TECHNICAL DROP-IN SPECIFICATION

 Absolute Barrier® Y-Series
7-Layer Co-extruded HDPE Barrier

The following technical drop-in specifications are provided as guidelines to be customized and finalized by the design engineer for preparing specific project specifications. This information is provided for reference purposes only and is not intended as a warranty or guarantee. Viaflex Inc. assumes no liability in connection with the use of this information. Please visit the Viaflex website at www.viaflex.com for current product specification sheets.

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**7-LAYER CO-EXTRUDED HDPE BARRIER GEOMEMBRANE SPECIFICATION**

The 7-layer co-extruded membrane consisting of very flexible, linear low-density polyethylene (LLDPE) and an inner core of chemically resistance barrier resin. The 7-layer co-extruded geomembranes serve as liners and covers for the containment of water, leachate or other liquids. The inner core of barrier layer is designed specifically to act as a barrier to VOC’s such as radon, methane and hydro-carbons. As a liner they can contain the liquid to prevent leakage or environmental impact and as a cover to minimize evaporation or contamination all while reducing the diffusion of VOC’s. It is of great importance that the 7-layer co-extruded geomembrane be free from defects and installed without damage.

1. **DESCRIPTION**
2. 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 7-layer co-extruded barrier geomembrane including all necessary and incidental items as detailed or required to complete the installation in accordance with the Contract Drawing and these Specifications

1. Related Work:

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

1. reference standards:

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

ASTM D6693 *Standard Test Method for Determining Tensile Properties of Non-Reinforced Polyethylene and Non-Reinforced Flexible Polypropylene Geomembranes*.

ASTM D1004 *Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting*.

ASTM D4218 *Standard Test Method for Determining Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique*.

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

ASTM D3895 *Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry*.

ASTM D5885 *Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry*.

ASTM D6392 *Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods*.

4. Quality Assurance:

Quality Assurance during installation of 7-layer co-extruded barrier geomembrane will be provided by the Owner as described in the accompanying Project CQA Manual.

5. Manufacturers Qualifications:

* 1. The Manufacturer shall have previously demonstrated his ability to produce the required 7-layer co-extruded barrier geomembrane by having successfully manufactured a minimum of 10,000,000 ft2 of 7-layer co-extruded barrier geomembrane
1. Manufacturer must be ISO 9001 certified
	1. Installer Qualifications:

The 7-layer co-extruded barrier geomembrane Installer shall have installed a minimum of 500,000 ft2 of LLDPE Geomembrane (or similar material).

7. Warranties:

The manufacturer of the 7-layer co-extruded barrier geomembrane will warrant the material to the installer on a pro rata basis for up to 20 years after the final acceptance of the work, based on thickness, 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. 7-LAYER CO-EXTRUDED HDPE BARRIER GEOMEMBRANE MATERIALS:

1. 7-layer co-extruded HDPE barrier 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. 7-layer co-extruded barrier geomembrane shall be a very flexible Linear Low-Density Polyethylene Geomembrane with an EVOH inner core as well as containing carbon black and stabilizers for resistance to degradation
2. Approved 7-layer Co-Extruded Barrier Geomembrane:
	* 1. Absolute Barrier Y30BAC Absolute Barrier Y40BAC
		 As manufactured by Viaflex of Sioux Falls, SD.
		2. Equal material, as approved by the Engineer.

**C. FACTORY FABRICATION**

1. The 7-layer co-extruded barrier geomembrane shall be supplied in panels which shall be of maximum size to provide the largest manageable sheet for the fewest possible field 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 produced in accordance with ASTM D7982 and 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.

1. **SUBMITTALS**

The Contractor shall submit the following to the CQA Engineer:

1. Pre-Installation Requirements:

Prior to 7-layer co-extruded HDPE barrier geomembrane installation the Contractor shall submit the following:

* 1. Certificate of Conformance and Sample: Prior to shipping to the site, the Contractor shall submit acertificate or affidavit signed by a legally authorized official of the Manufacturer for the 7-layer co-extrudedHDPE barrier geomembrane attesting that the 7-layer co-extruded HDPE barrier geomembrane meets thephysical and manufacturing requirements stated in these Specifications. The Contractor shall also submit asample of the 7-layer co-extruded HDPE barrier geomembrane to be used (sample may be of differentcolor). The sample shall be labeled with the product name and be accompanied by the Manufacturer’s specifications.
	2. Shipping, Handling, and Storage Instructions: The Manufacturer's plan for shipping, handling, and storage will be submitted for review.
	3. 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 sufficiently anchoring the 7-layer co-extruded HDPE barrier geomembrane to satisfy the Contractor’s Performance Warranty. This plan shall be approved by the Engineer prior to construction.
	4. 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 7-layer co-extruded HDPE barrier geomembrane installation, the Contractor shall submitthe following:

* 1. Completed material performance warranty.
1. **SITE PREPARATION AND INSTALLATION**

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

**TABLE 1:**

Required 7 layer co-extruded barrier geomembrane properties 30 mil

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PROPERTY** | **TEST METHOD** | **IMPERIAL UNITS** | **METRIC UNITS** | **IMPERIAL MIN. ROLL AVERAGES** | **METRIC MIN. ROLL AVERAGES** |
| Thickness  | ASTM D5199 | mils | mm | 30 | .76 |
| Weight  |  | lbs/msf | g/m² | 150 | 732 |
| Tensile Strength  | ASTM D6693 | lbs | N/cm | 85 | 148 |
| Tensile Elongation  | ASTM D6693 | % | 500 |
| Tear Resistance  | ASTM D1004 | lbs | N | 18 | 80 |
| Puncture Resistance  | ASTM D4833 | lbs | N | 60 | 267 |
| Standard OIT  | ASTM D3895 | min | 100 |
| High Pressure HPOIT  | ASTM D5885 | min | 400 |
| Carbon Black  | ASTM D4218 | % | 2 |
| Bonded Seam Strength  | ASTM D6392  | lbs/inch width  | N/cm width  | 57 | 100 |
| Seam Peel Adhesion  | ASTM D6392  | lbs/inch width  | N/cm width  | 45 | 79 |

**TABLE 2:**

Required 7 layer co-extruded barrier geomembrane properties 40 mil

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PROPERTY** | **TEST METHOD** | **IMPERIAL UNITS** | **METRIC UNITS** | **IMPERIAL MIN. ROLL AVERAGES** | **METRIC MIN. ROLL AVERAGES** |
| Thickness  | ASTM D5199 | mils | mm | 40 | .76 |
| Weight  |  | lbs/msf | g/m² | 205 | 1001 |
| Tensile Strength  | ASTM D6693 | lbs | N/cm | 125 | 166 |
| Tensile Elongation  | ASTM D6693 | % | 550 |
| Tear Resistance  | ASTM D1004 | lbs | N | 22 | 80 |
| Puncture Resistance  | ASTM D4833 | lbs | N | 70 | 267 |
| Standard OIT  | ASTM D3895 | min | 100 |
| High Pressure HPOIT  | ASTM D5885 | min | 400 |
| Carbon Black  | ASTM D4218 | % | 2 |
| Bonded Seam Strength  | ASTM D6392  | lbs/inch width  | N/cm width  | 80 | 140 |
| Seam Peel Adhesion  | ASTM D6392  | lbs/inch width  | N/cm width  | 60 | 105 |

Notes:

1. The Engineer may allow alternates to these requirements.
2. Seam testing performed at 20” per minute