

## Appendix B

### ENHANCED GRIP UN-REINFORCED POLYETHYLENE GEOMEMBRANE SPECIFICATION

Enhanced Grip Un-reinforced Polyethylene Geomembranes serve as liners to contain water, leachate or other liquids. As a liner they can contain the liquid to prevent leakage or environmental impact. It is of great importance that the Enhanced Grip Un-reinforced Polyethylene Geomembrane be free from defects and installed without damage.

#### A. DESCRIPTION

1. General:

The purpose of this specification is to provide details of Manufacturing Quality Control (MQC), Manufacturing Quality Assurance (MQA), Construction Quality Control (CQC), and Construction Quality Assurance (CQA) for the manufacture and pre-assembly of geomembrane products. The Contractor shall furnish all labor, material, and equipment to install the Enhanced Grip Un-reinforced Polyethylene Geomembrane including all necessary and incidental items as detailed or required to complete the installation in accordance with the Contract Drawing and these Specifications

2. Related Work:

Related Contract Work is described in the following section of the specification as approved by the CQA Engineer.

3. Reference Standards:

ASTM D5199 *Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.*

ASTM D5261 *Standard Test Method for Measuring Mass per Unit Area of Geotextiles.*

ASTM D4882 *Standard Test Method for Tensile Properties of Thin Plastic Sheeting.*

ASTM D4833 *Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.*

ASTM D1709 *Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.*

4. Quality Assurance:

Quality Assurance during installation of Enhanced Grip Un-reinforced Polyethylene Geomembrane will be provided by the Owner as described in the accompanying Project CQA Manual.

5. Manufacturers Qualifications:

- a. The Manufacturer shall have previously demonstrated his ability to produce the required Enhanced Grip Un-reinforced Polyethylene Geomembrane by having successfully manufactured a minimum of 10,000,000 ft<sup>2</sup> of Enhanced Grip Un-reinforced Polyethylene Geomembrane.
- b. Manufacturer must be ISO 9001 certified

6. Installer Qualifications:

The Enhanced Grip Un-reinforced Polyethylene Geomembrane Installer shall have installed a minimum of 500,000 ft<sup>2</sup> of Enhanced Grip Un-reinforced Polyethylene Geomembrane (or similar material).

7. Warranties:

The manufacturer of the Enhanced Grip Un-reinforced Polyethylene Geomembrane will warrant the material to the installer on a pro rata basis for up to 15 years after the final acceptance of the work, based on the application and location of the installation. This warranty shall include but not be limited to defects related to workmanship and manufacturing.

**B. MATERIALS**

1. General:

The materials supplied under these Specifications shall consist of first-quality 100% virgin products designed and manufactured specifically for the purpose of this work, which shall have been satisfactorily demonstrated, by prior use, to be suitable and durable for such purposes.

2. Enhanced Grip Un-reinforced Polyethylene Geomembrane Materials:

- a. Enhanced Grip Un-reinforced Polyethylene Geomembrane shall be manufactured to meet the following requirements:

- (1) Provide finished product free from holes, pin holes, bubbles, blisters, excessive gels, undispersed resins and/or carbon black, or contamination by foreign matter.
  - (2) Enhanced Grip Un-reinforced Polyethylene Geomembrane shall be a multi-layer Premium Linear Low Density Polyethylene Geomembrane
- b. Approved Enhanced Grip Un-reinforced Polyethylene Geomembrane:
- (1) Rufco E30BS  
  
As manufactured by Raven Industries of Sioux Falls, SD.
  - (2) Equal material, as approved by the Engineer.

**C. FACTORY FABRICATION**

1. The Enhanced Grip Un-reinforced Polyethylene Geomembrane shall be supplied in panels which shall be of maximum size to provide the largest manageable sheet for the fewest seams.
2. Factory seams are produced by thermal sealing methods and shall have a minimum seam width of 1 ½ inch.
3. Factory seams are 100% visually inspected and destructive testing is done to verify quality compliance.
4. Labels on the panels shall identify the thickness, length, width, lot and panel numbers, and name of Manufacturer.
5. Factory pre-assembled panels are accordion folded and rolled on a cardboard core. Rolled panels are wrapped in a protective layer for shipment.

**D. SUBMITTALS**

The Contractor shall submit the following to the CQA Engineer:

1. Pre-Installation Requirements:

Prior to Enhanced Grip Un-reinforced Polyethylene Geomembrane installation the Contractor shall submit the following:

- a. Certificate of Conformance and Sample: Prior to shipping to the site, the Contractor shall submit a certificate or affidavit signed by a legally authorized official of the Manufacturer for the Enhanced Grip Un-reinforced Polyethylene Geomembrane attesting that the Enhanced Grip Un-reinforced Polyethylene Geomembrane meets the physical and manufacturing requirements stated in these Specifications. The Contractor shall also submit a sample of the Enhanced Grip Un-reinforced Polyethylene Geomembrane to be used (sample may be of different color). The sample shall be labeled with the product name and be accompanied by the Manufacturer's specifications.
- b. Shipping, Handling, and Storage Instructions: The Manufacturer's plan for shipping, handling, and storage shall be submitted for review.
- c. Installation Procedures:  
  
Submit installation procedures for carrying out the work. Installation procedures to be addressed shall include but not be limited to material installation, repair, and protection to be provided in the event of rain or strong winds. With regard to protection, the Contractor shall provide a plan of anchoring the Enhanced Grip Un-reinforced Polyethylene Geomembrane sufficient to satisfy the Contractor's Performance Warranty. This plan shall be approved by the Engineer prior to construction.
- d. Furnish copies of the delivery tickets or other approved receipts as evidence for materials received that will be incorporated into the construction.

2. Post-Installation Requirements:

Upon completion of the Enhanced Grip Un-reinforced Polyethylene Geomembrane installation, the Contractor shall submit the following:

- a. Completed material performance warranty.

**E. SITE PREPERATION AND INSTALLATION**

1. Installation shall be in done in accordance with the manufactures Geomembrane Installation Guidelines.

**TABLE 1:  
REQUIRED ENHANCED GRIP UN-REINFORCED POLYETHYLENE  
GEOMEMBRANE PROPERTIES 30 MIL.**

<b>PROPERTY</b>	<b>TEST METHOD</b>	<b>UNITS</b>	<b>TYPICAL ROLL AVERAGES</b>
Thickness	ASTM D5199	Mils	33
Weight	ASTM D751	Lbs.	150
Tensile Strength	ASTM D6693	Lbf.	130
Tensile Elongation	ASTM D6693	%	800
Impact Resistance (Method B)	ASTM D1709	g.	3600
Puncture Resistance	ASTM D4833	Lbf.	60

Tests are average of machine and transverse directions