

# INSTALLATION GUIDELINE -SARAN VAPOR RETARDER FILM AND SARAN VAPOR RETARDER TAPE ITW INSULATION SYSTEMS

## *SARAN FILM AND SARAN TAPE APPLIED AS A VAPOR RETARDER ON MECHANICAL INSULATION SYSTEMS*

### 1 SCOPE

- 1.1 This guideline covers the installation of Saran\* Vapor Retarder Film and Saran Tape as a vapor retarder on mechanical insulation systems operating with service temperatures below ambient. Guidelines are provided for both factory and field applied Saran Film and Saran Tape in indoor, outdoor and underground applications.
- 1.2 Product data sheets and other ITW literature are referenced throughout this guideline. Visit [www.itwinsulation.com](http://www.itwinsulation.com) for the latest version of these documents.
- 1.3 The information contained in this guideline and referenced ITW documents are current as of Dec 2005. This guideline is subject to revision without notice. Contact ITW Insulation Systems Customer Information Group at 1-800-231-1024 or your local ITW Representative for the most recent version of this guideline or other ITW referenced literature.
- 1.4 Due to the variations in service conditions and use, this guideline may not be pertinent for every application. A design or specifying engineer can create specifications tailored to particular applications or owner's needs. Such a design or specification engineering service may be more familiar with local conditions, budgets, environment, and desired service life of the system allowing them to generate a precise specification.
- 1.5 It is the intent of this document to provide guidelines for the installation of Saran Film and Saran Tape manufactured by ITW Insulation Systems. This guideline may not be suitable and shall not be used for the purpose of installing other manufacturer's vapor retarder products. While supplemental insulation system products may be referenced in this guideline, ITW recommends consulting the manufacturers of such products for proper installation and handling.
- 1.6 **This guideline is offered as a guide for the purpose described herein. No warranty of procedures, either expressed or implied is intended. All other express or implied warranties of merchantability or fitness for a particular purpose are disclaimed.**

### 2 GENERAL

- 2.1 All mechanical insulation shall be free of foreign substances and free of surface moisture or frost prior to the application of Saran Film.
- 2.2 All Saran Film and Saran Tape shall be delivered to project site in original, unbroken factory packaging labeled with product designation. Shipment of Saran Film and Saran Tape from the manufacturer to the installation location shall be in weather-tight transportation. Saran Film and Saran Tape delivered to the job-site shall be stored so as to protect the materials from moisture and weather during storage and installation. Saran Film and Saran Tape shall be protected from long exposure to sunlight to avoid UV exposure from the sun. After installation, Saran Film and Tape can be left exposed for a maximum of two weeks before being covered with protective jacketing.

### **3 MATERIALS OF CONSTRUCTION**

#### **3.1 VAPOR RETARDER**

##### **3.1.1 Saran Vapor Retarder Film**

- 3.1.1.1 Saran 560 Film – 6 mils thick, 0.010 permeance, available in rolls 35.5” wide by 250 ft long.
- 3.1.1.2 Saran 540 Film – 4 mils thick, 0.02 permeance, available in rolls 35.5” wide by 375 ft long.

##### **3.1.2 Saran Vapor Retarder Tape**

- 3.1.2.1 Saran 560 Tape – Base film is 6 mils thick, 0.010 permeance, available in rolls 150’ long by 2” and 3” wide.
- 3.1.2.2 Saran 520 Tape – Base film is 2 mils thick, 0.03 permeance, available in rolls 150’ long by 1”, 2”, or 3” wide.

##### **3.1.3 Material Specification For Saran Film and Saran Tape**

- 3.1.3.1 Vapor retarder shall be Saran 540 Vapor Retarder Film for service temperatures above 32°F and Saran 540 or 560 Film in services at and below 32°F or where a permeance of 0.02 perm or better is required. Refer to ASTM standards ASTM C-755, ASTM C921 and ASTM C-1136 for information on selection and specification of vapor retarders. Refer to technical data sheets and literature on Saran Film and Saran Tape for additional product information.
- 3.1.3.2 Elbows and fittings shall be wrapped with Saran 520 Vapor Retarder Tape. When the temperature is  $\leq 32^{\circ}\text{F}$  or when a permeance of 0.02 perms or better is required, elbows and fittings should be wrapped with 2 layers of Saran 520 tape. When operating temperature is  $> 32^{\circ}\text{F}$ , elbows and fittings shall be wrapped with a single layer of Saran 520 Tape. When the nominal pipe size is 6” or less, use 1” wide Saran 520 tape. When the nominal pipe size is between 6” and 12”, use 2” wide Saran 520 tape. When the nominal pipe size is greater than 12”, use 3” wide Saran 520 tape.
- 3.1.3.3 When operating temperature is  $\leq 32^{\circ}\text{F}$  or when a permeance of 0.02 perms or better is required, butt joints shall be wrapped with either two layers of Saran 520 Vapor Retarder Tape or a single layer of Saran 560 Tape. When operating temperature is  $> 32^{\circ}\text{F}$ , butt joints shall be wrapped with a single layer of Saran 520 Tape.
- 3.1.3.4 Vapor Retarder shall have a maximum permeance of 0.020 perm for applications at or below 32°F and a maximum permeance of 0.030 perm for applications above 32°F.
- 3.1.3.5 Vapor retarder may be factory or field applied to the outer surface of pipe insulation.
- 3.1.3.6 When outer protective jacketing is used on tanks, vessels, and equipment, use Saran 540 or 560 Vapor Retarder Film as the vapor retarder.
- 3.1.3.7 When not using outer protective jacketing on tanks, vessels, and equipment, use Saran 560 Film as the vapor retarder. See section 3.4.1.1.

#### **3.2 ADHESIVES TO BE USED WITH SARAN FILM**

- 3.2.1 The following adhesives and tapes have been found to be compatible with Saran Film. Before using any alternative adhesives or tapes test their compatibility and performance in conjunction with Saran Film. The peel strength of the SSL tape with Saran vapor retarder film is recommended to be above 3 lb per FP 062 for 1½” or greater width.

- 3.2.2 **Self-Sealing Lap (SSL) tape** – for use on longitudinal joints in Saran Film. Recommended SSL tapes used for this application are:

- 3.2.2.1 Venture SSL 1124
- 3.2.2.2 Venture SSL 3693 FLE
- 3.2.2.3 Venture SSL 1163
- 3.2.2.4 Venture SSL 514CW

**3.2.3 Liquid adhesives used to attach Trymer with Saran** – may be used to seal any overlapping joints in Saran Film with Trymer insulation. Liquid adhesives shall be solvent-based or water based adhesive types. Consult adhesive manufacturer for most updated grades and literature for instructions on handling adhesives including required cure time prior to bonding surfaces to insure good adhesion. Potential liquid adhesives for this application are:

- 3.2.3.1 Fosters 81-05 adhesive (solvent based)
- 3.2.3.2 Childers CP-88 adhesive (solvent based)
- 3.2.3.3 Foster 85-50 adhesive (water based)
- 3.2.3.4 Childers CP 56 adhesive (water based)
- 3.2.3.5 Foster 85-60 adhesive (water based)

**3.2.4 Liquid adhesives used to attach Styrofoam with Saran** - may be used to attach the Saran Film to the outer surface of the Styrofoam insulation for factory applied Saran Film. Solvent based adhesives are not suitable for Styrofoam since most of the adhesives may react with Styrofoam. Consult adhesive manufacturer's literature for instructions on handling adhesives including required operating temperatures. See section 4.1.1.1 for additional information. Potential adhesives for use in this application include:

- 3.2.4.1 Foster 85-50 adhesive (water based)
- 3.2.4.2 Childers CP 56 adhesive (water based)
- 3.2.4.3 Foster 85-60 adhesive (water based)

### 3.3 JOINT SEALANTS AND MASTICS

- 3.3.1 Any type of joint sealants and mastics including solvent based may be used in contact with Saran Film. Note that solvent-based products can damage STYROFOAM® Brand Pipe Billet Insulation. Consult your ITW representative before placing any solvent-based product in contact with STYROFOAM Brand Insulation.
- 3.3.2 Mastics may be used in conjunction with Saran Film.

### 3.4 PROTECTIVE JACKETING MATERIALS

#### 3.4.1 Indoor Jacketing

- 3.4.1.1 In applications where no mechanical abuse is expected and aesthetics are non-critical, Saran Film and Saran Tape may be used without the addition of an outer protective jacket.
- 3.4.1.2 In applications outside of those referred to in 3.4.1.1, jacketing shall be PVC material. Consult PVC jacketing manufacturer for recommended thickness. Jacketing shall be tough and capable of enduring frequent wash-downs with hot water or cleaning agents. All joints of PVC jacket shall be solvent welded to prevent moisture infiltration into the insulation system.
- 3.4.1.3 In applications outside of those referred to in 3.4.1.1, preformed PVC covers at the same thickness as on straight pipe sections shall be used on all fittings, tees, elbows, valves, caps, etc.

#### 3.4.2 Outdoor jacketing

- 3.4.2.1 Saran Film and Saran Tape shall not be used as the outer jacketing in outdoor applications.
- 3.4.2.2 Jacketing shall be aluminum metal cladding. Jacketing shall be aluminum alloys 3003, 1100 or 3105 meeting ASTM B-209 with H-14 temper, and a minimum 2 ½ mil thickness polysurlyn® moisture barrier on the inner side. Use white painted aluminum jacketing on all outdoor applications operating at 32°F and below. Consult jacketing manufacturer for appropriate jacketing recommendations.
- 3.4.2.3 Aluminum jacketing for fittings, tees, elbows, valves, caps, etc. shall be sectional, factory contoured, or field-fabricated to fit closely around insulation.
- 3.4.2.4 Banding for jacketing shall be 0.02" thick by 1/2" wide stainless steel.

\*surlyn is a registered trademark of DuPont.

### 3.4.3 Underground Jacketing

- 3.4.3.1 Underground jacketing shall be Saran 560 Film manufactured by The Dow Chemical Company. Refer to Figure 1 in Appendix A for details on trench design.

## 4 APPLICATION

### 4.1 PIPING - GENERAL

#### 4.1.1 Factory Applied Saran Film

- 4.1.1.1 Factory application of Saran Film to STYROFOAM Brand Insulation or TRYMER\* Rigid Polyisocyanurate Insulation must be performed by a ITW Approved Fabricator. All Saran Vapor Retarder Films can be factory applied to the insulation using hot-melt (see section 3.2.4), liquid, or spray grade adhesives. When using hot-melt, temperature of Saran Film at point of adhesive application should be at or below 210°F to prevent the Saran Film from exhibiting any shrink. Apply hot-melt adhesive in a thin coating avoiding thick “globs” that may cause an uneven appearance on the outer film surface or cause the Saran Film to shrink. Since the Saran 540 Film is thinner, it is more susceptible to shrinkage induced by hot-melt adhesive. Care should be taken to insure that the hot-melt adhesive is applied in a thin even coating to avoid a wrinkled surface on the factory applied Saran 540 Film.
- 4.1.1.2 Lap seal of the Saran Vapor Retarder Film to be secured with SSL tape or liquid adhesives recommended in sections 3.2.1 and 3.2.3. Refer to Figure 3 in Appendix A for more detail. If using a liquid adhesive refer to section 4.1.2.6 for installation guidelines.
- 4.1.1.3 Butt joints in vapor retarder film shall be sealed using 3" wide Saran Vapor Retarder Tape. Tape shall be wrapped around the butt joint a minimum of 1-¼ circumferences (1¼ wraps). When operating temperature is ≤ 32°F or when a permeance of 0.02 perms or better is required, butt joints shall be wrapped with either two layers of Saran 520 Vapor Retarder Tape or a single layer of Saran 560 Tape. When operating temperature is > 32°F, butt Joints shall be wrapped with a single layer of Saran 520 Tape. Refer to Figure 2 in Appendix A for installation details.
- 4.1.1.4 Elbows and fittings shall be wrapped with 1", 2" or 3" wide Saran 520 Vapor Retarder Tape. Fitting shall be wrapped to provide a tight covering. Fitting shall be wrapped in a spiral configuration. Where permeance of 0.02 perms or better is specified, Saran 520 Tape shall be spiral wrapped with a 50% overlap to provide a double layer of tape upon completion of wrapping. Where a permeance of 0.03 perm is acceptable, use minimal overlap during the spiral wrapping of the Saran 520 Tape. If necessary mold the finished wrap by hand for proper fit of the PVC jacket. When the nominal pipe size is 6" or less, use 1" wide Saran 520 tape. When the nominal pipe size is between 6" and 12", use 2" wide Saran 520 tape. When the nominal pipe size is greater than 12", use 3" wide Saran 520 tape.
- 4.1.1.5 Do not attempt to shrink-wrap Saran Film that is factory applied to pipe insulation sections as this may cause the Saran Film to separate from the adhesive and/or insulation.
- 4.1.1.6 Mastic/Fab/Mastic (MFM) applications used at fittings and elbows may be used in conjunction with Saran Film applied on straight sections. See manufacturer for MFM installation instructions.
- 4.1.1.7 Holes or tears in the vapor retarder may be repaired by patching the hole or tear and wrapped a minimum of 1¼ circumferences (1¼ wraps) to avoid damage to tape edges from mechanical wear.
- 4.1.1.8 For application with TRYMER on chilled water systems where a protective jacketing is not used, the following is recommended: for pipe diameters 4" and greater wrap at least a 1" wide or greater Saran 520 tape around the outside of the Saran Vapor retarder on 18" centers. The circumferential overlap of this tape should be 25% (1¼ Wraps). See Figure 5 for details. When other vapor retarders are used, 1" wide or greater Saran 520 tape or ¾" wide or greater filament tape should be used to wrap around the outside of the Vapor retarder on 12" centers. See Figure 6 for details.

#### 4.1.2 Field Applied Saran Film

- 4.1.2.1 For maximum film flexibility, installation should occur at temperatures above 24°F (-4°C).
- 4.1.2.2 Apply three separate wraps of filament tape per section to secure pipe insulation to pipe prior to installation of Saran Film. Refer to Figure 4 in Appendix A.

- 4.1.2.3 Saran Film can be pre-sized and shipped to the job-site cut in sheets 35 ½" wide by the circumference of the pipe (plus 2" overlap) and wrapped around the individual pipe insulation sections with one end overlapping the previously installed sheet. These pre-sized pieces of Saran Film can be fabricated with SSL tape for a lap joint along one side. Install the pre-sized piece with an approximate overlap at the butt joint of 2" over the previous section. Adhere the SSL lap seal and then apply 1-¼ circumferences of the appropriate Saran Vapor Retarder Tape around the overlapped butt joint. Refer to Section 4.1.1.3.
- 4.1.2.4 Saran Film can be spiral wrapped around a length of pipe insulation in one continuous piece. Apply adhesive or Saran 520 Tape at overlapped spiral edge. When electing to use adhesives refer to manufacturer's instructions for application of contact adhesives along this spiral edge to insure a permanent bond. Use 1", 2" or 3" wide Saran 520 Vapor Retarder Tape product to wrap around joints and fittings. This spiral technique is a preferred installation method when wrapping larger diameter pipe where individual pre-sized pieces of Saran Film would be impractical.
- 4.1.2.5 Saran Film can be wrapped in cigarette fashion along the length of roll for insulation systems with an outer circumference of 33-1/2" or less. The 33 ½" inch circumference limit allows for the 2" overlap seal. Using the length of the roll allows for longer sections of Saran Film to be installed at one time. Use liquid adhesive on the lap seal. Visually inspect the lap seal for any fishmouthing and use Saran 520 Vapor Retarder Tape along the lap seal to help secure joint.
- 4.1.2.6 Consult manufacturer's guidelines for proper use of liquid contact adhesives. Recommended cure times must be followed for contact adhesive to properly set prior to joining of the two surfaces.
- 4.1.2.7 Entire installation of Saran Film may be heat shrunk if a tighter fit around insulation is desired.
- 4.1.2.8 Holes or tears in the vapor retarder may be repaired by use of Saran Vapor Retarder Tape placed over the hole or tear and wrapped a minimum of 1-¼ circumferences to avoid damage to tape edges from mechanical wear.
- 4.1.2.9 Mastic/Fab/Mastic applications may be used at fittings and elbows in conjunction with Saran Film applied on straight sections. This technique is used in lieu of the 1", 2" and 3" wide Saran 520 Tape at elbows and fittings. See manufacturer for MFM installation instructions.

## 4.2 UNDERGROUND PIPING

- 4.2.1 Saran 560 Film shall be used in underground applications.
- 4.2.2 Saran Film to be field applied in a spiral wrap or cigarette style to allow staggering of insulation sections. Refer to sections 4.1.2.4 and 4.1.2.5 for installation details. If using a cigarette style wrap, the lap seal shall be in a 3 or 9 o'clock position with the lap facing down to minimize moisture infiltration.
- 4.2.3 Saran Film should be applied prior to pipe sections being placed in trench. If pipe is to be installed prior to application of Saran Film, a void space below the pipe allowing the Saran Film to be wrapped under the pipe will be necessary.
- 4.2.4 Refer to Figure 1 in Appendix A for recommended trench detail in underground applications.

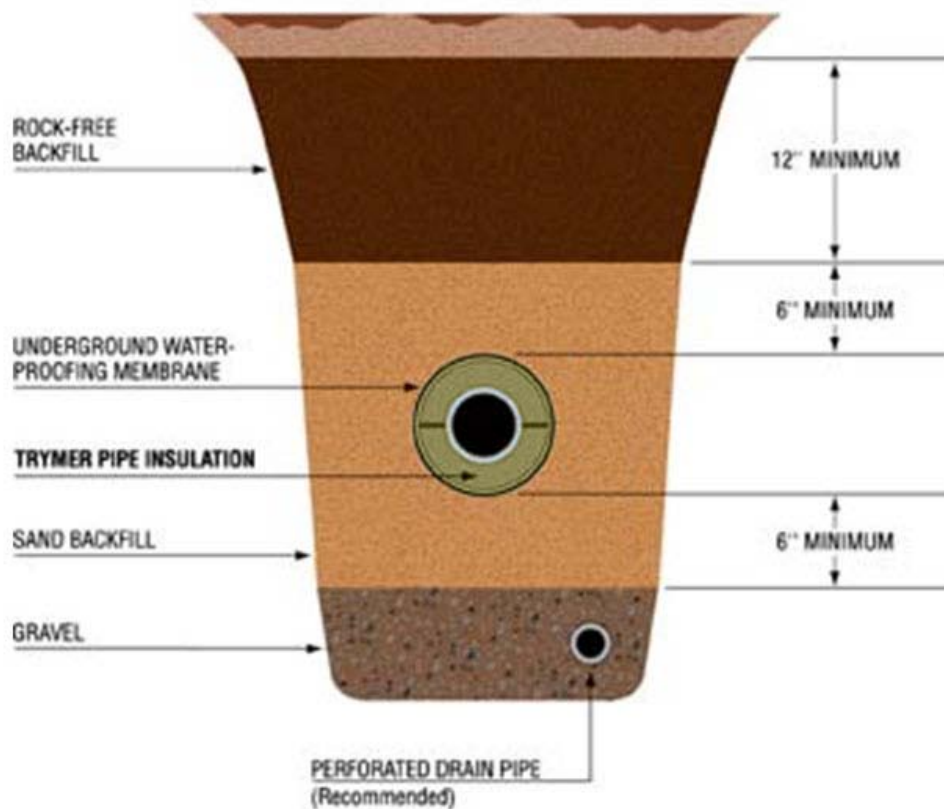
## 4.3 TANK, VESSEL, AND EQUIPMENT

- 4.3.1 Field apply Saran 540 or 560 Vapor Retarder Film. See sections 3.1.3 and 3.4. Tightly wrap the vessel or equipment insulation circumferentially with the Saran Film. Overlap the seams by a minimum of 2 inches. Seal the overlapped seams with Saran 560 Vapor Retarder Tape or the solvent adhesives referenced in section 3.2.3. On vertical vessels, apply the Saran 540 or 560 Film starting with the bottom course and working upwards. Each course should overlap on top of the one below it thus providing a joint that will naturally shed water. Refer to section 4.1.2 for field application techniques.
- 4.3.2 The vapor retarder on curved head sections shall be mastic/fab/mastic or approved alternate. Flat head sections can be covered with Saran 540 or 560 Film. Lap joints shall be sealed with Saran 560 Vapor Retarder Tape.
- 4.3.3 Indoor tanks and equipment shall be covered with PVC jacketing unless conditions allow for exposed Saran Film and Saran Tape. Refer to section 3.4.1.1. Outdoor tanks and equipment shall be covered with aluminum jacketing. Consult manufacturer's recommendations for jacketing thickness. See section 3.4 for additional information.
- 4.3.4 Caulk all joints, openings around flanges, instrument leg openings, support steel and such.

**5 APPENDIX A: DETAILS**

The following details are referenced in the text of this guideline by their Figure numbers. The diagrams included in this section are representative of details used within the industry. However, they are not intended to display the only accepted method of installation but to serve more as an example of commonly used and acceptable practices.

**UNDERGROUND TRENCH INSULATION DETAIL**

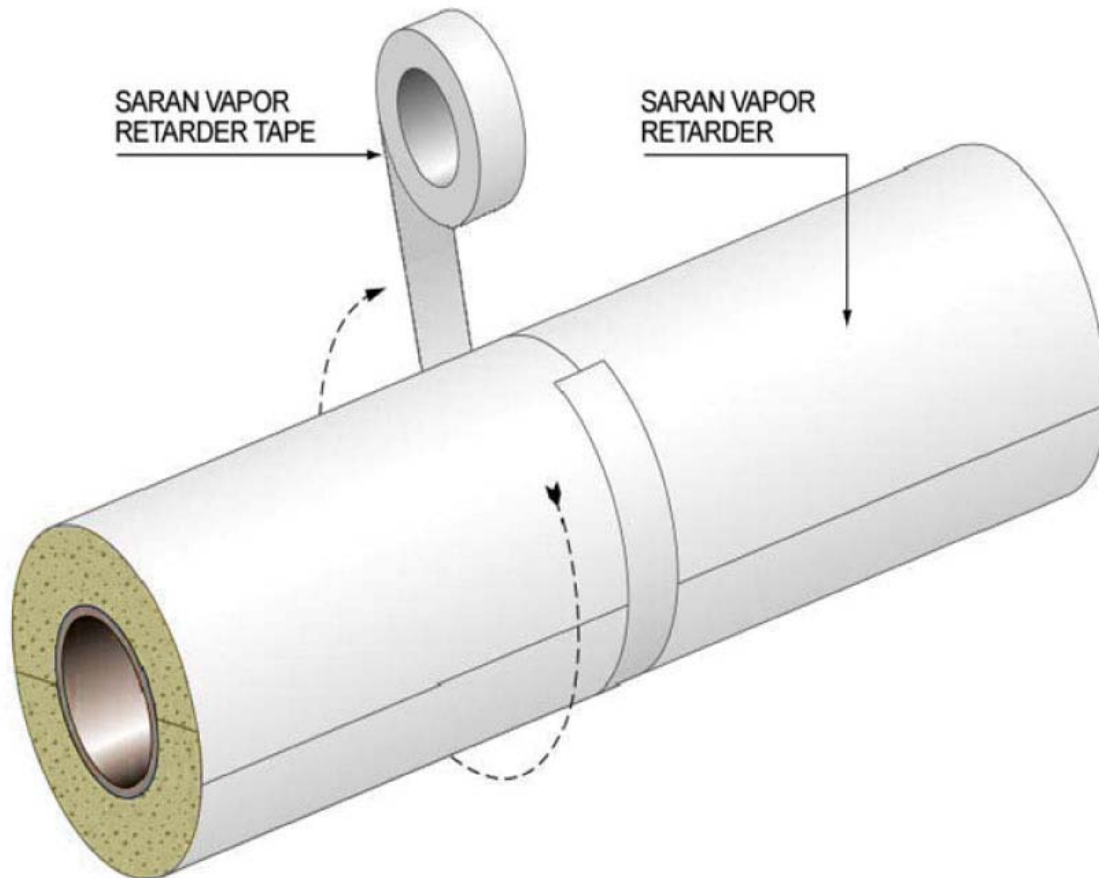


**Figure 1**

**Detail Notes:**

- Insulation shall be used in conjunction with a vapor retarder. Protective jacketing materials (PVC and aluminum) are not acceptable vapor retarders. Refer to section 3.4.3 of this guideline for recommended jacketing.
- Fill around the pipe shall be sand without contaminants that may puncture the vapor retarder.
- Drain tile in trench bottom is recommended to reduce time the insulation system will be immersed in groundwater.

## FACTORY APPLIED SARAN FILM AND SARAN TAPE

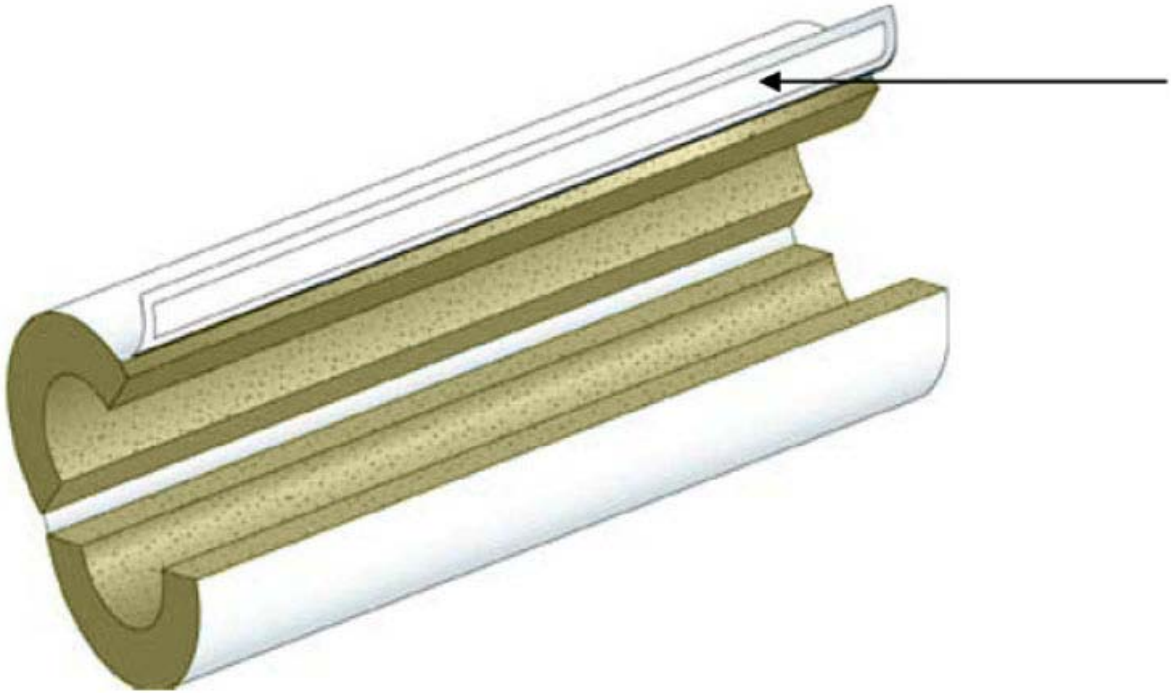


**Figure 2**

### Detail Notes:

- Lap seal on Saran Film to be SSL Tape or liquid adhesive.
- When operating temperature is  $\leq 32^{\circ}\text{F}$  or when a permeance of 0.02 perms or better is required, butt joints shall be wrapped with either two layers of Saran 520 Vapor Retarder Tape or a single layer of Saran 560 Tape. When operating temperature is  $> 32^{\circ}\text{F}$ , butt Joints shall be wrapped with a single layer of Saran 520 Tape. When the nominal pipe size is 6" or less, use 1" wide Saran 520 tape. When the nominal pipe size is between 6" and 12", use 2" wide Saran 520 tape. When the nominal pipe size is greater than 12", use 3" wide Saran 520 tape.
- Saran Tape used at butt joints shall be 3 inches wide.
- Wrap Saran Vapor Retarder Tape around butt joint a minimum of 1-1/4 circumferences.
- For application with TRYMER, when operating temperature is above  $35^{\circ}\text{F}$  but below ambient the following is recommended: For pipe diameters 4" and greater wrap at least a 1" wide Saran 520 tape around the outside of the Saran Vapor retarder on 18" centers. The circumferential overlap of this tape should be 25% (1-1/4 Wraps).

## LAP SEAL ON SARAN VAPOR RETARDER FILM



**Figure 3**

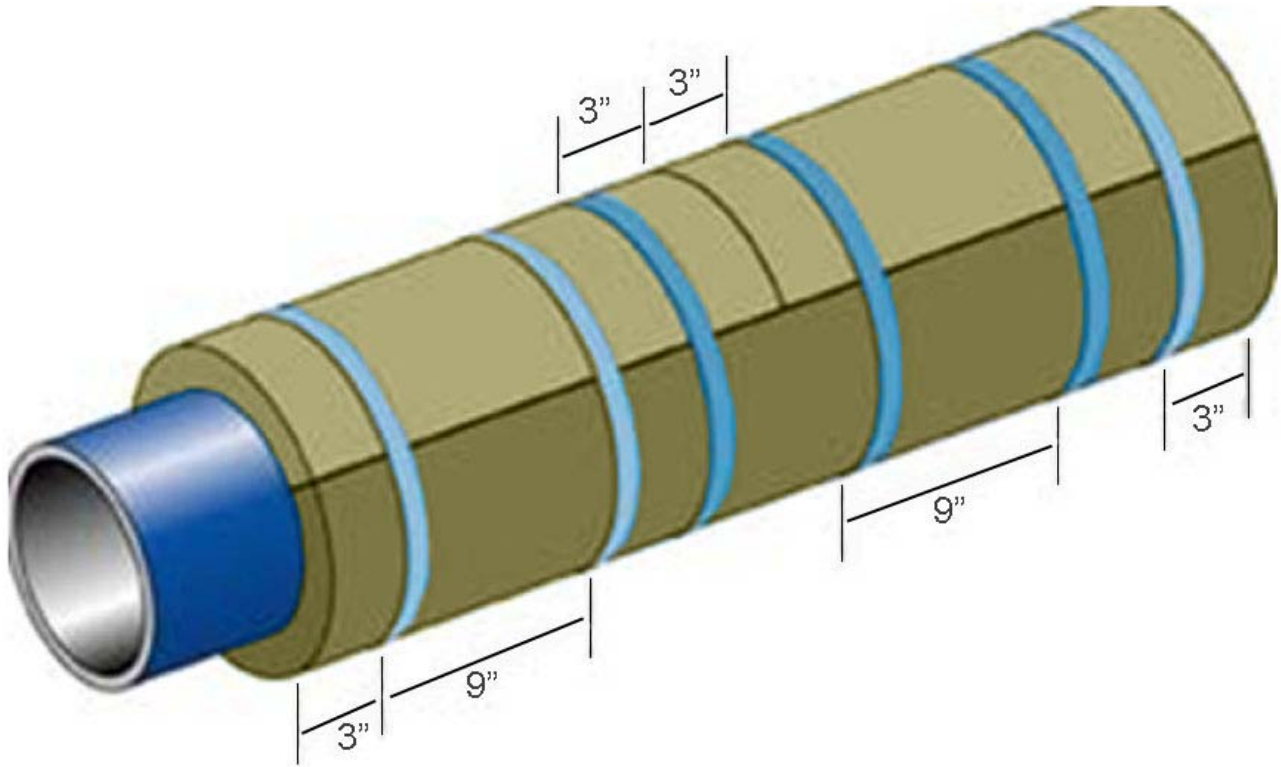
**Detail Notes:**

- Refer to sections 3.2 for approved manufacturers of SSL tapes and liquid adhesives, respectively.



## TAPING PATTERN

Figure 4



### Detail Notes:

- Use two wraps of tape to insure adequate bond.
- Use nylon or glass filament type tape,  $\frac{3}{4}$ " wide.

## TAPING PATTERN FOR CHILLED WATER APPLICATIONS



**Figure 5**

Figure 5 shows Saran as the vapor retarder. 1" or greater Saran 520 tape should be used to wrap outside of the Saran vapor retarder at 18" centers with 25% circumferential overlap (1 ¼ wraps).



**Figure 6**

Figure 6 shows other vapor retarder as the vapor retarder. 1" or greater Saran 520 tape or 3/4" or greater filament tape should be used to wrap outside of the vapor retarder at 12" centers with 25% circumferential overlap (1 1/4 wraps).