

COOLTHANE™ URETHANES

COOLTHANE Urethane Products

Cooley developed a range of urethane products designed for primary and secondary containment of fuels and other aggressive products. Cooley has two urethane products, one being ester-based and the other ether-based. Both of the products are available on several reinforcement configurations to meet specific needs.

The ester-based products consist of Cooley's exclusive extrusion laminated urethane coating on select substrates. These products are highly resistant to fuels, extremely flexible and highly puncture resistant, with excellent heat sealing characteristics. The ether-based product offers good resistance to fuels, good strength characteristics and excellent low temperature properties. Coolthane products are strong and hydrolytically stable for years of service in fuel and chemical applications.

There are many urethane products in the Cooley lineup, ranging from very high strength Military specified liners, water bladder material; inflatable boat material; oil boom material to lightweight SEG Certified incinerable material for nuclear waste. Certain urethanes are used frequently for military pillow tanks as they meet the requirements of MIL-T-529839E.

Why Use COOLTHANE?

The unique, high performance Coolthane liners are a combination of high strength fabrics, specially developed ester-based or ether-based urethane extrusion and a proprietary manufacturing process. In addition to its high fuel and chemical resistance, the liners exhibit very high physical performance. These characteristics are shown in the 'Physical Properties' data sheets for the respective products. The reinforcing fabrics are selected to provide the respective products with a superior physical performance to meet the real needs of the engineer and the installation.

Panel Sizes

Coolthane provides the end-user with a liner product that can be supplied in large panels to expedite installation and minimize the amount of field seaming to suit the installation. Panel sizes are determined by the size, complexity and access to the area to be lined in addition to the weight and material handling limitations. Large panels can be supplied through our network of fabricators throughout the USA and abroad.

Field Installation

To expedite installation, Coolthane can be prefabricated and delivered to the site in large custom sized panels. This method enables the area to be lined with the minimum of material and

'field seaming.' With the excellent seaming and related characteristics of Coolthane the expected problems with field seaming of other products are eliminated.

Typical Installations

The Coolthane geomembrane liners offer superior performance over other products for all aspects of lining lagoons, ponds, tanks or other impoundments, floating covers and similar containments.

Complying with the strict requirements of the Corps of Engineers, Coolthane can be used for many primary and secondary containment applications. These include fuel bladders, tank liners, oil booms, curtains, above and below ground tank farms, wash-down facilities, airport de-icing collection systems, digesters and many other applications to contain chemically aggressive waste streams. For your specific application contact us for a recommendation of a suitable Coolthane product.

Coolthane

Guideline Specification for Coolthane Geomembrane Liner Installation

Coolthane

Urethane Guide Specification

1.0 GENERAL

1.01 SCOPE OF WORK

The work covered by these specifications consists of installing reinforced Coolthane Geomembrane, as described in section 1.03, in the areas shown on the project drawings. All work shall be done in strict accordance with the project drawings, these specifications and the Fabricator's approved shop drawings. All work is subject to the terms and conditions of the contract.

Sufficient material shall be furnished to cover all areas as shown on the drawings including seam areas, anchor trenches and appurtenances as required. The Fabricator/Installer of the liner shall allow for any anticipated or planned shrinkage or wrinkles in the field panels, installing the membrane free of stress or tension.

1.02 MANUFACTURER/FABRICATOR/INSTALLER INFORMATION

The following shall be the minimum information submitted at the time of the bid, relating to the product Manufacturer, proposed Fabricator and Installer: Name, Address, Phone, FAX, Qualifications of the individuals who will personally be assigned to the project.

1.03 PRODUCTS

The geomembrane material shall be a fabric-reinforced Coolthane urethane, as manufactured by Cooley Engineered Membranes of Pawtucket RI. The finished membrane shall consist of two (2) plies of the laminate coating over one (1) ply of reinforcing fabric. The geomembrane shall consist of first quality ingredients, suitably compounded for the application. The finished compound shall be uniform in color, thickness, size and surface texture.

1.04 SUBMITTALS

The roll goods shall be factory fabricated into large panels. The Fabricator shall furnish a proposed geomembrane panel layout which is to be approved in writing by the Engineer prior to the installation. The drawings shall show the extent, the direction of factory seams and the size of panels, consistent with the requirements of the project drawings. These details shall include the recommended termination details of the geomembrane. Except for special requirements due to configuration and/or terminating the geomembrane, maximum use of the large size panels shall be made to reduce field seaming to a minimum.

1.05 FACTORY FABRICATION

The Fabricator shall be an experienced firm customarily engaged in factory-fabricating individual widths of scrim-reinforced roll stock into large panels. The fabricator shall have experience in fabricating a minimum of 2,000,000 square feet of geomembranes by the thermal fusion methods.

Prior to factory seaming, all roll goods shall be inspected. All factory seams shall be made by thermal fusion methods. All factory seams shall have a minimum scrim-to-scrim overlap of one and one quarter inches (1 1/4") when fabricated. Fabricated seams found to have less than the specified minimum overlap shall be repaired by adding an overlap or cap strip which does not prove the minimum specified overlap or it will be rejected. All seams shall be made so that the thermal fusion bond extends fully to the top edge of the sheet so that no loose edges are present on the top side of the sheet.

1.06 INSPECTION AND TESTING OF FACTORY SEAMS

1.06.1 Inspection

All sheets and seams shall be 100% visually inspected during fabrication. No defective seams or exposed scrim will be allowed. All exposed scrim edges shall be sealed with an approved edge caulk extrudate or capped. All indicated repairs shall be made by the geomembrane Fabricator before the panels are packaged for shipment.

1.06.2 Testing

In addition to visual inspection, a 48 inch (1.2M) sample shall be taken from each factory seam welding unit used in this work at the beginning of every work shift and every four hours of production thereafter. Samples shall be non-destructive, i.e., will not require patching of fabricated panels. Test specimens shall be cut at quarter points from each 48 inch seam sample (a total of three places) and tested for factory seam strength and peel adhesion. The shear seam strength shall be tested in accordance with ASTM D751 as modified in Annex A of ANSI/NSF 54. The peel adhesion shall be tested in accordance with ASTM D413 as modified in Annex A of ANSI/NSF 54. A log shall be maintained showing the date, time, panel number and test results. Failure of the material and/or seams to meet all the requirements of these specifications may be cause for rejection of the material and/or seams as appropriate. The Fabricator shall provide the test results to the Owner or Engineer upon request.

1.07 CERTIFICATION AND TEST REPORTS

Prior to installation of the panels, the Fabricator/Installer shall provide the Engineer with the following certification and test reports:

1.07.1 Written certification that the material meets all of the requirements of Section 1.03.

1.07.2 Written certification that the factory seams were inspected and tested in accordance with Section 1.06.

1.08 COOLTHANE PANEL PACKAGING AND STORAGE

Each factory fabricated panel shall be rolled and/or accordion-folded and placed onto a sturdy wooden pallet designed to be moved by a forklift or similar equipment. Each panel shall be given prominent and unique identifying markings indicating the proper direction of unrolling and/or unfolding to facilitate layout and positioning in the field. The panels shall be packaged in heavy cardboard or wood crates fully enclosed and protected to prevent damage during shipment; and each crate is to be prominently marked in the same fashion as the panels within. Until needed, packaged factory fabricated panels shall be stored in their original unopened crates in a dry area, and protected from the direct heat of the sun. Pallets should not be stacked.

2.0 INSTALLATION AND SEAMING

2.01 SUBGRADE PREPARATION

a) New Excavation

The surfaces on which the lining is to be placed shall be maintained in a firm, clean, dry and smooth condition during the lining installation. All earthen reservoir surfaces shall be compacted and smooth graded with anchor trenches provided as required and detailed. All reservoir surfaces shall be free of rocks, roots, gravel, grade stakes or debris that may puncture the geomembrane. The subgrade shall be compacted to a minimum of 90% of the dry density (as determined by ASTM D398 Standard Proctor Method). Geotextiles may be used as a cushioning agent. All vegetation, if present, shall be removed and a soil sterilant applied. The soil sterilant shall be selected for the geographical area and native grasses and growth. A partial list of soil sterilant suppliers is available from Cooley Engineered Membranes. Cooley does not endorse or recommend any specific manufacturer or product. If groundwater is present within 12 inches below the surface to be lined, the General Contractor shall de-water the area prior to and during installation of the liner.

The location of both the top and bottom of all slopes shall be completed within plus or minus 1 foot of the planned location. The completed subgrade and finished grades shall be within plus or minus 0.1 foot of the specified elevation.

Immediately prior to the installation of the geomembrane, a complete and detailed Inspection of the embankments shall be performed by the Field Engineer, Earthwork Contractor and the Geomembrane Installer to determine acceptance of the finished

subgrade and elevations. Any erosion or other damage to the base material which has occurred since placement shall be corrected by the Earthwork Contractor.

b) Existing Subgrade

If earthen, the surface shall be cleaned (free from debris) and if necessary regraded to the standards shown in section 2.01 (New Excavation).

c) Concrete Impoundment

Ensure that the surface is clean and free of debris that can damage to liner during construction. Any badly spalled or cracked concrete shall be grouted or similar treatment. In some cases a needle punched geotextile can be placed over the damaged concrete or similar subgrade prior to the installation of the liner.

d) Other Conditions

Refer to your engineering consultant for other questions related to surface preparation or repair.

2.02 GEOMEMBRANE INSTALLATION

The geomembrane shall be placed over the prepared surfaces in such a manner as to insure minimum handling and in accordance with the approved shop drawings.

The lining shall be sealed to all concrete structures and other openings in accordance with details shown on the plan and shop drawings. The geomembrane lining shall be closely fitted and sealed around all inlets, outlets and other projections through the lining, using prefabricated fittings where possible as shown in the construction details. Liner sheets, damaged from any cause, shall be removed, repaired or covered with additional sheeting.

Only those sheets of lining material which can be anchored and seamed together the same day shall be unpacked and placed into position. In areas that high wind is prevalent, the lining installation should begin on the upwind side of the project and proceed downwind. The leading edge of the liner shall be secured at all times with sandbags sufficient to hold it down during high winds. The leading edges of the liner material left exposed after the day's work shall be anchored to prevent damage or displacement due to wind.

Materials, equipment or other items shall not be dragged across the surface of the liner or be allowed to slide down slopes on the lining. All parties walking or working on the lining materials shall wear soft-sole shoes.

2.03 FIELD SEAMS

Lap joints shall be used to seal factory fabricated sheets together in the field. The lap joint shall be formed by lapping the edges of the sheets four (4) to six (6) inches. The contact surfaces of the sheets shall be wiped clean of all dirt, dust, moisture and other foreign matter.

A minimum one and one half inch (1 1/2") bond shall apply to all field seams.

2.03 FIELD SEAMS (Continued)

Extreme care should be taken throughout the work to avoid fishmouths, wrinkles, folds or pleats in the seam area. If fishmouths do occur, they should be slit out far enough from the seam to dissipate them, lapped, seamed together in the lapped area and patched. Any necessary repairs to the geomembrane shall be done using an additional piece of the specified sheeting applied as stated in Section 2.04.2 of this specification.

Cleanup within the lining compound shall be an ongoing responsibility of the Lining Contractor. Particular care should be taken to ensure that no stones, scrap material, trash, tools or other unwanted items are trapped beneath the geomembrane liner. All field seams shall be made utilizing the hot wedge welding techniques as outlined in appropriate Sections of the EPA Technical Guidance Document: "Inspection Techniques for the Fabrication of Geomembrane Field Seams".

2.04 INSPECTION AND TESTING OF GEOMEMBRANE SEAMS

2.04.1 INSPECTION

Upon completion of the liner installation, all seams shall be visually inspected for compliance with these specifications. In addition to visual inspection, all field seams shall be checked using an air lance nozzle directed on the upper edge and surface to detect any loose edges or ripples indicating unbonded areas within the seam (per ASTM D4437).

All field seams, on completion of the work shall be tightly bonded. Any geomembrane surface showing injury due to scuffing, penetration by foreign objects, or distress from other causes shall be replaced or repaired. All exposed fabric edges shall be sealed with an approved edge caulk, extrusion weld or cap strip.

2.04.2 REPAIRS

Any repairs made to the lining shall be patched with the lining material. Patches shall be cut with rounded corners and shall extend a minimum of four (4) inches in each direction from the damaged area. The entire surface of the patch shall be bonded to the lining material.

2.04.3 TESTING OF FIELD SEAMS

Test seams are to be made by each seaming crew at the beginning of the seaming process, and every four (4) hours thereafter, or every time equipment is changed. Each seaming crew and the materials they are using must be traceable and identifiable

to their test seams. The samples shall be numbered, dated, identified as to the personnel making the seam, and location made by appropriate notes on a print of the panel layout for the project. The completed field seam sample shall measure not less than 14 inches in width and 24 inches in length.

The field test seams are to be tested for seam strength and peel adhesion. Seam shear strength shall be tested in accordance with ASTM D751 as modified in Annex A of ANSI/NSF 54. The peel adhesion shall be tested in accordance with ASTM D413 as modified in Annex A of ANSI/NSF 54.

If a test seam fails to meet the field seam design specification, then additional test seam samples will have to be made by the same seaming crew, using the same tools, equipment and seaming materials, and retested.

2.04 INSPECTION AND TESTING OF GEOMEMBRANE SEAMS

2.04.1 INSPECTION

Upon completion of the liner installation, all seams shall be visually inspected for compliance with these specifications. In addition to visual inspection, all field seams shall be checked using an air lance nozzle directed on the upper edge and surface to detect any loose edges or ripples indicating unbonded areas within the seam (per ASTM D4437).

All field seams, on completion of the work shall be tightly bonded. Any geomembrane surface showing injury due to scuffing, penetration by foreign objects, or distress from other causes shall be replaced or repaired. All exposed fabric edges shall be sealed with an approved edge caulk, extrusion weld or cap strip.

2.04.2 REPAIRS

Any repairs made to the lining shall be patched with the lining material. Patches shall be cut with rounded corners and shall extend a minimum of four (4) inches in each direction from the damaged area. The entire surface of the patch shall be bonded to the lining material.

2.04.3 TESTING OF FIELD SEAMS

Test seams are to be made by each seaming crew at the beginning of the seaming process, and every four (4) hours thereafter, or every time equipment is changed. Each seaming crew and the materials they are using must be traceable and identifiable to their test seams. The samples shall be numbered, dated, identified as to the personnel making the seam, and location made by appropriate notes on a print of the panel layout for the project. The completed field seam sample shall measure not less than 14 inches in width and 24 inches in length.

The field test seams are to be tested for seam strength and peel adhesion. Seam shear strength shall be tested in accordance with ASTM D751 as modified in Annex A of ANSI/NSF 54. The peel adhesion shall be tested in accordance with ASTM D413 as modified in Annex A of ANSI/NSF 54.

If a test seam fails to meet the field seam design specification, then additional test seam samples will have to be made by the same seaming crew, using the same tools, equipment and seaming materials, and retested.