irregularities exceeding 2" (50 mm) using a concrete grout, patching mortar, or bentonite mastic.
4. Confirm concrete surfaces are clean, smooth, and free of standing water.
5. Patch all holes and voids and smooth out any surface misalignments.
6. Confirm surfaces are acceptable prior to proceeding with membrane installation.

B. INSIDE AND OUTSIDE CORNERS

1. Install a continuous 2" (50 mm) cant of granular bentonite at all vertical/ horizontal joints, including the wall/footing transition.
2. Install a continuous 1" (25 mm) cant of bentonite mastic at all vertical inside corners.

C. PENETRATIONS

1. Fill voids with concrete grout or bentonite mastic and trowel around penetration, ensuring all areas are completely filled.
2. Cut strips of the bentonite waterproofing membrane 6" (150 mm) wide and cut flanges across this strip to aid in wrapping the strip around the penetration.
3. Install this strip according to manufacturers' installation instructions and fasten into place.
4. Install bentonite waterstop around penetration and press into the bentonite waterproofing membrane.

D. CONSTRUCTION JOINTS

Specifier Notes: Construction joints are to be treated with either WATERSTOP EC or WATERSTOP EC PLUS. WATERSTOP EC PLUS can be used in all installations, however, it is essential for use in areas that will be below the water table.

1. Apply bentonite mastic in all areas to receive bentonite waterstop.
2. Remove release paper to expose adhesive on the bentonite waterstop.

3. Install bentonite waterstop a minimum of 2" (50 mm) from face of wall and press into place.
4. Fasten with nails and washers every 12" (304.8 mm) O.C.
5. Butt ends of the waterstop together for subsequent applications.

E. INSTALLATION OF BENTONITE WATERPROOFING MEMBRANE

1. Orient the bentonite waterproofing membrane so that the bentonite side is towards the concrete substrate and the HDPE side is facing out.
2. Mechanically affix the bentonite waterproofing across the top with a termination bar fastened every 12" (300 mm) O.C.
3. Lap all seams so that they are shingled and overlap a minimum of 1.5" (38 mm)
4. Locate all seams a minimum of 12" (300 mm) from all inside and outside corners.
5. Nail all seams every 24" (600 mm) O.C. with nail and washer.
6. Staple in between nails every 6" (150 mm) O.C.
7. Apply bentonite mastic over all fasteners.
8. Tape all seams with a 6" (150 mm) strip of self-adhesive overlap tape and roll press into place.

F. MEMBRANE PROTECTION

1. Repair any damaged areas of the bentonite waterproofing membrane according to manufacturers' membrane repair procedure.
2. Confirm all detailing has been completed to ensure continuity.
3. Install drainage board according to project requirements and manufacturers' installation instructions.
4. Backfill immediately using care to avoid damage to the waterproofing membrane system.
5. Compact backfill to achieve compression/compaction of 24 lb./ft.² (118 kg/m²).

3.05 UNDERSLAB WATERPROOFING

A. SURFACE PREPARATION

Specifier Notes: CLAY-TITE Waterproofing Membrane can be installed either on a compacted sub-grade or pre-installed mud slab. For a compacted sub-grade, prior to placement of the CLAY-TITE, the sub-grade needs to be prepared in accordance with ACI 302.1R-04: Chapter 4, Section 4.1.4 – Base Material. If a mud slab is to be used, it needs to be designed by the architect or engineer. This is an acceptable substrate for use with the CLAY-TITE Waterproofing Membrane.

1. Compacted Sub-grade
 - a. Level, tamp, or roll earth or granular material beneath the slab base to create a sound and solid substrate to eliminate any potential movement during the concrete pour.
2. Mud Slab
 - a. Remove all sharp protrusions, mud, debris, ice, or any other materials that will affect the membrane's performance.
 - b. Fill or cover any voids or irregularities exceeding 2" (50 mm) using a concrete grout, patching mortar, or bentonite mastic.
 - c. Confirm concrete surfaces are clean, smooth, and free of standing water.
 - d. Patch all holes and voids and smooth out any surface misalignments.
 - e. Confirm surfaces are acceptable prior to proceeding with membrane installation.

B. PENETRATIONS

1. Fill voids with concrete grout or bentonite mastic and trowel around penetration ensuring all areas are completely filled.
2. Cut strips of the bentonite waterproofing membrane 6" (150 mm) wide and cut flanges across this strip to aid in wrapping the strip around the penetration.
3. Install this strip according to manufacturers' installation instructions and fasten into place.

4. Install bentonite waterstop around penetration and press into the bentonite waterproofing membrane.

C. CONSTRUCTION JOINTS

Specifier Notes: Construction joints are to be treated with either WATERSTOP EC or WATERSTOP EC PLUS. WATERSTOP EC PLUS can be used in all installations; however, it is essential for use in areas that will be below the water table.

1. Apply bentonite mastic in all areas to receive bentonite waterstop.
2. Remove release paper to expose adhesive on the bentonite waterstop.
3. Install bentonite waterstop a minimum of 2" (50 mm) from face of wall and press into place.
4. Fasten with nails and washers every 12" (304.8 mm) O.C.
5. Butt ends of the waterstop together for subsequent applications.

D. INSTALLATION OF BENTONITE WATERPROOFING MEMBRANE

1. Orient the bentonite waterproofing membrane so that the bentonite side is facing up towards the concrete pour substrate and the HDPE side is facing out.
2. Lap all seams a minimum of 4" (101.6 mm).
3. Staple all seams every 6 - 12" (75 - 150 mm) and apply bentonite mastic over all the staples.

Specifier Notes: In situations where CLAY-TITE has the potential to be exposed to wet conditions for an extended period of time, the membrane should be installed HDPE side facing up. If this is the case, prior to installation of CLAY-TITE, install PERMINATOR® (10 mil) on the properly prepared sub-grade. Lap all seams of CLAY-TITE a minimum of 4" (101.6 mm) and then install PMPC TAPE over all seams and roll press into place.

E. MEMBRANE PROTECTION

1. Protect CLAY-TITE from damage that can be caused by reinforcing steel chairs by using chairs with sand plates or by placing a piece of protection board beneath the reinforcing steel chair.
2. Repair any damaged areas of the bentonite waterproofing membrane according to manufacturers' membrane repair procedure.
3. Confirm all detailing has been completed to ensure continuity.
4. Place concrete onto the bentonite waterproofing membrane in a method so as not to damage the membrane.
5. Do not drop concrete from a height greater than 4' (1.2 m).
6. Place concrete so that a minimum compression/compaction of 118 kg/m² is achieved.

END OF SECTION