



Cooler By Design.™

IG Distribution And Storage Products

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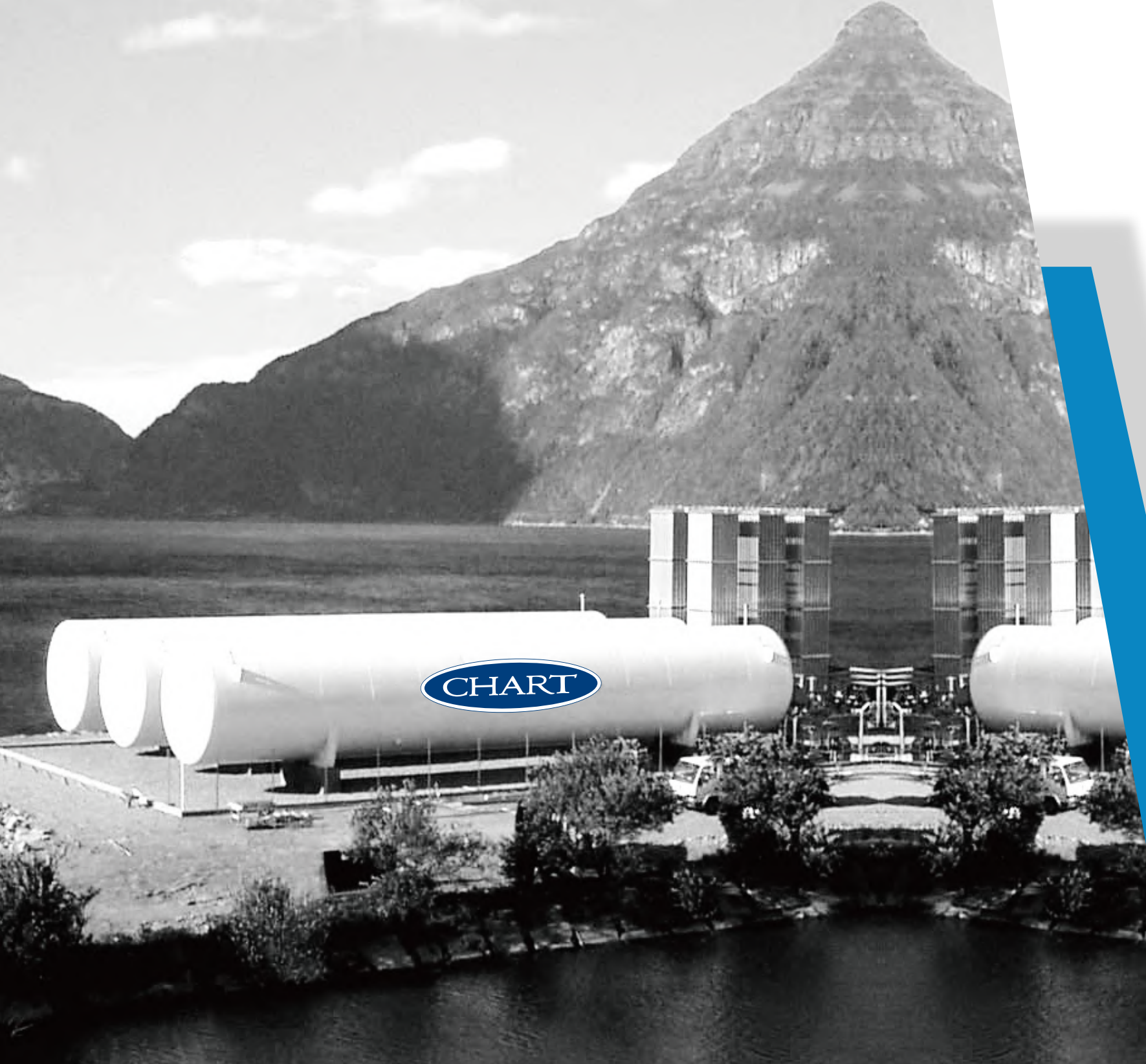
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80 Years Of Cryogenic
Industry Experience

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WE ARE CHART



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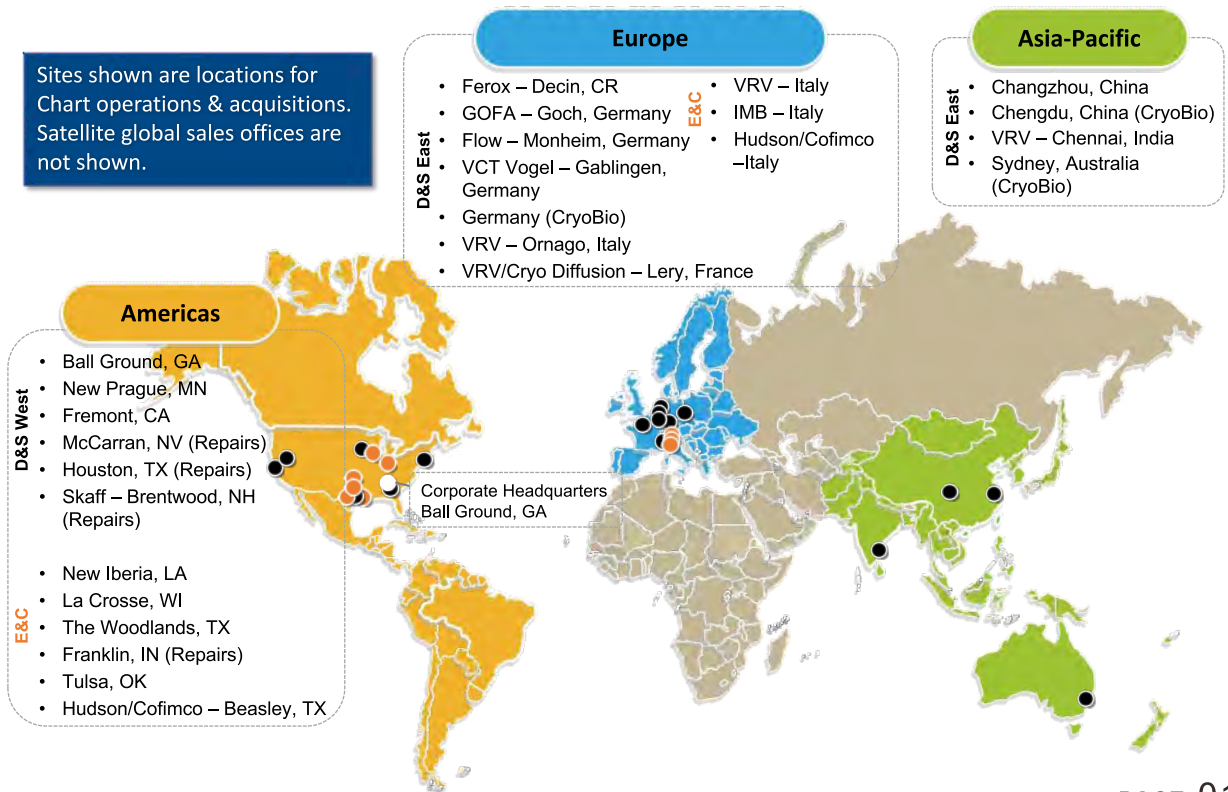
COMPANY PROFILE



Chart Industries, Inc. (Nasdaq: GTLS) is a leading independent global manufacturer of highly engineered equipment servicing multiple market applications in Energy and Industrial Gas. Our unique product portfolio is used throughout the liquid gas supply chain in the production, storage, distribution and end-use of atmospheric, hydrocarbon, and industrial gases. Chart has domestic operations located across the United States and an international presence in Asia, Australia, Europe and Latin America.

As the world transitions to a low carbon energy future, Chart is a key player in the development of LNG as a clean burning fuel alternative for power and transportation. It is the only international company equipped to provide complete solutions across the value chain; from liquefaction to end-use, particularly through the development of small-scale models and associated infrastructure that are revolutionizing the industry.

CHART HAS OPERATIONS ACROSS THE GLOBE



SOLUTIONS ACROSS THE IG SUPPLY CHAIN



Liquefaction Distribution

Chart brazed aluminum heat exchangers (BAHX) and cold boxes are at the heart of processes used for the liquefaction of natural gas.

Chart's proprietary IPSMR® process technology is 10% more efficient than other comparable processes.

Chart provides complete liquefaction plant solutions for small-scale LNG.

Chart's offers a complete range of products for the safe and efficient distribution of liquid gases by road, rail and sea.

It's more than 25 years since we pioneered the concept of cryogenic ISO containers and our mobile units are rugged and extremely reliable.

All Chart distribution products are supported by our best in class service packages.

Storage Terminal Application

Chart provides a complete range of cryogenic storage tanks from the smallest standard units through to the world's largest shop built units.

Chart Vacuum Technology® provides the highest thermal efficiency for maximum hold times and significantly reduced product loss.

Chart is a renowned global technology leader in the cryogenic industry pioneering the development of storage, transportation and technical solutions for liquid gases.

CHART IN CHINA

QUALIFICATION CERTIFICATE



In the early nineties, Chart introduced mature cryogenic technology into China, and has maintained a strong presence in the country ever since. Our wholly owned subsidiary located in Changzhou, Jiangsu is one of the six global research and manufacturing centers. Our motto is "US and European quality, Chinese Price", and our world class development team ensures that the performance of our products is perfectly consistent with equivalent items built in any of Chart's US and European facilities and totally trusted by our customers.

Through our products we serve two major applications; liquefied natural gas (LNG) and industrial gases. LNG products include liquefaction plants, heat exchangers and cold boxes, road trailers, railcars, ISO containers, fueling stations, vehicle tanks and marine solutions. From liquefaction to fuel systems, all LNG products utilize state-of-the-art US technology, providing optimal solutions and complete, one-stop service.

Industrial gas products are widely used in industrial, commercial and scientific applications, such as the purification, liquefaction, transportation, storage and utilization of various gases (helium, nitrogen, argon, oxygen, carbon dioxide). Applications served include: welding, laser cutting and a wide variety of industrial processes, biomedical, video production, entertainment, aviation, thermal testing, alternative fuels, vacuum systems, drinks dispense and many others for science and leisure.



- ISO 9001 Quality Certification
- ISO 14001 Environmental Certification
- OHSAS 18001 Health & Safety Certification
- IATF 16949 Automotive Quality Certification
- Manufacture license of special equipment of PRC (A2,B4,C2,C3)
- Design license of special equipment of PRC (A2,C2,C3)
- Installation license of special equipment of PRC (GC2,1)
- China Compulsory Certification
- ASME U Authorization
- NB R Authorization
- DOT approval for Welded Insulated Cylinders
- PED European Pressure Equipment Directive (CE Mark)
- KGSC Manufacturing Registration for Korean
- CCS approval for Marine Products
- BV approval for Marine Products

CHART Patented Cryogenic Liquid Transport Vehicle With Pump (ORCA)



Chart's ORCA is a cryogenic liquid transport vehicle with integral pump and accurate metering system, developed for the transportation and dispensing of many cryogenic liquids including oxygen, nitrogen argon, and carbon dioxide.

When Chart launched the ORCA, complete with submerged pump, in the USA it revolutionized the gas industry. This is a cryogenic liquid distribution vehicle incorporating the most advanced technology, the highest safety, the simplest operation and no emissions in operation; filling a gap gap in the global cryogenic transportation industry.

In 2006, Chart China introduced this technology and completed the localization design in accordance with associated domestic norms and standards. Chart China's ORCA series of cryogenic liquid delivery vehicles are equipped with a satellite positioning system in accordance with local regulations. They perform fixed tank filling and the process requires no pump cold, no liquid loss, with highly accurate metering. For our customers this means reduced labor costs, improved operational efficiency, and increased revenue!

Product advantages

- Designed with a submerged pump, no need for a pump cold, and easy to move with the charge (LOX/LCO2 is an external pump)
- Ergonomically designed sunken cabinet
- Integrated, one-button operation for optimum safety
- High-precision flowmeter from Germany (Chart's FLOW brand) with stable, reliable and accurate metering and ticket printing function
- The most advanced inner container support system ensures the reliability of the vehicle
- Satellite positioning system with fixed-point discharge function
- Complete electronic control system with automatic shut-off and pump stop function
- High quality accessories, low failure rate and high stability



Flowmeter-Flowcom 3000



ORCA cabinet

Specifications

Model I	IG ORCA										
	ORCA rigid tanker						ORCA small semi-trailer				
Product model	CTZ5265GDY	CTZ5268GDYB	CTZ5260GDYB	CTZ5261GYU	CTZ5265GDYC	CTZ5268GDYC	CTZ5260GDYC	CTZ9180GDY	CTZ9181GDY	CTZ9182GDY	CTZ9180GYU
Chassis model	SITRAK-C5H	SITRAK-C5H	SITRAK-C5H	SITRAK-C5H	SCANIA P320	SCANIA P320	SCANIA P320	SINGLE-AXLE	SINGLE-AXLE	SINGLE-AXLE	SINGLE-AXLE
Medium	LIN	LOX	LAR	LC02	LIN	LOX	LAR	LIN	LOX	LAR	LC02
Capacity(m³)	17	12.9	10.84	11.9	17	12.9	10.84	15.6	11.7	9.63	10.62
Design pressure (MPa)	0.5	0.5	0.5	2.4	0.5	0.5	0.5	0.52	0.52	0.52	2.4
Adiabatic mode	High vacuum multilayer insulation (aluminum foil + fiberglass paper)										
Loading and offloading mode	Differential pressure(Loading)/pump(Offloading)										
Axles number	3	3	3	3	3	3	3	1	1	1	1
Tare Weight (Kg)	13630	12430	12140	14300	14306	13145	12880	6910	6240	5750	8155
Rated mass(Kg)	Based on the actual density of the liquid source										
Total mass(Kg)	26000	26000	26000	26000	26000	26000	26000	18000	18000	17570	18000
Length (mm)	8805	8805	8805	8805	8805	8805	8805	7600	7240	7430	7320
Width (mm)	2500	2500	2500	2500	2500	2500	2500	2495	2495	2495	2495
Height (mm)	3450	3350	3200	3300	3450	3350	3200	3385	3205	2980	3070
Tractor model	6x4 National VI	6x4 National VI	6x4 National VI	6x4 National VI	6x2 National VI	6x2 National VI	6x2 National VI	4x2tractor	4x2tractor	4x2tractor	4x2tractor

Note: The above pictures and data are for reference only, the actual structure and data are subject to the actual product.

Chart offers the complete MicroBulk delivery System (Cryogenic liquid transport vehicle with pump (ORCA) + Cryogenic liquid small storage tank(Perma)) stable and reliable solution for different needs of various working conditions. ORCA provides flexible, fast, reliable and accurate metering of cryogenic liquid distribution for small storage tanks Perma and common standard tanks. The automatic cut-off function effectively eliminates safety hazards during filling and product loss due to overcharging.

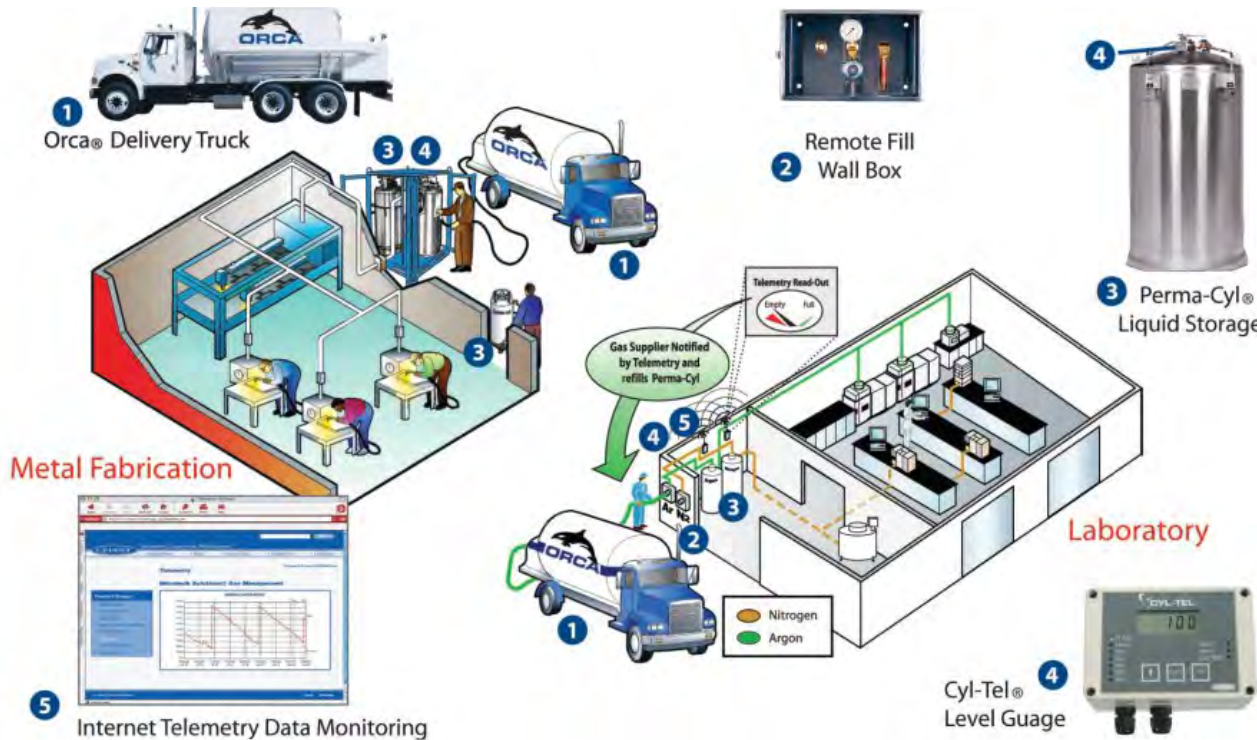


CHART Patented--Cryogenic Liquid Semi-trailer



The cryogenic liquid semi-trailer is used for the transportation of various cryogenic liquids such as oxygen, nitrogen argon and carbon dioxide. The products are designed and manufactured in accordance with relevant domestic specifications.

According to the different working conditions of the customer site, the following axle forms can be selected: single-axle semi-trailer, two-axle semi-trailer, and three-axle semi-trailer. All products are equipped with axles according to the weight requirements of domestic road regulations, and the axle load capacity is maximized.

The inner vessel and the pipe are made of austenitic stainless steel. The outer vessel is made of high-quality carbon steel and protected by high-quality paint. The interlayer is made of high-vacuum multi-layer winding insulation system to provide excellent thermal insulation performance.

The cabinet adopts a sunken structure design, and the maximum possible ergonomic design makes the operation convenient and safe.

The product can be driven by external power supply, hybrid power supply (external power supply + vehicle generator), or hydraulically driven three types of cryogenic liquid pumps. Optional digital display flow meter and printer. Equipped with spare tires and lifting brackets. Equipped with infusion hose storage box.

Product advantages

- All valves and instruments are ergonomically designed for safe and convenient operation
- Light weight, maximum effective loading, improved transportation efficiency and reduced transportation costs
- Independent dual-circuit pressure relief device and three-way valve with release back pressure valve for the highest safety and reliability
- Equipped with a fully functional rear control box. Including liquid filling and offloading control valves, pressure gauges, level gauges, gas and liquid sampling connector, safety relief devices. High-quality accessory configurations deliver the highest reliability.
- Anti-sliding system can effectively prevent the tractor from pulling off the hose or damaging the equipment without unloading the filling hose
- Optional extras for the running gear include axles, suspension brands and forms (for example, BPW or Hendrickson air suspension brake shafts), with air suspension and disc brakes as standard. The height of the airbag can be adjusted. The axles are durable, long lasting and deliver excellent performance with low maintenance costs.
- WABCO EBS anti-rollover and anti-lock brake stabilization system

Specifications

Model	IG Trailer				
Product model	CTZ9405GDYA	CTZ9408GDY	CTZ9407GDYA	CTZ9406GDY	CTZ9290GDY
Running gear model	3-axle semi-trailer	3-axle semi-trailer	3-axle semi-trailer	3-axle semi-trailer	2-axle semi-trailer
Medium	LIN	LOX	LAR	LCO2	LOX
Geometric volume (m³)	37.23 m³	28 m³	23.8 m³	26.38 m³	17.52 m³
Design pressure (MPa)	0.3 MPa	0.3 MPa	0.3 MPa	2.4 MPa	1.6 MPa
Adiabatic mode	High vacuum multilayer insulation (aluminum foil + fiberglass paper)				
Loading and offloading mode	Differential pressure(Loading)/pump(Offloading)				
axle number	3	3	3	3	2
Tare weight (Kg)	12000	11000	10140	15500	10450
Rated mass(Kg)	Based on the actual density of the liquid source				
Total mass(Kg)	40000	40000	40000	40000	28850
Length (mm)	12630	12130	11720	12690	9600
Width (mm)	2495	2495	2495	2495	2495
Height (mm)	3720	3530	3400	3620	3280
Tractor model	6x4 tractor	6x4 tractor	6x4 tractor	6x4 tractor	6x4/4x2tractor

Note: The above pictures and data are for reference only, the actual structure and data are subject to the actual product.

Reference structure

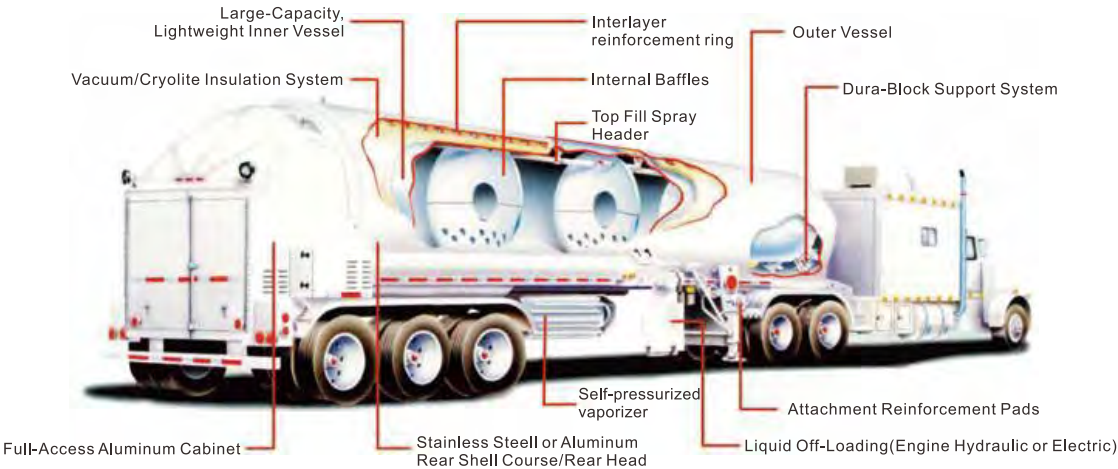


CHART Patented Cryogenic Tank Container (T75)



In 1994, CHART launched the first generation of cryogenic ISO tank container in Denver United States, and it immediately won the respect of both domestic and overseas customers for quality and reliability and has maintained that respect ever since. CHART China introduced cryogenic container technology from CHART Germany in 2013 and, under the guidance of European experts, developed a new generation of cryogenic tank container (UN T75). This product integrates the advanced design concepts, but also offers greater security, lighter weight, and is totally in accordance with market demand.

Product advantages

- Since 1994, we have been focused on the research and development, engineering and production of cryogenic containers, and gained a reputation for the highest levels of quality and service from our customers during that time.
- Multiple cryogenic services for intermodal transportation including LNG,LOX,LIN,LAR,LCO2,LC2H4,LN2O etc.
- Dual design code compliance (if required) for maximum flexibility according to geographic and market requirements.
- Long-term verification and continuous optimization of inner structural design proves the safe operation of Chart equipment for a long service life.
- All operating valves and gauges are ergonomically designed for safe and efficient operation and maintenance.
- Chart's excellent thermal insulation performance is verified through the continued performance and reliability of thousands of products in the field.
- Options available to customize the configuration (optional pump, flowmeter etc.)
- Optimized pressure build-up reduces offloading time.
- Continuous product improvement provides customers with enhanced safety, reduced weight, enhanced user experience and improved efficiency and economics.

Specifications

Dimension	Model	Capacity (M3)	Working pressure (Mpa)	Tare weight (Kg)	Payload (Kg)	Rating mass (Kg)
20Ft	GX20. 1/10-ASME-01 CSS I	20.11	1.0	6, 900	Note1	36000
	GX20. 1/17-ASME-01 CSS I	20.11	1.7	8, 210	Note1	36000
	GX20. 1/23-ASME-01 CSS I	20.11	2.3	9, 400	Note1	36000

Note 1: comply with the requirement of code

CHART Patented - Siphon Tank



Chart's in-house developed siphon tank provides superior economic and reliable performance. Developed from our 'tank to pump' system, which is widely used for loading gas to high pressure gas cylinder, it provides significant improvements on the low efficiency and high failure rate of traditional tanks. By integrating several innovative technologies it improves cryogenic pump performance with reductions in product loss, blockage and cavitation and also enables a fast pump start.

Product advantages

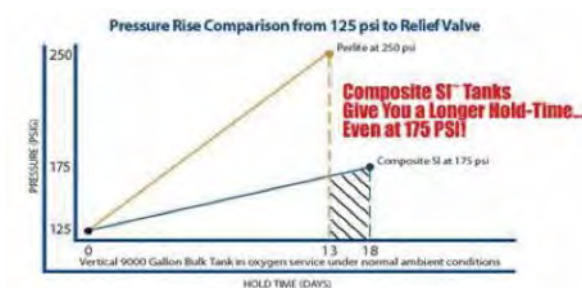
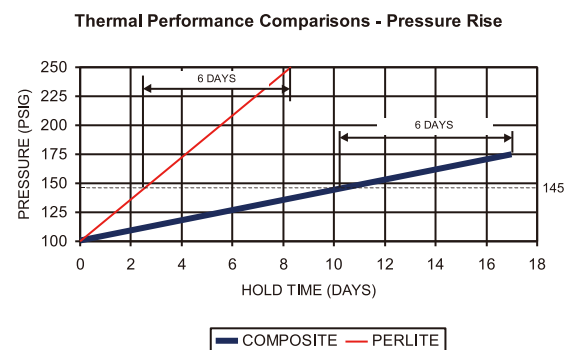
- Pump start in 3 minutes or less
- Easy to operate, reliable system
- Higher throughput of cryogenic liquid
- Low pressure pump start (10psi or less)
- Reduced liquid loss
- Extended pump life
- Suitable for connecting two cryogenic pumps
- Suitable for all cryogenic pumps



Super Insulation

SI Super Insulation is a high vacuum multi-layer insulation system, including multi-layer fiberglass paper and aluminum foil with absorbent for the highest level of vacuum.

- Excellent thermal insulation performance with advanced multi-layer insulation and annular support system.
- Less transportation cost due to lighter tank.
- Lower NER, longer holding time.
- Reduced cryogenic liquid loss.
- Compare to traditional perlite tank, SI insulated tank provide much lower NER, much longer hold time.
- Compare to traditional perlite tank, less repair time needed for SI insulated tank in case of vacuum issue.



Pioneered By CHART Vacuum Insulated Cryogenic Liquid Storage Tank

CHART's VS-GB series of vacuum insulated cryogenic liquid storage tanks are designed and built in accordance with the requirements of Chinese national standards and regulations and widely used in the storage and end-use of liquid oxygen, liquid nitrogen, liquid argon and other cryogenic liquids. Available in a range of sizes with both horizontal and vertical options and maximum working pressures of 8bar or 16bar;

CHART's VS-GB series of vacuum insulated cryogenic liquid storage tanks use CHART's unique vacuum insulation technology and safe cold stretch process, which improves the competitive advantage. They are competitively priced and provide excellent insulation performance with lowest life cycle maintenance cost. The lighter tank weight further reduces transportation and installation costs. CHART is the first to use an innovative modular piping system to improve performance, durability and reduce maintenance costs;

In addition to the VS-GB tank series, CHART China also provides VS-AS (conform to AS1210 code) and VS-ASME (conform to ASME code), series of tanks to meet the demands of overseas customers. Special certification and customization according to customer requirements is available on request. Maximum volume is 500m3. CHART China also provides electronic-grade storage tanks, Thermax vaporizers, vacuum insulation pipe, combined pressure regulator valves (PCM) and other related equipment to provide complete solution to the gas station.

Product advantage

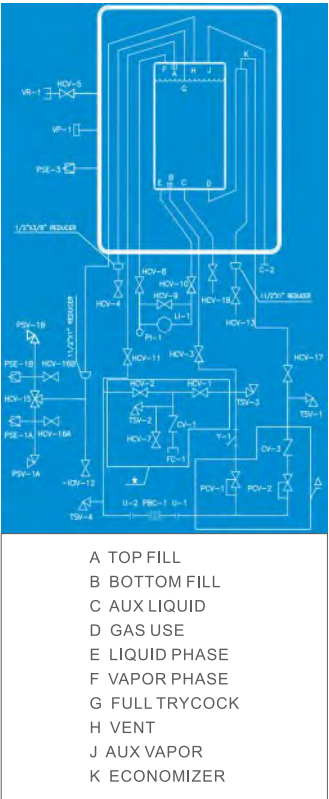
- **Inner vessel** - design and manufacture with austenitic stainless steel suitable for cryogenic liquid.
- **Outer vessel** - Design and manufacture with high quality carbon steel, equipped with unique special transportation lateral support and lug, convenient for safe transportation, lifting and low cost installation.
- **Insulation** - unique internal structure design, advanced vacuum equipment and professional testing measures, ensure excellent insulation properties and long vacuum performance, backed by a 3 year warranty on vacuum integrity.
- **Piping and valves**- compact modular pipe design, minimizing the external heat loss
 - Combined valve design, reduces the number of welded joints and maintenance costs
 - Piping process design, in accordance with best engineering principles, optimized location for valves and instruments, easy operation
 - All stainless steel piping design, stability performance, do the flexible calculation and checking with American advanced engineering software, ensure product quality
- **Pressure control** - an easily adjustable multifunction combined regulator valve and aluminum pressure build-up coil are included in the standard configuration. (Note: other PBUs including high pressure and stainless steel pipe insert type can be supplied as options, according to customer requirements)
- **Instrument** - high quality pressure gauge and different pressure level gauge are the standard configuration. (Note: pressure and level gauge with transmitter function or digital display are optional)
- **Safety** - tanks are equipped with dual safety relief system, including two safety valves and two bursting disks.
- **Product standards** - CHART's VS-GB series of tanks are designed and manufactured in strict accordance with Chinese pressure vessel national standards GB - 150 and Gb18442.
- **Cryogenic liquid pump application**- for optimal pump operation CHART siphon tanks are highly recommended when liquid is withdrawn from the tank using the cryogenic liquid pump.
- **Cleanliness** - all tanks' internal and components in contact with cryogenic liquid are cleaned for oxygen service
- **Outer finish** - pretreatment with high-grade sandblast and rust removing process, high quality, durable, anti-corrosion outdoor painting.
- **Considered transportation support design** - unique internal support system ensures safe transportation by road, rail or sea.



Configuration definition

G-2	connection, aux vapor	PSV-1B	vessel safety valve
CV-1	check valve (filling)	PSE-1A	bursting disk
FC-1	connection (filling)	PSE-1B	bursting disk
HCV-1	valve, bottom fill	LI-1	liquid level gauge, inner vessel
HCV-2	valve, top fill	PI-1	pressure gauge, inner vessel
HCV-3	valve, PB inlet	VR-1	vacuum gauge, outer vessel
HCV-11	valve, PB outlet	HCV-17	valve, economizer
HCV-7	valve, purge	PCV-1 PCV-2 CV-2	combined regulator valve
HCV-4	valve, full trycock	Y-1	strainer
HCV-5	valve, vacuum gauge tube	TSV-1	thermal safety valve, economizer
HCV-8	valve, LI-1 vapor phase	TSV-2	thermal safety valve, filling
HCV-9	valve, LI-1 equalization	TSV-3	thermal safety valve, PB circuit
HCV-10	valve, LI-1 liquid phase	TSV-4	thermal safety valve, PB circuit
HCV-12	valve, gas purge	VP-1	vacuum pump port
HCV-13	valve, liquid use	PBC-1	pressure build up coil
HCV-15	valve, 3 way divertor	PSE-3	vacuum bursting disk, outer vessel
HCV-16A	valve, test (option)	U-1	PB inlet connection
HCV-16B	valve, test (option)	U-2	PB outlet connection
PSV-1A	vessel safety valve	HCV-18	aux liquid (option)

" △ " express: 1/2" combined regulator valve with check valve
 " ☆ " express: combined filling valve
 Note: This PID is just for reference, specific configuration will be subject to the quotation specification and PID.



Specification

model	VS11/8 (16) -GB	VS16/8 (16) -GB	VS21/8 (16) -GB	VS30/8 (16) -GB	VS40/8 (16) -GB	VS50/8 (16) -GB
working pressure, barg	8 (16)	8 (16)	8 (16)	8 (16)	8 (16)	8 (16)
geometric volume, m ³	11. 14	15. 95	20. 76	30. 40	40. 17	49. 22
max fill rate	95%					
media	LOX, LIN,LAR					
NER % (per LOX)	0. 36	0. 35	0. 33	0. 29	0. 25	0. 23
Overall External Dimension (mm)	width	2250	2250	2250	2800	3080
	height	2350	2350	2350	2820	3100
	length	6355	8355	10355	10575	12750
equipment weight, kg	6400 (7050)	9080 (9800)	9750 (10850)	12860 (14430)	17350 (19200)	20300 (22480)

NOTE:
 The data in brackets corresponds to the parameters of 16 bar standard tank.
 Filling rate is determined in accordance with the relevant standard.
 Above parameter is the design data and for reference only. Actual data will be measured.
 The height of siphon tank is usually about 500mm-1000mm higher than the same volume standard tank.
 Special pressure, volume and flowrate, multiple optional features enable a high degree of customization according to customer requirements

The Perma-Cyl® Storage System



The Perma-Cyl®series is an innovative MicroBulk gas storage platform that is designed to improve the economics, distribution and convenience of industrial, scientific and medical gases-especially when teamed with an ORCA delivery tank, Evolved from proven technology used for many years in CHART liquid cylinders, Perma-Cyl units are reliable, efficient and more economical than comparable transportable cylinders.

For the first time, Perma-Cyl technology allows packaged gas distributors and users to enjoy the benefits of on-site gas delivery. Gone are the hassles, waste, and expense of full-for-empty gas cylinders. There are no cylinders. There are no cylinders to change, no residual gas losses, no back, hand or foot injuries from handling cylinders, and no lost or damaged cylinders.

Perma-Cyl units fill fast and without interrupting user operations when filled by an ORCA delivery tank in typical applications. Small Perma-Cyl containers fill in three minutes with zero losses under normal conditions. Large Perma-Cyl units can be filled with comparable speed and efficiency. In addition, the Perma-Cyl®series fill shutoff device assures a complete and safe fill each time.

Designed for a higher level of efficiency, Perma-Cyl cylinders can hold their gas contents longer and with lower pressure rise than other similar vessels, Their extraordinary thermal quality limits product losses during extended periods of little or no gas use.

Perma-Cyl® series Benefits

- Fast filling capability
- No-loss/low-loss filling
- Excellent insulation performance
- Automatic fill shutoff when used with ORCA system
- Extended holding time
- Size, pressures and configurations to meet most gas-user needs
 - 230 liters to 5000 liters
 - Pressures from 1.6MPa to 3.5MPa
- High- pressure high flow models for laser assist
- Gas Filling on-site provides higher purity, longer holding times, lower pressure rise, no transport damage, less administration and handing
- Outdoor or indoor installation and operation
 - Patented automatic fill shutoff feature and optional fill box allow remote filling from outside the building or compound when a Perma-Cyl unit is installed indoors
 - ORCA system automatically stops the fill process when Perma-Cyl unit is full

Specification

SPECIFICATIONS													
Description	Model	PC230HP	PC450HP	PC450VHP	PC1000HP	PC1000VHP	PC2000HP	PC2000VHP	PC3000HP	PC3000VHP	PC5000MP	PC5000HP	PC5000VHP
	MAWP	HP	HP	VHP	HP	VHP	HP	VHP	HP	VHP	MP	HP	VHP
	Base	N/A	Plate Base	Plate Base	Plate Base	Plate Base	Plate Base	Plate Base	Plate Base	Plate Base	Plate Base	Plate Base	Plate Base
Capacity (liters)	m³	0.243	0.45	0.45	1.01	1.01	2.07	2.07	2.98	2.98	4.99	4.99	4.99
Design Pressure	Mpa	2.4	2.4	3.5	2.6	3.5	2.6	3.5	2.4	3.5	1.6	2.4	3.5
Filling Rate	%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%
Medium		LIN LOX LAR	LIN LOX LAR	LIN LAR	LIN LOX LAR	LIN LAR	LIN LOX LAR	LIN LAR	LIN LOX LAR	LIN LAR	LIN LOX LAR	LIN LOX LAR	LIN LAR
Design Specification	GB/T150 GB/T18442 TSG 21-2016												
Thermal performance (NER%/Day)	N ₂	1.8%	1.8%	1.8%	0.8%	0.8%	0.7%	0.7%	0.60%	0.60%	0.45%	0.45%	0.45%
	O ₂ - Ar	1.12%	1.12%	1.12%	0.53%	0.53%	0.47%	0.47%	0.40%	0.40%	0.30%	0.30%	0.30%
Gas Delivery Rate	Nm3/h	10	15	15	20	25	35	75	50	75	120	120	120
Diameter	mm	600	800	800	1050	1050	1300	1300	1500	1500	1850	1850	1850
Weight	Kg	154	420	440	796	891	1206	1351	1730	2030	2115	2360	2835
Height	mm	1580	1802	1802	2380	2431	2886	2972	3009	3073	3270	3270	3270

NOTICE:

All specifications may be updated without notice.

The gas delivery is based on an ambient temperature of 10 ° C, a relative humidity of 50%, and the outlet temperature difference of 10 ° C from the ambient temperature.

The HP model for CO2 is manufactured with the non-cold stretching process as per GB code and is excluded in this parameter list.

CHART Framed Insulated Cylinder Mega-Cyl (MC390L/450L Series)

The MEGA-CYL series is Chart’s range of palletized cylinders designed for easy transport. Available with capacities of 390 liters and 450 liters, Mega-Cyl cylinders are available in all services at 230psig (15.8barg) and 350psig(24barg) and are specifically designed to optimize distribution costs.

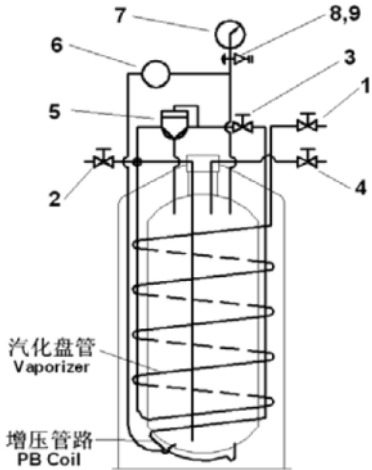


Product advantages

- Tough, Durable stainless steel construction
- Palletized cylinder for easy transport
- High-performance super insulation
- Easily accessible valves and gauges
- Accurate differential pressure contents gauge

Nomenclature

1. Gas-use valve
2. Liquid valve
3. Pressure Control valve
4. Vent valve
5. Regulator valve
6. Liquid level gauge
7. Pressure gauge
8. Relief Valve
9. Rupture disk



Specifications

Type name		DPL 700-390-1.38 (MC390MP MCR)	DPL 700-390-2.01 (MC390HP MCR)	DPL700-450-1.38 (MC450MP MCR)	DPL700-450-2.01 (MC450HP MCR)
Technical specifications					
Relief valve set	MPa/psig	1.58/230	2.41/350	1.58/230	2.41/350
NER(per day %)	LN2	1.84%	1.84%	1.8%	1.8%
	L02 LAr	1.5%	1.5%	1.4%	1.4%
	LC02		0.6%		0.5%
The volume of the gas in the standard conditions					
N ₂	Nm ³	218	291	252	233
O ₂	Nm ³	262	253	302	392
Ar	Nm ³	251	246	289	384
CO ₂	Nm ³		197		227
Dimensions					
Gross capacity	L	390	390	450	450
Cylinder diameter	CM	75	75	75	75
Cylinder height	CM	141	141	156	156
Frame length	CM	88	88	88	88
Frame width	CM	88	88	88	88
Frame height	CM	189	189	189	189
Empty cylinder weight	KG	190	242	208	266
Frame weight	KG	78	78	78	78
Liquid filling weight					
LN2*	KG	272	256	312	294
L0X*	KG	387	366	443	420
LAR*	KG	470	445	539	511
LC02*	KG	-	392	-	452
Gas flow					
N ₂ , O ₂ , Ar	Nm ³ /hr	-	15.1	15.1	15.1
CO ₂	Nm ³ /hr	-	5.1	-	5.1

*The liquid filling weight is calculated as the maximum allowable filling density at the set pressure of the safety valve.

CHART Insulated Cylinder (DC100L~DC200L Series)



Chart Industries, is the world's leading supplier of cryogenic storage and transportation equipment and our products cover the complete supply chain, from liquefaction to end-use. Our world class engineering and manufacturing center in Canton, Georgia holds multiple patents and our MVE brand liquid cylinder product line boasts a 60 year heritage and is renowned around the globe for high quality, high performance and long life.

Chart Changzhou, is a wholly owned subsidiary of Chart Industries and has adopted all the US parent company's technologies and standards. Raw materials for our Chinese made cylinders are imported direct from Chart approved vendors in the US and Chart Changzhou products meet all of Chart's quality standards, as well as international and Chinese codes. Capacities are available from 100L to 450L with working pressures classified as low pressure (LP), medium pressure (MP), high pressure (HP) and VHP.

Product advantages

- Full stainless steel construction, beautiful and simple
- Ergonomic design, easy to operate
- Industry-leading and unique vacuum insulation technology
- 100% oxygen cleaning - not all manufacturers can do this
- High-strength C-type base for durability
- Pointer type liquid level gauge, easy to load and unload, intuitive

Nomenclature

1. Liquid valve-Filling or outputting liquid

2. Liquid level gauge-Display liquid contents of the cylinder

3. Pressure Control valve-To isolate the pressure control regulator (on/off)

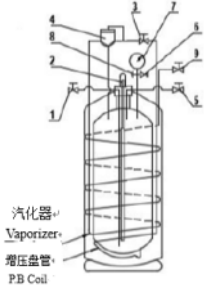
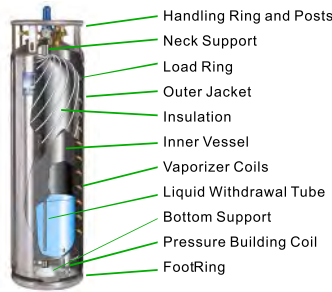
4. Regulator valve- Automatically controls operating pressure
5. Vent valve-Release the pressure

6. Relief Valve-Release overpressure gas to protect the cylinder

7. Pressure gauge-Display the internal pressure of the cylinder

8. Rupture disk-Output gas

9. Gas-use valve- For gas withdrawal(except 100LP)



Specifications

Type name		DPL450-106-0.35/1.38		DPL450-176-1.38/2.01		DPL450-196-1.38/2.01		DPL450-209-1.38/2.01		DPL450-202-2.84
		(DC100LP)	(DC100MP MCR)	(DC160MP MCR)	(DC160HP MCR)	(DC180MP MCR)	(DC180HP MCR)	(DC200MP MCR)	(DC200HP MCR)	(LC200VHP MCR)
Technical Data										
Relief valve set	MPa/psig	22/0.15	230/1.58	230/1.58	350/2.41	230/1.58	350/2.41	230/1.58	350/2.41	500/3.45
NER (per day %)	LN2	<2.7	<2.8	2.1	2.26	2	2.1	2	2	2.4
	L02 LAr	-	-	1.4	1.4	1.3	1.3	1.2	1.2	1.4
	LC02, LN20	-	-	-	0.5	-	0.5	-	0.5	0.5
The volume of the gas in the standard conditions										
N ₂	Nm ³	-	72	97	91	108	102	115	108	93
O ₂	Nm ³	-	58	120	114	134	127	143	133	123
Ar	Nm ³	-	70	117	111	130	124	139	130	120
CO ₂	Nm ³	-	-	-	89	-	99	-	105	93
N ₂ O	Nm ³	-	-	-	84	-	94	-	100	88
Dimensions										
Gross capacity	L	106	106	176	176	196	196	209	209	202
Cylinder diameter	CM	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8
Cylinder height	CM	115	115	152	152	162	162	167	167	167
Empty cylinder weight	KG	83	88	113	126	117	136	127	145	170
Liquid filling weight										
LN2*	KG	83	74	121	114	135	127	144	135	116
LOX*	KG	118	105	172	163	191	187	204	194	179
LAR*	KG	144	127	209	198	233	221	248	235	216
LC02*	KG	-	-	-	176	-	195	-	208	184
LN20*	KG	-	-	-	166	-	185	-	198	174
Gas flow										
N ₂ , O ₂ , Ar	Nm ³ /hr	-	-	9.2	9.2	9.2	9.2	9.2	9.2	9.2
CO ₂ , N ₂ O	Nm ³ /hr	-	-	-	2.9	-	2.9	-	2.9	2.9

*The liquid filling weight is calculated as the maximum allowable filling density at the set pressure of the safety valve.

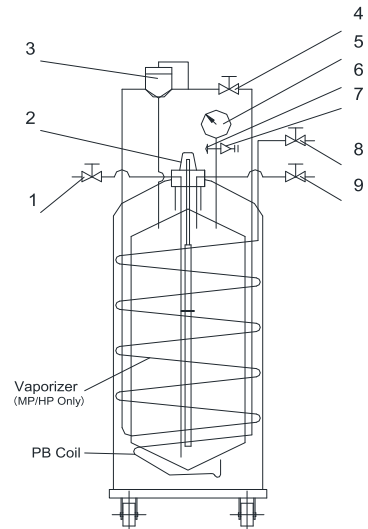
CHART Insulated Cylinder (DC230 Series)

230-liter series dura produced by CHART Changzhou is a high-vacuum cryogenically insulated cylinder with casters for easy location and relocation. Sleek, good looking and easy to handle, it is widely used in laboratories and the food and beverage industry in addition to supporting general industrial applications.



Nomenclature

- 1. Liquid valve
- 2. Liquid level gauge
- 3. Regulator valve
- 4. Pressure Control valve
- 5. Pressure gauge
- 6. Rupture disk
- 7. Relief Valve
- 8. Gas-use valve(only MP/HP)
- 9. Vent valve



Product advantages

- High-strength casters for easy movement and durability
- Full stainless steel construction, beautiful and simple
- Ergonomic design, easy to operate
- High vacuum and super insulation for maximum liquid holding time

Specifications

Type name		DPL 550-240-0.69 (DC 230LP)	DPL 550-240-1.38 (DC230MP MCR)	DPL 550-240-2.01 (DC230HP MCR)
Technical specifications				
Relief valve set	MPa/psig	0. 15/22	1. 58/230	2. 41/350
NER(per day %)	LN2	1. 8%	1. 8%	1. 8%
The volume of the gas in the standard conditions				
N ₂	Nm ³	—	132	124
O ₂	Nm ³	—	164	156
Ar	Nm ³	—	160	151
CO ₂	Nm ³	—	—	121
Dimensions				
Gross capacity	L	240	240	240
Cylinder diameter	CM	60. 6	60. 6	60. 6
Cylinder height	CM	160	160	160
Empty cylinder weight	KG	145	168	185
Plate size	CM	63	63	63
Liquid filling weight				
LN2*	KG	182	163	156
LOX*	KG	258	229	223
LAR*	KG	318	275	270
LCO2*	KG	—	—	239
Gas flow				
N ₂ , O ₂ , Ar	Nm ³ /hr	—	10. 5	10. 5
CO ₂ , N ₂ O	Nm ³ /hr	—	2. 9	2. 9

*The liquid filling weight is calculated as the maximum allowable filling density at the set pressure of the safety valve.

CHART Cryogenic Ultra Dewar

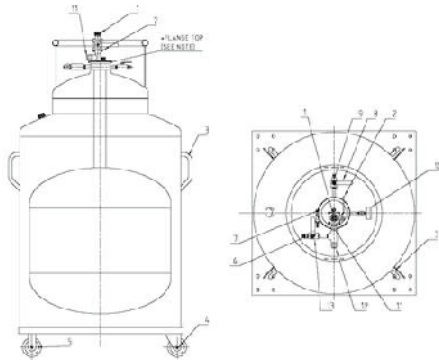


he cryogenic ultra helium dewar is designed and manufactured for storage of liquid helium. It is lightweight, easy to operate and provides high reliability and superior insulating properties. The unique neck tube design provides sufficient strength to allow for close movement and outboard caster base provides maximum stability in a compact design.

Available in sizes ranging from 100 to 500 liters. Ultra helium dewars are suitable for air transport (with optional absolute pressure relief valve fitted).

Nomenclature

- 1. Quick coupling stack
- 2. Liquid valve
- 3. Handle assembly
- 4. Swivel caster non-magnetic
- 5. Rigid caster non-magnetic
- 6. Vent valve connection
- 7. V-band clamp
- 8. Auxiliary relief isolation valve
- 9. Auxiliary relief valve(1psig)
- 10. Pressure gauge
- 11. Secondary relief valve
- 12. Primary relief valve
- 13. Vent valve



Product advantages

- Maximum durability and light weight
- Super insulation
- Large ball valves for up to 3/4” (19 mm)

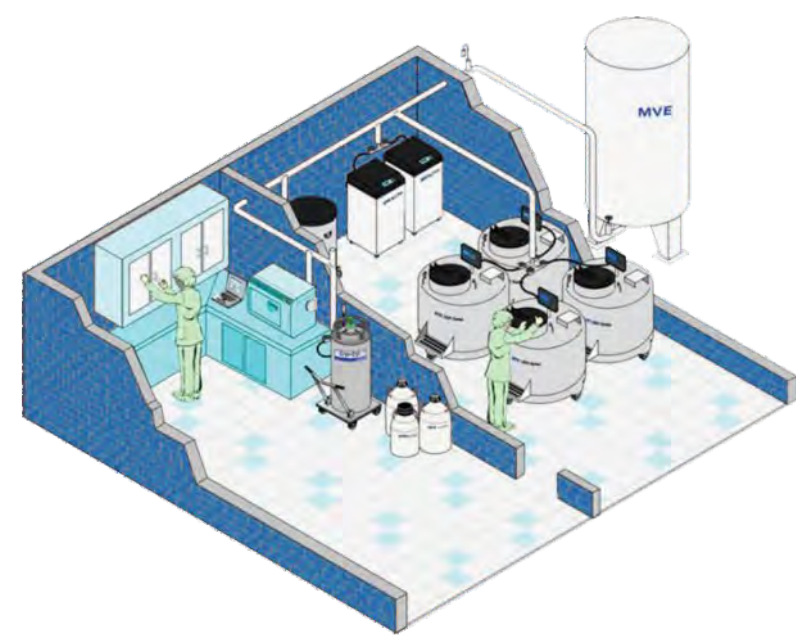
Transfer Linesthe Control Valve Sets And Joints Are Mounted On The Top Of Chart Cryogenic Ultra Dewar For Easy Operation And Can Be Connected To Various Standard Size Hoses.

Specifications

Model name		HE100	HE250	HE500
Technical Data				
Primary relief valve set	psig	10	10	10
Secondary relief valve set	psig	12	12	12
NER(per day %)	HE	1. 25%	1%	1%
Ma working pressure	psig	12	12	12
Dimensions				
Gross capacity	L	110	275	550
Cylinder diameter	CM	60. 6	85. 6	110. 8
Cylinder height	CM	154. 6	167. 5	179. 3
Empty cylinder weight	KG	114	181	278
Length from flange to bottom	CM	113. 2	130. 5	142. 1
Liquidfillingweight				
LHE	KG	12	30	60

CHART Patented Vacuum Insulated Pipe

Chart is a leading designer, manufacturer and installer of standard and custom vacuum insulated pipe (VIP) systems. This unique product is also referred to as Vacuum Jacketed Pipe, Cryogenic Pipe, or Super Insulated Vacuum Line (SIVL). Our industry-leading 40 years of experience covers the spectrum of traditional industry applications, from heat-leak sensitive helium lines to highly engineered aerospace applications.



Product advantages

- Patented Vacuum insulated pipe plug-in connection method, reliable connection, anti-vibration, can be repeatedly disassembled and installed
- Thin-walled piping design minimizes heat transfer and cold loss
- All imported precision machined vacuum port with minimal leak rate for long-term stable vacuum performance
- All imported insulated materials, rarely release harmful substances that damage vacuum, ensure long-term vacuum, and have low gasification rate
- Perfect connection and interface with the full vacuum of the CHART storage tank, no frost, no ice, no loss and beautiful appearance
- CHART has proven capability for vacuum piping systems designed to minimize system losses
- Professional installation team provide the best service experience
- Fast, efficient and unrivalled service: CHART VIP uses standard components and we maintain an inventory of spare parts enabling us to satisfy customer needs immediately. For many years, CHART has ensured fast service to satisfy customer needs.
- Turnkey project: CHART has provided customers with turnkey projects from site survey, measurement, solution design, production, installation to technical support.

Specifications

Model size	Inner tube size	Outer tube size	Maximum working pressure (Mpa)	Design temperature℃	Pipe connection method
1/2" x 2"	Φ 21.3 × 1.65	Φ 60.3 × 2.0	1.03	-196/60	male/female socket type, no welding required
1" x 3"	Φ 33.4 × 1.65	Φ 88.9 × 2.0	1.03	-196/60	male/female socket type, no welding required
1-1/2" x 3-1/2"	Φ 48.3 × 1.65	Φ 101.6 × 2.0	1.03	-196/60	male/female socket type, no welding required
2" x 3-1/2"	Φ 60.3 × 2.11	Φ 101.6 × 2.0	1.03	-196/60	male/female socket type, no welding required
3" x 5"	Φ 88.9 × 2.11	Φ 141.3 × 2.5	1.03	-196/60	male/female socket type, no welding required

In addition to the specifications listed above, CHART also provides high-pressure vacuum pipe Python tubes for the transport of media such as LNG and high-pressure liquid carbon dioxide, which can be used in a wide range of cryogenic liquids. Provide users with vacuum insulation performance for long-term stable and efficient delivery of liquid to the end-use.

CHART China has an advanced professional vacuum insulation pipe production line and an experienced engineering design and installation team. Provide users with long-term stable and efficient vacuum insulation performance to transfer liquid to the end-use. It saves a large amount of vaporization loss during liquid transportation and brings rich benefits to users.



CHART Patented High Pressure And High Flow Continuous Gas Supply System



TRIFECTA X series

TRIFECTA is a patented product for CHART and it is designed for users who requires high pressure, high flow and continuous gas supply. It has a maximum pressure of 450 psi / 31 bar and a maximum flow of 394 NM³ / Hr. The liquid enters two cryogenic cylinders in TRIFECTA from a standard storage tank and a stable high-pressure gas source is obtained through a specially designed pressure regulator and vaporizer device. TRIFECTA system provides uninterrupted continuous gas supply with minimal loss. This unique gas supply system does not require high-speed power components with high failure rate such as cryogenic pump compressors. It is extremely reliable and delivers the lowest maintenance costs.

Product advantages

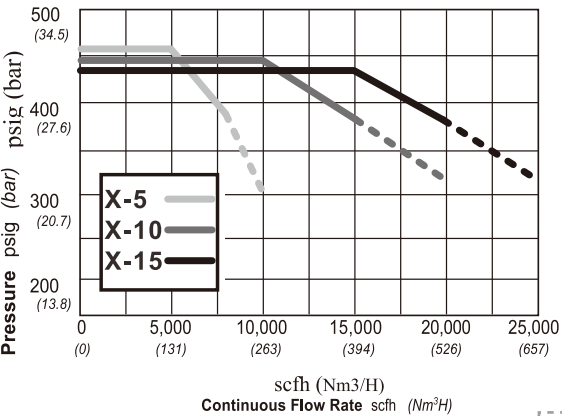
- It is compatible with standard storage tanks to reduce investment and make efficient use of equipment
- Two cryogenic liquid cylinders are automatically switched alternately for continuous operation without interruption
- Integrated module design for increasing durability and reliability, reducing maintenance
- Highly automated, No manual operation required after installation
- Compact structure, The base is 1460*1440 ,the height is 2440 and is equipped with a protective cover for indoor or outdoor installation.
- The control system supports network data management, It is equipped with a digital display pressure/level gauge with data remote transmission.
- Three capacities 5X, 10X and 450L are available

System Requirements

- The circuit pressure of cylinder is 15A, 220V not less than 50 psi (3.4bar)
- External vaporizer with a minimum working pressure of 550 psi (38 bar) for end requirements
- Two pipes are connected to the cylinder (liquid outlet, the signal of the meter is output from the bottom)
- Pressure regulation with high flow

Dimensions

length	1, 460 mm
width	1, 440 mm
height	2, 440 mm
	(X-5) 1, 025KG
weight	(X-10) 1, 035KG
	(X-15) 1, 070KG



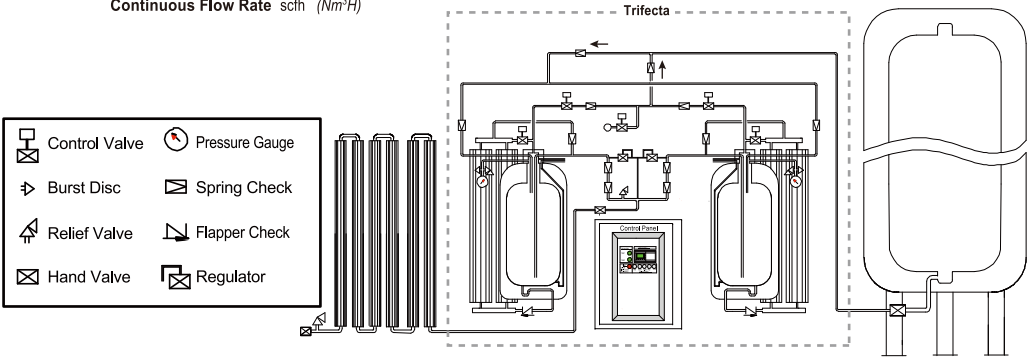
SIMPLIFIED STAINLESS STEEL PLUMBING (top view)



Simple stainless steel piping (top view)

Specifications

Trifecta X-5	Maximum flow 131Nm3/hr, Highest pressure 31bar
Trifecta X-10	Maximum flow 263Nm3/hr, Highest pressure 31bar
Trifecta X-15	Maximum flow 394Nm3/hr, Highest pressure 31bar Automatic diagnostic system CHART unique ultra-high pressure supercharging technology (HP2Technology)

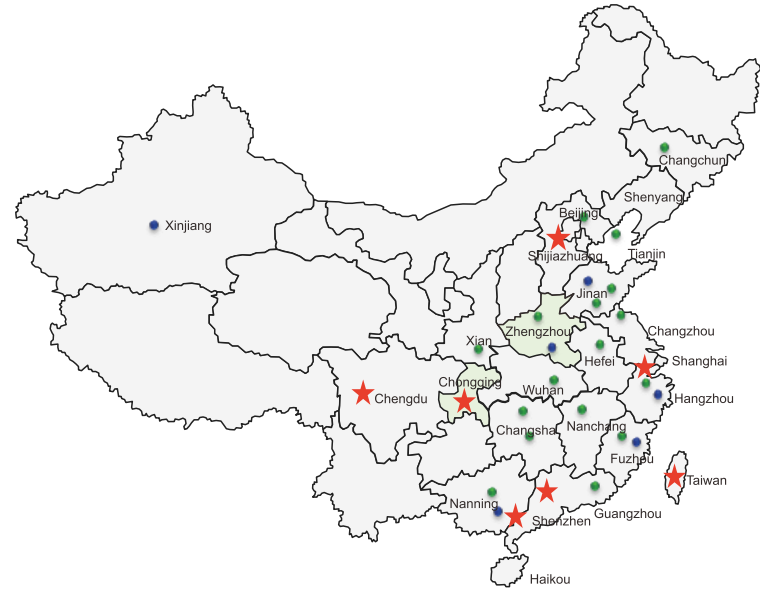


PATENT NUMBERS 5,924,291 - 5,937,655 - 5,121,609 - 5,231,838 - 6,542,848 - 6,782,339 - other patents pending

After-sales Service Guarantee

The regional service center works closely with the contractor , service hotlin: 400-887-8865

Note	Distance	The degree of response
1		Reply in 2 hours
2	≤ 1000km	Arrival at site in 24 hours
3	≥ 1000km	Arrival at site in 48 hours



China
Special service providers: 7
Location: Guangzhou, Shenzhen, Shanghai
Shijiazhuang, Chengdu, Chongqing, HM.Taiwan



Asia
Special service providers: 3
Location: HMC. MalaysiaSSB. Singapore
CFC. Vietnam