

1. SCOPE

- 1.1 This guideline covers the installation of Saranex® Vapor Retarder Film and Saranex Tape as a vapor retarder on mechanical insulation systems operating with service temperatures below ambient. Guidelines are provided for both factory and field applied Saranex Film and Saranex Tape in indoor, outdoor and underground applications.
- 1.2 Product data sheets and other JM literature are referenced throughout this guideline. Visit <http://www.jm.com> for the latest version of these documents.
- 1.3 The information contained in this guideline and referenced JM documents are current as of January 2, 2020. This guideline is subject to revision without notice. Contact the Johns Manville Customer Information Group at 1-800-231-1024 or your local JM representative for the most recent version of this guideline or other JM 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 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 more precise specification.
- 1.5 It is the intent of this document to provide guidelines for the installation of Saranex Film and Saranex Tape manufactured by Transcendia, Inc. 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, JM 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 This guideline covers the installation of Saranex Vapor Retarder Film and Saranex Tape as a vapor retarder on mechanical insulation systems operating with service temperatures below ambient. Guidelines are provided for both factory and field applied Saranex Film and Saranex Tape in indoor, outdoor and underground applications.
- 2.2 All Saranex Film and Saranex Tape shall be delivered to project site in original, unbroken factory packaging labeled with product designation. Shipment of Saranex Film and Saranex Tape from the manufacturer to the installation location shall be in weather-tight transportation. Saranex Film and Saranex Tape delivered to the job-site shall be stored so as to protect the materials from moisture and weather during storage and installation. Saranex Film and Saranex

Tape shall be protected from long exposure to sunlight to avoid UV exposure from the sun. After installation, Saranex 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 Saranex Vapor Retarder Film

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

3.1.2 Saranex Vapor Retarder Tape

- 3.1.2.1 Saranex 560 Tape – Base film is 6 mils thick, 0.010 permance, available in rolls 150' long by 2" and 3" wide.
- 3.1.2.2 Saranex 520 Tape – Base film is 2 mils thick, 0.03 permance, available in rolls 150' long by 1", 2", or 3" wide.

3.1.3 Material Specification for Saranex Film and Saranex Tape

- 3.1.3.1 Vapor retarder shall be Saranex 540 Vapor Retarder Film for service temperatures above 32°F and Saranex 540 or 560 Film in services at and below 32°F or where a permance of 0.02 perm or better is required. Refer to ASTM standards ASTM C-755, ASTM C-921 and ASTM C-1136 for information on selection and specification of vapor retarders. Refer to technical data sheets and literature on Saranex Film and Saranex Tape for additional product information.
- 3.1.3.2 Elbows and fittings shall be wrapped with Saranex 520 Vapor Retarder Tape. When the temperature is $\leq 32^{\circ}\text{F}$ or when a permance 0.02 perms or better is required, elbows and fittings should be wrapped with 2 layers of Saranex 520 tape. When operating temperature is $> 32^{\circ}\text{F}$, elbows and fittings shall be wrapped with a single layer of Saranex 520 Tape. When the nominal pipe size is 6" or less, use 1" wide Saranex 520 tape. When the nominal pipe size is between 6" and 12", use 2" wide Saranex 520 tape. When the nominal pipe size is greater than 12", use 3" wide Saranex 520 tape.
- 3.1.3.3 When operating temperature is $\leq 32^{\circ}\text{F}$ or when a permance of 0.02 perms or better is required, butt joints shall be wrapped with either two layers of Saranex 520 Vapor Retarder Tape or a single layer of Saranex 560 Tape. When operating temperature is $> 32^{\circ}\text{F}$, butt Joints shall be wrapped

- 3.1.3.4 Vapor Retarder shall have a maximum permeance of 0.02 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 Saranex 540 and 560 Vapor Retarder Film as the vapor retarder.
- 3.1.3.7 When not using outer protective jacketing on tanks, vessels, and equipment, use Saranex 560 Film as the vapor retarder. See section 3.4.1.1.

3.2 ADHESIVES TO BE USED WITH SARANEX FILM

3.2.1 The following adhesives and tapes have been found to be compatible with Saranex Film. Before using any alternative adhesives or tapes test their compatibility and performance in conjunction with Saranex Film. The peel strength of the SSL tape with Saranex vapor retarder film is recommended to be above 3 lb. per FP 062 for 1 ½" or greater width.

3.2.2 Self-Sealing Lap (SSL) tape - for use on longitudinal joints in Saranex 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® w/ Saranex – may be used to seal any overlapping joints in Saranex 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 Fosters 85-50 adhesive (water based)
- 3.2.3.4 Childers CP 56 adhesive (water based)
- 3.2.3.5 Fosters 85-60 adhesive (water based)

3.2.4 Liquid adhesives used to attach XPS with Saranex – may be used to attach the Saranex Film to the outer surface of the XPS insulation for factory applied Saranex Film. Solvent based adhesives are not suitable for XPS since most of the adhesives may react with XPS. 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 Fosters 85-50 adhesive (water based)
- 3.2.4.2 Childers CP 56 adhesive (water based)
- 3.2.4.3 Fosters 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 Saranex Film. Note that solvent based products can damage XPS Pipe Billet Insulation. Consult your JM representative before placing any solvent-based product in contact with XPS PIB Insulation.

3.3.2 Mastics may be used in conjunction with Saranex 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, Saranex Film and Saranex 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 Saranex Film and Saranex 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 Polyfilm 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.

4. APPLICATION

4.1 PIPING - GENERAL

4.1.1 Factory Applied Saranex Film

4.1.1.1 Factory application of Saranex Film to XPS PIB or TRYMER Rigid Polyisocyanurate Insulation must be performed by a JM Approved Fabricator. All Saranex 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 Saranex Film at point of adhesive application should be at or below 210°F to prevent the Saranex 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 Saranex Film to shrink. Since the Saranex 540 Film is thinner, it is more susceptible to shrinkage induced by hot-melt

adhesive. Care should be taken to ensure that the hot-melt adhesive is applied in a thin even coating to avoid a wrinkled surface on the factory applied Saranex 540 Film.

- 4.1.1.2 Lap seal of the Saranex 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 Saranex 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 Saranex 520 Vapor Retarder Tape or a single layer of Saranex 560 Tape. When operating temperature is > 32°F, butt Joints shall be wrapped with a single layer of Saranex 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 Saranex 520 Vapor Retarder Tape. Fittings shall be 0.02 perms or better is specified, Saranex 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 Saranex 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 Saranex 520 tape. When the nominal pipe size is between 6" and 12", use 2" wide Saranex 520 tape. When the nominal pipe size is greater than 12", use 3" wide Saranex 520 tape.
- 4.1.1.5 Do not attempt to shrink-wrap Saranex Film that is factory applied to pipe insulation sections as this may cause the Saranex 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 Saranex 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 1 ¼ circumferences (1 ¼ 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

Saranex 520 tape around the outside of the Saranex Vapor retarder on 18" centers. The circumferential overlap of this tape should be 25% (1 ¼ Wraps). See Figure 5 for details. When other vapor retarders are used, 1" wide or greater Saranex 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 Saranex 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 insulation to pipe prior to installation of Saranex Film. Refer to Figure 4 in Appendix A.
- 4.1.2.3 Saranex 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 Saranex 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 Saranex Vapor Retarder Tape around the overlapped butt joint. Refer to Section 4.1.1.3.
- 4.1.2.4 Saranex Film can be spiral wrapped around a length of pipe insulation in one continuous piece. Apply adhesive or Saranex 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 Saranex 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 Saranex Film would be impractical.
- 4.1.2.5 Saranex Film can be wrapped in cigarette fashion along the length of roll for insulation systems with an outer circumference of 33 ½" or less. The 33 ½" circumference limit allows for the 2" overlap seal. Using the length of the roll allows for longer sections of Saranex Film to be installed at one time. Use liquid adhesive on the lap seal. Visually inspect the lap seal for any fish mouthing and use Saranex 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 Saranex 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 Saranex 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 in lieu of the 1", 2" and 3" wide Saranex 520 Tape at elbows and fittings. See manufacturer for MFM installation instructions.

4.2 UNDERGROUND PIPING

- 4.2.1 Saranex 560 Film shall be used in underground applications.
- 4.2.2 Saranex 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 Saranex Film should be applied prior to pipe sections being placed in trench. If pipe is to be installed prior to application of Saranex Film, a void space below the pipe allowing the Saranex 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

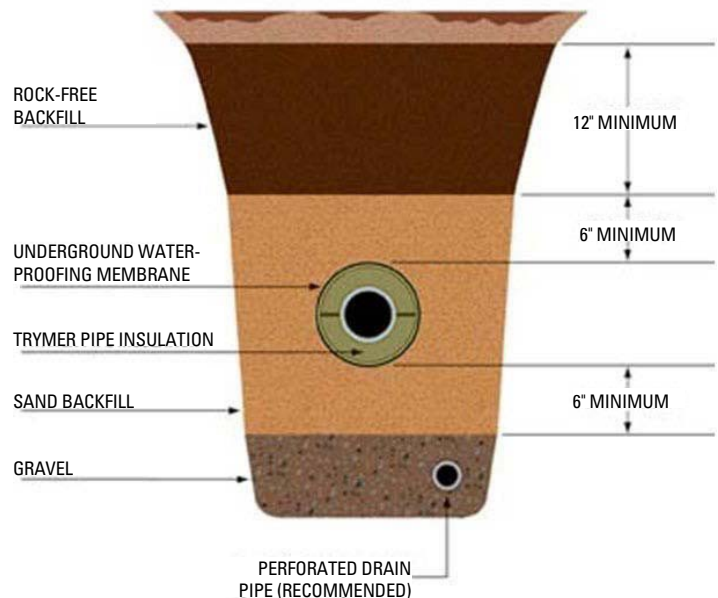
- 4.3.1 Field apply Saranex 540 or 560 Vapor Retarder Film. See sections 3.1.3 and 3.4. Tightly wrap the vessel or equipment circumferentially with the Saranex Film. Overlap the seams by a minimum of 2 inches. Seal the overlapped seams with Saranex 560 Vapor Retarder Tape or the solvent adhesives referenced in section 3.2.3. On vertical vessels, apply the Saranex 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 Saranex 540 or 560 Film. Lap joints shall be sealed with Saranex 560 Vapor Retarder Tape.
- 4.3.3 Indoor tanks and equipment shall be covered with PVC jacketing unless conditions allow for exposed Saranex Film and Saranex 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 APPENDICES

5.1 APPENDIX A: DETAILS

- 5.1.1 The following details are referenced in the text of this guideline by their Table or 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.

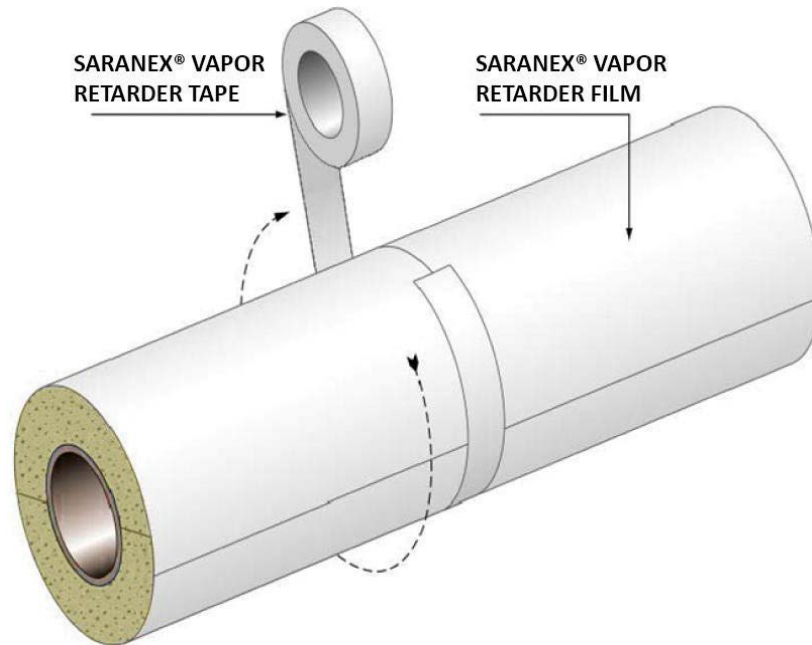
FIGURE 1: UNDERGROUND TRENCH INSULATION DETAIL



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.

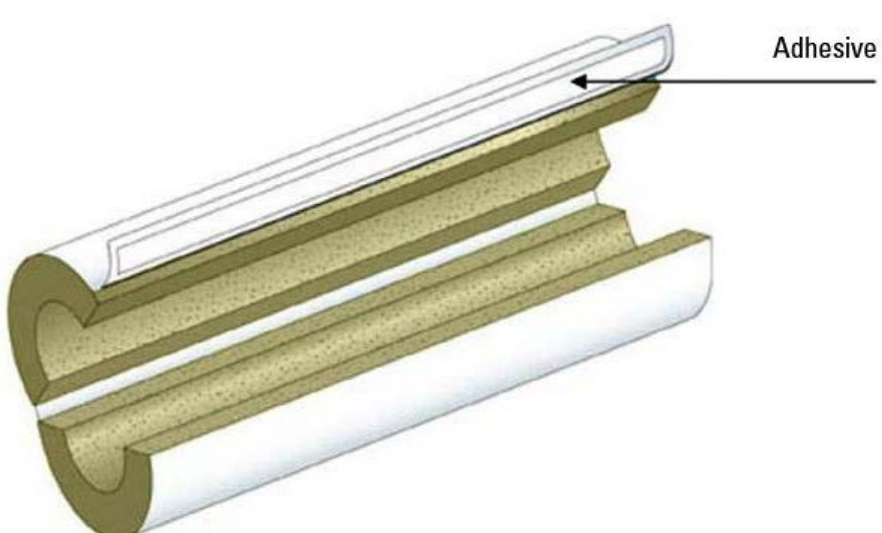
FIGURE 2: FACTORY-APPLIED SARANEX FILM & SARANEX TAPE



Detail Notes:

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

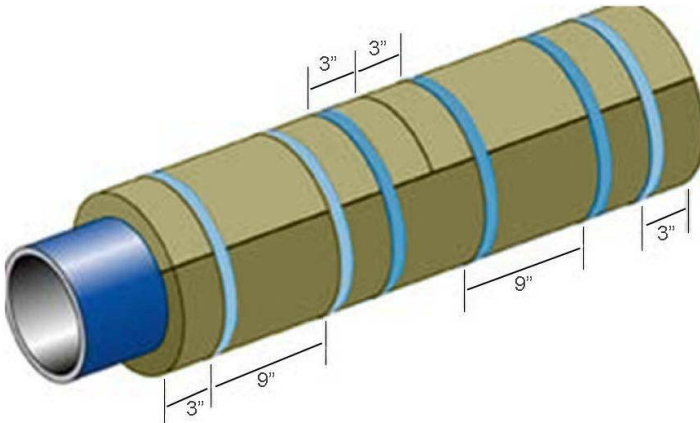
FIGURE 3: LAP SEAL ON SARANEX VAPOR RETARDER FILM



Detail Notes:

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

FIGURE 4: TAPING PATTERN



Detail Notes:

- Use two wraps of tape to insure adequate bond.
- Use nylon or glass filament type tape, 3/4" wide.

FIGURE 5: TAPING PATTERN FOR CHILLED WATER APPLICATIONS



Detail Notes:

- Figure 5 shows Saranex as the vapor retarder. 1" or greater Saranex 520 tape should be used to wrap outside of the Saranex vapor retarder at 18" centers with 25% circumferential overlap (1 1/4 wraps).

FIGURE 6: TAPING PATTERN FOR CHILLED WATER APPLICATIONS



Detail Notes:

- Figure 6 shows another vapor retarder as the vapor retarder. 1" or greater Saranex 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).