

# Insulon® Vacuum Jacketed Hoses



Engineered for Thermal Stability  
in Cryogenic and  
Temperature-Controlled Systems



## Description

**ANCORP** is expanding its offerings through a partnership with **Concept Group, LLC**, a thermal engineering firm specializing in advanced insulation solutions for complex thermal challenges: introducing **Insulon®** vacuum jacketed hoses.

Insulon® vacuum jacketed hoses are engineered with proprietary vacuum insulation technology to deliver maximum thermal precision and control for both cryogenic and high-temperature fluid transfer applications. With a smaller outer diameter than most other vacuum jacketed hoses, Insulon's compact and ergonomic design allows for greater flexibility and improved routing through complex manufacturing environments.

In addition to fluid transfer applications, insulated hoses support vacuum service environments where thermal stability, condensation prevention, and temperature control are essential, such as cryogenic systems, process heating and cooling systems, semiconductor and thin film processing platforms, and research instrumentation.

## Features and Benefits

- Insulon® proprietary advanced vacuum technology for superior thermal performance.
- Smaller outer diameters for a lighter, more flexible, and more ergonomic design.
- Hermetically-sealed vacuum annulus requires no pump-down maintenance.
- Available in two performance levels: Standard and Multi-Layer Insulation (MLI).
- Available for both vacuum and high pressure applications.
- Wide operating temperature range: -270°C to 815°C / -454°F to 1500°F
- Constructed from 316L stainless steel.
- Low non-volatile residue (NVR) on surfaces
- Fully annealed materials to mitigate hydrogen embrittlement.
- ASTM G93 oxygen cleanliness up to Level A available upon request.

## Thermal Performance Options

While some vacuum-jacketed hose applications prioritize flexibility and reduced weight, others require a more robust construction engineered for superior thermal insulation performance. To accommodate varying application requirements, Insulon® hoses are offered in two thermal performance options: **Standard** and **Multi-Layer Insulation (MLI)** (Fig. 1).

### Standard

Standard Insulon® hoses are engineered to be compact, lightweight, and flexible. With a hermetically sealed vacuum barrier between an inner and outer corrugated stainless steel tube, the Insulon® Standard hose minimizes convective and conductive heat transfer. Ideal for applications requiring superior thermal insulation without compromising ergonomic design.

### Multi-Layer Insulation (MLI)

MLI Insulon® hoses are engineered for maximum thermal insulation performance. Utilizing multiple layers of reflective material inside the vacuum barrier, MLI Insulon® hoses mitigate convective, conductive, and radiation heat transfer (Fig. 2). Ideal for very cold, very hot, or highly sensitive applications (Fig. 3).

### Zero Pump-Downs

Traditional vacuum jacketed hoses typically have a port that attaches to a vacuum pump to remove air from inside the double-walled hose; the deeper the vacuum, the greater the thermal insulation performance. Over time, however, air molecules slowly leak back into the vacuum space, through either the port or outgassing, thereby reducing insulation performance. Pump-downs are required to re-establish vacuum within the hose, which can interrupt manufacturing operations and reduce productivity and efficiency.

The proprietary technology in Insulon® hoses helps prevent outgassing, has a more hermetic seal than other vacuum jacketed hoses, and exhibits a deeper vacuum barrier, helping facilities maximize their productivity and minimize maintenance costs.

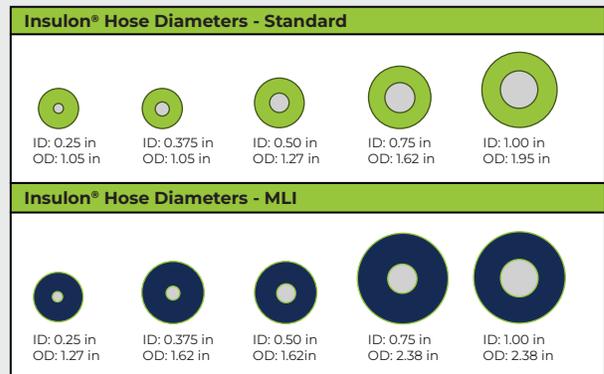


Fig. 1. Standard vs. MLI Insulon Hose Diameters. Inner diameter remains consistent across configurations; MLI increases the outer diameter.

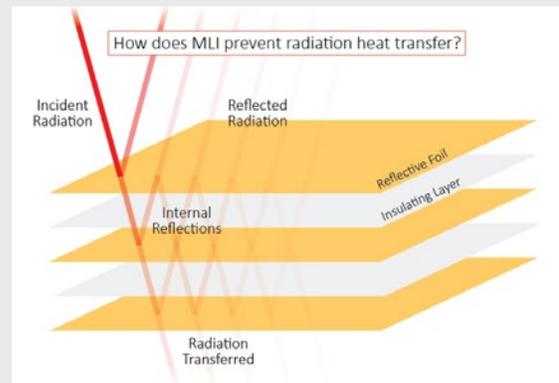


Fig. 2. Insulon® MLI vacuum jacketed hoses utilize multiple layers of reflective material between insulation layers to reduce radiation heat transfer.

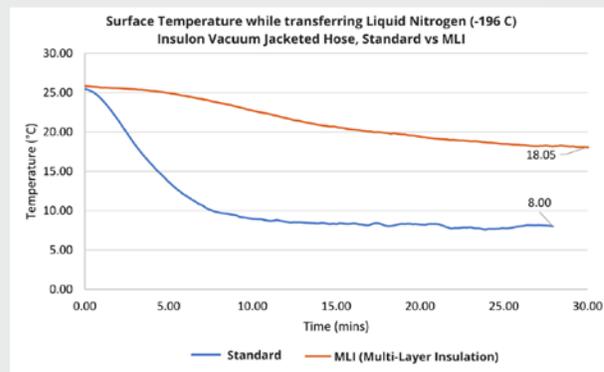


Fig. 3. In comparison to the Standard Insulon® vacuum jacketed hose, the MLI Insulon® hose maintained a significantly higher surface temperature over a 30 min period while transferring Liquid Nitrogen.

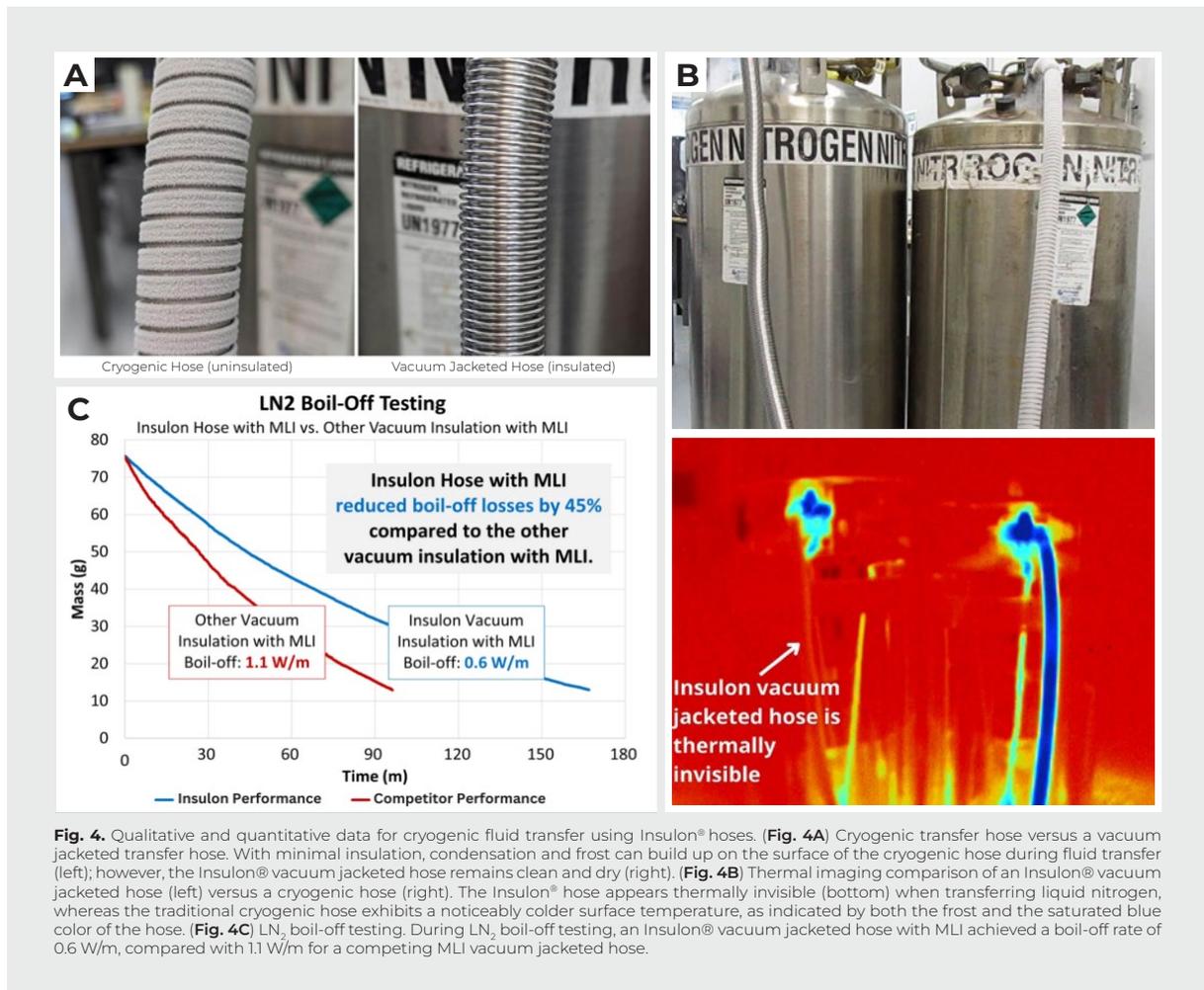
## Cryogenic Transfer with Insulon®

Cryogenic transfer systems handle extremely cold fluids, such as liquid nitrogen, argon, oxygen, and hydrogen. Traditional cryogenic transfer hoses are flexible, single-wall stainless steel transfer lines designed to withstand extremely low temperatures. However, due to a lack of insulation, heat from the surrounding environment can enter the transfer line, leading to frost formation, fluid boil-off, and reduced transfer efficiency.

Insulon® vacuum jacketed hoses address these challenges through proprietary thermal insulation. The double-wall stainless steel construction incorporates a hermetically sealed, evacuated annular space between the inner and outer walls, forming a stable vacuum barrier that significantly reduces heat transfer during cryogenic fluid transport.

Insulon® technology provides several key benefits for cryogenic fluid transfer:

- Reduced heat ingress, helping preserve cryogenic fluid temperature and minimize boil-off (**Fig. 4C**)
- Minimal frost and condensation formation, supporting cleaner and safer operating environments (**Fig. 4A, 4B**)
- External surface temperatures closer to ambient conditions, reducing cold-surface hazards (**Fig. 4B**)
- Improved thermal efficiency, maintaining stable cryogenic transfer



## Sizes

Insulon® vacuum jacketed hoses are available in multiple diameters and lengths, offering design flexibility for seamless integration into diverse system architectures.

Hose lengths range from 1 ½ to ~66 ft (0.5 to 20 m). Hoses are measured from end to end, including the tube stubs and any end fittings integrated prior to shipment.

Hose Diameters					
Hose Size ID [in]	DN (ISO 10380) [mm]	Inner Hose ID [in]	Standard or MLI	Outer Hose OD [in]	Min. Bend Radius, Static* [in]
1/4	6	0.236	STD	1.05	3.98
			MLI	1.27	5.00
3/8	10	0.394	STD	1.05	3.98
			MLI	1.62	6.15
1/2	12	0.472	STD	1.27	5.00
			MLI	1.62	6.15
3/4	20	0.787	STD	1.62	6.15
			MLI	2.38	9.41
1	25	0.984	STD	1.95	7.62
			MLI	2.38	9.41

\*For hoses < 4 ft (48 in) in length, the length tolerance is +/- 1 ½ in.

\*For hoses ≥ 4 ft (48 in) in length, the length tolerance is +/- 3%.



## Pressure Ratings \*

Insulon® vacuum jacketed hoses are available for both low pressure (LP) and high pressure (HP) applications.

Insulon® Vacuum Jacketed Hose LP is engineered for low pressure applications up to 72 psi, depending on hose diameter and fluid temperature.

Insulon® Vacuum Jacketed Hose HP is engineered for high pressure applications up to 750 psi, depending on hose diameter and fluid temperature.

Maximum Allowable Working Pressure (MAWP)			
Hose Size ID [in]	DN (ISO 10380) [mm]	Pressure Category	MAWP [psi] (-270°C to 38°C)
1/4	6	LP	72
		HP	750
3/8	10	LP	72
		HP	750
1/2	12	LP	72
		HP	750
3/4	20	LP	43
		HP	600
1	25	LP	43
		HP	500

Note: For applications with fluid temperatures >38°C (100°F), see pressure derating factor by temperature.

\*Pressure ratings apply to hoses without end fittings. Welded, swaged, or otherwise joined end fittings are unrated.

## End Fittings

All Insulon® vacuum jacketed hoses are shipped with fully weldable 316L stainless steel tube stubs.

Select from a wide variety of end configurations, including flanges, compression adapters, compression unions, flared swivel nuts, M fittings, and more. Integration with custom end fittings is also available.

Tube Stub Dimensions						
Hose Size [in]	DN (ISO 10380) [mm]	Tube Stub OD [in]	Tube Stub Thickness [in]	Min. Tube Stub ID [in]	Min. Tube Stub Length [in]	Max. Tube Stub Length [in]
1/4	6	0.250	0.028	0.194	1.250	2.250
3/8	10	0.375	0.035	0.305	1.250	2.250
1/2	12	0.500	0.035	0.430	1.250	2.250
3/4	20	0.750	0.049	0.652	1.250	2.500
1	25	1.000	0.065	0.870	1.500	2.500

## Pressure Derating Factor by Temperature

### Insulon® Hose Low Pressure (LP)

Maximum Fluid Temperature		Maximum Allowable Working Pressure (MAWP)				
Celsius (°C)	Fahrenheit (°F)	1/4" ID	3/8" ID	1/2" ID	3/4" ID	1" ID
38	100	72	72	72	43	43
93	200	65	65	65	39	39
149	300	61	61	61	36	36
204	400	56	56	56	33	33
260	500	55	55	55	33	33
316	600	54	54	54	32	32
371	700	53	53	53	31	31
427	800	52	52	52	31	31
482	900	48	48	48	29	29
538	1000	33	33	33	20	20
593	1100	21	21	21	13	13
649	1200	13	13	13	8	8
704	1300	9	9	9	5	5
760	1400	4	4	4	2	2
816	1500	3	3	3	2	2

\*Pressure ratings apply to hoses without end fittings. Welded, swaged, or otherwise joined end fittings are unrated.



## Pressure Derating Factor by Temperature

### Insulon® Hose High Pressure (HP)

Maximum Fluid Temperature		Maximum Allowable Working Pressure (MAWP)				
Celsius (°C)	Fahrenheit (°F)	1/4" ID	3/8" ID	1/2" ID	3/4" ID	1" ID
38	100	750	750	750	600	500
93	200	682	682	682	546	455
149	300	637	637	637	510	425
204	400	585	585	585	468	390
260	500	577	577	577	462	385
316	600	570	570	570	456	380
371	700	555	555	555	444	370
427	800	547	547	547	438	365
482	900	510	510	510	408	340
538	1000	350	350	350	280	233
593	1100	228	228	228	183	152
649	1200	143	143	143	114	95
704	1300	93	93	93	75	62
760	1400	48	48	48	39	32
816	1500	39	39	39	31	26

\*Pressure ratings apply to hoses without end fittings. Welded, swaged, or otherwise joined end fittings are unrated.

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Contact our sales associates, application sales engineers,  
or visit our website for more information!



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