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December 1, 2023

**Part 1 – Scope**

**1.01** The specifications associated with **HiTherm North America, LLC’s PIR400 Rigid Polyisocyanurate Foam Insulation** for commercial & industrial insulating applications.

**1.02** For additional information not included below or on the following pages, such as Product Data sheets, SDS sheets, other specifications and information on **HiTherm North America, LLC**, this can be referenced at <https://www.hitherm.com/reference/>

**Part 2 – General**

**2.01** 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 products or procedures, either expressed or implied, is intended nor given.

**2.02** Insulation material shall be rigid polyisocyanurate insulation as manufactured by **HiTherm North America, LLC**. No substitute materials manufactured by others is permittable.

**2.03** 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.

**2.03** All testing of the system shall be accomplished prior to application of insulation.

**2.04** Inspection of the application of insulation is the responsibility of the owner and/or his

representative. **HiTherm North America, LLC** does not incur responsibility for workmanship.

**2.05 Fabrication of Insulation**

**A.** Insulation shall be fabricated in required shapes from **HiTherm PIR400** polyisocyanurate 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 polyisocyanurate bun stock produced by **HiTherm North America, LLC**.

**B.** Fittings, such as valves, valve stations, flanges, 45˚ and 90˚ 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 C450 and C585.

**C.** Bun stock shall be stored at normal shop (indoor) conditions for at least 24 hours before fabrication. This will allow the **HiTherm PIR400** bun stock to equilibrate
to the shop conditions. For best fabrication quality, it is recommended that **HiTherm PIR400** buns be fabricated into pipe shells in conveyor direction (36” direction)
to maximize flatness.

**2.06 Delivery of Fabricated Rigid Polyisocyanurate Insulation**

**A.** Bill of lading must accompany shipment and should be clearly legible with contents of shipment including number of boxes, total weight, manufacturer’s contact information as well as receiver’s contact information. If receiver’s information is different than the entity responsible for placing the order, this too must be noted on bill of lading as reference.

**B.** Products to be delivered sealed in the bun stock manufacturer’s (**HiTherm North America, LLC**) original packaging. Product packaging will be clearly marked as to the contents inside the packaging by; brand, model, weight and other relevant information used to identify materials enclosed. Upon arrival, receiver must inspect product & packaging to assure there is no damage. If damage is identified or shipment does not match the bill of lading, receiver must notify **HiTherm North America, LLC** immediately.

**2.07 Storage & Handling of Fabricated Rigid Polyisocyanurate Insulation**

**A.** Boxes of product should be moved carefully and not abused. Stacking boxes on top of each other should be avoided. Do not stack other type of product on top of the boxes of foam. Heavy weight on top of the boxes could damage the foam inside.

**B.** Product should be stored so it is not exposed to weather including moisture, direct sunlight, dust, dirt & debris or any other environmental elements that could ultimately affect the performance of the product once installed.

**C.** If product must be stored outside, it must be covered with a white water-proof tarp or plastic sheeting. Failure to do so could compromise the products intended performance.

**D.** When opening boxes, special care & attention must be observed so product is not damaged during unpacking. Ideally avoid sharp objects to open boxes. If a utility knife or equivalent is used to open packaging, use extra care not to cut and/or damage the product.

**2.08 References**

Rigid Polyisocyanurate Foam Insulation shall have been tested in accordance to satisfy the following standards:

 **A. American Society for Testing and Materials (ASTM):**

**1.** ASTM C450 – standard practice for fabrication of thermal insulating fitting covers for NPS piping, and vessel lagging

**2.** ASTM C518 – addresses thermal performance, specifically; thermal conductivity and thermal resistance.

**3.** ASTM C585 – standard practice for inner and outer diameters of thermal insulation for nominal sizes of pipe and tubing

**4.** ASTM D1621 ­– determines the compressive properties of rigid cellular materials, particularly expanded plastics.

**5.** ASTM D1622 – covers the density of a cellular plastic.

**6.** ASTM D2126 – assesses the effect of humidity and temperature on rigid cellular plastics through the use of a thermal and humid exposure test.

**7.** ASTM D2842 – addresses the determination of the water absorption of rigid cellular plastics by measuring the change in buoyant force resulting from immersion under a 5.1-cm (2-in.) head of water for the specified immersion period of 96 h.

**8.** ASTM D2856 – determines the percentage of open cells using an older model of an air comparison pycnometer.

**9.** ASTM E84 – the standard test method used to assess the surface burning characteristics of a material used for interior wall and ceiling finishes, with results measured by Flame Spread Index (SFI) and Smoke Developed Index (SDI).

**10.** ASTM E96 – water vapor transmission rate test method used to assess rate of water vapor movement through the specimen into the desiccant.

**2.09 Terms & Conditions of Sale**

**A.** Terms & Conditions of Sale are typically requested at the time an agreement is reached prior to a Purchase Order being issued. For copy of **HiTherm North America, LLC’s** Terms & Condition of Sale, contact your representative or visit:

<https://www.hitherm.com/terms-of-sale/>

**Part 3 - Product**

**3.01 Description:** Rigid Polyisocyanurate Foam Insulation intended for use in commercial and industrial applications, specifically for the insulating of piping systems & equipment. This rigid polyisocyanurate thermal insulation **shall be PIR400 as manufactured by HiTherm North America, LLC, Kyle, Texas.**

**3.02 Form:** Shall be manufactured in accordance with ASTM C-591, type IV "Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation". **HiTherm North America, LLC’s** **PIR400** insulation may be fabricated in half, curved sidewall
or segmented sections.

**3.03 Insulation Specifications:** High temperature polyisocyanurate foam insulation shall have an aged K factor of .175 at 180 days, a nominal density of 2.5, a closed cell content 87%, a compressive strength of 30 psi and a service temperature not exceeding 400ºF. Insulation must be capable of handling brief intermittent temperature spikes to 450°F.

Foam must conform with ASTM Standards D1621, D1622, D2126, D2842, D2856, C518-91, E96 and have a **Flame/Smoke rating per ASTM E84 not exceeding 40/80**. Written independent performance certification to be provided with submittals.

**3.04 Insulation Thickness:** The insulation thickness shall be calculated based on the design criteria for the system being insulated. These calculations can be performed by **HiTherm North America, LLC** by request of the designer or owner. Consideration should be given to process control, energy conservation, personnel protection and other necessary criteria.

**3.05 Application Procedure**

**A.** 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.

**B.** Insulation may be taped or banded in place ensuring 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% so 1 ¼ wraps.

**3.06 Inspection**: All joints shall be tight, sealing and flashing should be completed watertight and finish shall be uniformed and free of defects.

**3.07 Approved Vendors: HiTherm North America, LLC, Kyle, Texas**. All other manufacturers wishing to bid on this Rigid Polyisocyanurate Foam Insulation project must provide the engineer of record with certified test data from an independent testing agency that the rigid foam insulation can withstand the service temperature continuously and meet the specifications as described above within the information above. The manufacturer shall obtain written approval from the engineer 10 days prior to bid date.