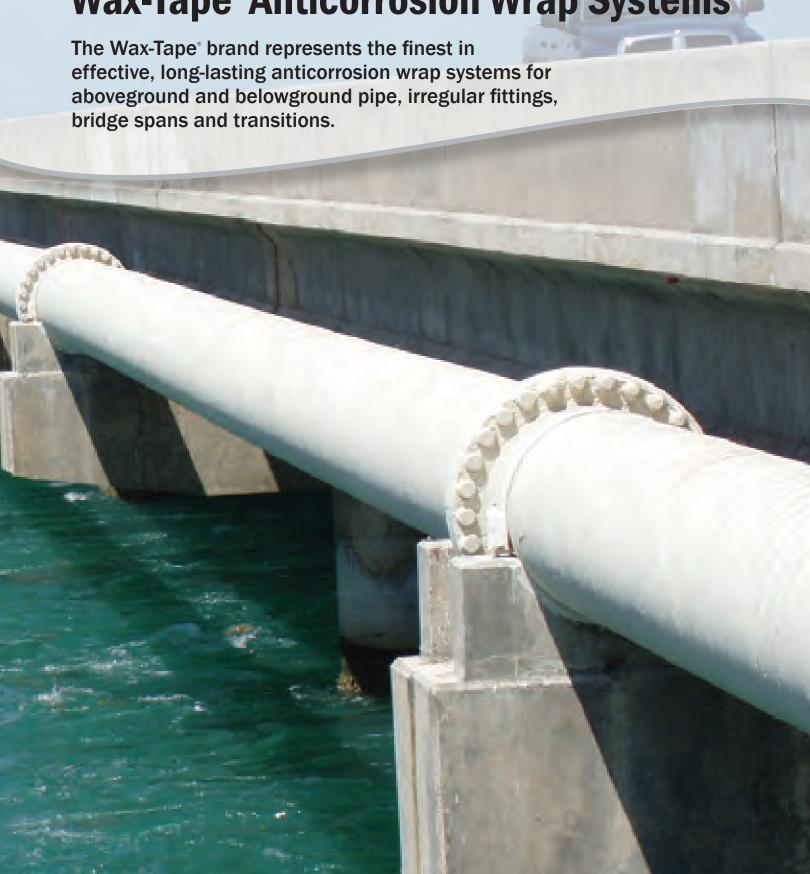


Wax-Tape® Anticorrosion Wrap Systems





A Complete Protection System

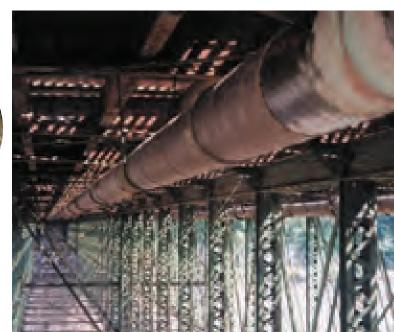
Since 1949, the Trenton Corporation has provided excellent anticorrosion coating systems for a variety of environments. The Wax-Tape® brand anticorrosion wrap system includes a selection of primers, wraps and outerwraps that work together to protect your resources. Trenton will help you assess your situation and select the proper combination of products to ensure the most effective corrosion protection available.



Sometimes abrasion blasting is awkward and environmentally questionable, particularly when the work is directly over a river or stream. Wax-Tape® anticorrosion wraps do not require abrasion blasting.



Trenton's Wax-Tape® #1 non-firming anticorrosion wrap protects irregularly shaped underground fittings and is compatible with cathodic protection.





- Customers have been impressed when removing a small patch of Trenton Wax-Tape® anticorrosion wrap for inspection purposes. They consistently find the surface in the same condition as when the wrap was first applied. After inspection, the small patch can then be reapplied for continued protection.
 - ▼ In exposed, aboveground applications, UV-stable Wax-Tape wraps can outperform paint in many situations, lasting much longer and providing better mechanical protection.



An easy-to-use system that field applicators can quickly master.

Trenton Wax-Tape® Anticorrosion Wrap Application Process



Step 1

Prepare Surface:
Use a wire brush to clean off loose rust and dirt.

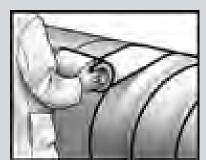


Step 3
Apply Wax-Tape
wrap:
After the initial wrapping,
pressing the wrap to the
pipe removes air bubbles.



Step 2

Apply Primer:
Rubbing the primer onto the surface displaces any moisture.



Step 4
Apply Outerwrap
(Optional):
Trenton offers a choice
of outerwraps for added
protection.

Trenton Wax-Tape® Anticorrosion Wraps

When considering an anticorrosion system, it is important to understand the unique features and benefits of Trenton products. The concept of wrapping a pipe or fitting with a thick wrap to form a continuous, effective protective coating is still foreign to some people. The fact that the wraps are not "rock hard" sometimes makes it hard to understand how they can protect for so long. In fact the wraps form a better protection than paint, and they do not require the surface preparation that is so essential when using paints and epoxies.

Wax-Tape® brand anticorrosion wraps are unique and made of high-quality materials.

Trenton's wraps use microcrystalline wax and are thick, with no fillers. This means they stay conformed to irregular fittings and provide excellent protection.



Wax-Tape® #1 Non-Firming Anticorrosion Wrap

Used primarily belowground, this wrap remains pliable and offers excellent value.

Trenton Wax-Tape® #1 anticorrosion wrap resists corrosion on belowground pipe, including wet and irregular surfaces. It requires no waiting time or drying time, can be backfilled immediately and is compatible with cathodic protection. Trenton Wax-Tape #1 wrap is user friendly, contains no VOCs, is nontoxic, nonhazardous and noncarcinogenic. It provides excellent protection for a variety of applications, including couplings, valves, fittings, weld cutbacks and exothermic welds.



Trenton's Wax-Tape® #1 wrap provides long-lasting protection and is compatible with many types of materials, such as steel, ductile iron and PVC.



Trenton's Wax-Tape® #1 wrap is widely used in the water industry.

Wax-Tape® #2 Self-Firming Anticorrosion Wrap

Used above- and belowground, this wrap slowly firms up and protects against the elements.

Trenton Wax-Tape® #2 wrap resists corrosion on bridge crossings, vaults, and other straight or irregular surfaces. It is easy to apply, is compatible with most other coatings and requires only minimal surface preparation. Nontoxic and noncarcinogenic, Wax-Tape #2 wrap is composed of inert, nonbiodegradable materials, so it is essentially unaffected by the elements.



A sweating meter run pipe protected with Wax-Tape® #2A wrap demonstrates the wraps's ability to protect in wet conditions.

Wax-Tape® HT-3000 High-Temperature Anticorrosion Wrap



Trenton's Wax-Tape® HT-3000 high-temperature anticorrosion wrap will perform effectively at continuous operating temperatures up to 230°F (110°C). When used aboveground, an outerwrap such as Trenton's MCO® 110 outerwrap is recommended.

Trenton Primers

Trenton primers are a key reason why the Trenton Wax-Tape® wrap system is so effective in mitigating corrosion. The primers penetrate surface rust in preparation for the application of the Wax-Tape wraps, which means that field applicators only need to use a wire brush to prepare the surface.

The primers penetrate the surface rust to displace moisture and "wet" the surface of the pipe. They require no specific surface profile or anchor pattern for proper adhesion. Trenton primers are required in order to create an effective anticorrosion system.

Wax-Tape® Primer: Brown or White

Wax-Tape® Primer remains spreadable in cold conditions.



Here Trenton's Wax-Tape® #2 wrap is being applied over the Wax-Tape® primer (white). Notice that the Wax-Tape primer can be applied to the pipe after only minimal surface preparation.

Temcoat[™] 3000 Primer

Temcoat[™] 3000 primer is a heavy-duty primer that does not melt.



Temcoat 3000 primer can handle very high temperatures but can also be applied in lower temperatures.



Trenton Outerwraps

Oftentimes Trenton Wax-Tape® wraps are used with no outerwrap, but sometimes conditions indicate that more mechanical protection is required. Trenton offers a range of outerwraps in order to meet the needs of each situation.

MCO® 110 outerwrap in particular provides a very hard coating, so it is used in applications where a pipe "transitions" from aboveground to belowground. Not only can it withstand an industrial-strength weed cutter, MCO 110 outerwrap can weather the frost heave that stresses coatings during the winter months.

Guard-Wrap™ **Outerwrap**

Guard-Wrap™ outerwrap is a wax-impregnated, nonwoven fabric wrap.



Guard-Wrap outerwrap is a cost-effective extra layer of protection in underground applications.

PVC Outerwrap



PVC outerwrap is very helpful for mitigating possible damage from rocks or soil stress in underground applications.

MCO® 110 Outerwrap

One of Trenton's newest products is MCO[®] 110 outerwrap, developed for situations that require mechanical protection.



The "MC" in MCO 110 outerwrap stands for "moisture cured." The materials in the wrap start to cure when they are exposed to the moisture in the air. Soon the wrap provides a very hard and tough outer coating.

Poly-Ply[™]**Outerwrap**



Poly-Ply™ outerwrap is a multi-layer version of plastic wrap. It helps keep a separation between the wrap and the soil.

A World of Applications



▲ The Wax-Tape® anticorrosion wrap system is particularly effective in situations where it is difficult to abrasion blast. In addition, if any of the fittings need to be accessed, Trenton Wax-Tape wrap is easily removed. Then replacement wrap is just as easily applied.

Utilities and other companies have found many uses for Trenton Wax-Tape® brand anticorrosion wraps, primers and outerwraps. One reason is that the wraps are "forgiving." During the wrap application, the applicator can easily correct deficiencies by repositioning the wrap. Wax-Tape wrap application crews become effective and efficient immediately, because the application process is so easy to learn and to correct.

As more companies become aware of Trenton Wax-Tape wraps, new and innovative applications are being discovered.

Trenton
products are used
globally, in a
variety of
environments.

Consider Total Costs

Trenton Wax-Tape wraps are very cost-effective, especially when the total cost of the project is taken into consideration.

Operator Training

The Trenton Wax-Tape anticorrosion wrap system requires minimal operator training because it is easy to apply and the wrap can be repositioned after it is placed on the pipe.

■ Required Equipment

No special spray equipment or heating devices are required — only a wire brush.

■ Surface Preparation

No sand blasting or powered wire brushing is necessary. Using a wire brush by hand to remove loose dirt and rust is all that is required. The surface can even be wet.

Application Conditions

No need to wait until the temperature is warm enough or dry enough. The crew is always working.

■ Cost of Materials

Trenton Wax-Tape wraps require only a one-inch overlap for standard service conditions, creating a more cost-effective application when compared to other systems.

■ Time before Backfill

With no curing time required, Trenton Wax-Tape wrap applications can be immediately backfilled, adding up to major savings in crew time.

■ Length of Service

Wax is inert and does not degrade over time, so Wax-Tape wraps offer very long service. Long after a paint coating needs to be again abrasion blasted and re-painted, Trenton Wax-Tape wraps continue to protect.

A System Solution for Your Application

SITUATIONAL CONDITIONS	PRIMER	PROFILING MASTIC	ANTICORROSION WRAP	OUTERWRAP
BELOWGROUND APPLICATIONS				
Normal conditions	Temcoat 3000 ¹¹		Wax-Tape #18	
Hot pipe (100° to 230°F)	Temcoat 3000		Wax-Tape HT-3000	
Wet pipe	Wax-Tape Primer ¹		Wax-Tape #18	
Voids or very irregular fittings	Temcoat 3000 ¹¹	Fill-Pro	Wax-Tape #18	
Large-diameter pipe (> 10")	Temcoat 3000 ¹¹		Wax-Tape #18	MCO 110 ⁹
High soil stress	Temcoat 3000 ¹¹		Wax-Tape #18	MCO 110 ⁶
Rocky backfill	Temcoat 3000 ¹¹		Wax-Tape #18	MCO 110 ⁶
Absorbent soil	Temcoat 300011		Wax-Tape #18	Poly-Ply ⁴
Chemically contaminated soil	Temcoat 3000 ¹¹		Wax-Tape #18	Poly-Ply ⁵
Conformability	Temcoat 3000 ¹¹		Wax-Tape #18	Poly-Ply
Dielectric protection needed	Temcoat 3000 ¹¹		Wax-Tape #18	Poly-Ply ¹³
TRANSITIONS				
Normal conditions	Temcoat 3000 ¹¹		Wax-Tape #1 belowground then Wax-Tape #2 aboveground ³	
Mechanical protection, impact resistance or abrasion resistance	Temcoat 3000 ¹¹		Wax-Tape #1 belowground then Wax-Tape #2 aboveground ³	MCO 110
ABOVEGROUND APPLICATIONS				
Normal conditions	Temcoat 3000 ¹¹		Wax-Tape #2 ²	
Use of pigmented Wax-Tape #2	Wax-Tape Primer - White ¹⁰		Wax-Tape #2 ²	
Hot pipe (100° to 230°F)	Temcoat 3000		Wax-Tape HT-3000	MCO 110 ¹²
Wet pipe	Wax-Tape Primer ¹		Wax-Tape #2 ²	
Voids or very irregular fittings	Temcoat 3000 ¹¹	Fill-Pro	Wax-Tape #2 ²	
Mechanical protection, impact resistance or abrasion resistance	Temcoat 3000 ¹¹		Wax-Tape #2 ² MCO 110 ⁷	

¹ Wax-Tape® Primer is better at displacing water, but Temcoat™ 3000 primer can effectively be rubbed onto wet surfaces.

² Wax-Tape® HT-3000 wrap may be used aboveground with no outerwrap, but it has a slightly sticky texture.

³ Start Wax-Tape® #2 wrap at least one foot below ground level, using a 50% to 80% overlap.

⁴ A few clay-type soils can, over time, absorb some saturant out of the wrap. Poly-Ply™ outerwrap, as well as Guard-Wrap™ and MCO® 110 outerwraps, will protect the Wax-Tape® #1 anticorrosion wrap.

⁵ Wax-Tape[®] wraps resist chemicals, but if there is a large quantity of hydrocarbons in the soil, Poly-Ply™ outerwrap should be used.

⁶ Guardwrap™ and PVC outerwraps also protect against soil stress and rocky backfill.

⁷ PVC outerwrap also provides some mechanical protection.

⁸ Wax-Tape® #2 and HT-3000 wraps may also be used belowground.

⁹ Guard-Wrap[™] outerwrap can also be used on large-diameter pipe.

¹⁰ Wax-Tape® Primer - Brown color will sometimes bleed through the non-brown Wax-Tape anticorrosion wraps.

¹¹ Wax-Tape® Primer may also be used.

¹² MCO[®] 110 outerwrap is optional. It can handle high temperatures and protect the HT-3000 wrap, which does not firm-up like Wax-Tape[®] #2 wrap.

¹³ PVC and Guardwrap™ outerwraps may also be used to add dielectric strength.

PRIMERS

Temcoat™ 3000 Primer

Description:

Temcoat™ 3000 primer is a high-temperature microcrystalline wax-based coating compound that will not melt and can be applied at surface temperatures up to 230°F (110°C). It requires no curing time and is easily applied by hand.

End Use:

Temcoat 3000 primer is used as an anticorrosion coating for aboveground and belowground surfaces. It can be used for straight pipe, irregular fittings and flat surfaces. Because of its paste-like consistency over a wide temperature range, it is excellent for filling voids.

Application Procedures:

Wire brush and wipe the surface clean of any loose coating, rust, scale and foreign matter. Then apply Temcoat 3000 primer by hand directly to the surface. At higher temperatures, Temcoat 3000 primer can be applied by brush. On wet surfaces, rub and press firmly to displace moisture and ensure adhesion. For belowground applications, overwrap with Wax-Tape® #1 or #2 anticorrosion wraps. For aboveground applications, overwrap with Wax-Tape #2 self-firming wrap. For higher temperatures, overwrap with Wax-Tape HT-3000 high-temperature anticorrosion wrap.

Packaging:

3-gallon (11.4-liter) pails (approximately 24 lb (10.8 kg)/pail) 1-gallon (3.8-liter) cans (4 gallons/case, 32 lb (14.4 kg)/case)

Specifications:

 $\begin{array}{lll} \mbox{Color:} & \mbox{Brown} \\ \mbox{Pour point:} & \mbox{Nonmelting} \\ \mbox{Flash point (min.):} & 350 \mbox{°F (177 °C)} \\ \mbox{Dielectric strength:} & 100 \mbox{V/mil (4 kV/mm)} \\ \mbox{Application temp.:} & 0 \mbox{°} - 230 \mbox{°F (-}18 \mbox{°} - 110 \mbox{°C)} \end{array}$

Wax-Tape® Primer

Description:

Wax-Tape® Primer is a blend of microcrystalline waxes, plasticizers, and corrosion inhibitors (no clay fillers). It has a paste-like consistency and is designed to displace moisture and wet the surface, ensuring adhesion of the wrap.

End Use:

As a surface conditioner for aboveground and belowground metal surfaces prior to application of Trenton Wax-Tape #1 and #2 wraps.

Application Procedures:

Wire brush and wipe the surface clean and as dry as possible. Apply the Wax-Tape Primer by hand, rubbing and pressing the primer firmly onto the surface, especially if the surface is wet, cold or rusty, to displace any moisture and ensure adhesion to the surface. Trenton Wax-Tape wraps may be applied immediately.

Packaging:

1-gallon (3.8-liter) cans (4 gallons/case, 32 lb (14.4 kg)/case)

Specifications:

Color:	Brown	White*
Pour point:	100 - 110°F (38 - 43°C)	110 - 120°F (43 - 49°C)
Flash point:	350°F (177°C)	350°F (177°C)
Coverage (approx.):	100 sq ft/gal (2.5 m ²)/L	100 sq ft/gal (2.5m ² /L)

^{*}White primer should be used with aluminum or white Wax-Tape #2 wrap.

WAX-TAPE® WRAPS

Wax-Tape® #1, #2 and HT-3000 Anticorrosion Wraps

Description:

Wax-Tape® #1, #2 and HT-3000 anticorrosion wraps are composed of microcrystalline waxes, plasticizers, corrosion inhibitors and other ingredients (no clay fillers) saturated into a nonwoven, nonstitch-bonded synthetic fabric. They contain no siliceous mineral fillers.

End Use:

Use on aboveground and belowground metal surfaces, pipe or fittings to prevent corrosion.

Application Procedures:

Wire brush and scrape the surface clean of dirt, loose coating and loose rust. Apply a thin film of primer. If the surface is wet, cold or rusty, rub and press on the primer to displace moisture and ensure adhesion. Then wrap the Wax-Tape wrap, using a 1" overlap. On straight pipe, apply slight tension to ensure contact with surface. On irregular surfaces, allow slack so the wrap can be molded into conformity. In either case, press and form the wrap so there are no air pockets or voids under the wrap. Press and smooth the lap seams to ensure they are sealed. The wrap does not require curing or drying time, so it can be backfilled immediately. For belowground pipes that are 10" or larger, apply a Trenton outerwrap. For aggressive soil conditions, a Trenton outerwrap, a rock shield, or select backfill should be considered. For aboveground applications of Wax-Tape HT-3000 wrap, Trenton MCO® Outerwrap is recommended.

Packaging:

Wax-Tape #1 and #2 wrap rolls are packed in cardboard cartons, approximately 35 lb (15.8 kg)/case.

2" x 9' (5 cm x 2.7 m) rolls (48 rolls/case) 4" x 9' (10 cm x 2.7 m) rolls (24 rolls/case) 6" x 9' (15 cm x 2.7 m) rolls (16 rolls/case) 6" x 18' (15 cm x 5.5 m) rolls (8 rolls/case) 9" x 18' (23 cm x 5.5 m) rolls (6 rolls/case) 12" x 18' (31 cm x 5.5 m) rolls (4 rolls/case)

Wax-Tape HT-3000 wrap rolls are packed in cardboard cartons, approximately 42 lb (19 kg)/case.

2" x 9' (5 cm x 2.8 m) rolls (48 rolls/case) 4" x 9' (10 cm x 2.8 m) rolls (24 rolls/case) 6" x 9' (15 cm x 2.8 m) rolls (16 rolls/case) 12" x 18' (31 cm x 5.5 m) rolls (4 rolls/case)

Special widths and lengths available for all Wax-Tape wraps.

Specifications:

	Wax-Tape #1	Wax-Tape #2
Color:	Brown	Brown, aluminum, white*
Thickness:	70 - 90 mil (1.8 - 2.3 mm)	70 - 90 mil (1.8 - 2.3 mm)
Dielectric strength:	236 V/mil (9.2 kV/mm)	170 V/mil (6.7 kV/mm)
Application temp.:	-50 - 120°F (-45- 49°C)	-50 - 140°F (-45 - 60°C)
Operating temp.:	-50 - 120°F (-45- 49°C)	-50 - 140°F (-45 - 60°C)
Saturant pour point	: 115 - 125°F (46- 52°C)	125 - 135°F (51.6 - 57.2°C)

*Also available in yellow, red, blue and green

Color: Brown Thickness (ASTM D1000): 100 mil (2.54 mm) Maximum substrate operating temp.: 230°F (110°C) Maximum substrate application temp.: 230°F (-1°C) Minimum substrate application temp.: 30°F (-1°C)

OUTERWRAPS

MC0[®] & MC0[®] 110 Outerwraps

Description:

MCO® outerwraps use a specialized blend of quick-curing resins impregnated into a fiberglass fabric. MCO 110 outerwrap is a newer, premium version that is stronger, cures quicker and has less odor. The MCO outerwraps provide soil stress and backfill protection for coatings that need additional mechanical strength. These outerwraps are designed as a "hard shell" over Wax-Tape® wraps and other coatings.

End Use:

MCO outerwraps are used aboveground or belowground as a protective wrap over Trenton's Wax-Tape wraps.

Application Procedures:

Pre-apply any of Trenton's wraps and then, with only enough tension to keep the slack out, spiral wrap MCO outerwrap with at least a 50% overlap (use 80% overlap for added strength in high stress areas, such as transition pipe in clay soils). Make sure MCO outerwrap is extended out past the new coating on both ends for better anchoring. At the end of the last roll, brush on end adhesive for MCO outerwrap to prevent possible unraveling before the outerwrap has cured.

Packaging:

Rolls are individually vacuum-packed in foil bags.

4" x 4' (10 cm x 1.2 m) roll (1.33 sq ft (0.12 m²)/roll)

 $4" \times 12' (10 \text{ cm } \times 3.7 \text{ m}) \text{ roll } (4 \text{ sq ft } (0.37 \text{ m}^2)/\text{roll})$

4" x 27' (10 cm x 8.2 m) roll (9 sq ft (0.84 m²)/roll)

6" x 27' (15 cm x 8.2 m) roll (13.5 sq ft (1.25 m²)/roll)

9" x 40' (23 cm x 12.2 m) roll (30 sq ft (2.78 m²)/roll)

NOTE: Alternative sizes may be available at an additional cost.

Specifications:

Color: Black

Average thickness: 30 mil (0.76 mm) (when cured)*

Application temperatures MCO: $-20^{\circ}-125^{\circ}F$ (-29° - 52°C)

MCO 110: -18° – 125° F (-28° – 52° C)

Operating temperatures MCO: $-30^{\circ}-250^{\circ}\text{F} (-35^{\circ}-121^{\circ}\text{C})$

MCO 110: -29°- 250°F (-34°- 121°C)

PVC Outerwrap

Description:

PVC outerwrap is a PVC film with synthetic rubber adhesive.

End Use

This is a cost-effective outerwrap for applications where there is limited potential for impact on cathodic protection systems.

Application Procedures:

Wrap PVC outerwrap over the Wax-Tape wrap, using tension to ensure conformability and tight adhesion. Overlaps should be a minimum of 1" or greater as specified. End laps should be a minimum of 55% of wrap width and extend past the Wax-Tape wrap on both ends for better anchoring.

Packaging:

Available in both 10-mil and 20-mil thicknesses.

2" x 100' (5 cm x 30.4 m) rolls (24 rolls/case)

4" x 100' (10 cm x 30.4 m) rolls (12 rolls/case)

6" x 100' (15 cm x 30.4 m) rolls (8 rolls/case)

Specifications:	US Std.	Metric
Thickness:	10 mil	0.25 mm
Adhesion to steel:	20 oz/in	232 g/cm
Tensile strength:	25 lbs/in	225 N/50 mm
Elongation:	200%	200%
Dielectric strength:	1000 V/mil	39.4 kV/mm
Maximum operational temperature:	176°F	80°C

Poly-Ply[™] **Outerwrap**

Description:

Poly-Ply™ outerwrap consists of three membranes of .5-mil clear, polyvinylidene chloride high-cling plastic, wound together as a single sheet. It provides a mechanical and electrical barrier while remaining flexible enough to conform to irregularly shaped surfaces. It is inert, will not deteriorate, and is resistant to chemicals and bacteria commonly found in soil.

End Use:

Use as a wrap over Wax-Tape #1 wrap on straight pipe and irregular metal surfaces, such as tees and couplings.

Application Procedures:

Pre-apply any of Trenton's wraps and then, with only enough tension to keep the slack out, spiral wrap Poly-Ply outerwrap with at least a 50% overlap. Make sure Poly-Ply outerwrap is extended out past the new, underlying coating on both ends for better anchoring.

Packaging:

Rolls are packaged in cardboard cartons, 50 sq yd (41.8 m²) /carton.

4" x 50' (10 cm x 15.2 m) rolls (27 rolls/carton) 6" x 50' (15 cm x 15.2 m) rolls (18 rolls/carton) 9" x 50' (23 cm x 15.2 m) rolls (12 rolls/carton) 12" x 50' (31 cm x 15.2 m) rolls (9 rolls/carton)

NOTE: 18" & 36" (46 cm & 91 cm) widths available by special order.

Specifications:

Color: Clear

Thickness: 1.5 mils (.04 mm)

Dielectric strength: 2000 V/mil (78.7 kV/mm)

Water absorption: Negligible

Guard-Wrap[™] **Outerwrap**

Description:

Guard-Wrap™ outerwrap consists of a spunbonded polyester mat saturated with microcrystalline wax that is laminated to a polyester film which is coated with microcrystalline wax. Its conformability makes it effective for wrapping fittings and it also works well on straight pipe.

End Use:

Guard-Wrap outerwrap can be used as a protective wrapper over Wax-Tape #1 wrap. It offers mechanical protection from backfill and soil stress, provides an additional moisture barrier and increases dielectric strength.

Application Procedures:

Pre-apply the Trenton primer and then wrap Guard-Wrap outerwrap over the Wax-Tape #1 wrap, allowing for at least a 1" overlap. It is preferable to apply the dull side against the pipe with the smoother, film side against the soil. On straight pipe, Guard-Wrap outerwrap is applied with some tension. On irregular surfaces, slack is allowed in the Guard-Wrap outerwrap so it can be formed and molded to the contours of the surface.

Packaging:

Rolls are packed in cardboard cartons, 50 sq yd (41.8 m²)/carton.

6" x 150' (15. cm x 45.7 m) rolls (6 rolls/carton) 9" x 150' (23 cm x 45.7 m) rolls (4 rolls/carton) 12" x 150' (31 cm x 45.7 m) rolls (3 rolls/carton) 18" x 150' (46 cm x 45.7 m) rolls (2 rolls/carton)

Specifications:

Color: Brown

Polyester film thickness: .5 mil (0.013 mm)

Total thickness: 10-14 mils (.25 - .36 mm) Dielectric strength: 300 V/mil (11.8 kV/mm) Wax melt point: $160^{\circ}-180^{\circ}\text{F}$ (71 $^{\circ}-82^{\circ}\text{C}$)

^{*} Thickness depends on amount of overlap.

