



Bulk Storage Systems

Equipment for Cryogenic Service

BULK STORAGE | ACCESSORIES | SYSTEM DESIGN | MANUFACTURING | TRAINING | INSTALLATION | SERVICE

Bulk Storage Product Catalog
www.chartbulk tanks.com

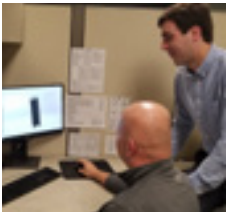
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Innovative Design, Technology & Reliability

Across Chart, we pride ourselves on designing innovative products with advanced technology and high reliability to enhance customer value. Our understanding of our customer's business needs and end-use applications has helped us achieve a wide product portfolio of solutions. We provide the right product for the application – driving a competitive advantage for our customer and our company.



Innovative Design

Our Bulk Storage advantage starts with our innovative Composite Super Insulation™ and finishes with ergonomic modular piping to offer you the best in Bulk Storage Systems.



Quality Manufacturing

Our experience and code compliant ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2007 certifications ensure that our Bulk Storage Systems are manufactured to high quality standards to provide the high reliability you expect from Chart.



Application Ready

Chart allows you to custom build your Bulk Storage System to match your customer's needs and budget. With our wide range of products, there's a bulk tank to match your customer's application and your business strategy.

When you choose Chart, you get single-source accountability from the engineered solution through post-installation service.

Bulk Storage Applications

Metal Fabrication

Welding – GMAW/MIG, GTAW/TIG and Laser Beam Welding

Metal fabrication uses many different welding processes for the wide range of materials, thickness and product applications. Many of these unique and specialized welding processes use inert shielding gas or the combination of gases to obtain the maximum weld quality and optimized productivity. For single gas requirements, Bulk Storage provides you with a continuous supply of quality gas. And for mixed gas applications, a mixer solution provides on-site gas blending directly from bulk storage for the most accurate mixture available and at the lowest cost.



Cutting – Laser, Oxy Fuel and Plasma

All thermal cutting techniques utilize gases to assist in the cutting process. High-pressure nitrogen and oxygen are used as an assist gas to rapidly remove the molten metal from the cut zone or burn it away during the laser cutting process. To maintain maximum laser uptime and achieve the best cut quality, it is critical that the gas supply be uninterrupted and the required pressures and flows for the material and thickness being cut are maintained. Oxy Fuel and Plasma cutting processes have similar requirements. Only Chart offers an engineered “High-Pressure, High-flow Package” to customize your Bulk Storage System for these demanding applications.



Aerospace

Space Fuels

Chart’s Bulk Storage and vacuum insulated pipe systems are used on launch pads delivering extremely high flow rates of liquid hydrogen and oxygen to fuel today’s demanding space programs. Aerospace applications are extremely precise, requiring higher pressures and intense analysis of engineering stress and heat leak. Additionally, Chart is able to meet the precision clean requirements common to these applications.



Medical/Laboratory

Bulk Biological Storage and Research

A sufficient supply of high-quality liquid nitrogen is needed to keep valuable biological samples stored indefinitely. Today’s top medical research facilities depend on a reliable liquid nitrogen supply to find cures for tomorrow’s diseases. Any interruption in supply can result in the loss of many years of research. Chart’s experience in the biological container market makes us the first choice in Bulk Storage Systems for these applications.



Medical Oxygen Therapy, O.R.

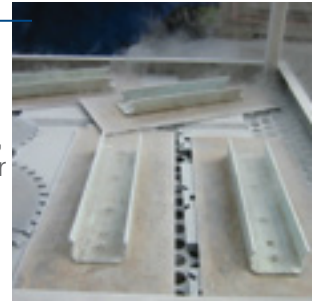
Medical applications have some of the most stringent gas requirements and the Bulk Storage Systems meet these requirements with NF grade capability. Liquid oxygen for respiratory therapy is easily and safely dispensed from bulk storage into smaller systems to lower distribution costs. Similarly, the bulk storage and a reserve tank is an excellent solution as the main oxygen gas supply for hospitals. NF grade nitrogen can also be supplied for gas applications to operate pneumatic surgical tools and supply liquid for medical uses such as cryotherapy.



Metal Processing

Heat Treating, Cryotempering, Thermal Spray Coating

Heat treating and cryotempering processes are dependent on the quality of the nitrogen gas and liquid supply to maintain production at peak performance. With our Bulk Storage System directly piped to the equipment, these applications are assured of a consistent supply of nitrogen with minimal operator intervention. In the thermal spray coating process, oxygen or argon gas is used at high pressure and high flows. With optional packages, your gas supply will exceed these requirements and provide long-term trouble-free service.



Food Processing

Food and Beverage Packaging

In beverage packaging, CO₂ is used in carbonated drinks and liquid nitrogen is used to create a positive pressure in non-carbonated drinks to improve container rigidity for lower-cost handling. Additionally, this process eliminates oxygen to improve the products shelf life (MAP- Modified Atmospheric Packaging). For meat packaging, nitrogen gas yields the same benefits and when combined with carbon dioxide and carbon monoxide for processing meat a longer shelf life of the desired red color is maintained. Our Bulk Storage Systems give you optimum control of your liquid and gas supply for maximum production uptime.



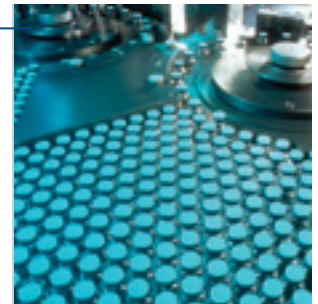
Food Freezing

Total system cost and efficiency is crucial in food freezing applications. Chart's superior insulation technology delivers liquid nitrogen and liquid CO₂ with more cooling capacity, using less gas per pound of frozen product. With our experience and capabilities in providing complete Bulk Storage and vacuum insulated pipe system solutions, we help maintain the lowest total cost of ownership by supplying the most efficient system.



Purging and Blanketing

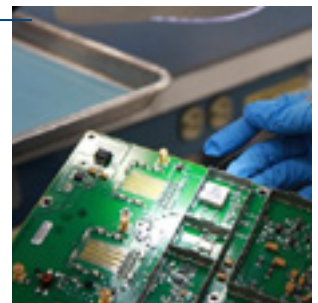
Inert purging and blanketing with nitrogen or argon gas is a common processing step in many manufacturing applications. These range from pharmaceutical to chemical to the wine industry, and they require a secure supply of gas for optimum processing results. With a dedicated Perma-Cyl tank and the optional telemetry system, you are assured of a continuous, oxygen-free gas supply because cylinder change outs are eliminated.



General Processing

Electronic Manufacturing and Testing

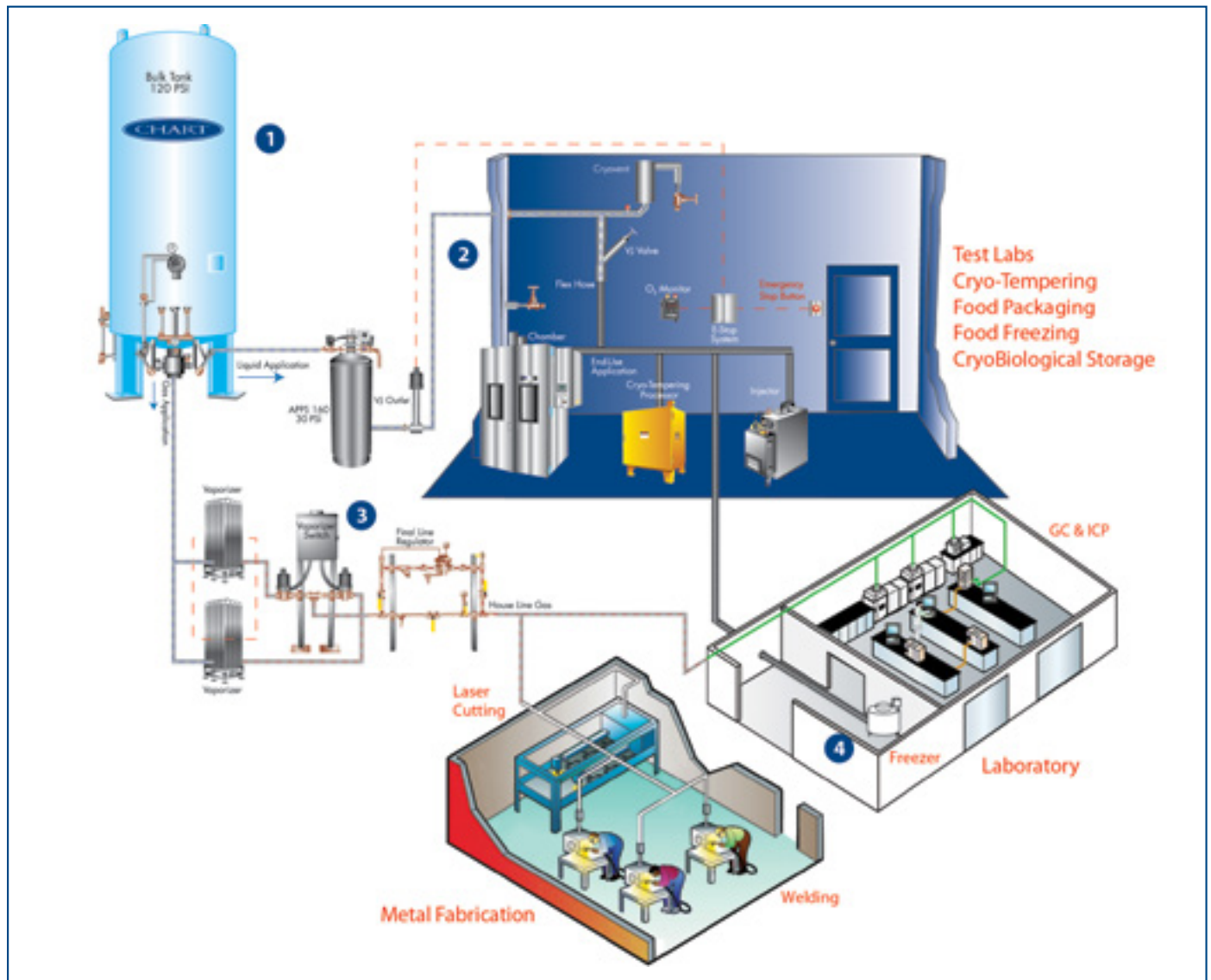
Electronic grade manufacturing requires an Ultra High Purity gas stream void of contamination. Our electronic grade tanks are built with all stainless steel construction from the annular lines to the exterior plumbing to maintain gas purity. For electronic component testing, Chart works with today's leading equipment manufacturers to design and manufacture Bulk Storage and vacuum insulated pipe systems that supply the flows demanded by today's thermal stress environmental test chambers.



Engineered for Efficiency—Built to Last

A Turnkey Approach

Chart's Bulk Storage Systems are custom engineered to meet your application's specifications. Chart's complete system solution package ensures quality liquid or gas to keep your processes operating at peak efficiency. Built for long-term integrity and industry-leading efficiency, these systems give you the highest performance at the lowest operating cost.



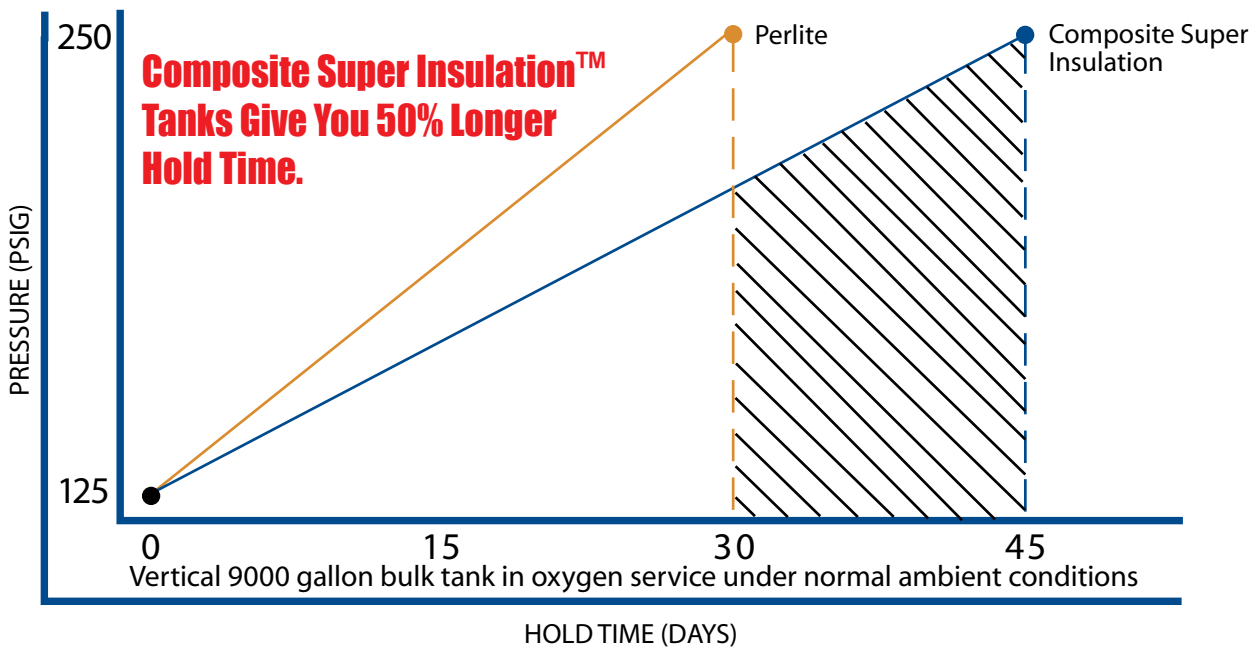
1. Liquefied gases are stored at ultra-cold temperatures in a vacuum insulated tank. Controls on the tank keep the pressure at optimum levels to assure proper liquid delivery to the application.
2. Vacuum insulated pipe connects the tank's liquid withdrawal to the application equipment. The pipe is the foundation for the system's heat-loss efficiency and long-term integrity. It must be engineered to work with the associated controls and accessories.
3. Chart manufactures equipment that controls and provides gas to other applications within the facility. Our engineers can help provide proper sizing for vaporizers, control manifolds, etc. to serve both a liquid and gas application from a single bulk tank liquid source.
4. The application equipment is designed to utilize liquid or gas at specific properties. The system design must take careful consideration of these requirements so the equipment meets the user's performance specifications.

Our Composite Super Insulation™ System

At Chart we have always taken pride in developing the best thermal insulation system possible in our cryogenic bulk tanks. Years of experience have driven us to engineer our multi-layer Composite Super Insulation™ system to achieve the ultimate thermal protection in our cryogenic bulk storage equipment. Providing the best insulation system to protect your valuable gases from harsh ambient conditions results in lower pressure rise and lower losses, yielding better gas utilization. Our Composite Super Insulation and Chart Vacuum Technology® is at the core of why Chart bulk tanks are recognized around the world as the premier cryogenic bulk storage tank.



Pressure Rise Comparison from 125 psi to Relief Valve



Clearly, the Composite Super Insulation™ has it all.

COMPOSITE SI	Key Features	PERLITE
<input checked="" type="checkbox"/> 114	Diameter (in)	<input type="checkbox"/> 118
<input checked="" type="checkbox"/> 29,400	Tare Weight (lbs)	<input type="checkbox"/> 38,400
<input checked="" type="checkbox"/> 0.1	NER (%)	<input type="checkbox"/> 0.15
<input checked="" type="checkbox"/> 45	Hold Time (days)	<input type="checkbox"/> 30
<input checked="" type="checkbox"/> 1,035	Losses at MAWP (SCFD)	<input type="checkbox"/> 1,550

Note: All values based on a vertical 9000 gallon bulk tank half-full in oxygen service at 125 psig under normal ambient conditions. Published values posted online. SCFD = Standard Cubic Feet per Day

VS-01 Series Premier Vertical Storage Systems

Chart's VS-01 Series Storage Systems, available in liquid nitrogen, oxygen or argon service are offered in a wide range of sizes for applications requiring Maximum Allowable Working Pressure of 250 psig (17 barg) as standard.

Our proprietary Composite Super Insulation™ system gives you the competitive edge with high thermal performance, extended hold times, low life-cycle costs and lower weight to reduce operational and installation costs. Chart leads the industry with an innovative, modular piping system designed for performance, durability and low maintenance.



Interchangeable gauge systems with digital telemetry capable gauge and flexible stainless steel interconnection lines.

Patents - 6,782,339 • 6,944,570



Combination pressure building/economizer regulator for easy in-field adjustments.



Long-life extended stem packing pressure builder and economizer isolating valves are standard on the VS-01 series.

Modular Piping Design Advantages

- Reduces your life-cycle costs by reducing the number of external piping joints, minimizing the risk of external piping leaks and the cost to repair.
- Simple by design yet robust and able to support a broad range of customer applications.
- Combination pressure building/economizer regulator for easy pressure adjustment and extended bonnet bronze control valves for ease of operation.
- Piping modules designed for ease-of-access to all operational control valves with stainless steel interconnecting piping for improved durability.

Product Advantages

- Sizes and configurations to meet most applications
- Backed by an industry-leading 5-year vacuum warranty
- Leg design provides better access to anchor bolts for quicker installation
- Plumbing built in accordance with ASME B31.3 code and leak tested at 1.1 times the MAWP - Certified
- Long-life urethane paint system
- Inner vessel designed and built to ASME Section VIII Division 1 code
- Tank mounted vaporizer optional on 1500 gallon models: 1500 or 2000 SCFH
- Stainless steel lifting lugs



Analog pressure and liquid level gauges option



High-performance safety system with dual relief valves and rupture disks supplied as standard



Innovative vertical fin pressure building system improves performance, while reducing frost and ice build up to further reduce your maintenance costs

Model	Gross Capacity		Net Capacity		MAWP*		Flow Capacity**		Diameter		Height		Weight***		NER %/day	
	Gal	Liters	Gal	Liters	psig	bar	SCFH	Nm ³ /hr	in	mm	in	mm	lbs.	Kg	in O ₂ /Ar	in N ₂
VS 1500SC	1,640	6,208	1,580	5,981	250	17.2	9,000	237	66	1,676	196	4,978	6,200	2,818	.35	.56
VS 3000SC	3,150	11,924	3,030	11,470	250	17.2	18,000	473	86	2,184	228	5,791	12,800	5,806	.25	.40
VS 6000SC	6,010	22,750	5,770	21,842	250	17.2	18,000	473	86	2,184	383	9,728	21,500	9,752	.15	.24
VS 9000SC	9,360	35,431	8,990	34,031	250	17.2	42,000	1,104	114	2,896	348	8,840	32,300	14,682	.10	.16
VS 11000SC	11,410	43,192	10,960	41,488	250	17.2	42,000	1,104	114	2,896	407	10,338	38,700	17,591	.10	.16
VS 13000SC	13,470	50,989	13,060	49,437	250	17.2	42,000	1,104	114	2,896	466	11,837	45,700	20,773	.10	.16
VS 15000SC	15,520	58,750	15,060	57,008	250	17.2	42,000	1,104	114	2,896	525	13,335	52,600	23,909	.10	.16

* MAWP - Maximum Allowable Working Pressure. operating pressure of 15 psig (bar)

500 psig tanks are available upon request

** Flow capacity rating down to a 20% contents level with a maximum fall of in tank (NER) = Normal Evaporation Rate

HS Series Horizontal Bulk Storage

The HS Series Bulk Stations are engineered and built with the same quality you have come to expect from Chart. They have standard features along with pre-engineered options sure to satisfy all of your requirements. Chart's HS Series Bulk Stations are designed to ASME code and available in 250 psig (17 barg) as standard (other pressures available upon request).

Our composite insulation system gives you the competitive edge with high thermal performance and extended hold times, resulting in low life-cycle costs. In addition, the light weight design reduces your installation costs.



Interchangeable gauge systems with digital telemetry capabilities and flexible stainless steel interconnection lines.



Chart leads the industry with an innovative modular piping system designed for performance, durability and low maintenance.

Product Advantages

- Piping modules designed for ease-of-access to all operational control valves with stainless steel interconnecting piping minimizes the number of connections, reducing maintenance and cost of ownership
- Component selection to improve operational performance – combination pressure building/economizer regulator for easy pressure adjustment and extended bonnet bronze control valves for ease of operation
- High performance safety system with dual relief valves and rupture disks supplied as standard
- New, innovative vertical fin pressure building system improves performance, while reducing frost and ice build-up to further reduce your maintenance costs
- Backed by an industry-leading 5-year vacuum warranty
- Inner vessel designed and built to ASME Section VIII Division 1 code

Model	Gross Capacity		Net Capacity		MAWP*		Width		Height		Length		Weight**		NER %/day	NER %/day
	Gal	Liters	Gal	Liters	psig	bar	in	mm	in	mm	in	mm	lbs	Kg	in O ₂ / Ar	in N ₂
HS-1500SC	1,640	6,208	1,580	5,981	250	17.2	68	1,728	80	2,032	201	5,105	6,800	3,084	.56	.90
HS-3000SC	3,150	11,924	3,030	11,470	250	17.2	86	2,184	95	2,413	233	5,918	11,900	5,398	.32	.52
HS-6000SC	6,010	22,750	5,770	21,842	250	17.2	86	2,184	95	2,413	386	9,804	22,000	9,979	.22	.35
HS-9000SC	9,360	35,431	8,990	34,031	250	17.2	114	2,896	126	3,200	348	8,839	32,300	14,651	.15	.24
HS-11000SC	11,410	43,192	10,960	41,488	250	17.2	114	2,896	126	3,200	408	10,363	38,800	17,599	.15	.24
HS-13000SC	13,470	50,989	13,060	49,437	250	17.2	114	2,896	126	3,200	467	11,862	45,400	20,593	.15	.24
HS-15000SC	15,520	58,750	15,060	57,008	250	17.2	114	2,896	126	3,200	528	13,411	52,300	23,723	.15	.24

*MAWP - Maximum Allowable Working Pressure. **Weights are for ASME design. (NER) = Normal Evaporation Rate

VSCO₂/N₂O & HSCO₂/N₂O Vertical & Horizontal Bulk Storage

Our VSCO₂/N₂O and HSCO₂/N₂O Series of Bulk Carbon Dioxide and Nitrous Oxide Storage Tanks continue our pioneering of user-friendly engineered products. This product series offers strength and durability in an all-welded outer container, providing lower life-cycle costs. Utilizing our proprietary Composite Super Insulation™ system along with superior vacuum technology, we offer:

- An ultra-low heat leak – eliminating the need for a costly refrigeration system in most applications.
- No costly downtime to refurbish water-soaked or deteriorated foam insulation.

Available Options

ThermaBlock™ Electric Unit



Thermax® Side Arm Pressure Builder

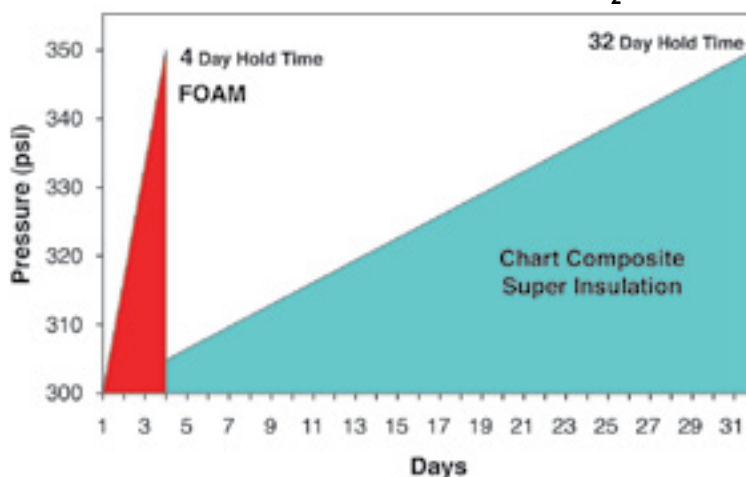


VSCO₂/N₂O & HSCO₂/N₂O Vertical & Horizontal Bulk Storage

Product Advantages

- Stainless steel piping for greater strength and durability
- Stainless steel ball valves standard on all fill and process lines
- Stainless steel inner vessel material standard on all models
- CGA fill and vapor return fittings with drain valves standard on all models
- High-performance safety system with dual relief valves and rupture disks supplied as standard on all models
- Thermax Pressure Building and Vaporizer options available, inquire with factory for more details
- Interchangeable gauge systems with a choice of analog or digital telemetry capable systems are available with flexible stainless steel interconnecting phase lines
- High-strength, dent resistant outer jacket eliminates deterioration of insulation, costly repairs, down-time
- Hold time is 8 times longer than foam insulated tanks
- Refrigeration system not required for maintaining heat leak
- Refrigeration systems including internal coil available as options (vapor space)
- Backed by an industry-leading 5-year vacuum warranty
- Inner vessel designed and built to ASME Section VIII Division 1 code

Thermal Performance - VSCO₂ Vacuum Jacketed vs. Foam CO₂ Tanks



VERTICAL

Model	CO ₂				N ₂ O				MAWP* psig bar	Diameter in mm	Height in mm	Weight**		NER %/day in CO ₂ /N ₂ O	
	Gross Cap. Ton	Net Cap. Tonne	Gross Cap. Ton	Net Cap. Tonne	Gross Cap. Ton	Net Cap. Tonne	Gross Cap. Ton	Net Cap. Tonne				lbs	Kg		
6 Ton	6.9	6.3	6.6	6.0	6.6	6.0	6.3	5.7	350	24.1	66 1,727	196 4,969	7,400	3,357	.15
14 Ton	13.2	12.0	12.6	11.4	12.9	11.7	12.3	11.2	350	24.1	86 2,184	228 5,791	13,700	6,214	.08
30 Ton	30.7	27.8	29.1	26.4	29.3	26.6	27.9	25.3	350	24.1	114 2,900	291 7,391	31,700	14,379	.05
50 Ton	47.7	43.3	45.4	41.1	45.6	41.4	43.4	39.3	350	24.1	114 2,900	406 10,312	44,300	20,094	.04

* MAWP - Maximum Allowable Working Pressure. ** Weights are for ASME design. (NER) = Nominal Evaporation Rate

HORIZONTAL

Model	CO ₂				N ₂ O				MAWP* psig bar	Length in mm	Width in mm	Height in mm	Weight**		NER %/day in CO ₂ /N ₂ O	
	Gross Cap. Ton	Net Cap. Tonne	Gross Cap. Ton	Net Cap. Tonne	Gross Cap. Ton	Net Cap. Tonne	Gross Cap. Ton	Net Cap. Tonne					lbs	Kg		
6 Ton	6.9	6.3	6.7	6.0	8.5	7.7	8.0	7.3	350	24.1	188 4,775	68 1,728	80 2,032	8,500	3,856	.24
14 Ton	13.2	12.0	12.6	11.4	12.9	11.7	12.3	11.2	350	24.1	233 5,913	86 2,184	95 2,413	17,400	7,890	.12
30 Ton	32.9	29.8	31.2	28.3	32.1	29.2	30.5	27.7	350	24.1	280 7,112	114 2,900	127 3,226	31,900	14,470	.08
50 Ton	51.1	46.3	48.5	44.0	49.9	45.3	47.4	43.0	350	24.1	396 10,058	114 2,900	127 3,226	43,300	19,641	.06

* MAWP - Maximum Allowable Working Pressure. ** Weights are for ASME design. (NER) = Normal Evaporation Rate

VSi-CO₂/HSi-CO₂ Series Vertical & Horizontal Integrated Bulk Storage

The VSi-CO₂ and HSi-CO₂ Series are engineered for the efficient supply of carbon dioxide gas in any outdoor installation. All components are tank mounted and prefabricated, minimizing installation time and costs. The key design features of the HSi-CO₂ Series are the electrically powered pressure builder and process gas vaporizers, all housed in a protective cabinet for full security. The VSi-CO₂ Series has other standard features along with pre-engineered options to satisfy all your requirements for a complete turnkey installation. For maximum lifetime thermal efficiency, the integrated bulk storage systems use all-welded outer jackets to contain our proprietary Composite Super Insulation™ system and superior vacuum technology, providing:

- An ultra-low heat leak – eliminating the need for a costly refrigeration system in most applications.
- No costly downtime to refurbish water-soaked or deteriorated foam insulation.



VSi-CO₂/HSi-CO₂ Series Vertical & Horizontal Integrated Bulk Storage

Product Advantages

- All-in-one tank mounted design greatly minimizes installation time (VSi-CO₂)
- All-in-one skidded design with protective plumbing cabinet (HSi-CO₂)
- Standard electric PB & process gas vaporizers with controls
- Stainless steel inner vessel & piping eliminates dry ice concerns
- Inner vessel designed & built to ASME Section VIII, Div. 1 code
- Backed by a five-year vacuum warranty
- Low horizontal profile eliminates seismic & height concerns (HSi-CO₂)
- Control panel with PLC to operate vaporizers, alarms, solenoids & optional refrigeration system (HS-CO₂)
- Adjustable low temperature cutoff switch
- Single field connection for gas use line
- Pressure & liquid level transmitters
- Optional refrigeration system w/ internal vapor condensing coil
- SCADA available via MODBUS TCP/IP (HSi-CO₂)

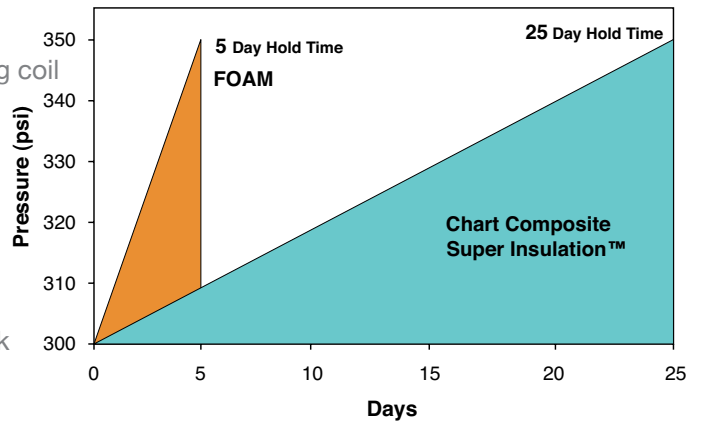
Vacuum Jacketed vs. Foam CO₂ tanks

- Lowest lifecycle costs for bulk CO₂ storage
- Superior functional performance manages liquid quality
- Hold time is 5 times longer than new foam
- Refrigeration system not required for maintaining heat leak

Ideal Applications

- Wastewater pH Balancing
- Beverage Carbonation Production
- Modified Atmosphere Packaging (MAP)
- Breweries and Brew Houses
- Greenhouse Growing

**Thermal Performance
Vacuum Jacketed vs. Foam CO₂ Tanks**



VERTICAL

Model	Gross Capacity		Net Capacity		MAWP*		Diameter		Height		Weight**		NER %/day in CO ₂
	Ton	Tonne	Ton	Tonne	psig	bar	in	mm	in	mm	lbs	Kg	
6 Ton	6.9	6.3	6.6	6.0	350	24.1	66	1,727	232	5,893	7,400	3,357	.15
14 Ton	13.2	12.0	12.6	11.4	350	24.1	86	2,184	264	6,706	13,700	6,214	.08
30 Ton	30.7	27.8	29.1	26.4	350	24.1	114	2,900	327	8,306	31,700	14,379	.05
50 Ton	47.7	43.3	45.4	41.1	350	24.1	114	2,900	442	11,227	44,300	20,094	.04

* MAWP - Maximum Allowable Working Pressure. ** Weights are for ASME design. (NER) = Nominal Evaporation Rate

HORIZONTAL

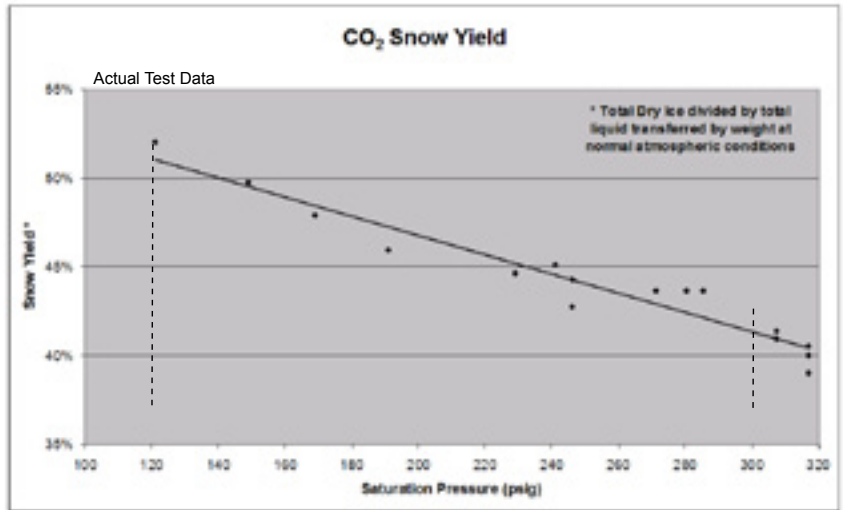
Model	Gross Capacity		Net Capacity	MAWP*	Width		Height	Length	Weight**		NER %/day in CO ₂				
	Ton	(Tonne)			PSIG	(bar)			in	(mm)		in	(mm)	lbs	kg
14 Ton	14.3	(13.0)	13.8	(12.5)	350	(24.1)	89	(2,261)	93	(2,362)	272	(6,909)	19,300	(8,754)	.30
30 Ton	30.8	(27.9)	29.3	(26.6)	350	(24.1)	89	(2,261)	93	(2,362)	464	(11,786)	31,400	(14,243)	.21
50 Ton	51.1	(46.4)	48.6	(44.1)	350	(24.1)	89	(2,261)	93	(2,362)	704	(17,882)	46,400	(21,047)	.14
60 Ton	63.4	(57.5)	60.2	(54.6)	350	(24.1)	89	(2,261)	93	(2,362)	848	(21,539)	55,500	(25,174)	.12

* Maximum Allowable Working Pressure

** Tare weight

ChillZilla[®] CO₂ Bulk CO₂ Food Freezing and Dry Ice Production System

The ChillZilla[®] bulk CO₂ Liquid Supply System for food freezing and dry ice production increases the refrigeration capacity of the liquid CO₂ by as much as **24%** over traditional bulk tanks. The ChillZilla system incorporates a patented design to lower the saturation pressure of the liquid output without reducing the delivery pressure. With the aid of an external refrigeration system, an internal heat exchanger coil and an insulating baffle, the temperature of the liquid CO₂ is effectively reduced. This system subcools the saturated liquid CO₂ from 300 psig to 120 psig while the electric pressure builder maintains the high tank vapor pressure necessary for consistent CO₂ delivery to the application. The result is an increase in refrigeration capacity in the liquid or an improved snow yield from 41 to 51%.



Patent No. 9,939,109 B2

Product Advantages

- Reduce liquid CO₂ consumption by as much as 24%
- Reduce bulk tank minimum operating temperature from -40°F to -320°F with stainless steel inner vessel
- T304 stainless steel inner complies with food grade standards
- Improve bulk tank thermal efficiency with vacuum-insulated super insulation system
- Control freezing process more accurately by controlling liquid conditions
- Flexible system control allows lower tank operating pressure to further reduce operating costs
- Reduce deliveries at bulk tank site
- Reduce CO₂ emissions
- Liquid connection: 2" NPS, Python[®] Vacuum Insulated Pipe Ready
- Inner vessel designed and built to ASME Section VIII Division 1 code

System Requirements

- Chiller: Option 1: 30HP
480 VAC/3Ph/60Hz
23kW
230 VAC/1Ph/60Hz (control circuit)
171" L x 45" D x 56" H
2500 lbs
- Option 2: 100HP
480 VAC/3Ph/60Hz
230 VAC/1Ph/60Hz (control circuit)
171" L x 90" D x 56" H
5200 lbs
- Pressure Builder: 480 VAC/3Ph/60Hz
12kW

Model	Gross Capacity		Net Capacity		MAWP*		Height		Diameter		Tare Weight**		NER %/day in CO ₂
	Ton	Tonne	Ton	Tonne	psig	bar	in	mm	in	mm	Lbs.	kg	
30 Ton	30.7	27.8	29.1	26.4	350	24.1	291	7,391	114	2,900	44,300	20,094	.05
50 Ton	48.1	43.6	45.8	41.5	350	24.1	406	10,312	114	2,900	56,900	25,810	.04
75 Ton	78.5	71.2	74.5	67.6	350	24.1	623	15,824	114	2,900	73,400	33,294	.04

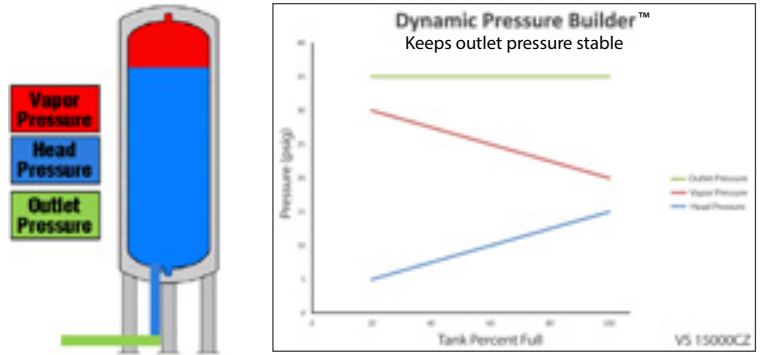
*MAWP - Maximum Allowable Working Pressure. **Weights are for ASME design. (NER) = Normal Evaporation Rate

ChillZilla[®] LN₂ Bulk LN₂ Supply Management System

The ChillZilla[®] bulk LN₂ Liquid Supply System is engineered to provide consistent liquid nitrogen for optimum equipment performance. Ideally suited for Individually Quick Frozen (IQF), immersion freezers and cryobiological storage freezers, the ChillZilla LN₂ system features a Dynamic Pressure Builder™ for precise saturated liquid supply to the freezer regardless of the LN₂ liquid level. The ChillZilla system incorporates an insulation baffle to inhibit the mixing of fresh liquid from a trailer load delivery with the liquid supply to the freezer for better liquid supply stability during the refill.

With the aid of a patented high performance two-stage ambient pressure building coil, the heat management of this circuit is optimized for fast pressure recovery and reduced heat transfer to the contents. Coupling these unique features with the temperature monitoring of the liquid supply, a Programmable Logic Controller (PLC), VJ feed valve with an extended VJ pod and extended legs, the ChillZilla LN₂ system automatically provides the optimum liquid nitrogen supply to any liquid application.

Ideally suited for other LN₂ applications with the same demand, like cryogenic rubber and tire deflashing. Optional gas use conversion assembly available.



Patent No. 6,799,429 B2 & 9,869,429 B2



1 1/2" Vacuum Jacketed Valve and Female Bayonet Standard for Liquid Supply

Shown with optional 40 gpm (8 tph) PB coil

Product Advantages

- Dynamic Pressure Builder™ System for precise saturated LN₂ supply regardless of liquid level
- Insulation Baffle with dedicated upper fill port for uninterrupted LN₂ supply during transport refill
- High performance two-stage ambient pressure builder vaporizer for maximum efficiency (20 gpm (4 tph) standard)
- PLC controlled with actual LN₂ storage temperature, pressure and level monitoring for precise tank pressure control (PB and Vent) with automatic desaturation capability
- High flow automatic pressure building valve improves response time and performance after a fill along with a tighter operating pressure dead-band
- Extended legs and vacuum insulated pod for increased head pressure aids in dampening LN₂ saturation pressure fluctuations
- Large 1 1/2" vacuum insulated inner supply line provides 20 gpm flow
- Large 1 1/2" vacuum insulated isolation valve with mating female bayonet for plug-n-play to Chart VIP and ice-ball free operation
- Dual 125 PSI main tank relief valves standard to protect down stream VIP system (175 psig tank MAWP)
- Reduced deliveries and improved inventory turn-over with 95% bulk tank capacity utilization
- High-performance Composite Super Insulation™ (CSI) for ultra-low heat leak
- Inner vessel designed and built to ASME Section VIII Division 1 code

System Requirements

- PLC: 120 VAC/1Ph/60Hz 15 Amp

Options

- 2" VIP supply line and valve for 40 gpm (8 tph) flow (300' VIP + 5 elbows + 2 valves = 2 psi pressure drop)
- 40 gpm (8 tph) PB coil
- Vent muffler
- Gas use conversion assembly
- Redundant fill valves

Model	Gross Capacity		Net Capacity		MAWP*		Diameter		Height		Weight**		NER % /day LN ₂
	Gal	Liters	Gal	Liters	psig	bar	in	mm	in	mm	lbs.	Kg	
VS 9000CZ	9,354	35,410	8,990	34,031	175	12.1	114	2,896	398	10,109	32,100	14,560	.16
VS 11000CZ	11,410	43,192	10,960	41,438	175	12.1	114	2,896	457	11,608	37,900	17,191	.16
VS 13000CZ	13,470	50,989	13,060	49,437	175	12.1	114	2,896	516	13,106	44,300	20,094	.16
VS 15000CZ	15,520	58,750	15,060	57,008	175	12.1	114	2,896	575	14,605	50,600	22,952	.16

*MAWP - Maximum Allowable Working Pressure. **Weights are for ASME design. (NER) = Normal Evaporation Rate

VS High Pressure High Pressure Bulk Storage

Chart's VS High Pressure Bulk Stations are engineered for superior performance in high pressure applications. To support these demands, the VS High Pressure Bulk Station comes standard with a larger pressure-building regulator and coil. For more demanding applications with higher withdrawal rates, a remote pressure-building system is available.



High flow pressure-building regulator and coil are standard.

Product Advantages

- All welded stainless steel piping modules
- Heavy duty bronze valves with extended bonnets
- Valve bonnet uniformity to reduce spare parts inventory
- Highest grade components for low to zero maintenance
- Separate pressure building and economizer regulators are standard on all 500 psi (34.5 bar) models
- High performance safety system with dual relief valves and rupture disks supplied as a standard
- Inner vessel designed and built to ASME Section VIII Division 1 code

Model	Gross Capacity		Net Capacity		MAWP*		Flow Capacity**		Diameter		Height		Weight***		NER %/day	NER %/day
	Gal	Liters	Gal	Liters	psig	bar	SCFH	Nm ³ /hr	in	mm	in	mm	lbs	Kg	in O ₂ / Ar	in N ₂
VS-1500SC	1,640	6,208	1,580	5,981	500	34.5	3,600	97	66	1,676	196	4,978	8,700	3,946	.35	.56
VS-3000SC	3,150	11,924	3,030	11,470	500	34.5	3,800	100	86	2,184	228	5,791	15,100	6,849	.25	.40
VS-6000SC	6,010	22,750	5,770	21,842	500	34.5	4,700	124	86	2,184	383	9,728	27,100	12,292	.15	.24
VS-9000SC	9,360	35,431	8,990	34,031	500	27.6	7,500	197	114	2,896	348	8,840	38,900	17,645	.10	.16
VS-11000SC	11,410	43,192	10,960	41,488	500	27.6	8,100	213	114	2,896	407	10,338	46,700	21,183	.10	.16
VS-13000SC	13,470	50,989	13,060	49,437	500	27.6	8,600	226	114	2,896	466	11,837	55,100	24,993	.10	.16
VS-15000SC	15,520	58,750	15,060	57,008	500	27.6	14,400	378	114	2,896	525	13,335	63,400	28,758	.10	.16

*MAWP - Maximum Allowable Working Pressure. **Flow capacity rating down to a 20% contents level with a maximum fall off in tank operating pressure of 15 psi (1 bar).

*** Weights are for ASME design. (NER) = Normal Evaporation Rate

Siphon 100[®] Fill Plant Bulk Storage System

Chart has engineered the Siphon 100[®] Bulk Storage Tank to provide an economical, reliable and high-performance storage system for pump filling high-pressure cylinders, liquid cylinders and transports. Current cryogenic tanks have worked for years, but increased efficiencies are now available with the Siphon 100 system allowing you to utilize 100% of the liquid contents.

The Siphon 100 system combines two revolutionary technologies in cryogenic bulk tanks. Its improved “thermal-siphoning” system reduces and efficiently reprocesses the heat from pumping. Additionally, this system’s Composite Super Insulation™ is 30% to 70% more efficient than Perlite in reducing the heat transfer from the atmosphere.

Product Advantages



- Thermal-siphon design manages heat from pump cool down, keeping storage tank pressure down
- Simple and reliable automatic pump start-up in three minutes
- Pump priming at tank pressure of 10 psi (0.69 bar) or less without the necessity for pressure building*
- Vacuum insulated pod provides colder liquid to pump reducing cavitation
- Extended legs add head pressure to pump without increasing liquid inventory for improved pump performance
- Reduce liquid cylinder & Orca™ MicroBulk Delivery System filling losses
- Longer life of high-wear pump parts
- Capability to operate two pumps at once (liquid and HP pump)
- Adapters available to match all standard pumps
- Inner vessel designed and built to ASME Section VIII Division 1 code

**Pump filling only. Add pressure builder if liquid filling large quantities from Siphon 100 tank.*



- Vacuum insulated pod & extended legs provides colder liquid
- Backed by an industry-leading 5-year warranty

Model	Gross Capacity		Net Capacity		MAWP*		Diameter		Height		Weight**		NER % /day in O ₂ / Ar	NER % /day in N ₂
	Gal	Liters	Gal	Liters	psig	bar	in	mm	in	mm	lbs.	Kg		
VS 1500SC	1,640	6,208	1,580	5,981	250	17.2	66	1,676	240	6,096	6,200	2,818	.35	.56
VS 3000SC	3,150	11,924	3,030	11,470	175	12.1	86	2,184	271	6,883	12,800	5,810	.25	.40
VS 6000SC	6,010	22,750	5,770	21,842	175	12.1	86	2,184	425	10,795	21,300	9,660	.15	.24
VS 9000SC	9,354	35,410	8,990	34,031	175	12.1	114	2,896	398	10,109	32,100	14,560	.10	.16
VS 11000SC	11,410	43,192	10,960	41,438	175	12.1	114	2,896	457	11,608	37,900	17,191	.10	.16
VS 13000SC	13,470	50,989	13,060	49,437	175	12.1	114	2,896	516	13,106	44,300	20,094	.10	.16
VS 15000SC	15,520	58,750	15,060	57,008	175	12.1	114	2,896	575	14,605	50,600	22,952	.10	.16

* MAWP - Maximum Allowable Working Pressure. ** Weights are for ASME design. (NER) = Normal Evaporation Rate

Siphon Zero Bulk Fill Plant System with Zero Storage Loss

The Siphon Zero Bulk Storage System is engineered for the efficient storage of argon or oxygen liquid with zero losses at fill plants. The key design feature is a heat exchanger located in the inner vessel gas space. Liquid nitrogen is passed through the heat exchanger to control the tank pressure, preventing any gas losses, regardless of the Siphon Zero usage patterns. Because the heat exchanger can accommodate liquid nitrogen at any time, the operator can easily control the tank pressure – and, ultimately, the saturation pressure of the liquid as desired. Lower saturation pressure in a fill plant tank has many advantages, from a more efficient HP fill pump operation to reducing liquid cylinder filling losses. Built on the Siphon 100® Bulk Storage Tank platform, the Zero model offers all the same features as our standard Siphon 100 model. These key features are: Composite Super Insulation™ for ultra-low heat leak, thermal-siphoning internal piping and a vacuum insulated pod for quick pump operation and reduced heat transfer to the Siphon tank. With the Siphon Zero model in your fill plant operation, you can save expensive gas molecules and improve your filling operation, every day.



Product Advantages

- Replace expensive argon and oxygen gas losses with low cost sacrificial nitrogen
- Control tank pressure and liquid condition as desired
- Control tank sub-cool as desired for HP pump prime uptime
- Reduce HP pump lifetime cold-end costs and pump down time
- Reduce HP cylinder fill time labor by pumping lower saturated (denser) liquid per stroke
- Reduce liquid cylinder and other liquid transfer losses from highly saturated liquid
- Increase storage tank liquid capacity with colder liquid
- Improve gas storage inventory accuracy
- Inner vessel designed and built to ASME Section VIII Division 1 code
- Includes all the benefits of the Siphon 100 design

Ideal Applications

- Argon Fill Plant Storage
- Oxygen UHP Fill Plant Storage

Model	Gross Capacity		Net Capacity		MAWP*		Diameter		Height		Weight**		NER % /day in O ₂ / Ar
	Gal	Liters	Gal	Liters	psig	bar	in	mm	in	mm	lbs.	Kg	
VS 1500SC	1,640	6,208	1,580	5,981	250	17.2	66	1,676	240	6,096	6,200	2,818	.35
VS 3000SC	3,150	11,924	3,030	11,470	175	12.1	86	2,184	271	6,883	12,800	5,810	.25

* MAWP - Maximum Allowable Working Pressure. ** Weights are for ASME design. (NER) = Normal Evaporation Rate

Engineered Tanks

Bulk Storage Systems

Chart's Engineered Bulk Tanks are designed and manufactured with the highest quality standards to satisfy the most stringent applications. Featuring the latest plumbing designs and technologies, Chart's Engineered Bulk Tanks are assembled with state-of-the-art fabrication techniques for maximum cleanliness and durability. Consult the factory for more details.



Product Advantages

- Premium materials, joint designs and fabrication methods minimize particle entrapment
- Vertical and horizontal tanks available from 1500 to 264,000 gallon (6 to 1000 m³) capacities
- Designed in accordance with ASME code, 40 to 250 psig (2.8 to 17.2 barg) or custom pressure
- Standard and custom grades available to comply with any specifications
- Internal cleaning and surface treatment options available
- Applications: Ozone, LNG, Hydrogen (pictured above, left), Electronic Grade (pictured above, right), Air Separation Unit (ASU), and Engineered-To-Order
- Inner vessel designed and built to ASME Section VIII Division 1 code

Ambient Air Vaporizers High-Performance Ambient Vaporizers

Thermax Supergap™ Ambient Vaporizers have become the industry standard for ambient air vaporization. Supergap vaporizers use natural convection of air to vaporize liquefied gases. Finned aluminum tubes absorb heat from the air and transfer that heat to the product gas. The huge four inch gap between fin tips provides room for ice growth allowing for more than 500 hours of continuous operation without defrost, making Supergaps vaporizers ideal for severe climates and long-duration operation. Extended operation requires a vaporizer switching system. In addition to the standard aluminum construction, units are available with stainless steel and other alloy liners for high-pressure and corrosive applications.

Product Advantages

- 12-inch fin tube center-to-center spacing
- 4-inch gap between fins
- Standard models rated up to 200 MSCFH
- Aluminum corrosion-resistant construction
- High-strength welded base frame
- Withstands 100 mph winds and Zone 4 seismic forces
- 600 psig standard design pressure on all aluminum units
- Severe thermal cycling design
- Enhanced internal 16-fin heat transfer area, highest in industry
- No-crate shipping design for larger models
- Perimeter frame and legs for unrestricted airflow
- ANSI B31.3, CRN (all provinces), and PED Category IV Module B & D compliant



Part Number	Thermax Model Number	Flow Rate*		Inlet/Outlet Connection Size (inches)	Dimensions W x D x H (inches)	Weight (Lbs)	Design Pressure
		8hrs, SCFH, Aluminum	Nitrogen SS Lined				
FG00015	SG25HF	2,600	2,100	3/4 MPT	22 x 22 x 152	155	600
FG00028	SG35HF	3,900	3,100	3/4 MPT	32 x 22 x 152	215	600
FG00056	SG50HF	5,200	4,200	3/4 MPT	44 x 22 x 152	275	600
FG00069	SG70HF	7,800	6,200	3/4 MPT	48 x 36 x 152	405	600
FG00089	SG110HF	11,700	9,400	1 Mueller**	48 x 36 x 213	580	450
FG02487	SG140HF	15,600	12,500	1 Mueller**	48 x 48 x 213	760	450
FG00128	SG180HF	19,400	15,500	1 Mueller**	48 x 60 x 213	935	450
FG00154	SG270HF	29,200	23,400	1-1/2 Mueller**	60 x 72 x 224	1,425	450
FG00180	SG360HF	38,900	31,100	1-1/2 Mueller**	75 x 62 x 284	1,890	450
FG00232	SG770HF	82,900	68,300	2 Mueller**	98 x 98 x 284	3,875	450

For nominal flow rate: O₂ - multiply by 0.92, Ar - multiply by 1.14.

* Nominal flow rate is based on eight hours continuous service between defrosts, an ambient temperature of 70°, relative humidity 70%, and a 70° approach temperature. Please consult your Chart sales person for ratings for other conditions.

**Mueller Flanges supplied with mating brass flange, bolts, nuts and gaskets.

All tables and information are intended as guides only. Actual performance and dimensions may vary. Thermax does not make any representations or warranties, express or implied, of fitness for a particular purpose. Request a copy of Thermax's Limited Warranty and Remedy for further details. Speak to a Thermax representative for specific design considerations and application criteria.

VHR Series

Vertical Hospital Reserve Storage System

The VHR Series high-performance storage system creates a competitive advantage with industry-leading hold times and a stainless steel, low maintenance outer shell. The VHR liquid bulk systems are economical customer stations designed to receive and hold liquid oxygen at a low temperature and pressure. This low-cost storage system is ideal for applications requiring liquid or reserve supply, such as hospitals, nursing homes and health care facilities, or as back-up to membrane/PSA systems.



Product Advantages

- Dual relief and rupture disc vent system with a 3-way diverter valve
- Extended Stem Valve on all liquid lines
- Analog liquid level gauge with low level alarm
- Stainless steel interconnecting piping
- All stainless steel outer vessel eliminates the need for paint and surface maintenance
- Internal product vaporizer saves pad space and reduces maintenance costs
- Super-insulation system provides industry leading NER performance and extended product hold times
- Optional Certified lab test reports for medical oxygen service available
- Inner vessel designed and built to ASME Section VIII Division 1 code

Model	VHR-120	VHR-260	VHR-400
Capacity - Liquid (gal / liters)			
Net	112 / 424	255 / 964	387 / 1,479
Gross	118 / 447	268 / 1,015	407 / 1,553
Capacity - Gas @ 1 atm of 70°F (SCF / NM³)			
Nitrogen	10,500 / 280	23,800 / 630	36,100 / 950
Oxygen	12,900 / 340	29,400 / 780	44,600 / 1,180
Argon	12,600 / 340	28,700 / 760	43,600 / 1,150
Dimensions (in / cm)			
Diameter	30 / 76	42 / 107	48 / 122
Height	80 / 203	94 / 239	100 / 254
Weight (lbs / kg)			
Tare	700 / 320	1,700 / 770	2,100 / 950
Nitrogen	1,400 / 640	3,500 / 1,590	4,800 / 2,180
Oxygen	1,710 / 780	4,200 / 1,910	5,800 / 2,630
Argon	1,950 / 890	4,700 / 2,130	6,600 / 2,990
Maximum Pressure (psig / bar)	250 / 17	250 / 17	250 / 17
Gas Delivery Rate (SCFH O₂ / Nm³H O₂)			
Normal*	340 / 10	620 / 18	790 / 22
Peak**	490 / 14	890 / 25	1,140 / 32
Evaporation Rate (% per day of O₂ / Ar)	1.1	0.62	0.62
Evaporation Rate (% per day of N₂)	1.8	1.0	1.0

* Normal flow rate is for eight hours with a minimum exit temperature of 32°F at an ambient temperature of 68°F.

** Peak flow rate is for one hour with a minimum exit temperature of 32°F at an ambient temperature of 68°F.

Automatic Switching Manifold Ambient Vaporizer

The Chart Automatic Ambient Vaporizer Switching Manifold reduces the amount of ice build-up in your vaporizer process to keep them performing at peak efficiency. Designing a vapor system with two independent vaporizers provides the most efficient vaporization solution. Minimizing the amount of ice build-up from overworking a single vaporizer, the controller automatically alternates vaporizers based on the size and usage of your vaporizer system.

While the unit is operated by electricity, the loss of power does not shut down the vaporizing system; it simply continues to supply gas through the same vaporizer until power is restored.



Product Advantages

- 110 Volt, 60 Hz Single Phase
- 3-way valve for long service life
- Electric actuator operation
- Oxygen Cleaned for Medical Service
- NEMA-4 Enameled Steel or SS Enclosure
- ½", 1" and 1½" NPT sizes available

Local Signal Panel Medical Gas Supply

Chart offers two medical local signal panels that are designed to meet all National Fire Protection Association (NFPA) alarm requirements for medical bulk oxygen storage systems.



Product Advantages

- Meets 2005 NFPA 99 lock signal panel design requirements
- Provides local visual indication of alarms at the tank pad
- Provides dry contacts for all alarms, allowing hospital alarm loop connection
- Includes 24VDC power supply for powering all local alarm loops
- Compatible with most liquid level and pressure indicating systems that provide contacts for system low liquid level and pressure
- Designed to fail safe – any loss of power or abnormal condition will send the appropriate channel into alarm
- Durable weather-resistant construction meets NEMA-4 standards and will withstand years of outdoor use
- Available for high-pressure gas or liquid backup systems

Final Line Pressure Control Manifold Industrial Gas

The Final Line Pressure Control Manifold is the last key piece of equipment for the gas to pass through before entering the house line. It is critical that the regulators can supply sufficient flow without adding significant pressure drop to the system while maintaining the required house line pressure. The Final Line Pressure Control Manifold from Chart offers a simple ergonomic solution in a complete package for easy installation.



Model IG-200D4000FS - Free Standing - Dual Regulator

Product Advantages

- Oxygen, nitrogen, argon and CO₂ industrial gas service
- Field adjustable mounting stand
- High flow, quarter turn isolation ball valves
- Minimum design temperature: -40°C/°F
- All brazed stainless steel and copper piping for premium quality
- Ergonomic design allows for easy operation and maintenance

Model Final Line PCM	Application	Control Design	Gas Flow *		
			SCFH	Nm ³ h	
IG-110BPS3500FS	Industrial Gas (N ₂ , Ar, O ₂)	40-110 PSI w/By-Pass Single Regulator	0-3,500	0-99	
IG-110D4000FS	Industrial Gas (N ₂ , Ar, O ₂)	40-110 PSI Dual Regulator	0-4,000	0-113	
IG-200BPS3500FS	Industrial Gas (N ₂ , Ar, O ₂)	100-200 PSI w/By-Pass Single Regulator	0-3,500	0-99	
IG-200D4000FS	Industrial Gas (N ₂ , Ar, O ₂)	100-200 PSI Dual Regulator	0-4,000	0-113	
CO2-110BPS3500FS	Industrial CO ₂	40-110 PSI w/By-Pass Single Regulator	0-3,500	0-99	
CO2-110S3500FS	Industrial CO ₂	100-200 PSI Single Regulator	0-3,500	0-99	
CO2-200D4000FS	Industrial CO ₂	100-200 PSI Dual Regulator	0-4,000	0-113	
Medical Gas Manifold		Primary Supply	Reserve Supply		
MO-LHP3500FS	Medical Oxygen	Liquid	High Pressure Cylinder	0-3,500	0-99
MO-LHP3500CAB	Medical Oxygen	Liquid	High Pressure Cylinder	0-3,500	0-99
MO-LL3500FS	Medical Oxygen	Liquid	Liquid	0-3,500	0-99
MO-LL3500CAB	Medical Oxygen	Liquid	Liquid	0-3,500	0-99
HO-L4000FS	Hyperbaric Oxygen**	Liquid	N/A	0-4,000	0-113
HO-L4000CAB	Hyperbaric Oxygen**	Liquid	N/A	0-4,000	0-113

* Flow rates are approximate. Contact Chart for your application.

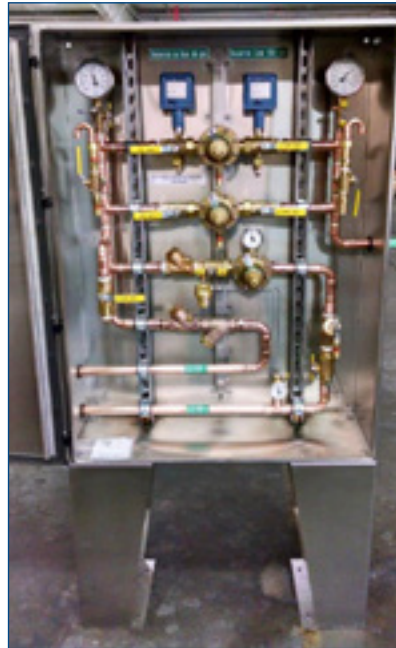
**Hyperbaric Oxygen Manifold must be used with a Medical Oxygen Manifold (includes tie in).

Medical Gas Manifold Oxygen Service

The Medical Gas Manifold is the final piece of equipment for gasified liquid oxygen to pass through before entering the house oxygen line to the hospital. It is the command center and ensures that the oxygen storage and distribution system is functioning properly. The Medical Gas Manifold monitors the liquid levels and pressures of the primary and secondary gas supply, and interfaces with the hospital's alarm system. All manifolds are free standing and are available with an aluminum rain shield or a heavy gauge stainless steel cabinet for NFPA compliance.



Model MO-LL3500FS - Liquid Reserve - Free Standing - Economizer Regulator - Hyperbaric Tie In



Model MO-LL3500CAB - Liquid Reserve - Economizer Regulator - Hyperbaric Tie In - Stainless Steel Cabinet Mounted

Product Advantages

- Liquid supply tanks monitored with economizer regulators to reduce product loss
- All brazed stainless steel and copper piping for premium quality
- Ergonomic design allows for easy operation and maintenance
- All models for Medical Oxygen include tie in for Hyperbaric Chambers

Cabinet	Pipe Connections	Width		Height		Depth		Weight	
		in	cm	in	cm	in	cm	lbs	kg
Free standing no cover	1" Nom Copper	36	91	60	152	8	20	35	16
Free standing no cover	1" Nom Copper	36	91	60	152	8	20	40	18
Free standing no cover	1" Nom Copper	36	91	60	152	8	20	35	16
Free standing no cover	1" Nom Copper	36	91	60	152	8	20	40	18
Free standing no cover	1" Nom Copper	36	91	60	152	8	20	35	16
Free standing no cover	1" Nom Copper	36	91	60	152	8	20	40	18
Free standing no cover	1" Nom Copper	36	91	60	152	8	20	40	18
Free Standing w/Alum Rain Cover	1" Nom Copper	36	91	72	183	8	20	125	57
Standing Stainless Steel Cabinet w/Door	1" Nom Copper	36	91	72	183	12	30	200	91
Free Standing w/Alum Rain Cover	1" Nom Copper	36	91	72	183	8	20	125	57
Standing Stainless Steel Cabinet w/Door	1" Nom Copper	36	91	72	183	12	30	200	91
Free Standing w/Alum Rain Cover	1" Nom Copper	36	91	72	183	8	20	60	27
Standing Stainless Steel Cabinet w/Door	1" Nom Copper	36	91	60	152	12	30	150	68

Trifecta® XPro Series Laser Assist Gas Supply System

The Trifecta® XPro Series Gas Supply System is the preferred solution for reliable and continuous laser assist gases for delivery pressures up to 550 psig and flow rates up to 15,000 scfh. Drawing liquid from a standard bulk tank, the Trifecta system boosts the liquid pressure by alternately feeding two liquid cylinders equipped with innovative multi-function pressure building vaporizers. Each cylinder alternates dispensing liquid to a vaporizer, providing gas to the application. The Trifecta solution has no downtime during liquid delivery and minimal losses when compared with other laser assist gas solutions. This convenient solution eliminates high-pressure pumps, compressors, cylinder cradles and surge tanks.

Product Advantages

- System utilizes standard MP (175 or 250 psig) bulk tank to reduce investment and use existing assets
- No downtime – system maintains pressure and flow when bulk tank is filled and eliminates excessive product losses associated with high-pressure bulk tanks
- Cylinders switch by pressure instead of level to further reduce product loss and protect against pressure decay
- Robust design features streamlined all stainless steel piping with only five control valves and one integrated electronic control system (PLC) for increased durability and reliability
- Computer-controlled design simplifies installation, start-up and continuous operation
- Frame assembly features a protective top cover in a compact footprint with an elevated base for improved ventilation
- Inconel and copper material used where required in oxygen service model (meets CGA guidelines)
- Available for Nitrogen, Argon, and Oxygen service



Trifecta XPro Gas Supply System

TRIFECTA XPRO SPECIFICATIONS										
Model	Flow		MAWP		MAOP		Dimensions (W x D x H)		Weight	
	(SCFH)	(Nm ³ /h)	(psig)	(barg)	(psig)	(barg)	(in)	(cm)	(lb)	(kg)
XPRO LIN/LAR-500 15K	15,000	425	500	34.5	450	31	65 x 59 x 95.25	165 x 150 x 242	1800	816.5
XPRO LOX-500 15K	15,000	425	500	34.5	450	31	65 x 59 x 95.25	165 x 150 x 242	1800	816.5
XPRO LIN/LAR-600 15K	15,000	425	600	41.4	550	38	65 x 59 x 95.25	165 x 150 x 242	1900	861.8



XPro Controller

System Requirements

- 15 amp, 110 VAC power, dedicated circuit
- Bulk storage tank with 125 psig minimum pressure
- External vaporizer, minimum 650 psig working pressure, sized for maximum flow rate
- One piping connection to bulk storage tank
- One piping connection to downstream process vaporizer
- Optional: vent-to-bulk connection
- High-flow pressure regulation

Trifecta[®] Pro 30K Laser Assist Gas Supply System

The Trifecta[®] Pro 30K Gas Supply System is the preferred solution for reliable and continuous laser assist gases for delivery pressures up to 550 psig and flow rates up to 30,000 scfh. Drawing liquid from a standard bulk tank, the Trifecta system boosts the liquid pressure by alternately feeding two liquid cylinders equipped with innovative multi-function pressure building vaporizers. The Trifecta solution has no downtime and minimal losses when compared with other laser assist gas solutions. This convenient solution eliminates high-pressure pumps, compressors, cylinder cradles, and surge tanks.

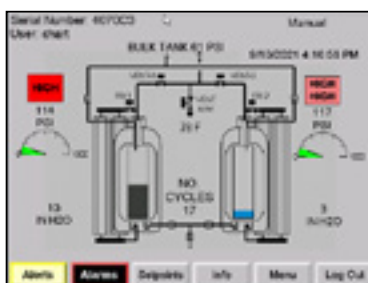
Product Advantages

- System utilizes standard MP (175 or 250 psig) bulk tank to reduce investment and use existing assets
- No downtime – system maintains pressure and flow when bulk tank is filled, thus minimizing product losses associated with filling high pressure bulk tanks
- Cylinders switch by pressure instead of level to further reduce product loss and protect against pressure decay
- Robust design features streamlined all stainless steel piping with only five control valves and one integrated electronic control system (PLC) for increased durability and reliability
- Computer-controlled design simplifies installation, start-up and continuous operation
- Frame assembly features a protective top cover in a compact footprint with an elevated base for improved ventilation
- Plumbing configuration allows for an easy addition of stand alone pressure build vaporizers in the field
- Available for Nitrogen and Argon service



Trifecta Pro 30K Gas Supply System

TRIFECTA PRO 30K SPECIFICATIONS											
Model	Service	Flow		MAWP		MAOP		Dimensions (W x D x H)*		Weight	
		(SCFH)	(Nm ³ /h)	(psig)	(barg)	(psig)	(barg)	(in)	(cm)	(lb)	(kg)
Pro30	LIN/LAR	30,000	850	600	41.4	550	37.9	72x84x96	183x213x244	4500	2041



Pro 30K HMI Screen

System Requirements

- 15 amp, 110 VAC power, dedicated circuit
- Bulk storage tank with 125 psig minimum pressure
- External vaporizer, minimum 650 psig working pressure, sized for maximum flow rate
- One piping connection to bulk storage tank
- One piping connection to downstream process vaporizer
- Optional: vent-to-bulk connection
- High-flow pressure regulation

APPS 160 Adjustable Pressure Phase Separator

The Adjustable Pressure Phase Separator (APPS 160) unit is used to lower the saturation point of liquid nitrogen, when supplied from a high pressure bulk storage tank. Liquid nitrogen saturated at a high pressure flows into the APPS 160, and exits at a much lower saturation pressure and temperature. Liquid nitrogen enters the APPS 160 unit through an automatic solenoid valve, and exits through a one-inch vacuum insulated female bayonet. A control panel maintains the liquid level in the cylinder.

An adjustable back pressure regulator is used to maintain tank pressure. During times of rapid pressure increases, such as a fill, a vent solenoid valve will open to rapidly vent the APPS 160 unit down to the desired pressure.

Product Advantages

- Allows low pressure liquid and high pressure gas from a single storage vessel
- More precise pressure control on liquid use
- Mini-bulk storage for under-sized vacuum insulated pipe lines
- Two operating pressure ranges available for pressure adjustments from 10-85 psig
- Stainless steel plumbing
- Low cost alternative to two bulk tanks



Generation 4 APPS 160

Height	61 9/16 in / 1564 mm
Width	30 3/16 in (20 in OD cyl) / 767 mm
Weight (tare)	210 lbs / 138 kg
Capacity	160 liters / 42.27 gallons
Cryogenic Fluids *	Nitrogen
Inlet Connection	1/2 in male 45° Flare
Outlet Connection	1 in female MVE bayonet (MPT adapter option)
Vent Connection	1/2 in female pipe thread
Max. Allowable Working Pressure	100 psi / 6.9 bar
Operating Pressure Range Options	10-50 psi or 40-85 psi / .7-3.4 bar or 2.8-5.9 bar
Max. Inlet Pressure	235 psi / 16.2 bar
Max. Withdrawal Rate	15 gallons per minute continuous
Steady State Noise	85-91 dB
Power Requirements	110 Volt / 60 Hz 100 watts or 220 Volt / 50 Hz Option
Applicable Codes	ASME Section VIII, Division 1
Evaporation Rate (% per day of LN₂)	2.0
Evaporation Rate (% per day of O₂ / Ar)	1.4

* Oxygen and argon service available upon special request. Specifications subject to change at any time without notice.

Vacuum Jacketed (VJ) Valves Cryogenic Pipe Systems

Cryogenic pipe systems often require valves to properly control the liquid flow to the application. Strategically located valves control flow to a branch of the system or into a use-point drop. A vacuum jacketed valve has the benefit of extremely low heat leak for minimum gas boil-off, and it eliminates ice build-up and dripping water.

Product Advantages

- Available in many sizes and styles such as T or Y pattern.
- Actuators can be installed on valves for control from a remote location or signal. Standard pneumatic actuators are often used to control flow rate or open and close valves based on the state of a switch, control system, or oxygen system E-stop switch.
- Vacuum Insulated Pipe (VIP) ready with female bayonet termination

Bulk Tank Liquid Withdrawal Vacuum Jacketed Valve Option with Female Bayonet



T-Pattern Vacuum Insulated Globe Valve



Y-Pattern Vacuum Insulated Globe Valve



Tank-Tel[®] Liquid Level Gauge

Go digital with Chart's Tank-Tel[®] system, the industry leading hands-free tank monitoring solution. Forget the time and hassles of calibration charts associated with traditional analog tank monitoring. The Tank-Tel system brings you a low cost, reliable and userfriendly differential pressure (DP) gauge for industrial bulk tank applications.

Product Advantages

- Choice of digital liquid level and pressure readouts
 - (8) level choices: percent full, standard cubic feet, gallons, inches of water, pounds, normal cubic meters, liters or kilograms
 - (3) pressure choices: pounds per square inch, kilopascals or bars
- Oxygen, Nitrogen Argon, CO₂ and N₂O gas densities pre-programmed for accurate level read-out.
- Operates on 12 VDC (12 VDC required for telemetry) or batteries
- Standard on new Chart bulk tanks
- Improved level accuracy program automatically adjusts for changes in liquid density
- Programmable to match any custom tank dimensions
- Upgrade existing tank by adding to or replacing existing gauges
- Telemetry ready – two choices:
 - (1) Analog phone line up to 4 signals
 - (2) Cellular battery power for level and easy install
- Available in a low DP model for horizontal tanks



Patents - 6,782,339 • 6,944,570

Analog Pressure & Liquid Level Gauges

Analog pressure and liquid level gauges option replaces the Tank-Tel[®] Liquid Level Gauge assembly. Phase Line tee connections allow for a convenient connection point of high and low phase lines for an owner supplied telemetry system or remote level gauge.

Product Advantages

- Equalization valve standard
- Phase line tee connections optional
- Custom liquid level chart (Calibration Chart) available upon request





Chart Online Marketing Services

As Chart Inc. continues to provide distributors and customers with the best products and services in the industry, we would like to introduce you to an innovative marketing support tool designed to assist you in growing your business faster! Chart Online Marketing Services is like having your very own 24/7 marketing department providing you the marketing materials needed to drive customers to you. But this is much more than just a site to download product photos, you now have the ability to truly customize brochures, spec sheets and posters with your local contact information and company logo.

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Chart Tank Sizing App

Correctly sizing your cryogenic equipment supply is easy when you know how – or know who to ask. For decades, Chart has helped gas distributors select the optimal cryogenic storage products for their customers. But now, Chart has developed a new **Tank Sizing App** that can advance your mode-change sales process faster and more accurately. No matter the challenge, Chart will provide the tools you need to succeed.

Download the app today for free at your app store and start learning from our experience.

Saturation Pressure PSIG	OXYGEN		NITROGEN		ARGON	
	Liquid Density Lbs/Ft ³	Gas Density SCF/Gal	Liquid Density Lbs/Ft ³	Gas Density SCF/Gal	Liquid Density Lbs/Ft ³	Gas Density SCF/Gal
0	71.17	115.10	50.44	93.11	87.51	112.50
5	70.42	113.72	49.62	91.55	85.77	110.89
10	69.80	112.73	49.00	90.40	84.77	109.60
25	67.86	109.59	47.50	87.63	82.46	106.61
50	65.55	105.86	45.69	84.18	79.90	103.31
75	63.76	102.97	44.19	81.53	77.90	100.71
100	62.43	100.82	42.88	79.12	76.15	98.45
150	59.80	96.57	40.70	75.08	73.16	94.59
200	57.62	93.05	38.76	71.51	70.28	90.87
250	55.60	89.79	36.83	67.95	67.79	87.65

Note: Density of water at 60°F = 62.30 lbs/cu ft

Argon

	Weight		Gas		Liquid	
	Pounds (Lb)	Kilograms (Kg)	Cubic Feet (SCF)	Cubic Meters (Nm ³)	Gallons (Gal)	Liters (L)
1 Pound	1.0	0.4536	9.671	0.2543	0.08900	0.3255
1 Kilogram	2.205	1.0	21.32	0.5605	0.18957	0.7176
1 SCF Gas	0.1034	0.04690	1.0	0.02628	0.008893	0.03366
1 Nm ³ Gas	3.933	1.7840	38.04	1.0	0.3382	1.2802
1 Gal Liquid	11.630	5.276	112.5	2.957	1.0	3.785
1 L Liquid	3.072	1.3936	29.71	0.7812	0.2642	1.0

Nitrogen

1 Pound	1.0	0.4536	13.803	0.3827	0.1481	0.5606
1 Kilogram	2.205	1.0	30.42	0.7996	0.3262	1.2349
1 SCF Gas	0.07245	0.03286	1.0	0.02628	0.01074	0.04065
1 Nm ³ Gas	2.757	1.2506	38.04	1.0	0.4080	1.5443
1 Gal Liquid	6.745	3.060	93.11	2.447	1.0	3.785
1 L Liquid	1.782	0.8083	24.60	0.6464	0.2642	1.0

Oxygen

	Weight		Gas		Liquid	
	Pounds (Lb)	Kilograms (Kg)	Cubic Feet (SCF)	Cubic Meters (Nm ³)	Gallons (Gal)	Liters (L)
1 Pound	1.0	0.4536	12.076	0.3174	0.1050	0.3977
1 Kilogram	2.205	1.0	26.62	0.6998	0.2316	0.8767
1 SCF Gas	0.08281	0.03756	1.0	0.02628	0.008891	0.0329
1 Nm ³ Gas	3.151	1.4291	38.04	1.0	0.3310	1.2528
1 Gal Liquid	9.527	4.322	115.1	3.025	1.0	3.785
1 L Liquid	2.517	1.1417	30.38	0.7983	0.2642	1.0

SCF (Standard Cubic Foot) gas measured at 1 atmosphere and 70°F.
Liquid measured at 1 atmosphere and boiling temperature.

Nm³ (normal cubic meter) measured at 1 atmosphere and 0°C.

Carbon Dioxide

	Weight			Gas		Liquid		Solid
	Pounds (Lb)	Tons (T)	Kilograms (Kg)	Cubic Feet (SCF)	Cubic Meters (Nm ³)	Gallons (Gal)	Liters (L)	Cubic Feet (Cu Ft)
1 Pound	1.0	0.0005	0.4536	8.741	0.2294	0.11806	0.4469	0.010246
1 Ton	2000.0	1.0	907.2	17,483.0	458.8	236.1	893.9	20.49
1 Kilogram	2.205	0.0011023	1.0	19.253	0.5058	0.2603	0.9860	0.2260
1 SCF Gas	0.1144	—	0.05189	1.0	0.02628	0.013506	0.05113	0.0011723
1 Nm ³ Gas	4.359	0.002180	1.9772	38.04	1.0	0.5146	1.9480	0.04468
1 Gal Liquid	8.470	0.004235	3.842	74.04	1.9431	1.0	3.785	0.08678
1 L Liquid	2.238	0.0011185	1.0151	19.562	0.5134	0.2642	1.0	0.02293
1 Cu Ft Solid	97.56	0.04880	44.25	852.8	22.38	11.518	43.60	1.0

SCF (Standard Cubic Foot) gas measured at 1 atmosphere and 70°F.
Liquid measured at 21.42 atmospheres and 1.7°F

Nm³ (normal cubic meter) gas measured at 1 atmosphere and 0°C.
Solid measured at -109.25°F.



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