



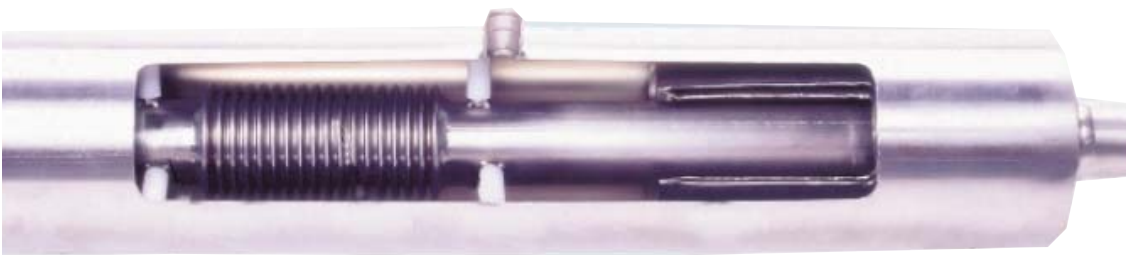
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Vacuum Jacketed Pipe



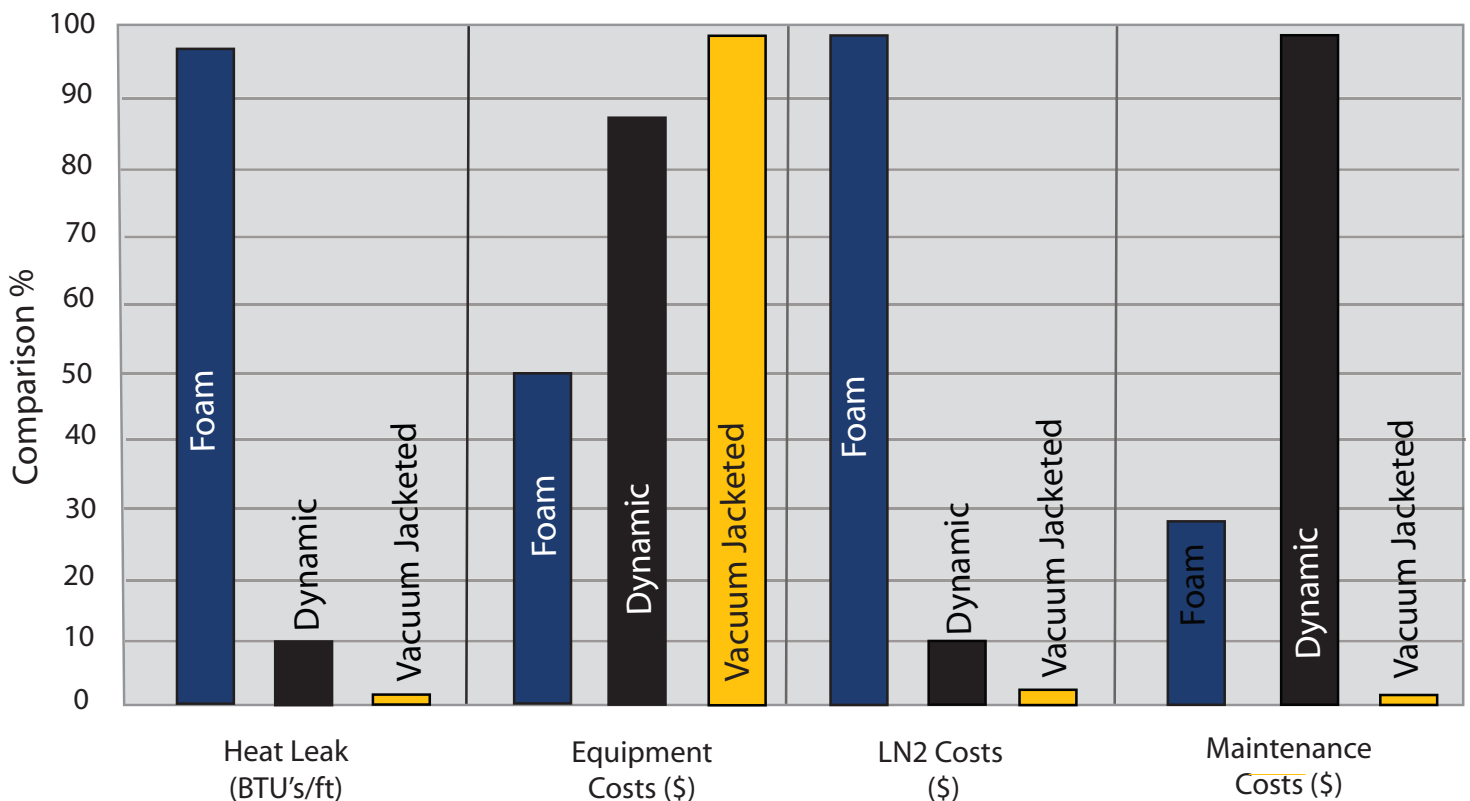
Midwest Cryogenics provides vacuum jacketed pipe systems that are custom engineered to meet your application needs. Midwest Cryogenics ensures quality liquid to keep your processes operating at their peak efficiency. Our systems give you the highest performance at the lowest operating cost. To ensure consistent pressure, the transfer of cryogenic liquid from tank to the end use application is vital. We supply various styles and sizes of vacuum jacketed pipe and accessories.

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Midwest Cryogenics Vacuum Jacketed Pipe is superior compared to other conventional insulation. Take a look at our Cryogenic Pipe Comparison Chart below to see how the right piping solution can save your company time and money.

Cryogenic Pipe Comparison Chart





MIDWEST CRYOGENICS

Application Expertise

- Industrial Plants
- Electronics
- Food Freezing
- Special Effects
- Aerospace
- Cryobiological



Capabilities

- Custom Design
- Complete System Engineering
- Fabrication
- Installation and Startup
- Cryogenic VJ Piping (Internal or External Bellows, Invar, Helium, and CO₂)
- Gas Piping (High Pressure, Low Pressure, Stainless Steel, and Copper)

Cost Effective Systems

- Vacuum Jacketed Pipe and Accessories
- Cryovents
- Flexible VIP
- Bayonet Connections

Accessories

- Tanks (LN₂, CO₂, O₂, Ar)
- Vaporizers
- High Pressure Manifolds
- Lazer Applications

The biggest problem in transferring cryogenic liquids is loss of product due to heat transfer. With Vacuum Jacketed Piping, the vacuum and insulation effectively prevent heat transfer caused from conduction, convection, or radiation. Of all the piping options available to you, Vacuum Jacketed Piping (VJP) is best suited to minimize heat transfer and lower boil-off. VJP multi-layer insulation is demonstrably superior to conventional foam insulated piping. In fact, it is up to 40 times more effective in reducing heat leaks.

Bare Copper Pipe	Foam Jacketed Pipe	"Dynamic" Vacuum Pipe	Midwest Cryogenics VJ Pipe
200.0 BTU/hr-ft 192.3 watts/m	20.0 BTU/hr-ft 19.4 watts/min	4.0 BTU/hr-ft 3.9 watts/m	0.45 BTU/hr-ft 0.43 watts/min

Advantages of Vacuum Jacketed Pipe

- Lower Heat Inleak
- Ease Of Installation
- Safety You Can Count On
- Unique Bayonet Designs
- Factory Sealed Vacuum Sections
- Future System Expansion



Cryogenic Liquid Piping System Specifications

Cryogenic Materials:

The equipment that is provided is manufactured for use with extremely low temperatures -320°F (-196°C). Any material coming in contact with liquid nitrogen must be either stainless steel, brass, bronze, copper, aluminum, Teflon™, or Kel-F. Any material coming in contact only with cold vapors must be appropriate for extremely low temperatures.

Related Codes and Standards:

The equipment that is provided under this specification should be manufactured to the appropriate codes and specifications, including but not limited to the following:

1. Bulk Storage Tanks
 - ASME Section 8, Division 1 - unfired pressure vessel. The liquid storage vessel must comply with the latest addendum.
2. Vacuum Jacketed Pipe
 - ANSI Section B31.3 Process Piping.

Vacuum Jacketed Piping (VJP) System:

The Vacuum Jacketed Piping (VJP) system is designed for the efficient transfer of liquid nitrogen at pressures up to standard 150 psi (10.34 bar) or greater. The normal operating pressure and the flow requirements are determined by the liquid nitrogen storage tank, and the equipment requirements. Midwest Cryogenics is available for consultation on the appropriate sizing of the VJP system.

The VJP system is made up of individual components. These components include VJP sections, cryogenic valves, fittings, and Electronic or Mechanical Keep-Cold assemblies.

Midwest Cryogenics VJP is a double walled construction that has an inner pipe for the transfer of liquid nitrogen and an outer pipe to support and retain the vacuum insulation. The inner and outer pipe is constructed with Type 304 stainless steel.

The insulation is a low vacuum with multiple layers of paper and foil (super insulation) applied in such a way as to reflect back radiant heat. Molecular sieves and getters are used with the insulation system to maintain low vacuum levels over a minimum of 10 years.

Thermal contraction of Midwest Cryogenics VJP system is accommodated by the inner pipe, so the outer jacket of the pipe system does not require special roller hangers.

The Vacuum Jacketed Pipe sections are designed and built with a factory sealed vacuum and super insulation system. The sections may be connected together with either a mechanical bayonet coupling, or a welded field joint coupling.

An optional thermocouple vacuum gauge and bellow seal isolation valve is used to determine the vacuum level of each section in the field.

The VJP system meets the required codes and specifications for cryogenic piping, specifically ASME B31.3

