

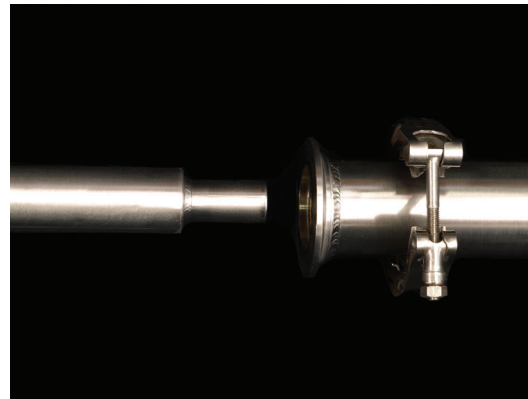
# ENGINEER TO ORDER RIGID PIPE

## VACUUM INSULATED RIGID PIPE

All Engineer to Order Vacuum Insulated Pipe rigid products come with Chart's renowned customer service, from conceptual design to implementation, and are backed by a ten year warranty.\* Engineer to Order rigid VIP is an all stainless steel coaxial vacuum insulated piping system. Modular by design, rigid VIP spools are joined together with shrink fit bayonet connections. Each section is evacuated, sealed and then tested for vacuum integrity. This advanced piping system minimizes heat gain between the inner carrier pipe and the outer jacket. Chart offers a complete line of components including in-line venting devices, phase separators and gas traps to maximize the system performance. Engineer to Order rigid pipe's smooth bore inner with periodic internal bellows, minimizes pressure drop and improves flow characteristics. By incorporating strategically located flexible sections when required, Engineer to Order rigid pipe is easy to install for both indoor and outdoor installations. Rigid VIP is used in a wide variety of installations including food and beverage, MBE's, environmental temperature chambers, test handlers, nanotechnology and R&D.



Engineer to Order Rigid VIP Installation



MVIP Pro Rigid Pipe

### RIGID BENEFITS

- Engineer to Order rigid pipe is durable, easy to install and practically maintenance free
- Excellent flow characteristics make Engineer to Order rigid VIP ideal for pipe mains
- Engineer to Order rigid can mate to our flex's bendable pipe for inside drops
- Multilayer superinsulation and chemical gettering assures long term vacuum integrity\*
- Fabricated by an ASME B31.3 code shop by certified welders (TIG Welded)
- Rigid sections are less expensive, have better heat leak and less pressure drop than flexible vacuum insulated pipe
- Rigid section will not dip between hangers and will minimize gas traps
- Rigid sections have a long life and have been known to last as long as 30 years

\*Chart Vacuum Technology™ (CVT 10/20):  
10 year limited vacuum insulated pipe  
warranty, 20 year design life.



Innovation. Experience. Performance.®

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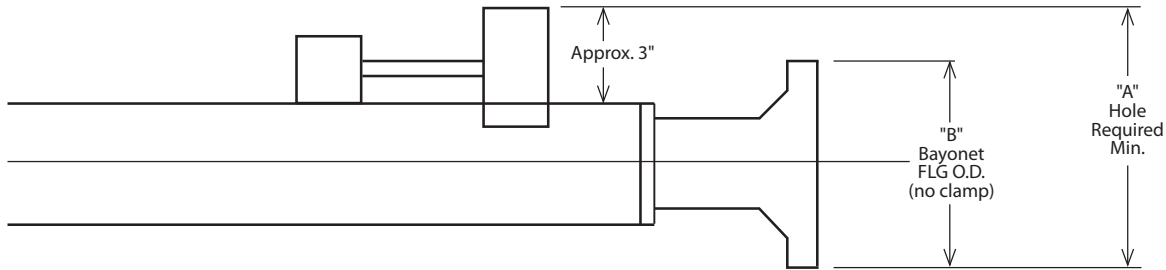
## VACUUM INSULATED RIGID PIPE

### Technical Specifications

Inner Pipe Size	Outer Jacket Diameter*	Actual Flow Diameter	"A"	"B"	Weight / Length	MAWP (psi)
			Hole Required to Accommodate Pump Out**	Bayonet FLG O.D. (no clamp)		
½"	2"	0.710"	5.75"	2.755"	3.0 lb/ft (3.4 kg/m)	150
1"	3"	1.185"	6.75"	3.761"	4.5 lb/ft (6.2 kg/m)	150
1 ½"	3 ½"	1.770"	7.50"	4.396"	5.5 lb/ft (7.4 kg/m)	150
2"	3 ½"	2.245"	7.75"	4.923"	6.0 lb/ft (8.4 kg/m)	150

\* Not including pump out.

\*\* Pump out with no Thermocouple (TC)



### Performance Data

Inner Pipe Size	Cool Down			Static Heat Leak		LN <sub>2</sub> Bayonet Pair Heat Leak	
	kJ/m	kg/m*	lb of LN <sub>2</sub> /ft	BTU/hr/ft	Watt/m	BTU/hr	Watt
½"	39	0.20	0.13	0.32	0.31	14.1	4.13
1"	58	0.29	0.19	0.48	0.46	20.8	6.09
1 ½"	85	0.43	0.29	0.58	0.56	22.1	6.47
2"	107	0.54	0.36	0.79	0.76	19.3	5.65

\* LN<sub>2</sub> at one bar.

### LN<sub>2</sub> Flow Guideline

Inner Pipe Size	Pipe Size	100 ft	200 ft	300 ft	400 ft	500 ft
½"	½" PS	4.8 gpm	3.5 gpm	2.9 gpm	2.6 gpm	2.2 gpm
1"	1" PS	29.0 gpm	20.0 gpm	16.0 gpm	12.0 gpm	11.0 gpm
1 ½"	1 ½" PS	63.0 gpm	50.0 gpm	42.0 gpm	38.0 gpm	36.0 gpm
2"	2" PS	110.0 gpm	80.0 gpm	70.0 gpm	62.0 gpm	58.0 gpm

### Pressure Drop (psi/ft)\*

Inner Pipe Size	Flow (gal/min)							
	2	5	10	25	50	75	100	150
½"	0.006	0.039	0.154	0.964				
1"		0.003	0.011	0.063	0.262	0.570	1.014	
1 ½"			0.001	0.008	0.040	0.070	0.125	0.280
2"				0.002	0.009	0.193	0.034	0.077

\*Pressure drop numbers listed do not account for elevation changes. Chart recommends pressure drop be kept to 5 psi or less.

## Your Local Representative



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