
MANUFACTURER'S GUIDE SPECIFICATION

SECTION 07 17 13 MIRACLAY® BENTONITE WATERPROOFING

[NOTE TO SPECIFIER:

This Guide Specification includes language for underslab, pre-applied (i.e. blindside) and post-applied waterproofing applications using bentonite waterproofing.]



SECTION 07 17 13
BENTONITE PANEL WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

The general provision of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

1.2 DESCRIPTION OF WORK

The extent of Geotextile/Bentonite Clay waterproofing membrane is shown on the drawing and/or as specified herein.

1.3 RELATED SECTIONS

- A. Section 03 10 00 – Concrete Forming and Accessories
- B. Section 03 20 00 – Concrete Reinforcing
- C. Section 03 30 00 – Cast-In-Place Concrete
- D. Section 04 22 00 – CMU - Concrete Unit Masonry
- E. Section 31 23 00 – Excavation and Fill
- F. Section 31 20 00 – Earth Moving
- G. Section 31 40 00 – Shoring and Underpinning
- H. Section 31 50 00 – Excavation Support and Protection
- I. Section 31 60 00 – Special Foundations and Load-Bearing Elements

1.4 REFERENCE STANDARDS

- A. ASTM D751 Standard Test Methods for Coated Fabrics
- B. ASTM D903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
- C. ASTM D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection (Low Temperature Flexibility)
- D. ASTM D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- E. ASTM D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
- F. ASTM D5887 Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter
- G. ASTM D5890 Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners
- H. ASTM D5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners
- I. ASTM D5993 Standard Test Method for Measuring Mass per Unit Area of Geosynthetic Clay Liners
- J. ASTM D4643 Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
- K. ASTM D6243 Standard Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method

- L. ASTM D6496 Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners
- M. ASTM D6768 Standard Test Method for Tensile Strength of Geosynthetic Clay Liners

1.5 QUALITY ASSURANCE

- A. Manufacturer: Provide Geotextile/Bentonite Clay waterproofing membrane produced by a manufacturer with a minimum of 5 years experience in the waterproofing industry.
- B. Installer: A firm with a minimum of 2 years experience in installing bentonite clay or other related waterproofing products.
- C. MiraCLAY Waterproofing System must be installed by a Carlisle Coatings & Waterproofing Inc. Approved Applicator in compliance with shop drawings approved by Carlisle Coatings & Waterproofing Inc. There must be no deviations made from Carlisle's specifications or the approved drawings without the prior approval from Carlisle Coatings & Waterproofing Inc.
- D. The project Geotechnical Report and Environmental Study shall be provided to Carlisle Coatings & Waterproofing Inc. for review and approval at time of Approved Applicator's bid.
- E. A pre-installation meeting should be coordinated by the General Contractor and attended by an Owner's Representative, the Waterproofing Consultant, the waterproofing applicator and membrane manufacturer's representative. Any trade having relevant or adjacent work to the Blindside System before, during and after installation should also be present and properly represented by a Project Manager and Job Foreman. These trades include but are not limited to the Foundation Contractor, the Concrete Contractor, the Steel Reinforcement Contractor, the Mechanical Contractor, the Electrical Contractor and the Plumbing Contractor. The purpose of this meeting is to discuss the necessity of ensuring proper waterproofing membrane protection during all phases of installation and to review other applicable requirements or unusual field conditions.
- F. Upon request by the Approved Applicator, an inspection will be conducted by a Carlisle Coatings & Waterproofing Inc. representative to ensure that the waterproofing membrane has been installed according to Carlisle Coatings & Waterproofing Inc. specifications and details. This inspection shall be coordinated such that access to the membrane is not impaired.
- G. An in-progress inspection may be scheduled after the initial inspection (after the membrane installation is completed) to ensure proper protection procedures are being followed to prevent possible damage to the membrane during the installation of above membrane components.

1.6 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00.
- B. Product Data: Submit manufacturer's product literature and installation instructions.
- C. Subcontractor's approval by manufacturer: Submit document stating manufacturer's acceptance of subcontractor as an Approved Applicator for the specified materials.
- D. Water Sample Test Result: A water sample (2 liters) is required on projects that have ground water and should be submitted to the waterproofing manufacturer to test for contamination and compatibility with waterproofing membrane. Submit to architect a letter of compatibility recommending which formulation to use.
- E. Warranties: Submit sample warranties identifying the terms and conditions stated in Section 1.7

1.7 WARRANTY

- A. Upon completion and acceptance of the work required by this section, the manufacturer will issue a warranty agreeing to promptly replace defective materials for a period of 5 years.
- B. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of Carlisle and Carlisle shall not be responsible for any claims, repairs, restoration, or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original manufacturer's packaging and store materials in strict accordance with manufacturer's instructions.
- B. Remove and replace products that have been prematurely exposed to moisture.

1.9 PROJECT CONDITIONS

- A. Coordination between various trades is essential to avoid unnecessary traffic to prevent damage to the membrane. Heavily traveled areas must be protected by placing temporary protection courses to prevent damage to the membrane.
- B. Coordinate waterproofing work with other trades. The applicator shall have sole right of access to the specified areas for the time needed to complete the application.
- C. Protect adjoining surfaces not to be waterproofed against damage or soiling. Protect plants, vegetation and animals which might be affected by waterproofing operations.
- D. Wear applicable protective clothing and respiratory protection gear.
- E. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

PART 2 - PRODUCTS

2.1 WATERPROOFING SYSTEM

- A. Provide products manufactured and supplied by Carlisle Coatings & Waterproofing Inc., 900 Hensley Lane, Wylie Texas 75098, phone (800) 527-7098, fax (972) 442-0076.
- B. The components of this system are to be products of Carlisle Coatings & Waterproofing Inc. The installation, performance or integrity of products by others is not the responsibility of Carlisle Coatings & Waterproofing Inc. and is expressly disclaimed by the warranty.

2.2 MEMBRANE

- A. Bentonite panel sheet membrane: Shall be CCW MiraCLAY Bentonite Clay Waterproofing Membrane
- B. Bentonite panel sheet membrane for saltwater and contaminated groundwater: Shall be CCW MiraCLAY EF Bentonite Clay Waterproofing Membrane

2.3 RELATED ACCESSORY PRODUCTS

- A. Sealant: Shall be CCW MiraCLAY Sealant used for detailing at terminations and penetrations, to fill minor voids in concrete, and as a fillet in angle changes
- B. Granules: Shall be CCW MiraCLAY Granules used for horizontal to vertical transitions and for detailing at seams and slab penetrations
- C. Pre-formed, high-impact resistant, heavy-duty thermoplastic tie-back cover: Shall be CCW Tie-Back Cover for protecting the MiraCLAY integrity at soil retention tie-back systems
- D. Swellable Sealant: Shall be MiraSTOP SS for use in non-moving joints to create watertight concrete joints and as an adhesive for CCW MiraSTOP waterstop strips
- E. Pre-formed Bentonite hydrophilic waterstop strip: Shall be CCW MiraSTOP BW for use in non-moving joints to create watertight concrete joints
- F. Pre-formed Non-Bentonite hydrophilic waterstop strip: Shall be CCW MiraSTOP NBW for use in non-moving joints to create watertight concrete joints
- G. Injectable waterstop (grout tube): Shall be MiraSTOP IW for use as an injectable waterstop for use in non-moving joints to create watertight concrete joints
- H. Chemical grout: Shall be MiraSTOP CG-F and for use with the MiraSTOP IW
- I. Miscellaneous products: accessory products approved by Carlisle Coatings & Waterproofing Inc.
- J. Membrane to Substrate Fasteners: Fasteners, of the type and length suitable for the substrate, shall be used in conjunction with washers, of at least 1" diameter to attach the bentonite membrane to the substrate.
- K. Membrane to Membrane Fasteners: Mechanically fasten membrane sheets together with a box stapler or similar device for horizontal applications.
- L. The Geotextile/Bentonite membrane shall consist of geotextile panels of sodium bentonite clay sandwiched between two layers of needle-punched woven and non-woven polypropylene fabrics.
- M. Drainage Composite: Shall be CCW MiraDRAIN as recommended by the manufacturer for each condition
- N. Perimeter Drainage System: Shall be CCW MiraDRAIN HC

2.4 PHYSICAL PROPERTIES FOR MiraCLAY

Property	Method	Unit	Value
Thickness	-	In.	0.25
Bentonite Mass/Unit Area	ASTM D5993	lb/ft ² MARV (kg/m ² MARV)	0.893 (0.123)
Nonwoven	ASTM D5261	oz/yd ² MARV (g/m ² MARV)	6.0 (200)
Woven	ASTM D5261	oz/yd ² MARV (g/m ² MARV)	3.1 (105)
Swell Index, Minimum	ASTM D5890	-	24 ml (2 g)
Moisture Content	ASTM D4643	%, maximum	12
Fluid Loss	ASTM D5891	ml, maximum	18
Tensile Strength	ASTM D6768	lb/in MARV (kN/m MARV)	30 (5)
Peel Strength	ASTM D6496	lbs/in MARV (N/m MARV)	3.5 (610)
Permeability, Maximum	ASTM D5887	m/s	5 x 10 ⁻⁹
Index Flux, Maximum	ASTM D5887	m ³ /m ² /s	1 x 10 ⁻⁸
Internal Shear Strength	ASTM D6243	psf (kPa)	500 (24)
Elongation	ASTM D4632	%	150
Low Temperature Low Temperature	ASTM D1970	@ -25°F (-32°C)	Unaffected
Hydrostatic Head Pressure	ASTM D751	ft (meter)	228 (69.49)
Adhesion to Concrete	ASTM D903	lb/in (kg/cm)	17.7 (8)

*@ 12% moisture content

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrate and condition under which waterproofing will be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. The substrate must be relatively even without noticeable high spots or depressions, relatively smooth, free of protrusions, debris, sharp edges or foreign materials and must be free of accumulated water, ice and snow. Earth, crushed stone, or soil shall be compacted to a minimum of 85% modified Proctor.
- B. Before any waterproofing work is started the waterproofing applicator shall thoroughly examine all surfaces for any deficiencies. Should any deficiencies exist, the architect, owner, or general contractor shall be notified in writing and corrections made.
- C. All surface preparation shall be performed in accordance with Carlisle-CCW application instructions which include but are not limited to:
 - 1. Subbase/Grade Substrates (concrete, earth, or crushed stone)
 - i. Concrete working slab/mud slab/rat slab must be relatively even without noticeable high spots or depressions, relatively smooth, free of protrusions, debris, sharp edges, or foreign materials.
 - a. Honeycombing, voids and aggregate pockets exceeding 1" in diameter or have a depth greater than ¾" should be filled with a non-shrink cementitious grout.
 - ii. Earth and stone substrates should be compacted to a minimum 85% modified Proctor.
 - a. Crushed stone should not be larger than ¾" (18 mm) in size.
 - 2. Support of Excavation, S.O.E. (Wood Lagging, Concrete Caissons, Sheet Piling, Shotcrete, etc.)
 - i. All soil retention substrates shall be relatively smooth and even.
 - ii. Gaps or voids greater than 1.0 in. (25mm) shall be filled or covered with CCW approved material.
 - iii. Remove projections greater than ¾" (20 mm).
 - iv. CCW MiraDRAIN Composites by Carlisle Coatings and Waterproofing is an acceptable substrate and is installed before the MiraCLAY.
 - a. Install CCW MiraDRAIN with the fabric side facing the soil retention system.
 - 3. Concrete Foundation Wall:
 - i. The substrate must be properly prepared to receive the MiraCLAY waterproofing membrane.
 - ii. All honeycombs, form-tie cavities and indentations should be filled with MiraCLAY Sealant or filled with latex Portland Cement.
 - iii. Substrate must be smooth and uniform removing any protrusions over ½" (12 mm) from the surface.
 - iv. Apply CCW MiraCLAY Sealant to all construction joints at a minimum of ¼" (7 mm) thickness and a 3" (8 cm) minimum width.
 - v. Footings must be free of soil, rocks or debris to provide a suitable substrate to receive the MiraCLAY waterproofing membrane.

3.3 INSTALLATION

- A. Underslab Application: (Structural concrete slab shall be reinforced and have a minimum thickness of 4" (10 cm)).
1. Install CCW MiraCLAY with the white non-woven side up, facing the installer.
 2. Overlap edges a minimum of 4" (10 cm).
 3. Protect CCW MiraCLAY from damage caused by rebar chairs with sharp edges or points by placing a patch of CCW MiraCLAY under the rebar chair.
 4. Staple joints often enough to prevent excessive movement.
 5. Pour CCW MiraCLAY Granules or trowel CCW MiraCLAY Sealant around all penetrations and press in "cut-to-fit" collars of CCW MiraCLAY.
 6. Extend the installation of CCW MiraCLAY 12" (31 cm) up or beyond the perimeter slab forms.
 7. Inspect and repair any damaged material before concrete pour.
- B. Pre-Applied (i.e. Blindsided) Application for Foundation Wall against S.O.E.:
1. Install MiraCLAY with the white non-woven side facing the installer.
 2. Secure the MiraCLAY into position with fasteners and 1" (25 mm) washers.
 - i. Use the appropriate fasteners for the type of substrate used to receive the MiraCLAY.
 3. Install succeeding courses of MiraCLAY by overlapping the previous course a minimum of 4" (100 mm).
 - i. Install in shingle fashion so that the upper roll of MiraCLAY overlaps the lower roll.
 - ii. Stagger the seams a minimum of 24" (600 mm).
 4. Fasten membrane once every 18" (45 cm) on seams or as required to prevent blousing.
 5. Extend waterproofing membrane to 6" below grade and fasten membrane to the substrate to maintain constant compression using a 1/8" x 1" (3 x 25 mm) minimum termination bar.
 6. Embed the top edge of MiraCLAY and termination bar with a thick bead of CCW MiraCLAY Sealant 2" (50 mm) wide by 1/2" (12 mm) thick
- C. Concrete Foundation Wall Application (i.e. post-applied):
1. The MiraCLAY waterproofing membrane should be installed with the white non-woven side facing the applicator.
 2. Create a cant at any vertical to horizontal transition by applying a 1 1/2" (39 mm) to 2" (50 mm) of CCW MiraCLAY Granules or CCW MiraCLAY Sealant along that junction.
 3. At the base of the foundation wall where the vertical wall meets the horizontal footing, install MiraCLAY in a horizontal manner extending out onto the footing a minimum of 12" (300 mm).
 4. Fasten the MiraCLAY in place with concrete fasteners and 1" (25 mm) washers.
 5. Install succeeding courses of MiraCLAY by overlapping the previous course a minimum of 4" (100 mm).
 - i. Install in shingle fashion so that the upper roll of MiraCLAY overlaps the lower roll.
 - ii. Stagger the seams a minimum of 12" (300 mm).
 6. Fasten membrane once every 18" (45 cm) to 3' (90 cm) on seams or as required to prevent blousing.
 7. At grade line, terminate MiraCLAY with a rigid termination bar or fasten 12" (300 mm) on center.
 - i. Embed the top edge of MiraCLAY and termination bar with a thick bead of MiraCLAY sealant 2" (50 mm) wide by 1/2" (12

- mm) thick.
- 8. Backfill must be compactible soils free of construction debris
 - i. Backfill should be placed in 6-12" lifts
 - ii. Each lift should be uniformly compacted to a minimum 85% modified Proctor.
- D. Detail Conditions
 - 1. For standard installation details, follow the MiraCLAY detail drawings.
 - 2. For non-standard installation instructions, contact your local Carlisle Coatings & Waterproofing representative

3.4 PROTECTION AND DRAINAGE

- A. Prevent geotextile/bentonite clay waterproofing membrane from hydrating before being covered with overburden.
 - 1. When threat of rain is imminent or backfill is not immediate, geotextile/bentonite clay waterproofing membrane should be covered with polyethylene sheeting.
- B. Protect waterproofing as per manufacturer's recommendations until concrete or backfill placement.
- C. For underslab applications, inspect waterproofing for damage after steel reinforcement placement and just prior to concrete placement.
- D. Repair waterproofing as per manufacturer's recommendations
- E. Protect the geotextile/bentonite clay waterproofing membrane with CCW MiraDRAIN Drainage Composite.
- F. Install the CCW MiraDRAIN Drainage Composite according to the detailed drawings for the specific installation requirements of the project.

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