



HITHERM® INSULATION SPECIFICATION
HITHERM Technical Support

**SPECIFICATION FOR THE APPLICATION OF HITHERM PIR400 INSULATION TO ABOVE
GROUND HOT PIPING FROM +200°F to +300°F**

1. SCOPE

- 1.1. This guideline encompasses the installation of HiTHERM PIR400 rigid polyisocyanurate insulation on low pressure steam ranging from +200°F to +300°F.
- 1.2. Product Data sheets, specifications and other HiTHERM information are referenced in this guideline, please visit <http://www.hitherm.com> for current versions of these documents.
- 1.3. The procedure and information provided in this guideline is current as of January 2010. This document is subject to revision without notice. Contact HiTHERM at (205) 961-0009 or your local representative for up-to-date information.
- 1.4. Due to the variety of ambient and operating conditions, this guideline may not be applicable in every situation. Design or specifying engineers may have more detailed knowledge of the owner's needs and can tailor a more precise specification for each application.
- 1.5. This guideline is tailored for the installation of HiTHERM's PIR Series insulations and should not be used for installation of another manufacturer's products. Please consult the proper manufacturers for recommended installation and application procedures.

2. GENERAL

- 2.1. This guideline is offered as a reference for the purpose described herein and should be utilized at the discretion of the user. No warranty of procedures, either expressed or implied, is intended.
- 2.2. All piping and equipment to be insulated shall be cleaned of oil, grease, rust and foreign matter, and shall be dry and free of frost, prior to and during insulation application.
- 2.3. All insulation materials shall be delivered to the project site in unbroken factory packaging labeled with product designation and thickness and stored in a dry area protected from the weather before and during application.
- 2.4. All testing of the system shall be accomplished prior to application of insulation.
 - 2.4.1. Inspection of the application of insulation is the responsibility of the owner and/or his representative. HiTHERM® does not incur responsibility for workmanship.

3. MATERIALS

3.1. Insulation Materials

- 3.1.1. Insulation shall be HITHERM PIR400 closed cellular polyisocyanurate (PIR) insulation.
- 3.1.2. Insulation shall have a thermal conductivity of 0.175 BTU-in/hr-ft²-°F or better at 75° F.

3.2. Adhesives/Mastics

- 3.2.1. Solvent based adhesives, joint sealers and mastics may be used in contact with PIR400 insulation. Mastics shall remain flexible at the lowest expected ambient temperature.

3.3. Tape

- 3.3.1. Insulation shall be secured to the pipe with 3/4" wide fiber reinforced tape.

3.4. Mechanical Jacketing

3.4.1. Indoor Applications

- 3.4.1.1. For piping located in minimal mechanical abuse areas, the factory or field applied vapor retarder can be used at discretion of the design engineer.
- 3.4.1.2. If mechanical jacketing is required, it shall be polyvinylchloride (PVC). Consult manufacturer for recommended thickness.
- 3.4.1.3. Supply preformed and for fitting PVC covers for all fitting, valves, caps, tees, etc. at same thickness as straight piping.
- 3.4.1.4. **PVC shall not be considered a vapor retarder.**
- 3.4.1.5. **Do not use staples, screws or other fastening devices that will penetrate the mechanical and/or vapor barrier and cause instability in the system.**

3.4.2. Outdoor Applications

- 3.4.2.1. Mechanical jacketing outdoors shall be aluminum metal cladding. Jacketing shall be aluminum alloys 3003, 1100 or 3105 meeting ASTM B209 and contain polysurlyn* moisture barrier.
- 3.4.2.2. All aluminum for fittings, tees, caps, etc. shall be factory, field contoured or sectional to fit snugly around the insulation.
- 3.4.2.3. Metal Bands - options are:
 - 3.4.2.3.1. Stainless steel bands shall be 0.5" x 0.020" with matching seals for piping, vessels, or equipment with O.D.'s of 48" or less.
 - 3.4.2.3.2. For larger O.D.'s, use 0.75" x 0.020" stainless steel bands.
- 3.4.2.4. **Aluminum jacketing shall not be considered a vapor barrier.**
- 3.4.2.5. **Do not use staples, screws or other fastening devices that will penetrate the mechanical and/or vapor barrier and cause instability in the system.**

4. FABRICATION OF INSULATION

- 4.1. Insulation shall be fabricated in required shapes from bun stock in accordance with ASTM C-450 "Standard Practice for Prefabrication and Field Fabrication of Thermal Insulating Fitting Covers for NPS Piping, Vessel Lagging, and Dished Head Segments" and C-585 "Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)". Insulation shall be factory fabricated from bun stock.
- 4.2. Fittings, such as valves, valve stations, flanges, 90° and 45° elbows, and tees shall be a two piece fly-cut or routed as the preferred fabrication method. For diameters too large for fly cutting or routing, the pieces shall be fabricated in two halves with each half made up of mitered sections. Both methods shall be in accordance with ASTM C-450 and ASTM C-585.
- 4.3. Store the bun stock at normal shop (indoor) conditions for at least 24 hours before fabrication. This will allow the PIR400 bun stock to equilibrate to the shop conditions. For best fabrication quality, it is recommended that PIR400 buns be fabricated into pipe shells in conveyor direction (36" direction) to maximize flatness.

5. INSULATION THICKNESS

- 5.1. The insulation thickness shall be calculated based on the design criteria for the system being insulated. These calculations can be performed by HiTHERM® by request of the designer or owner. Consideration should be given to process control, energy conservation, personnel protection and other necessary criteria.

6. APPLICATION PROCEDURE

- 6.1. In the temperature range of +105°F to +400°F, the insulation may be applied in a single layer using half segments or curved sidewall segments when applicable.

*surlyn is a registered trademark of DuPont

- 6.2. The insulation shall be applied to piping with all joints dry and tightly fitted to eliminate voids. All broken or non-conforming insulation shall be refitted or replaced.
- 6.3. Insulation may be taped or banded in place taking care to ensure the insulation is not damaged during application. Banding or tape shall be installed on equal spacing and be a minimum of four inches (4") from the end of any insulation section. Tape shall be applied to overlap a minimum of 25% (1-1/4 turns)
- 6.4. Fittings shall be insulated in a manner similar to piping. Where the outer diameter of fitting shall be the same as the outer diameter of the piping. If the outer diameters do not match, a beveled reducer shall be applied.
- 6.5. Expansion joints constructed of loose fill glass fiber insulation shall be installed in the piping insulation system where necessary. The appropriate designer or engineer must specify the spacing of expansion joints separately for each system.
- 6.6. Jacketing Application
 - 6.6.1. Mechanical jacketing shall be fitted with tight, smooth joints and all laps positioned at three or nine o'clock for proper water shed. Securement of the jacketing shall be with matching bands, the spacing of jacket banding shall not be greater than 18" on center and there shall be no less than three bands per section.
 - 6.6.2. See section 3.4 for proper application and selection procedures.

7. INSPECTION

- 7.1. Inspect all insulation and accessory materials to be certain they are applied in conformance with the specification recommendations stated above. Joints should be tight, sealing and flashing should be thorough and watertight, and finished should be uniform and free of defects.

This specification has been prepared by HiTHERM using generally accepted and appropriate technical information, but it is not intended to be solely relied upon for specific design or technical applications. Having no control over the elements of design, installation, workmanship or site conditions, HiTHERM assumes that persons trained and qualified in the appropriate disciplines will make the actual design choices and installation. Therefore, HiTHERM disclaims all liability potentially arising from the use or misuse of this specification.