TAPECOAT - TC Enviroshield Series 'S' Module
For Square Piling

WRAP AROUND SYSTEMS FOR ENCAPSULATING SQUARE STEEL AND CONCRETE PILING

PART I GENERAL

1.1 Description

A. Work Included

1. This section specifies requirements for coating square steel and concrete piles with corrosion protection modules. All products used by the Contractor, as a part of the encapsulation system, shall be manufactured by a single manufacturer to ensure product compatibility. The manufacturer of the encapsulation system shall be a member of the Steel Structures Painting Council (SSPC) or the National Association of Corrosion Engineers (NACE).
2. The manufacturer shall be ISO 9001 registered.
3. The work specified in this section consists of surface preparation of the pile and encapsulation.

1.2 References

A. Federal Standards

B. American Society for Testing and Materials (ASTM) Publications

1.3 Quality Assurance

A. Manufacturer's Representative

The Contractor shall arrange for a qualified technical representative of the manufacturer of the approved system to be present at the construction site to instruct and demonstrate the application procedures.

1.4 Delivery, Storage, and Protection

Deliver materials in original packages, containers, boxes or crates bearing the name of the manufacturer, brand, and model. Store all materials and equipment delivered to the construction site, so that weather conditions or other potential hazardous situations are properly taken into account. Exercise particular care to avoid damaging materials throughout all lifting or handling operations.

PART 2 PRODUCTS

2.1 TC Enviroshield Series "S" Module

TC Enviroshield Series "S" as manufactured by The Tapecoat Company, Evanston, Illinois (800-758-6041). The corrosion protection modules used in the piling protection system will be made of materials defined in this section and have the following features:

A. Unitized design, providing an factory assembled module with a reinforced outer urethane jacket, reticulated foam layer, inner felt (impregnated with petrolatum), and a composite non-metallic bolt and clip closure system manufactured in one unit:

Assembled Module Properties:

Color	Black	
Thickness	Outer Jacket	30 mils 0.030")
	Inner Mat	110 mils (0.110")
Total Thickness		**140 mils (0.140")**
Weight	Outer Jacket	25 oz per sq yd
	Inner Mat	70 oz per sq yd
Total Weight		**95 oz per sq yd**

B. Manufactured in various sizes to conform to specific job requirements. Closure to be accomplished by bolting.

C. Encapsulation modules designed to overlap when joined together eliminating the need for ancillary banding.

D. Modules will have a 1/2" reticulated foam layer between the outer jacket and inner petrolatum mat to add a compressive force to the flat sides of the square pile (not included in weight or thickness calculations).

2.2 Materials

A. Primer: TC Enviroprime II

1. Composition: The primer consists of a formulated, non-toxic, highly viscous petrolatum wax. The primer shall be installed to minimum of 4 mils and have the following physical properties:

Property	Requirements	ASTM
Penetration, cone @ 77'F	7.4 to 22.4 mm	D 937
Viscosity, SUS, @ 210'F	150 cps. avg.	D 88
Flash point, c.o.c., °F	500°F	D 92
Drop melt point	145°F avg.	D 127

1. Performance: The primer shall be used as a filler material for cracks or voids over 1/8” deep.

B. TC Enviroshield Module Composition

1. The inner felt and petrolatum formulation shall have a 110 mill thickness with a water-impermeable backing and shall have the following properties:

a. The inner felt:

Property	Requirements
Material	Polyester Felt
Weight	10 oz / sq. yd. ASTM D-3776
Thickness	110 mil min. ASTM D-1777
Grab Strength	305 lb. ASTM D-4632
Grab Elongation	60% ASTM D-4632
Trapezoid Tear Strength	100 lb. ASTM D-4533
Puncture Resistance	130 lb. ASTM D-4833
Mullen Burst Strength	510 p.s.i. ASTM D-3786

Water Flow Rate	80 gpm/sq.ft. ASTM D-4491
Permittivity	1.07 sec(-1) ASTM D-4491
Permeability	.57 cm/sec ASTM D-4491
AOS	210 mm ASTM D-4751

b. The Petrolatum formulation:

Property	Requirements	
Color	Brownish - Gray	
Dielectric Strength	170 volts/mil minimum	D-149
Water Vapor Transmission	0.25 mg maximum	E-96
Saturant Drop Melt Point	150 degrees F minimum	D-127
	180 degrees F typical value	
Saturant Cone Penetration		
100 g weight, 5 sec @ 77 F	.24 - .50 in	D-937
Weight per Gallon	7.7 lb./gal	
Viscosity, 150 F, 0.5 RPM		
Spindle S21	20,300 cps	D-88

2. The foam filler shall be an open cell reticulated polyether foam with the following physical properties:

Property	Requirements
Material	Reticulated polyether foam
Thickness	1/2 inch
Density	1.4 PCF
Pour Size	20 ppi (65ppi)
Tensile Strength	13.0 psi
Elongation	180%
Tear Strength	2 lbs/in

3. The outer jacket shall be made of a multi-layer urethane coated, reinforced polyester, UV resistant composite material meeting the following physical properties:

Property	Requirements
Material	Multi-layer reinforced Urethane
Color	Black
Thickness	30 mil
Total Weight	25 oz per sq. yd.
Tensile Strength (grab lb.)	warp 440, fill 340 D751-A
Tensile Strength (1” strip lb.)	warp 275, fill 225 D751-B
Tear Strength (tongue lb.)	warp 160, fill 160 D751-B
Hydro Resistance	400 p.s.i. D751-A
Low Temperature	-60 degrees F D2136
Abrasion Resistance (tabor cycles)	5000 D3884
Accelerated Weathering	300 hr. - Excellent
Hydrocarbon Resistance	Excellent (MIL-C-20696B)

4. The Closure System shall consist of (4) pultruded fiberglass stiffener rods, two (2) on each side running along each longitudinal seam, 7/8 inch diameter glass filled acetyl plastic bolts, and threaded and unthreaded acetyl plastic clips spaced approximately 13" on center.

a. The bolts and clips shall have the following physical properties:

Property	Requirements	
Tensile strength	34700 psi	D638
Tensile Elongation @ Brk	3%	D638
Flexural Modulus	2110000 psi	D790
Flexural Strength	54000 psi	D790
Coef. of Friction	0.52	D1894
Water absorption @ 24 hrs	0.45%	D570
Ultraviolet fight (UV) resistance	Excellent	
Max. Continuous Tmp	212-356 F	D794

b. The stiffener rods shall have the following physical properties:

Property	Requirements	
Material	E-glass fiber in proprietary resin	
Tensile Strength	120,000 p.s.i.	D3915/D38
Tensile Modulus	6.0 x 10(8^{th}) p.s.i.	D3915/D38
Flexural Strength	120,000 p.s.i.	D4476/D790
Flexural Modulus	6.0 x 10(6^{th}) psi	D4476/D790
Compressive Strength	70,000 p.s.i.	D695
Barcol Hardness	60	D256
Izod Impact	40 ft.lb./in.	D256
Glass Content	75% by weight	D2584
Density	0.072 lb./cu. in.	D792
Water Absorption	0.05%	D570
Coefficient of Thermal Exp.	5.3 x 10 (-6^{th})	D696

PART 3 EXECUTION

3.1 Installation

A. Cleaning and Surface Preparation - The entire surface of each pile shall be thoroughly cleaned to remove all marine growth and foreign matter for the entire length covered by the modular system. The cleaning does not require the removal of surface growth from cavities or other indentations that do not come in contact with the module. The cleaning process does require removal of all surface projections such as bolts, welded projections, fouling organisms, and other surface conditions that would either penetrate the module or cause undue deformation. It shall not be necessary to remove surface bumps or other similar unevenness, provided these are smooth, as the material has sufficient elasticity to pass over these surface defects.

B. Primer or filler - Priming the surface is not required under the Module. TC Enviroprime should be used as a filler in any areas that have deep indentations and cracks over 1/8” inch deep as directed by the project engineer.

C. TC Enviroshield System

After cleaning and priming the pilings with TC Enviroprime, the Series "S" Modules are installed as follows:

1. Remove the bolts (bolts and clips will not float) and Modules from the shipping carton. Unroll the Module and remove the protective release liner from the inner petrolatum mat.
2. Re-roll the Module and lower it to diver (Module will float).
3. Wrap the Module around the piling and insert center bolt.
4. Position the Module in the proper location at the top of the piling. Secure Module by tightening center bolt just enough to hold Module in correct location.
5. Insert balance of the bolts and tighten with a pneumatic or hand wrench, alternating bolts up and down the Module. On larger piling two temporary longer bolts should be inserted in the second clip from each end to compress the foam layer to allow the insertion of the final composite bolts. Note: Do not over-torque the bolts at first tightening. Allow to rest, proceed to the next Module and finish tightening the first Module after the petrolatum inner mat has cold flowed and the foam layer has compressed.
6. Cut off the threaded end of the bolts next to the clips with hacksaw or pneumatic cut off tool.
7. Repeat steps 1, 2, 3 and 4 with the next Module and position it with a 3-inch overlap over the bottom of the first Module. Continue to install Modules until the piling has the required coverage.

A manufacturer meeting these specifications is:

The Tapecoat Company
Evanston, IL
Ph 800-758-6041

A local Supplier for this product is:

Schrader Co. Sales, LLC
1326 5th Street – Suite B-2
Marysville, WA 98270
Ph 425-377-1550
Fx 425-377-0408