



INSULATION SYSTEM FOR LNG APPLICATIONS

TRYMER[®] PIR, SARANEX[®] CX and Metal Jacketing



TRYMER® PIR and SARANEX® CX for LNG Applications

Time-Tested for Dependable Service

TRYMER® POLYISOCYANURATE INSULATION IS PRODUCED IN BUNSTOCK AND CAN BE FABRICATED INTO VARIOUS SHAPES AND SIZES FOR APPLICATION ON PIPE, VESSEL WALLS AND HEADS, TANKS, VALVES AND FITTINGS, AND OTHER EQUIPMENT.

Proven Performance

When planning new liquefied natural gas (LNG) facilities and expansions, consider the insulation system that has proven itself in countless demanding applications: TRYMER polyisocyanurate (PIR) insulation and SARANEX® Vapor Retarder Film and Tape.

Minimizing heat gain is particularly important in cryogenic applications, like LNG, so an insulation material that is both thermally efficient and moisture resistant is critical. TRYMER PIR insulation products feature excellent (low) thermal conductivity (k-factor), especially at cryogenic temperatures. The insulation material must also be able to stand up to the harsh conditions typical of LNG installations: extremely low pipe temperatures, rough handling during transport, outdoor storage, high wind speeds and high humidity conditions. A TRYMER PIR/SARANEX CX system has the proven performance to do the job.

A Powerful Choice for Extreme Conditions

Made in a continuous process by Johns Manville, following rigorous

manufacturing standards, TRYMER PIR insulation is a polyurethane-modified polyisocyanurate rigid foam formulated with a high concentration of isocyanurate linkages. This formulation contributes to reliable long-term thermal performance, moisture-resistance, low flammability and dimensional stability. TRYMER PIR pipe insulation products are available in a variety of densities and compressive strengths to meet a wide range of application requirements for service temperatures, ranging from from -460°F to 300°F (-273°C to 149°C).

TRYMER 2500 PIR (2.5 pcf) and TRYMER 3000 PIR (2.5 pcf) are often specified for LNG. Depending on project parameters, TRYMER 2000XP PIR (2.0 pcf) and/or other TRYMER products may also be used. SARANEX CX Vapor Retarder Film and Tape further enhance the strong physical and thermal integrity of TRYMER PIR insulation by resisting water absorption and vapor drive, particularly in demanding cryogenic applications. The low permeance of SARANEX 560 CX Vapor Retarder products is well-suited to cryogenic temperatures, such as those found in LNG applications, where high vapor drive conditions are present.

Why Choose TRYMER PIR Insulation Over Cellular Glass?

Lower cost for TRYMER PIR

- The superior thermal conductivity allows TRYMER PIR to be used at less insulation thickness while still meeting the required design criteria (condensation control, energy efficiency, etc.)
- Lower cost to fabricate and install (less damaged material, less labor)
- Less insulation material equates to lower cost for accessories (hangers, metal jacketing, joint sealant, vapor retarder, etc.) and lower cost to ship

Breakage resistance

- Little to no damage during shipment
- Allows for easier fabrication of sophisticated and robust joint treatments (e.g., tongue and groove and shiplap)

Flame spread performance

- No asphalt coating required
- ≤ 25 flame spread for TRYMER PIR

Installation ease

- Lightweight and easy to install
- Produced in longer sections (3' vs. 2'), resulting in fewer joints to seal and less potential for failure compared to cellular glass





TRYMER PIR – The Optimum LNG Pipe Insulation

When specifying a pipe insulation system, it's important to evaluate all of the variables that contribute to optimum performance and the best long-term value:

- Excellent thermal efficiency (low k-factor, high R-value)
- Great moisture resistance
- Strength and durability to stand up to harsh environments
- Light weight
- Good flame spread/smoke development performance
- Ease of fabrication, installation and maintenance
- Long service life
- Low initial and life-cycle cost

Stainless Steel Jacketing

JM manufactures Stainless Steel Jacketing in rolls and sheets using T-304 or T-316 grade material. These jacketing materials comply with the key ASTM standard for stainless steel alloys, A240 and are supplied with a regular mill finish for reduced glare. These alloys are of a special soft-annealed temper, for ease in fabrication. T-304 is most commonly used, but in environments that are more highly corrosive such as coastal areas with salt from ocean mist in the air, T-316 is recommended. Since many LNG facilities are in such a location, T-316 may be preferred.

In addition to complying with the ASTM alloy standard, all these JM materials also comply with the ASTM standard for stainless steel jacketing, C1767. Compliance with this jacketing standard assures our stainless steel is optimized for use as insulation jacketing. The 300 series Stainless Steels have a melt point of approximately 2500°F, providing improved fire resistance. Stainless Steel has a higher emittance value than Aluminum which can help reduce the required insulation thickness in situations where condensation control is the key design criterion.

Stainless Steel roll jacketing is available in smooth, stucco embossed, or 3/16" corrugated finishes. The choice of finish depends on many factors, including aesthetics and specifier preferences. JM also supplies stainless steel jacketing in deep corrugated sheets which are recommended for use on tanks and vessels larger than 8 feet in diameter.

All metal jacketing should have a three layer 3 mil (76 micron) thick polyfilm moisture barrier factory heat laminated to the interior surface to help prevent certain types of corrosion of the hidden interior jacket surface. Polyfilm moisture barrier has superior performance compared to the older style 1 mil and 3 mil thick polykraft moisture barriers which it replaces.

Aluminum Jacketing

JM is a leading manufacturer of aluminum jacketing which can also be used on insulated LNG pipes, tanks, and equipment. Our aluminum jacketing comes in various finishes and complies with ASTM aluminum alloy standard B209 and aluminum jacketing standard C1729. Aluminum jacketing is a more economical alternative when the greater strength and higher melting point of stainless steel jacketing is not required.

T-316 Pressed 2-Piece Elbows

JM's two-piece stainless steel elbows are made in two, precision-formed, matching halves and are sized to cover and weatherproof insulated 90° and 45° elbows along pipelines. They are manufactured from Type-316 Stainless Steel in .016" thickness. They can be used on long and short radius, butt weld, socket weld, and screwed pipe elbows from 1/2" to 10" Iron Pipe Size.

These metal jacketing elbows should be used wherever they are available in the necessary size to reduce installation costs, minimize the number of joints, and improve aesthetics.

PRODUCT	Density ASTM D1622		K-Factor at 75°F ASTM C518 Aged 180 Days		Compressive Strength (Parallel to Rise) ASTM D1621		Temperature Range of Insulation		Closed-Cell Content
	English Units	S.I. Units	English Units	S.I. Units	English Units	S.I. Units	English Units	S.I. Units	English and S.I. Units
	lb/ft ³	kg/m ³	BTU •in./hr• ft ² •°F	W/m•°C	lb/in. ²	kPa	°F	°C	%
TRYMER 2500	2.5	40	0.19	0.027	39	268	-460 to +300	-273 to +149	≥95%
TRYMER 3000	3	48	0.19	0.027	65	450	-460 to +300	-273 to +149	≥95%

PRODUCT	Thickness		Yield	Service Temp Range*		Water Vapor Permeance (ASTM E96)	
	English Units	S.I. Units		English Units	S.I. Units	English Units	S.I. Units
	mil	mm	ft ² /lb	°F	°C	perms	ng/Pa-s-m ²
Saranex 560 CX Film	6	0.15	26.1	-40 to +250	-40 to +121	≤0.01	≤0.57

NOTE: The above values are typical physical properties.

*The temperature to which the Saranex® is exposed after application. This is much warmer than the LNG temperature since the Saranex is separated from the pipe by the insulation.

Support From an Industry Leader

When you specify Johns Manville products, you get support from an industry leader. We offer an array of resources to help design and install the optimum insulation system:

- Experienced sales and technical service personnel to assist with designing a high-performance, long-lasting insulation system
- Complete product information, including test data, technical data sheets, installation guidelines and safety data sheets (SDS)
- Johns Manville's authorized Fabricator Network – highly qualified and experienced fabricators located strategically throughout the United States, Canada, and Mexico, ensuring highest quality, reliable delivery and worldwide availability
- Extensive third-party certified test lab data available for key properties
- Quick and easy access to product data, installation instructions, application information, and literature downloads on www.jm.com

JM LNG System Requirements Technical Presentation

Johns Manville has prepared a technical presentation detailing LNG insulation system design criteria including material selection, installations, and critical properties. Call 1-800-866-3234 to request the presentation and learn about the competitive advantages of TRYMER® PIR insulation and to determine which TRYMER PIR product is the right choice for your most challenging LNG application.



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Technical specifications as shown in this literature are intended to be used as general guidelines only. Please refer to the Safety Data Sheet and product label prior to using this product. The physical and chemical properties of the products listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame spread or smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the Regional Sales Office nearest you for current information.

All Johns Manville products are sold subject to Johns Manville's standard Terms and Conditions, which includes a Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville standard Terms and Conditions or for information on other Johns Manville thermal insulation and systems, visit www.jm.com/terms-conditions or call (800) 654-3103.