

# Section 07136

## Drainage Waterproofing

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### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Subsurface Drainage Composite:

#### 1.2 RELATED SECTIONS

- A. Section 02315 - Excavation and Fill: Excavating for drainage system piping and surrounding filter aggregate.
- B. Section 02320 - Backfill: Backfilling over filter aggregate, up to subgrade elevation.
- C. Section 02630 - Storm Drainage: Connection to drainage system.
- D. Section 07130 – Membrane Waterproofing: Membrane waterproofing application.
- E. Section 07900 - Joint Sealers.

#### 1.3 REFERENCES

- A. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- B. ASTM D 3776 – Standard Test Method for Mass Per Unit Area (Weight) of Fabric.
- C. ASTM D 3786 - Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics, Diaphragm Bursting Strength Method.
- D. ASTM D 4491 - Standard Test Method for Water Permeability of Geotextiles by Permittivity.
- E. ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- F. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- G. ASTM D 4716 - Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- H. ASTM D 4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

- I. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.
- J. ASTM D 5261 - Test Method for Measuring Mass per Unit Area of Geotextiles.

#### 1.4 SYSTEM DESCRIPTION

- A. Drainage Composite:
  - 1. Enkadrain Subsurface Drainage Composite is a drainage product used to relieve hydrostatic pressure from backfill abutting below-grade structures where indicated.
  - 2. Enkadrain Subsurface Drainage Composite is used to protect waterproofing during and after backfill.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Indicate dimensions, layout of membrane layers, high and low points of pipe inverts, and gradient of slope between corners and intersections.
- D. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
  - 1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
  - 2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Manufacturer's Certificate: Certify specified products meet or exceed specified requirements.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in subsurface drainage composites with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing work of this section with minimum three years documented experience.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle and store product according to manufacturers recommendations.
- C. Store products in a dry space at temperatures between 50 to 90 degrees F (10 to 32 degrees C). Do not store in direct sunlight.
- D. For cold weather applications, store products in a heated airspace at 50 degrees F (10 degrees C) or above for at least 2 days prior to application. Take out only the amount of material that can be applied within 2 hours.

#### 1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 1.9 WARRANTY

- A. Colbond Inc. warrants that Enkadrain products, when installed in accordance with the product's published installation instructions, are free from manufacture defects for 20 years.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Colbond Inc.; P. O. Box 1057, 1301 Sand Hill Rd., Enka, NC 28728. ASD. Tel. Toll Free: (800) 365-7391. Tel: (828) 665-5000. Fax: (828) 665-5009. Email: [enka-engineered@colbond.com](mailto:enka-engineered@colbond.com). Web Site: [www.colbond-usa.com](http://www.colbond-usa.com).
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

#### 2.2 MATERIALS

- A. Drainage Composite.
  1. Enkadrain 9120:
    - a. Core: Nylon 6 with geotextile on one side.
    - b. Thickness: 0.8 inches (20.3 mm).
    - c. Total Weight: 25.6 oz/sq yd (868 g/sm).
    - d. Core Weight: 21.3 oz/sq yd (722 g/sm).
    - e. Fabric Weight: 3.54 oz/sq yd (120 g/sm) ASTM D 3776.

- f. Fabric: Nylon 6 and Polyester
  - g. Fabric Grab Strength: 125.0 lbs (556.0 N) ASTM D 4632
  - h. Fabric Grab Elongation: 40% ASTM D 4632
  - i. Fabric Trapezoidal Tear: 40.0 lbs (178.0 N) ASTM D 4533
  - j. Fabric Puncture Resistance: 35.0 lbs (155.0 N) ASTM D 4833
  - k. Fabric Mullen Burst: 160.0 psi (1102.0 kPa) ASTM D 3786
  - l. Fabric AOS (max. average): 0.357 mm ASTM D 4751
  - m. Fabric Flow Rate: 185.0 gpm/sq ft (125.0 l/sec/sq m) ASTM D 4491
  - n. Fabric Permittivity: 2.5 sec<sup>-1</sup> ASTM D 4491
  - o. Compressive Load: Greater than 30,000 psf (4713 kN/sm) when tested in accordance with ASTM D1621 modified and ASTM D 4716.
2. Enkadrain 3611R:
- a. Core: Recycled polypropylene with geotextile on one side.
  - b. Thickness: 0.45 inches (11.4 mm).
  - c. Total Weight: 20.5 oz/sq yd (695 glsm).
  - d. Core Weight: 16 oz/sq yd (543 g/sm).
  - e. Fabric Weight: 4.5 oz/sq yd (153 g/sm) ASTM D 5261.
  - f. Fabric: Polypropylene
  - g. Fabric Grab Strength MD/CD: 120.0 lbs (0.54 kN) ASTM D 4632
  - h. Fabric Grab Elongation: 50% ASTM D 4632
  - i. Fabric Trapezoidal Tear: 50.0 lbs (0.22 kN) ASTM D 4533
  - j. Fabric Puncture Strength: 70.0 lbs (0.31 kN) ASTM D 4833
  - k. Fabric AOS (max. average): 70 US Sieve (0.212 mm) ASTM D 4751
  - l. Fabric Flow Rate: 120.0 gal/min/sq ft (4887 l/sec/sq m) ASTM D 4491
  - m. Fabric Permittivity: 1.8 sec<sup>-1</sup> ASTM D 4491
  - n. Compressive Load: Greater than 30,000 psf (4713 kN/sm) when tested in accordance with ASTM D1621 modified and ASTM D 4716.
3. Enkadrain 3615R:
- a. Core: Recycled polypropylene with geotextile on one side.
  - b. Thickness: 0.45 inches (11.4 mm).
  - c. Total Weight: 28.5 oz/sq yd (966 glsm).
  - d. Core Weight: 24 oz/sq yd (814 g/sm).
  - e. Fabric Weight: 4.5 oz/sq yd (153 g/sm) ) ASTM D 5261.
  - f. Fabric: Polypropylene
  - g. Fabric Grab Strength MD/CD: 120.0 lbs (0.54 kN) ASTM D 4632
  - h. Fabric Grab Elongation: 50% ASTM D 4632
  - i. Fabric Trapezoidal Tear: 50.0 lbs (0.22 kN) ASTM D 4533
  - j. Fabric Puncture Strength: 70.0 lbs (0.31 kN) ASTM D 4833
  - k. Fabric AOS (max. average): 70 US Sieve (0.212 mm) ASTM D 4751
  - l. Fabric Flow Rate: 120.0 gal/min/sq ft (4887 l/sec/sq m) ASTM D 4491
  - m. Fabric Permittivity: 1.8 sec<sup>-1</sup> ASTM D 4491
  - n. Compressive Load: Greater than 30,000 psf (4713 kN/sm) when tested in accordance with ASTM D1621 modified and ASTM D 4716.
4. Enkadrain 3811R:
- a. Core: Recycled polypropylene with geotextile on both sides.
  - b. Thickness: 0.45 inches (11.4 mm).
  - c. Total Weight: 23.7 oz/sq yd (804 glsm).
  - d. Core Weight: 16 oz/sq yd (543 g/sm).
  - e. Fabric 1: Nylon 6 and Polyester
    - 1) Fabric Grab Strength: 125.0 lbs (556.0 N) ASTM D 4632
    - 2) Fabric Grab Elongation: 40% ASTM D 4632
    - 3) Fabric Trapezoidal Tear: 40.0 lbs (178.0 N) ASTM D 4533
    - 4) Fabric Puncture Resistance: 35.0 lbs (155.0 N) ASTM D 4833
    - 5) Fabric Mullen Burst: 160.0 psi (1102.0 kPa) ASTM D 3786

- 6) Fabric AOS (maximum average): 0.357 mm ASTM D 4751
- 7) Fabric Flow Rate: 185.0 gpm/sq ft (125.0 l/sec/sq m) ASTM D 4491
- 8) Fabric Permittivity: 2.5 sec<sup>-1</sup> ASTM D 4491
- f. Fabric 2: Polypropylene
  - 1) Fabric Grab Strength MD/CD: 120.0 lbs (0.54 kN) ASTM D 4632
  - 2) Fabric Grab Elongation: 50% ASTM D 4632
  - 3) Fabric Trapezoidal Tear: 50.0 lbs (0.22 kN) ASTM D 4533
  - 4) Fabric Puncture Strength: 70.0 lbs (0.31 kN) ASTM D 4833
  - 5) Fabric AOS (max. average): 70 US Sieve (0.212 mm) ASTM D 4751
  - 6) Fabric Flow Rate: 120.0 gal/min/sq ft (4887 l/sec/sq m) ASTM D 4491
  - 7) Fabric Permittivity: 1.8 sec<sup>-1</sup> ASTM D 4491
- g. Compressive Load: Greater than 30,000 psf (4713 kN/sm) when tested in accordance with ASTM D1621 modified and ASTM D 4716.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until waterproofing specified in Section 07130 has been properly installed and that substrate has been properly prepared for waterproofing installation.
- B. Do not begin installation until subsurface is smooth and sound.
- C. Do not begin installation until substrate has been properly prepared for subsurface drain installation. Before beginning installation, inspect to ensure that perimeter subgrade has been excavated to within plus or minus 0.5 feet of design elevation.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3 DRAINAGE COMPOSITE INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Vertical Method:
  - 1. Measure the height needed; add approximately 2 feet (610 mm) to cover drain at bottom of wall.
  - 2. Cut piece from roll to correct length.
  - 3. Trim 5 inches (127 mm) of black mesh from edge and adhere geotextile fabric to the wall. Drainage composite may also be mechanically attached using a treated wood or metal termination bar placed along the top edge of the drainage composite and fastened with power actuated fasteners.
  - 4. Drape strips over drain pipe at bottom and hold in place with stones or soil. Each Enkadrain strip has a nominal 2.5 inch (64 mm) fabric overlap on one

edge. At regular 2 foot (610 mm) intervals, glue fabric overlap over the previously installed strip.

5. Backfill as soon as possible. Do not displace drain strip during backfill operations.

C. Horizontal Method

1. Cut piece from roll to required length.
2. Place strips with the fabric overlap down and temporarily tape top edge to wall. Tape vertical butt joints with 2 inch (51 mm) duct tape.
3. Drape strips over drain at bottom and hold in place with stones or soil. Each Enkadrain strip has a nominal 2.5 inch (64 mm) fabric overlap on one edge. At regular 2 foot (610 mm) intervals, glue fabric overlap over the previously installed strip.
4. Backfill to within 4 to 5 inches (102 to 127 mm) of top edge of installed sheet.
5. Place each successive horizontal piece with fabric overlap shingled over and with a minimum fabric overlap of 2.5 inch (64 mm). Stagger vertical butt joints and tape with 2 inch (51 mm) duct tape.
6. Backfill to within 4 to 5 inches (102 to 127 mm) of top edge.
7. If desired, cut and pre-glue strips of Enkadrain into convenient shapes to fit various wall configurations in a manner recommended by the manufacturer.

### 3.4 SUBDRAIN INSTALLATION

- A. Coordinate the preparation of the subgrade with Section 02320. Use a uniform aggregate, such as pea gravel, to properly grade the area around the footer for correct slope of drain pipe. Remove all large rocks and soil clods that may affect drainage and/or clog the drain system.
- B. Coordinate the installation of drain pipe and sump pump as specified in Section 02630 prior to installation of subsurface drainage netting.
- C. Start installation of Enkadrain on a wall corner and work in the opposite direction of the 3 inches (76 mm) material flap. Cut Enkadrain to wall length, plus additional material to cover and wrap around the drain pipe.
- D. Remove the top 5 inches (127 mm) of netting from the Enkadrain.
- E. Using a construction adhesive, bond the Enkadrain fabric to the wall with a bead of adhesive 0.125 to 0.25 inch (32 to 64 mm) in diameter.
- F. Install the next strip of Enkadrain, overlapping and bonding the fabric flap to the previous piece.
- G. Apply a bead of construction adhesive 0.125 to 0.25 inch (32 to 64 mm) in a zigzag pattern along the edge of the strip of Enkadrain without the fabric overlap.
- H. Wrap the drain pipe with the Enkadrain. Place soil or other suitable material at the bottom of the strip to temporarily hold it to the wall and on top of the drain pipe during backfill.
- I. Repeat procedure until entire wall is covered with geocomposite drain.
- J. Remove excess material from last strip without eliminating the fabric overlap.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Repair or replace damaged products before Substantial Completion.

END OF SECTION