SECTION 33 47 13

GEOMEMBRANE FLOATING BAFFLE SYSTEM VS 1.01 8138

PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

The Work includes furnishing and installing a prefabricated Geomembrane Floating Baffle System as shown on the drawings and as specified in these Special Provisions and the Geomembrane Baffle Manufacturer's and Installer's approved shop drawings.

1.3 RELATED REQUIREMENTS

1.4 REFERENCES

A. ASTM D751 – Standard Test Methods for Coated Fabrics
B. ASTM D413 – Standard Test Methods for Rubber Property – Adhesion to Flexible Substrate
C. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geomembranes
D. ASTM D2136 – Standard Test Method for Coated Fabrics – Low Temperature Bend Test
E. ASTM G153 – Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for exposure of Nonmetallic Materials
F. ASTM D1204 – Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures
G. ASTM D471 – Standard Test Method for Rubber Property – Effect of Liquids
H. ASTM D3389 – Standard Test Method for Coated Fabrics Abrasion Resistance
I. ASTM D696 – Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics between -30° C and 30° C with a Vitreous Silica Dilatometer
J. ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber
K. ASTM D4437 – Standard Practice for Nondestructive Testing (NDT) for Determining the Integrity of Seams used in Joining Flexible Polymeric Sheet Geomembranes

1.5 SUBMITTALS

A. Geomembrane Manufacturer
   1. Geomembrane manufacturer shall submit a list of the name and location of at least 5 projects using the proposed material in floating baffle applications.
   2. Geomembrane manufacturer shall provide certification that each roll of membrane supplied for the project meets the requirements of Section 2.2.
   3. Geomembrane manufacturer shall provide a certification that baffle manufacturer is approved by geomembrane manufacturer.
   4. Geomembrane manufacturer's standard catalog information and specifications.
   5. Geomembrane manufacturer's warranty per section 1.8 A

B. Floating Baffle Manufacturer
   1. Geomembrane baffle manufacturer shall provide a list of not less than 5 projects using XR-5 geomembrane in similar applications.
   2. Shop QC/QA Plan for handling, welding and testing.
   3. Shop drawings with a proposed layout and construction of the baffle (s) as shown in the project plans.

4. Welded seam samples
5. Tensiometer calibration certificate showing current date and successful operation.
6. Diversion curtain manufacturer's warranty per section 1.8 B.

C. Baffle Installer
1. Baffle installer shall provide certification that they are regularly engaged in construction of water and wastewater treatment and storage facilities.
2. Installer shall provide a construction plan which details the installation sequence of the baffle system.
3. Installer's warranty per section 1.8C

1.6 QUALITY ASSURANCE

A. Provide materials and equipment that are standard products of a manufacturer regularly engaged in the manufacturing of such products, which are of a similar material, design and workmanship.
B. Testing requirements
1. The geomembrane manufacturer shall conform to the approved submittals in Section 1.5 A, providing documentation to the Owner or their representative.
2. The baffle manufacturer shall conform to the approved submittals in Section 1.5 B, providing documentation to the Owner or their representative.
3.. The baffle installer shall conform to the approved submittals in Section 1.5 C providing documentation to the Owner or their representative

1.7 DELIVERY, STORAGE AND HANDLING

A. Manufactured Geomembrane Baffles
1. Manufactured baffles shall be folded or rolled, and protected, as necessary to allow damage free shipping, handling and job site storage.
2. Each section shall be prominently and indelibly marked with the section size and placement designation.
3. Factory fabricated panels shall be protected as necessary to prevent damage during shipment and storage.
4. Factory manufactured sections which have been delivered to the project site shall be stored in a dry area and single stacked. All materials shall be covered.

B. Miscellaneous material
1. All project materials shall be delivered, stored and handled in accordance with the appropriate manufacturer's recommendations.

1.8 WARRANTY

A. Furnish a written warranty from the geomembrane manufacturer that covers weathering and resistance to the contents of the impoundment or tank in which the baffles will operate. The warranty must include test data to support the assumption of compatibility. The warranty will be specific to the project for a period of 10 years.
B. Furnish a written warranty from the baffle manufacturer that covers the integrity of factory seams and other connections for a period of 2 years.
C. Furnish a written warranty from the baffle installer that covers the integrity of all connections, installation features and construction of the geomembrane baffles for a period of 1 year.

PART 2 PRODUCTS

2.1 GENERAL

A. The geomembrane material shall be manufactured specifically for the use as a barrier to contain wastewater and other specific liquids.

C. The geomembrane material shall have a treated base fabric that eliminates the need for edge protection. Encapsulated edges will not be acceptable in lieu of treated base fabric.

D. The manufacturer of the geomembrane shall have a minimum of 30 years of proven experience manufacturing the product used in this project.

2.2 GEOMEMBRANE

A. 8138 XR-5 Geomembrane manufactured by Seaman Corporation complying with all properties in Table 1.

Table 1: Geomembrane Properties

Property	**Test Method**	**Requirement-Imperial Units**	**Requirement-Metric Units**
Base Fabric	Type	Polyester	Polyester
Membrane Construction	Type	Coated Fabric	Coated Fabric
Edge Protection	Type	Base Fabric Tie Coat	Base Fabric Tie Coat
Base Fabric Weight	ASTM D751	6.5 oz/yd^2 nom.	220 g/m^2 nom.
Finished Membrane Weight	ASTM D751	38 +-2 oz/yd^2 nom.	1290 +-70 g/m^2 nom.
Trapezoid Tear	ASTM D751	40/55 lbf min.	175/245 N min.
Yield Tensile Strength	ASTM D751, Grab Method, Proc A	550/550 lbf min.	2448/2448 N min.
Elongation at Yield	ASTM D751	20% min.	20% min.
Adhesion - Ply	ASTM D751, Type A	15 lbf/in min. or Film Tearing Bond	130 N/5 cm min. or Film Tearing Bond
Hydrostatic Resistance	ASTM D751, Method A	800 psi min.	5.51 MPa min.
Puncture Resistance	ASTM D4833	275 lbf min.	1200 N min.
Bursting Strength	ASTM D751 Ball Tip	750 lbf min.	3300 N min.
Thickness	ASTM D751	30 mil min.	0.76 mm min.
Low Temperature Bend	ASTM D2136, 4 hrs, 1/8 in (3.1 mm) mandrel	Pass @ -30^0 F	Pass @-35^0 C
Weathering Resistance	ASTM G153, Carbon Arc	8000 hrs with no appreciable changes, or stiffening/cracking of coating	8000 hrs with no appreciable changes, or stiffening/cracking of coating
Dimensional Stability	ASTM D1204, 212^0 F (100^0 C), 1 hr, each direction	0.5% max. change	0.5% max. change

Table 1: Geomembrane Properties (continued)

Property	Test Method	Requirement-Imperial Units	Requirement-Metric Units
Coefficient of Thermal Expansion Contraction	ASTM D696	8 x 10^{-6} in/in/^{0}F max. change	1.4 x 10^{-5} cm/cm/^{0}C max. change
Abrasion Resistance	ASTM D3389, H-18 wheel, 100 g	2000 cycles with no exposed base fabric	2000 cycles with no exposed base fabric
Water Absorption	ASTM D741, 7 days, 212° F (100^0 F)	0.45 oz/ft^2 max.	0.14 kg/m^2 max.
Hydrocarbon Resistance	Retention of Yield Tensile Strength, 75 months full exposure with exposed base fabric, Crude Oil and Jet A	>95% retention	>95% retention
Dead Load	ASTM D751, Room Temperature, 1 in (2.54 cm) Thermal weld, 4 hours	Pass @ 240 lbf min.	Pass @ 1068 N min.
Dead Load	ASTM D751, 160^{0}F (70^0 C), 1 in (2.54 cm) Thermal weld, 4 hours	Pass @120 lbf min.	Pass @ 534 N min.
Bonded Seam Strength	ASTM D751, Grab Method, Proc A	550 lbf min.	2450 N min.
Adhesion – Thermal Seam	ASTM D751	40 lbf/2 in weld min.	175 N/ 5 cm weld min.

2.3 CONNECTION MATERIALS

A. All field connections will be mechanical connections using materials which are resistant to the contents of the liquid in the impoundment or tank during the service life of the system.
B. Anchor and joint connections shall be uniform and securely connected in a manner sufficient to prevent the baffles from becoming disconnected. The flow patterns and the weight of the baffles themselves shall be considered in the anchoring process.

2.4 MISCELLANEOUS MATERIALS

A. The baffles shall be constructed using the specified geomembrane and mechanical items. All materials must be resistant to the contents of the impoundment or tank, be compatible with the geomembrane, and approved by the Engineer.
B. Solvents should only be used as approved by the Engineer.

2.5 WELDING EQUIPMENT

A. The baffle manufacturer shall supply thermal welding equipment as recommended by the equipment supplier for welding XR geomembranes and capable of producing factory seams capable of meeting the requirements of Section 2.2 A, Table 1, Dead Load, Bonded Seam Strength and Adhesion-Thermal Seam.

B. Provide tensiometers capable of measuring the seam strength requirements of Section 2.2 A, Table 1, Bonded Seam Strength and Adhesion-Thermal Seam.
C. Tensiometers will be calibrated, and documentation shall be provided per Sections 1.5 B. 5.

PART 3 EXECUTION

3.1 FACTORY FABRICATION

A. The individual XR-5 geomembrane widths shall be factory fabricated into large sheets custom designed for this project.
B. A two-inch nominal seam done by automatic thermal high-pressure welding is required. The surface of the welded areas must be dry and clean. Pressure must be applied to the full width of the seam on the top and bottom surface while the welded area is still in a melt-type condition. The bottom welding surface must be flat to ensure that the entire seam is welded properly. If the floor of the fabrication facility is used as a bearing surface during the welding, the temperature of that surface must be within 5 degrees F of the air temperature of the facility.
C. Factory welds must meet the requirements of Section 2.2 A, Table 1, Dead Load, Bonded Seam Strength and Adhesion – Thermal Seam.

3.2 INSTALLATION

A. Baffle installer shall be responsible for proper handling and storage of curtain sections prior to and during installation.
B. Attach baffle sections on ends and as required on plans. Seal geomembrane at all protrusions and openings except as shown on the plans. Follow plans and manufacturer's recommendations.
C. Anchor the geomembrane at termination areas. Install mechanical connections per baffle manufacturer's directions and the project plans.
D. The installation of the baffle shall not result in excessive binding or other abnormal loading inconsistent with the design and intended operation of the equipment. Residual tearing forces from construction shall be minimized.
E. No field installation shall be made when the ambient air temperature is below 30 deg F, unless approved by the Engineer.
F. Any geomembrane surface showing injury due to scuffing, penetration by foreign objects, or distress from rough handling, shall as directed by the Owner or their representative, be replaced or covered, and sealed with an additional layer of lining of proper size, in accordance with the patch procedure.
G. Patching procedure: Any repairs to the geomembrane shall be patched with the geomembrane material. Patch material shall have rounded corners and shall extend a minimum of four inches in each direction from the damaged area. Seam repairs or seams which are questionable should be cap stripped with a one inch wide (minimum) strip of the geomembrane material. The requirements of Sections 3.2 H apply to this cap stripping. Patching shall be performed only by qualified personnel, approved by the diversion curtain manufacturer.
H. The installer shall be responsible for cleaning the finished geomembrane in accordance with the submittals of Section 1.5 C. 2.

3.3 FIELD QUALITY CONTROL

A. Baffle Installer shall furnish information sufficient for the Engineer to be assured of the experience and qualifications of personnel responsible for the assembly and installation.

END OF SECTION 33 47 13