

SECTION 071324

Pre-Applied Sheet Membrane Waterproofing

PART 1 — GENERAL

1.01 SUMMARY

- A. The Work of this Section includes, but is not limited to, pre-applied sheet membrane waterproofing that forms an integral bond to poured concrete for the following applications:
 - 1. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
 - 2. Horizontal Applications: Membrane applied on prepared subbase prior to placement of concrete slabs.
- B. Related sections include, but are not limited to, the following:
 - 1. Section 031000 - Concrete Forming
 - 2. Section 312000 – Earth Moving
 - 3. Section 031500 – Concrete Accessories
 - 4. Section 031500 – Hydrophilic Waterstop
 - 5. Section 316200 - Driven Piles
 - 6. Section 316400 - Caissons
 - 1. Section 032000 - Concrete Reinforcing
 - 2. Section 033000 – Cast-In-Place Concrete

NOTE TO SPECIFIER: For vertical applications, coordinate with concrete formwork section to require one-sided wall forming system to minimize punctures to the sheet membrane waterproofing during formwork installation.

1.02 SUBMITTALS

- A. Submit manufacturer's product data, installation instructions and membrane samples for approval.

1.03 REFERENCE STANDARDS

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM):
 - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
 - D 412 Standard Test Methods for Rubber Properties in Tension
 - D 570 Standard Test Method for Water Absorption of Plastics
 - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
 - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - D 3767 Standard Practice for Rubber - Measurements of Dimensions
 - D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
 - E 96 Standard Test Methods for Water Vapor Transmission of Materials
 - E 154 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. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- B. Installer: A firm which has at least 3 years experience in work of the type required by this section.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.
- E. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer’s instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations.

1.06 PROJECT CONDITIONS

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

1.07 WARRANTY

- A. Sheet Membrane Waterproofing: Provide written five year material warranty issued by the membrane manufacturer upon completion of work.

PART 2 — PRODUCTS

2.01 MATERIALS

- A. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: PREPRUFE® 300R Membrane [or PREPRUFE®300LT Membrane for application temperatures between 25°F (-4°C) and 60°F (+16°C)] by GCP Applied Technologies (“GCP”), a 1.2mm (0.046 in) nominal thickness composite sheet membrane comprising 0.8 mm (0.030 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

NOTE TO SPECIFIER: PREPRUFE® 300R and PREPRUFE® 300LT membranes can both be installed at temperatures 25°F (-4°C) and above. For temperatures 25°F (-4°C) to 55°F (13°C) GCP Technical Bulletin #16 states the use of PREPRUFE® LT Tape is required at all side laps when using PREPRUFE® 300R membrane. Alternatively, contractors may elect the use of PREPRUFE® 300LT membrane which does not require the use of PREPRUFE® LT Tape at side laps in temperature ranges 25°F (-4°C) to 55°F (13°C). For this reason, GCP suggests that both products be incorporated into the specification.

PHYSICAL PROPERTIES FOR PREPRUFE® 300R (or 300LT) MEMBRANE:

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767	1.2 mm (0.046 in.) nominal
Lateral Water Migration Resistance	ASTM D 5385 ¹	Pass at 71 m (231 ft.) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -29°C (-20°F)
Elongation	ASTM D 412 ²	400%
Crack Cycling at -23°C (-9.4°F), 100 Cycles	ASTM C 836 ⁵	Unaffected, Pass
Tensile Strength, film	ASTM D 412	27.6 MPa (4,000 lbs./in. ²)
Peel Adhesion to Concrete	ASTM D 903 ³	880 N/m (5.0 lbs./in.)
Resistance to Hydrostatic Head	ASTM D 5385 ⁶	231ft. (71m)
Lap Adhesion	ASTM D 1876 ⁴	880 N/m (5.0 lbs./in.)
Puncture Resistance	ASTM E 154	890N (200 lbs.)
Permeance	ASTM E 96 Method B	<0.1 perms ((5.74 ng/(Pa x s x m ²)))
Water Absorption	ASTM D 570	0.5%

Footnotes:

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
2. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
3. Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
4. The test is conducted 15 minutes after the lap is formed at a rate of 50 mm (2 in.) per minute.
5. Test conducted at -23°C (-9.4°F)
6. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.

- B. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: PREPRUFE® 160R Membrane [or PREPRUFE®160LT Membrane for application temperatures between 25°F (-4°C) and 60°F (+16°C)] by GCP Applied Technologies, a 0.8mm

(0.032 in) nominal thickness composite sheet membrane comprising 0.4 mm (0.016 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

NOTE TO SPECIFIER: PREPRUFE® 160R membrane and PREPRUFE® 160LT membrane can both be installed at temperatures 25°F (-4°C) and above. For temperatures 25°F (-4°C) to 55°F (13°C) GCP Technical Bulletin #16 states the use of PREPRUFE® LT Tape is required at all side laps when using PREPRUFE® 160R membrane. Alternatively, contractors may elect the use of PREPRUFE® 160LT membrane which does not require the use of PREPRUFE® LT Tape at side laps in temperature ranges 25°F (-4°C) to 55°F (13°C). For this reason, GCP suggests that both products be incorporated into the specification.

PHYSICAL PROPERTIES FOR PREPRUFE 160R (or 160LT) MEMBRANE:

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767	0.8mm (0.032 in.) nominal
Lateral Water Migration Resistance	ASTM D5385 ¹	Pass at 71 m (231 ft) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -29°C (-20°F)
Elongation	ASTM D 412 ²	400%
Crack Cycling at -23°C (-9.4°F), 100 Cycles	ASTM C 836 ⁵	Unaffected, Pass
Resistance to Hydrostatic Head	ASTM D 5385 ⁶	231ft. (71m)
Tensile Strength, film	ASTM D 412	27.6 MPa (4,000 lbs./in. ²)
Peel Adhesion to Concrete	ASTM D 903 ³	880 N/m (5.0 lbs./in.)
Lap Adhesion	ASTM D 1876 ⁴	880 N/m (5.0 lbs./in.)
Puncture Resistance	ASTM E 154	445 N (100 lbs)
Permeance	ASTM E 96 Method B	<0.1 perms ((5.74 ng/(Pa x s x m ²))
Water Absorption	ASTM D 570	0.5%

Footnotes:

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
 2. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
 3. Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
 4. The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute.
 5. Test conducted at -23°C (-9.4°F)
 6. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.
- C. Waterstop: ADCOR® hydrophilic waterstop by GCP Applied Technologies for non-moving concrete construction joints. See gcpat.com
- D. Preformed Soil Retention Wall Tieback Cover: PREPRUFE® Tieback Cover by GCP Applied Technologies as a prefabricated detail for soil retention wall tiebacks.
- E. Tape for covering cut edges, roll ends, penetrations and detailing: PREPRUFE® Tape LT (for temperatures between 25°F (-4°C) and 86°F (+30°C)) and PREPRUFE® Tape HC (for use in Hot Climates, minimum 50°F (10°C))
- F. Miscellaneous Materials: accessories specified or acceptable to manufacturer of pre-applied waterproofing membrane.

PART 3 — EXECUTION

3.01 EXECUTION

- A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 SUBSTRATE PREPARATION

- A. It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability.
1. Horizontal Surfaces - The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.
 2. Vertical Surfaces - Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment

3.03 INSTALLATION, HORIZONTAL APPLICATIONS

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Place the PREPRUFE® 300R membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
 2. Leave the plastic release liner in position until overlap procedure is completed.
 3. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
 4. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
 5. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

3.04 INSTALLATION, VERTICAL APPLICATIONS

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Where desired mechanically fasten the PREPRUFE® 300R or PREPRUFE®160R membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length.
 2. All mechanical fastening shall be through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
 3. Immediately remove the plastic release liner.
 4. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
 5. After placement roll firmly to ensure a watertight seal.
 6. Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary.
 7. Allow to dry and apply PREPRUFE® Tape LT (or HC in hot climates) centered over the lap edges and roll firmly.
 8. Immediately remove printed plastic release liner from the tape.

3.05 WATERSTOP INSTALLATION

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Secure ADCOR® hydrophilic waterstop using masonry nails 1½ in. - 2 in. (40 mm – 50 mm) long with a washer ¾ in. (20 mm) in diameter. Hilti EM6-20-12 FP8 shot fired fixings with ¼ in. (6 mm) nuts and ¾ in. (20 mm) diameter washers may also be used. Fixings should be spaced at a maximum of 12 in. (300 mm) centers with a minimum spacing that ensures proper contact to substrate.
 2. On irregular concrete faces, or on vertical surfaces, apply a ½ in. (12 mm) bead of ADCOR® Adhesive as bedding for ADCOR® hydrophilic waterstop.
 3. ADCOR® hydrophilic waterstop joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.

3.06 PROTECTION

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

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In Canada, GCP Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

