

PERMA-PIPE®

Preinsulated Piping Systems

POLY-THERM® CRYOGENIC PIPING

- *Over fifteen years experience as a premiere supplier of Prefabricated Cryogenic Piping Systems to the Industrial Gas and LNG Industries.*
- *Designed for Cryogenic Liquids and Gases operating at temperatures from -100°F (-73°C) down to -320°F (-196°C).*
- *Unique Six Step Manufacturing Process for economic, durable and maintenance free piping systems that are efficient and easy to install.*



PERMA-PIPE's POLY-THERM prefabricated cryogenic piping systems provide a highly efficient and durable alternative to inferior low cost PVC jacketed pour foam piping and expensive vacuum insulated piping (VIP). POLY-THERM's unique design is the result of PERMA-PIPE'S supply to a major global gas producer that began in 1989. Now POLY-THERM is being installed at air separation plants and end use customer sites all over the world.

POLY-THERM's time proven construction consists of two independent layers of spray-applied polyurethane foam insulation separated by a glass fiber blanket with PVDC vapor barrier and encased in a watertight integral fiberglass wound jacket. Additionally, insulation contraction joints are designed into the system to compensate for the different rates of thermal contraction between the service pipe, insulation layers and jacket to ensure its long life integrity.

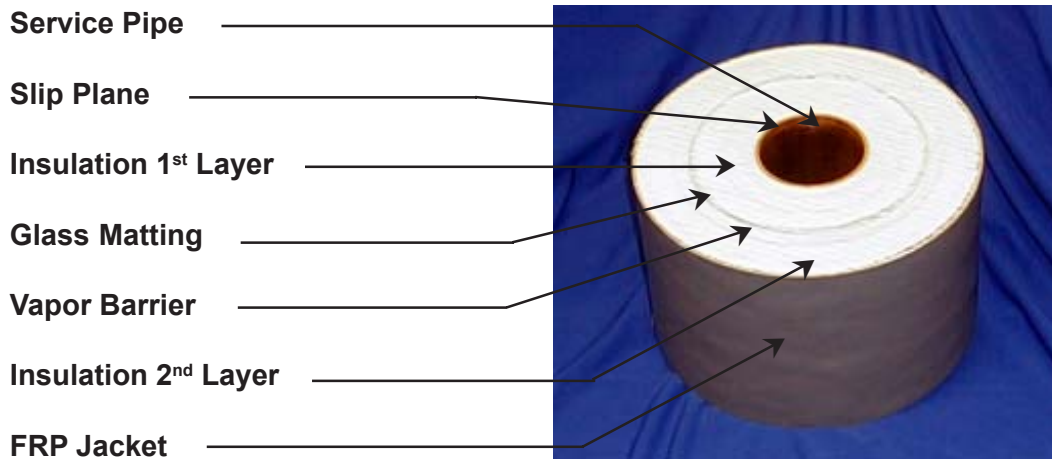
Pour foam insulated piping frequently has insulation voids that allow cryogenic temperatures to reach the PVC jacket causing cracks. This in turn allows moisture to enter the

insulation, rapidly spreading, causing ice build up and further deteriorating the thermal efficiency of the system. Furthermore, these systems do not compensate for the high amount of thermal movement during normal system cycling, causing over stressing and cracking of the insulation, jacket and loss of the vapor barrier.

Expensive vacuum insulated piping, although thermally efficient, is custom manufactured in exact configurations, factory evacuated and sealed. These systems cannot be reconfigured or altered in the field, and if a single section loses vacuum it will cause the overall system's thermal performance to degrade well below the performance of a foam insulated system. Periodic re-evacuation is also required by skilled technicians using expensive multi-stage ultra high vacuum pumps.

POLY-THERM® CRYOGENIC PIPING

SIX STEP CONSTRUCTION



Service Pipe

Offered in Type K or Type L copper or stainless steel from 1" up to 36".

Slip Plane

Service pipe slip plane allows independent movement between service pipe and first layer of insulation.

Insulation (1st layer)

Polyurethane foam insulation mechanically spray applied to a uniform thickness of 1.5" to 3.5" depending on pipe diameter.

Glass matting

0.25" thick glass fiber matting installed over first layer of insulation to allow independent movement between first and second layer of insulation.

Vapor Barrier

PVDC film applied over glass matting for vapor barrier and base for 2nd layer of insulation.

Insulation (2nd layer)

Polyurethane foam insulation mechanically spray applied to a uniform minimum thickness of 1.5" to 3" depending on pipe diameter.

FRP Jacket

Filament wound resin/fiberglass reinforced plastic composite applied directly to 2nd layer of insulation.

Contraction Joint

Glass fiber contraction joints installed in first layer of insulation every 20' maximum.

PERMA-PIPE®

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Nominal Pipe Size (In)	Insulation Layers	Minimum Jacket Thickness (In)	Jacket O.D. ± ¼" (In)	Heat Gain* (BTU/ FT-HR)
1	1	.080	8 ¾	14.2
1 ½	2	.080	10 ½	15.4
2	2	.080	11	17.2
3	2	.080	13 ⅛	19.9
4	2	.080	14 ⅛	23.0
6	2	.120	17 ⅜	27.7
8	2	.120	20 ⅜	30.9
10	2	.120	22 ½	36.0
12	2	.120	24 ½	40.8
14	2	.120	26 ¾	41.4

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*Based on -320°F operating temperature and 70°F ambient temperature.