SECTION 071326

Pre-Applied Sheet Membrane Waterproofing

*PREPRUFE® 300R Plus, 160R Plus, 300R Plus LT, 160R Plus LT*

PART 1 — GENERAL

1.01 SUMMARY

1. 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:
2. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
3. 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
7. Section 032000 - Concrete Reinforcing
8. 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

1. Submit manufacturer’s product data, installation instructions and membrane samples for approval.

1.03 REFERENCE STANDARDS

1. The following standards and publications are applicable to the extent referenced in the text.
2. 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 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

1. 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.
2. Installer: A firm which has at least 5 years successful experience in work of the type required by this section and must be familiar with the proper installation techniques and requirements for PREPRUFE® membranes.
3. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
4. 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.
5. 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

1. 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

1. 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

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

PART 2 — PRODUCTS

2.01 MATERIALS

1. Pre-Applied Integrally Bonded HDPE Sheet Waterproofing Membrane for vertical or horizontal application: PREPRUFE® 300R Plus Membrane [or PREPRUFE® 300R Plus LT Membrane for application temperatures between 25°F (-4°C) and 95°F (+35°C)] as manufactured by GCP Applied Technologies, a 1.2mm (0.046 in) nominal thickness composite sheet membrane consisting of 0.8 mm (0.030 in.) of high density polyethylene film, a pressure-sensitive adhesive and a trafficable weather resistant coating. The membrane shall be supplied in a kick-out roll orientation and shall have no release liner to reduce waste onsite. The membrane shall form an integral, adhesive and permanent bond to poured concrete to prevent lateral water migration at the interface of the membrane and structural concrete and shall include dual adhesive ZipLap™ seam technology to complete side laps and secure adjacent sheets. Provide membrane with the following physical properties:

NOTE TO SPECIFIER: PREPRUFE® Plus LT can be installed between temperatures 25°F (-4°C) and 95F (+35C). Preprufe Plus can be used for application temperature above 65°F.

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

|  |  |  |
| --- | --- | --- |
| Property | Typical Values | Standard |
| Color | white |   |
| Thickness | 46 mils | ASTM D3767 |
| Lateral Water Migration Resistance | Pass at 231 ft (71 m) of hydrostatic head pressure | ASTM D53851 |
| Long Term Lateral Water Migration Resistance, After 3 Years Water Immersion | Pass at 231 ft (71 m) of hydrostatic head pressure | ASTM D53851 |
| Resistance to hydrostatic head | 231 ft (71 m) | ASTM D53852 |
| Resistance to hydrostatic head, Functional details | 231 ft (71 m) | ASTM D53853 |
| Tensile strength, film | 4000 psi (27.6 Mpa) | ASTM D412 |
| Tensile strength after soil burial, film | Retain >90% | ASTM D412/ASTM D4068 |
| Elongation  | 500% | ASTM D412 |
| Elongation after soil burial | Retain >90% | ASTM D412/ASTM D4068 |
| Low temperature flexibility | Unaffected at -20°F (-29°C) | ASTM D1970 |
| Crack cycling at -9.4°F (-23°C), 1/8" Movement | Unaffected, Pass | ASTM C1305/ASTM C836 |
| Puncture resistance | 225lbs (1000N) | ASTM E154 |
| Environmental stress resistance | Pass | ASTM D1693 |
| Peel adhesion to concrete | 10 lbs/in. (1750N/m)  | ASTM D 903 |
| Peel adhesion to concrete, After 3 years of water immersion | 10 lbs/in. (1750N/m)  | ASTM D 903 (After 3 years of water immersion) |
| Peel adhesion to concrete, after immersed in underground contaminates  | Retain >80% | ASTM D 543/ASTM D 9034 |
| Lap peel adhesion | 10 lbs/in. (1750N/m)  | ASTM D18765 |
| Lap peel adhesion, after immersed in underground contaminates | Retain >80% | ASTM D 543/ASTM D 18766 |
| Shear strength of joint | >100 lb | ASTM D882 |
| VOC permeance | Not Detectable (Membrane, Seam) | ASTM F 739 (Open loop) |
| Methane permeance  | <40 ml/day.m2.atm | ASTM D 1434 |
| Methane permeance (before and after soil burial) | <40 ml/day.m2.atm | ASTM D 4068/ASTM D 1434 |
| Radon diffusion coefficient (membrane and seam) , m2/s | 3.7 X 10-12Membrane, Seam | Method C of ISO/TS11665-1 |
| Permeance to water vapor transmission | <0.01 perms (0.6 ng/(Pa x s x m2)) | ASTM E 96, method B |
|  |  |  |
| 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 membrane. |
| 2. Hydrostatic head tests of PREPRUFE Membranes are performed by casting concrete against the membrane with a lap.  |
| 3. Test is performed by casting concrete against the membrane with detail prepared per GCP standard details.  |
| 4. Sample immersed under TCE, PCE, BETX and acid & alkaline solution  |
| 5. The test is conducted 15 minutes after the lap is formed. |
| 6. Sample immersed under TCE, PCE, BETX and acid & alkaline solution  |

1. Pre-applied Integrally Bonded HDPE Sheet Waterproofing Membrane (not for horizontal application): PREPRUFE® 160R Plus Membrane as manufactured by GCP Applied Technologies, a 0.8 mm (0.032 in) nominal thickness composite sheet membrane consisting of a 0.4 mm (0.016 in.) of high-density polyethylene film, a pressure-sensitive adhesive and a trafficable weather resistant coating. The membrane shall be supplied in a kick-out roll orientation and shall have no release liner to reduce waste onsite. The membrane shall form an integral, adhesive and permanent bond to poured concrete to prevent lateral water migration at the interface of the membrane and structural concrete and shall include dual adhesive ZipLap™ seam technology to complete sidelaps and secure adjacent sheets. Provide membrane with the following physical properties:

NOTE TO SPECIFIER: PREPRUFE® Plus LT can be installed between temperatures 25°F (-4°C) and 95F (+35C). Preprufe Plus can be used for application temperature above 65°F.

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

|  |  |  |
| --- | --- | --- |
| **Property** | **Typical Values** | **Standard** |
| Color | white |   |
| Thickness | 32 mils | ASTM D3767 |
| Lateral Water Migration Resistance | Pass at 231 ft (71 m) of hydrostatic head pressure | ASTM D53851 |
| Long Term Lateral Water Migration Resistance, After 3 Years Water Immersion | Pass at 231 ft (71 m) of hydrostatic head pressure | ASTM D53851 |
| Resistance to hydrostatic head | 231 ft (71 m) | ASTM D53852 |
| Resistance to hydrostatic head, Functional details | 231 ft (71 m) | ASTM D53853 |
| Tensile strength, film | 4002 psi (27.6 Mpa) | ASTM D412 |
| Tensile strength after soil burial, film | Retain >90% | ASTM D412/ASTM D4068 |
| Elongation  | 500% | ASTM D412 |
| Elongation after soil burial | Retain >90% | ASTM D412/ASTM D4068 |
| Low temperature flexibility | Unaffected at -20°F (-29°C) | ASTM D1970 |
| Crack cycling at -9.4°F (-23°C), 1/8" Movement | Unaffected, Pass | ASTM C1305/ASTM C836 |
| Puncture resistance | 100 lbs. (445 N) | ASTM E154 |
| Environmental stress resistance |   | ASTM D1693 |
| Peel adhesion to concrete | 10 lbs/in. (1750N/m)  | ASTM D 903 |
| Peel adhesion to concrete, After 3 years of water immersion | 10 lbs/in. (1750N/m)  | ASTM D 903 (After 3 years of water immersion) |
| Peel adhesion to concrete, after immersed in underground contaminates  | Retain >80% | ASTM D 543/ASTM D 9034 |
| Lap peel adhesion | 10 lbs/in. (1750N/m)  | ASTM D18765 |
| Lap peel adhesion, after immersed in underground contaminates | Retain >80% | ASTM D 543/ASTM D 18766 |
| Shear strength of joint | >60 lb | ASTM D882 |
| VOC permeance | Not Detectable (Membrane, Seam) | ASTM F 739 (Open loop) |
| Methane permeance  | 74.5 ml/day.m2.atm | ASTM D 1434 |
| Methane permeance (before and after soil burial) |   | ASTM D 4068/ASTM D 1434 |
| Radon diffusion coefficient (membrane and seam) , m2/s | 5.3 X 10-12Membrane, Seam | Method C of ISO/TS11665-1 |
| Permeance to water vapor transmission | <0.01 perms (0.6 ng/(Pa x s x m2)) | ASTM E 96, method B |
| 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 membrane.2. Hydrostatic head tests of PREPRUFE Membranes are performed by casting concrete against the membrane with a lap. 3. Test is performed by casting concrete against the membrane with detail prepared per GCP standard details. 4. Sample immersed under TCE, PCE, BETX and acid & alkaline solution 5. The test is conducted 15 minutes after the lap is formed.6. Sample immersed under TCE, PCE, BETX and acid & alkaline solution  |

2.02 Ancillary Products

1. Waterstop: ADCOR® hydrophilic waterstop or DE NEEF® Injecto® Tube groutable waterstop by GCP Applied Technologies for non-moving concrete construction joints.
2. Preformed Soil Retention Wall Tieback Cover: PREPRUFE® Tieback Cover by GCP Applied Technologies as a prefabricated detail for soil retention wall tiebacks.
3. Tape for covering cut edges, roll ends, penetrations and detailing: PREPRUFE® Tape LT (for temperatures between 25°F (-4°C) and 95°F (35°C) and PREPRUFE® Tape HC (for use in Hot Climates)
4. Fully bonded Two-component, elastomeric, liquid applied detailing compound : PREPRUFE® Liquid Flashing by GCP Applied Technologies for detailing penetrations, pile caps and other pre-applied detail areas that bonds to concrete placed onto it to prevent lateral water migration between PREPRUFE Liquid Flashing and concrete placed onto PREPRUFE Liquid Flashing as well as between PREPRUFE Liquid Flashing and substrate onto PREPRUFE Liquid Flashing has been applied.
5. Miscellaneous Materials: accessories specified or acceptable to manufacturer of pre-applied waterproofing membrane.

PART 3 — EXECUTION

3.01 EXECUTION

1. 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

1. 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.
2. 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.
3. 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

1. Strictly comply with installation instructions in manufacturer’s published literature, including but not limited to, the following:
2. Place the membrane HDPE film side to the substrate with the green zip strip facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
3. Leave the green and blue (backside) zip strips in position until the overlap procedure is completed, and the lap is to be made.
4. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with a blue guideline. The blue zip strip on the underside of the succeeding membrane shall be positioned on top of the green zip strip on the top of the previous sheet. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
5. Peel back and remove both the green and blue zip strips in the overlap area to achieve an adhesive-to-adhesive bond, lining up leading edge of the top sheet with the blue guideline.
6. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
7. 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.
8. Allow to dry and apply PREPRUFE® Tape LT (or HC in hot climates) centered over the lap edges and roll firmly. Apply additional PREPRUFE® Tape LT (or HC in hot climates) a minimum of 2 in. beyond all edges of membrane that are not sealed by the selvedge.
9. Immediately remove plain/tinted/printed plastic release liner from the PREPRUFE® Tape.
10. Construction joint optional detailing:
	1. Center PREPRUFE® CJ Tape LT (or HC in hot climates) at all concrete construction joints and adhere the PREPRUFE® CJ Tape to the top of pre-applied waterproofing membrane.
	2. Immediately remove tinted plastic release liner from the PREPRUFE® CJ Tape.

3.04 INSTALLATION, VERTICAL APPLICATIONS

1. Strictly comply with installation instructions in manufacturer’s published literature, including but not limited to, the following:
2. Place the membrane HDPE film side to the substrate with the green zip strip facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
3. Leave the green and blue zip strips in position until the overlap procedure is completed and the lap is to be made.
4. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with a red guideline. The blue zip strip on the underside of the succeeding membrane shall be positioned on top of the green zip strip on the top of the previous sheet. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
5. Peel back and remove both the green and blue zip strips in the overlap area to achieve an adhesive to adhesive bond, lining up leading edge of the top sheet with the red guideline.
6. For lengths of membrane greater than 8 ft. (2.4 m), mechanically fasten the membrane at 2 ft. (0.6 m) intervals in the self-adhesive selvedge ½ in. (12 mm) from outside edge prior to overlapping succeeding sheet. Fastener type is substrate dependent but fastener head shall have small diameter and low-profile.
7. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
8. 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.
9. Allow to dry and apply PREPRUFE® Tape LT (or HC in hot climates) centered over the lap edges and roll firmly. Apply additional PREPRUFE® Tape LT (or HC in hot climates) a minimum of 2 in. beyond all edges of membrane that are not sealed by the selvedge.
10. Immediately remove plain/tinted/printed plastic release liner from the PREPRUFE® Tape.
11. Construction joint optional detailing:
	1. Center PREPRUFE® CJ Tape LT (or HC in hot climates) at all concrete construction joints and adhere the PREPRUFE® CJ Tape to the top of pre-applied waterproofing membrane.
	2. Immediately remove tinted plastic release liner from the PREPRUFE®CJ Tape.

3.05 INSTALATION, ROLL ENDS AND CUT EDGES

1. 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.
2. Allow to dry and apply PREPRUFE® Tape LT (or HC in hot climates) centered over the lap edges and roll firmly.
3. Immediately remove plain/tinted/printed plastic release liner from the PREPRUFE® Tape.

3.06 PROTECTION

1. 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 recommendation

END