

Instruction for Welded Adiabatic Gas Cylinders



河北润丰低温设备有限公司

Hebei Runfeng Low Temperature Equipment Co. LTD



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Preface

This instruction is applicable to the welded adiabatic gas cylinders (hereinafter referred to as gas cylinders) provided by Runfeng company. **The gas cylinders are used as a low-temperature adiabatic pressure vessel for storing and transporting liquid oxygen, liquid nitrogen, liquid argon, liquefied natural gas and carbon dioxide. It is also a container to provides a continuous gas.** This instruction contains information on safety, operation and fault detection. Anyone who operates this equipment must read carefully and understand this instruction.

This instruction is intended to provide the user with all the necessary information relating to the operation and maintenance of the cylinder. The name of the parts used for the gas cylinder is indicated in the flow chart. These name are used throughout the description for the function, operation or maintenance of the parts in order to give special attention to the parts.

The pressure gauges and safety accessories of our company's gas cylinders must be used within the validity period.

The terms of safety precautions in this instruction is expressed as:

Warning:A description about the conditions that can cause personal injury and death

Caution: A description of the conditions that can cause damage to the part

Note: Repetitive claims for important information



1、 Product specification

Vertical industrial bottle

Model: DPL450-175/195/210/232

Working pressure: 1.37MPa/2.3MPa/2.88MPa

Model		175	195	210	232
Maximum filling weight(Kg)	Oxygen	170	190	205	225
	Nitrogen	120	134	145	160
	Argon	208	232	250	275
	Carbon dioxide	164	183	197	217
	Natural gas LNG	70	78	84	93

Note: When the working pressure is 1.37MPa, the gas cylinder cannot be filled with carbon dioxide medium.

Horizontal industrial bottle

Model: DPW650-410/499

Working pressure: 1.59 MPa /2.5 MPa /3.45 MPa

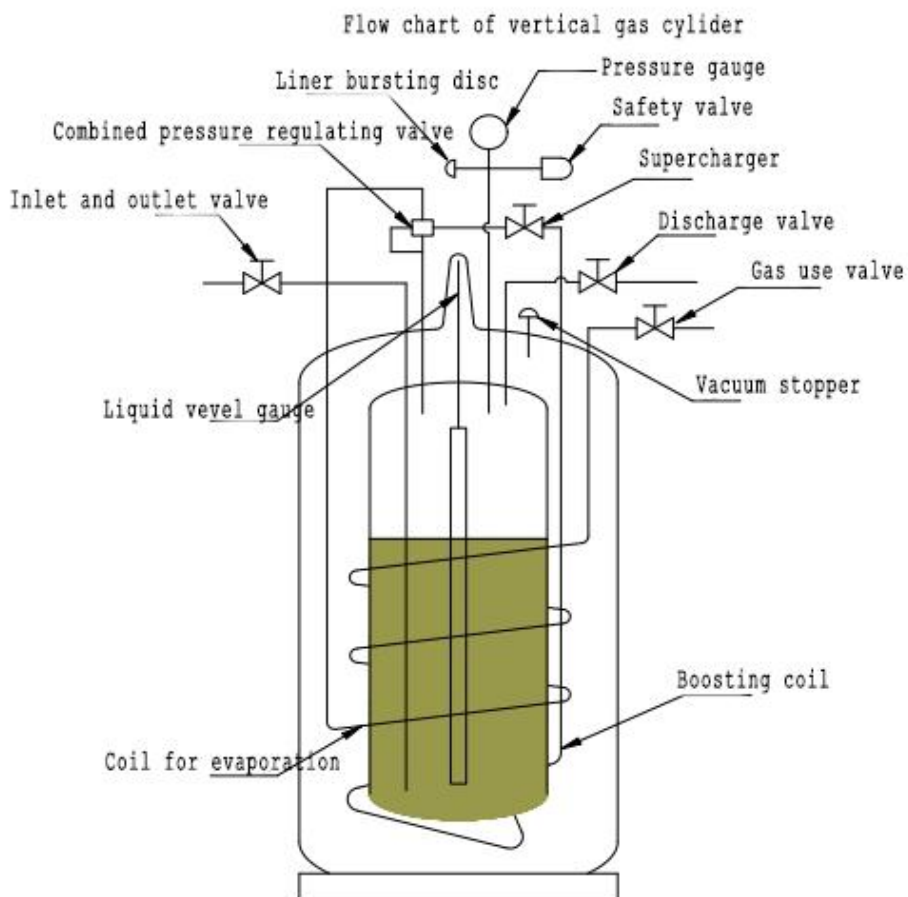
Model		410	499
Maximum filling weight(Kg)	Oxygen	393	478
	Nitrogen	274	334
	Argon	480	585
	Carbon dioxide	160	460
	Natural gas LNG	160	196

Note:When the working pressure is 1.59 MPa. The cylinder cannot be filled with carbon dioxide medium.

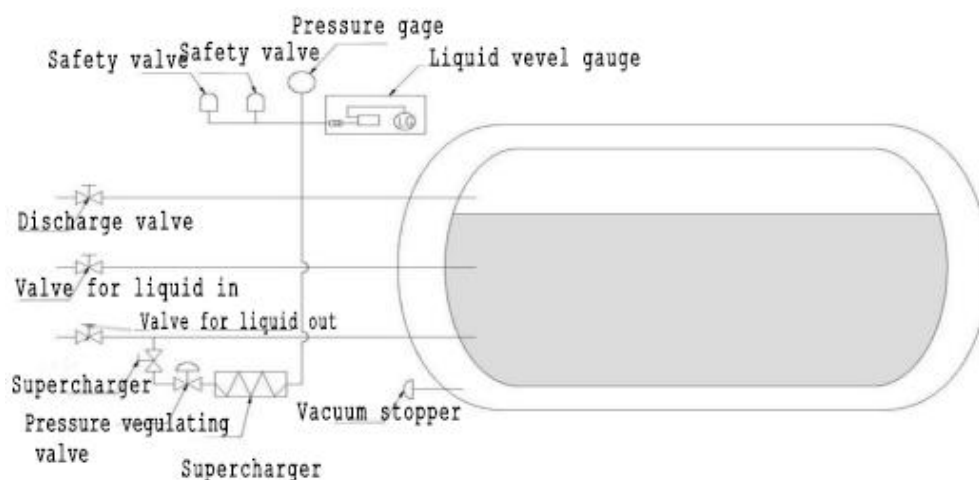


2. Cylinder details

Vertical gas cylinder flow chart



Horizontal cylinder flow chart





2.1 Main components

2.1.1 Vertical gas cylinder

The functions of the gas cylinder are realized by the following components. It should be read carefully before operation to familiarize yourself with the functions and usage of the various components of the cylinder.

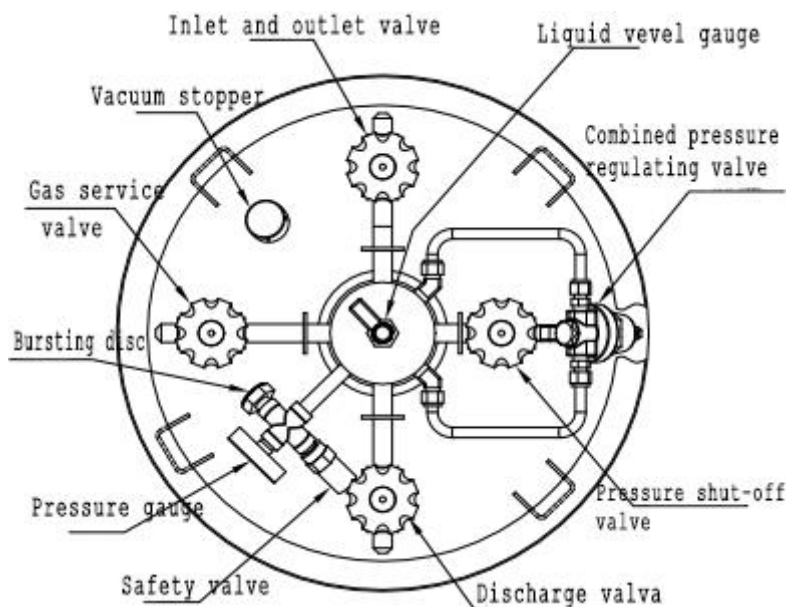


Diagram of vertical gas cylinder valve parts

Built-in vaporizer: The vaporizer is a built-in vaporization coil that is installed inside the interlayer of the cylinder. When the gas use valve is opened, and the low temperature liquid exchanges heat with the outside through the vaporization coil which is close to the outer casing, thereby to realize the purpose of liquid vaporization by liquid gas conversion .

Under normal temperature and pressure, when the required gas flow rate is below 350cfh (9.2m³/h), the built-in vaporizer can meet the customer's continuous gas demand. If the gas flow rate is larger, several gas cylinders need to be connected in parallel to one main pipe. Or a single cylinder (outlet) is connected to an external vaporizer to make it.

Supercharger: The supercharger is used to ensure that there is enough driving pressure in the cylinder at high discharge, and the low temperature liquid or gas can be quickly pressed out to meet the customer's gas demand. The pressure shut-off valve is opened, and the low temperature liquid at the bottom of the cylinder exchanges heat with the outside through the pressure coil which is close to the outer casing, and the low temperature liquid is converted into saturated steam, and the combined pressure regulating valve is returned to the gas phase space at the top of the cylinder to increase the internal pressure of the cylinder;

Combined pressure regulating: This valve has the function of adjusting the pressure of the medium in the cylinder. Open the pressure shut-off valve: When the cylinder pressure is lower than the set value, the combined pressure regulating valve is automatically pressurized, and the low temperature liquid in the bottle is converted into gas through the boosting coil, and returns to the inner tank to increase the pressure;while above the set value, the combined regulator automatically closes.



Gas service valve: It is connected to a built-in vaporizer and the vaporized gas is obtained through it.

Inlet and Outlet Valve: This valve controls the filling and discharging of cryogenic liquids.

Pressurized (cut-off) valve: This valve controls the booster circuit. Increasing the pressure in the bottle by opening it.

Discharge valve: This valve is connected to the gas phase space of the cylinder. When opened, the gas in the bottle can be released to reduce the pressure.

Liquid level gauge: (1) The cylinder level gauge uses a float type liquid level gauge, which uses the buoyancy of the cryogenic liquid to approximately indicate the volume of the cryogenic liquid in the cylinder.

(2) The gas cylinder level gauge adopts a capacitive liquid level meter. The capacitance sensor generates a proportional electrical signal according to the liquid height in the bottle. The liquid level display meter performs signal conversion after receiving the electric signal, and represents different percentages of the amount of liquid.

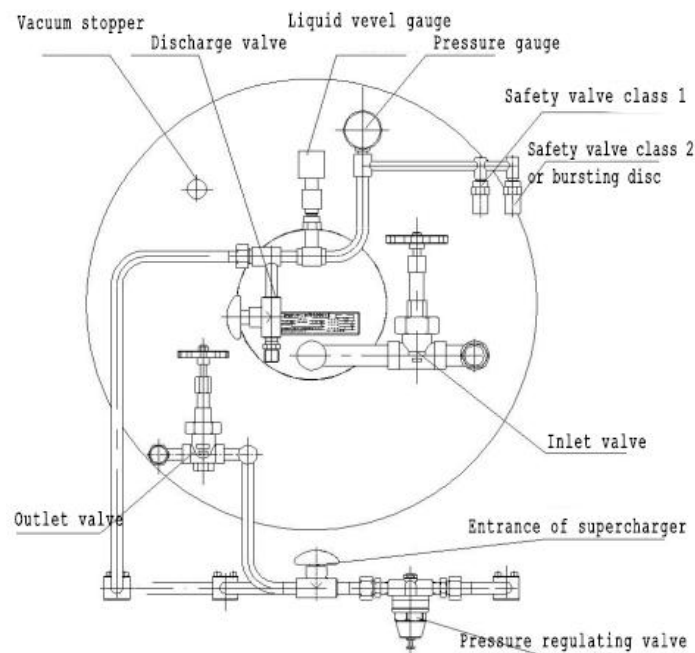
Pressure gauge: Displaying liner pressure in megapascals (MPa) or pounds per square inch (psi).

Safety device: The gas cylinder is designed with safety valve and bursting disc to protect the cylinder when overpressured. The safety valve is opened, and it is to automatically close the high pressure gas when reaching the set pressure. In case of the failure of it, the bursting disc will open to relieve pressure to ensure the safety of the cylinder.

2.1.2 Horizontal gas cylinder

The functions of the horizontal gas cylinders are realized by the following components. They should be read carefully before operation to get familiar with the functions and usage of the various components.

Diagram of horizontal gas cylinder valve parts





Supercharger: The supercharger uses a finned heat exchanger. It's installed at the bottom of the cylinder to increase the gas pressure inside the bottle.

Discharge valve: This valve is connected to the gas phase space of the cylinder. When it is opened, the gas in the bottle is released to reduce the pressure.

Inlet shut-off valve: This valve is used to control the filling of cryogenic liquids.

Outlet shutoff valve: This valve is used to control the output of cryogenic liquids.

Boost shut-off valve: This valve is used to control the booster circuit. When it is opened, the cylinder is pressurized.

Pressurization regulating valve: The cryogenic liquid enters the supercharger through this valve, converts into gas, and returns to the inner tank, so that the pressure in the bottle reaches the set value of the boost regulating valve.

Liquid level gauge: The level gauge uses a capacitive level gauge. The capacitive sensor produces a proportional electrical signal based on the liquid level in the bottle. The liquid level display meter converts the signal after receiving the electrical signal, indicating the different liquids as a percentage of the amount of liquid.

Pressure gauges and safety valves: See the instruction to vertical gas cylinder.

3. Security summary

This part of the manual covers the necessary knowledge of cryogenic equipment protection. In an oxygen-filled environment, inflammable materials burn intensely and may explode. Excessive oxygen accumulation will fill the surrounding area with oxygen (usually the amount of oxygen concentration exceeds 23%, the surroundings are full of oxygen). Some objects that are considered to be unburned in the air may burn immediately in an oxygen-filled environment. Remove all organic matter and other combustible materials so that they keep away from oxygen, especially oil, grease, kerosene, cloth, wood, paint, asphalt, coal, dust or some dirt which may stick to oil or grease. Don't smoke or have an open flame in any area where it is stored, transported or used. Or, it may have serious personal injury.

Volatile gases such as nitrogen and argon in the air reduce the concentration of oxygen which is necessary to sustain life. In-drawing high concentrations of these gases can cause hypoxia, which can lead to dizziness, nausea, vomiting, coma or even death. The place with less than 19% oxygen, should be forbidden to enter, otherwise a respirator should be put on, if oxygen concentration is below 8%, it may lead to coma and death without any signs.

Warning: Do not remove the vacuum plug under any circumstances.

Note: The bursting disc can only be used once. It must be replaced after acting. It can be purchased from our company.

Note: When filling natural gas, double safety valve and no bursting disc.

Note: The booster regulating valve automatically opens and closes, no manual operation is required. Cylinders with different pressures, the booster regulating valves have different factory setting pressures and different adjustment ranges. Do not adjust it optionally.

3.1 Security protection

◆ Workers must wear long trousers, goggles, face shields, and insulated gloves when handling. Otherwise it may cause cold burns.



◆When disassembling and repairing the cylinder parts, the liquid in the cylinder should be drained and the pressure should be reduced to zero to avoid the damage caused by the residual pressure of the cylinder.

◆When the cylinder is used as a cryogenic liquid oxygen cylinder, use the equipment and accessories which comply with the oxygen regulations , and they must meet the oxygen requirements.

◆ When transporting the cylinder, use the matching trolley or other tools to assist the handling through the lifting lugs on the cylinder protection ring.

◆ Gas cylinders must be placed vertically in all conditions, Any pressure, drop and tipping may cause fatal damage to the cylinder.

Warning: During the filling or use, the cryogenic liquid should be prevented from splashing or overflowing . Anti-freezing measures should be taken during operation.

3.2 Warning

◆ Protect your eyes and exposed skin

◆ Maintain good ventilation in the area where the equipment is located.

◆ Keep away from flammable products or sparks when filling liquid oxygen

◆ Horizontal scrolling is strictly forbidden to move the cylinder.

4. Operation

4.1 Check before use

After receiving the cylinder, remove the protective jacket and make the following inspection:

a) Whether it's damaged during transportation, including scratches and dents on the surface, and damaged or bent external pipes and accessories. If so, report it to the shipping company immediately.

b) Whether there is a product certificate, instruction manual, and whether the certificate matches the received gas cylinder.

c) Read and understand this technical manual carefully before using this cylinder.

If any questions, please contact your gas cylinder dealer or contact the sales department of Hebei Runfeng Cryogenic Equipment Co., Ltd. directly.

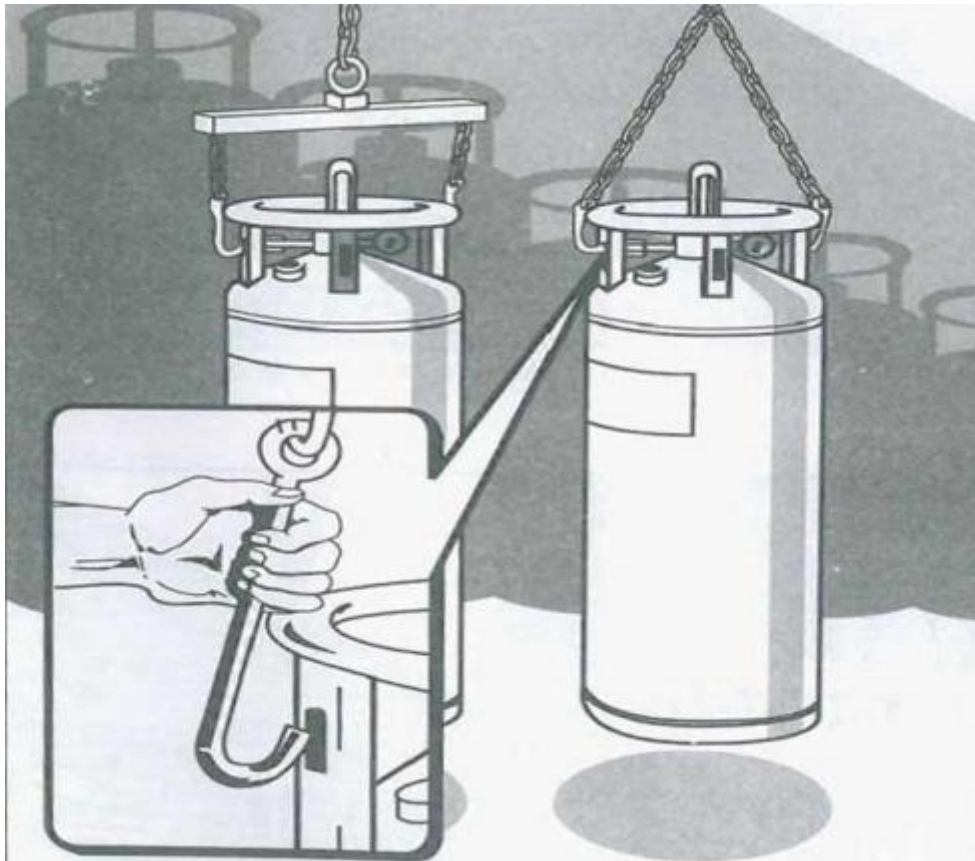
4.2 Lifting procedure

The top of the cylinder is fitted with a stainless steel retaining ring designed to protect the top pipe valve components. The stainless steel protection ring has four brackets supported on the cylinders, each with an oblong hole. This long hole can be used to lift a cylinder or to be carried on a transport trolley.

4.2.1 Lifting

It is necessary to lift the cylinder, use the appropriate hooks and hang them on the long round holes of the two brackets, and the cylinders are lifted vertically.

As shown in the picture, hook and lift the cylinder with chain, or use two hooks to ensure the lifting safe and reliable.

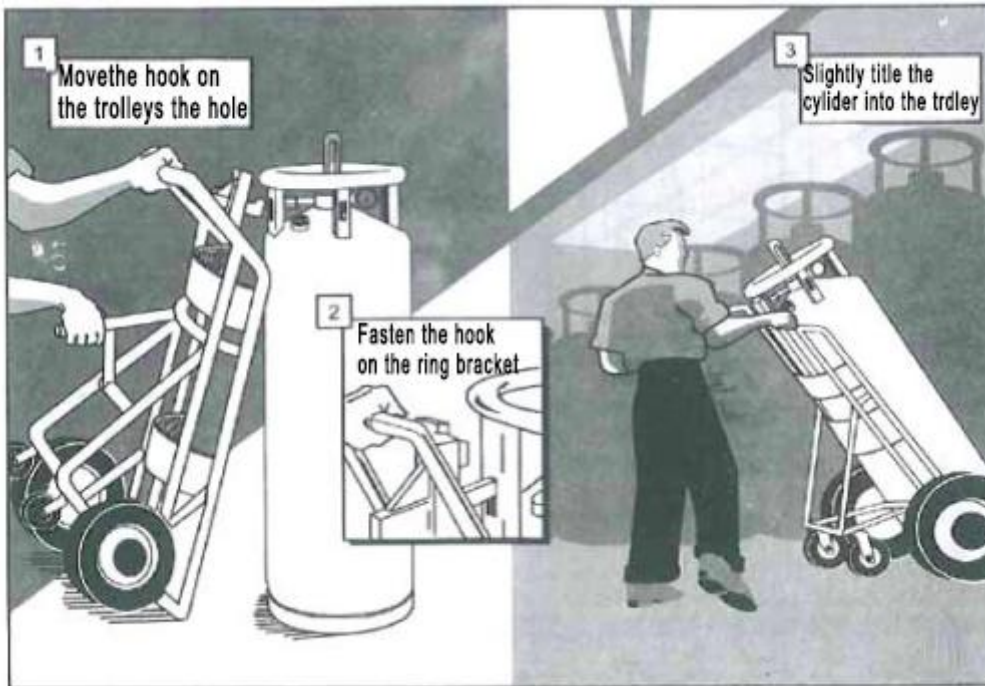


4.2.2 Handling

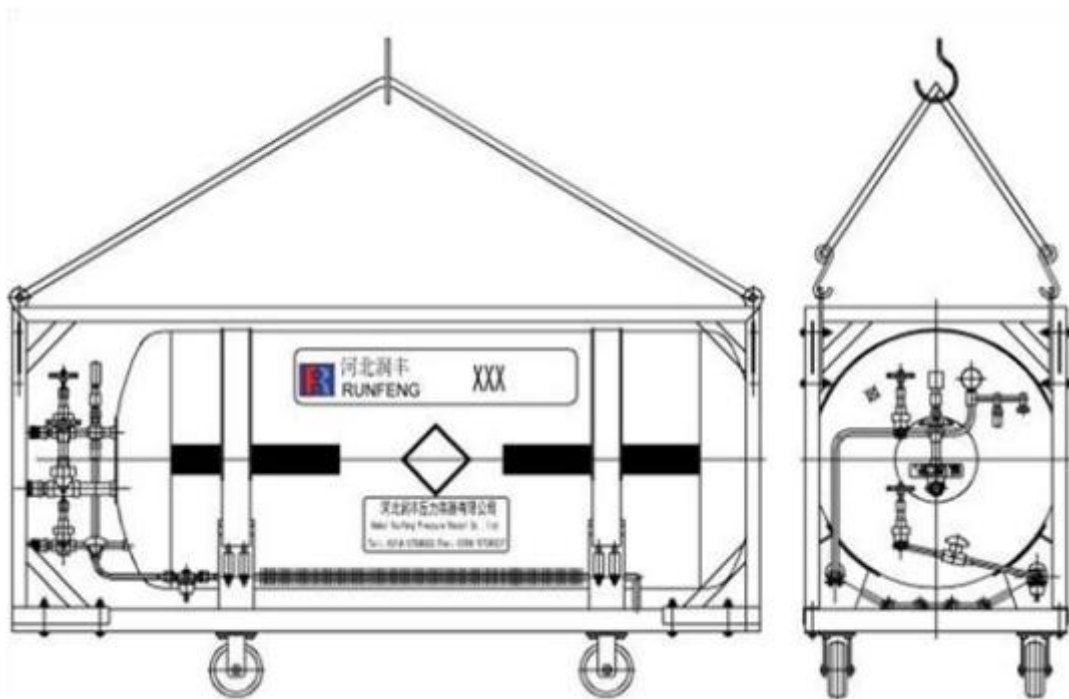
The gas cylinder should be carried by a special bottle transporter. Don't roll the cylinder relying on the cylinder base. Cylinders must be stored and used in a vertical position. When it is necessary to transport cylinders by truck, use lifting platforms, cranes or slopes (less than 15°) for loading and unloading. If not, it may cause serious damage to the cylinders and personal injury.

As shown in the picture below, in the picture it is carried out by using a trolley with pneumatic tires. When handling, the small hook on the trolley should be fastened to the slot on the cylinder protection ring bracket. The cylinder is erected during operating, and slightly tilted during handling.

The trolley shown in the picture below is designed by our company to transport gas cylinders. When moving a liquid gas cylinder frequently within a short distance, it is convenient to use a transport trolley. As long as the ground in the working area trolley is flat, it is convenient and safe to transport the cylinder. Pneumatic tires on the bottle can also be replaced by metal wheels with hard rubber.



Horizontal cylinder



- * When lifting, as shown above
- * Lift the bottom with a forklift
- * Move the cylinder by its base if flat ground short distance.

4.2.3 Transportation

To prevent the cylinders from moving or colliding with each other during transportation, they are mounted on the truck and fixed with nylon straps. Do not bundle them with steel chains .

4.2.4 Storage

Gas cylinders should be stored in a well-ventilated place and should not be exposed to the sun



for a long time .

4.3 Filling

4.3.1 Hot bottle filling

Usually we name the bottle before which is never used or isn't be filled by cryogenic liquid for more than two weeks ,as a "hot bottle". The temperature of the liner is the ambient one , which is different so much from that of the cryogenic liquid . Unnecessary waste happens because of much cryogenic liquid evaporating if filling the hot bottle directly .

Here is the hot bottle filling procedure:

1. First fill the bottle with about 20L of cryogenic liquid, let it stand. During in the process of low-temperature liquid gasification and boosting in the bottle, the bottle liner is also cooled;
2. When the pressure inside the bottle reaches the normal working pressure, the system detects the leak;
3. After lowering the pressure inside the bottle by opening the discharge valve, filling can be done according to the conventional procedure;

Warning: Drain the air in the bottle before filling. Fill with the corresponding media according to the cylinder label.

Warning: Overfilling the cylinder is strictly forbidden;

Warning: Filling in a well-ventilated area, because the accumulation of gas is very dangerous.

Warning: Before the first using of the LNG cylinder, it must be replaced with nitrogen and do analysis for oxygen content. The oxygen must be $\leq 0.3\%$. Blasting gas comes if LNG mixes with air or oxygen, and it burns with tinder,so LNG must be piped to a safe place for discharge.

Note: The pressuring of a fully filled bottle will rise very quickly and which may make the safety valve open.

Note: At the beginning of the operation with liquid oxygen, please don't smoke or be near a fire because liquid oxygen is likely to be splashed in the clothes.

Note: When the saturation pressure of carbon dioxide drops to 0.49 MPa (70 psi), carbon dioxide forms solid dry ice, which blocks the pipe. Therefore, when the cylinder is filled with carbon dioxide, the carbon dioxide gas in the bottle must be pressurized before it can be filled.

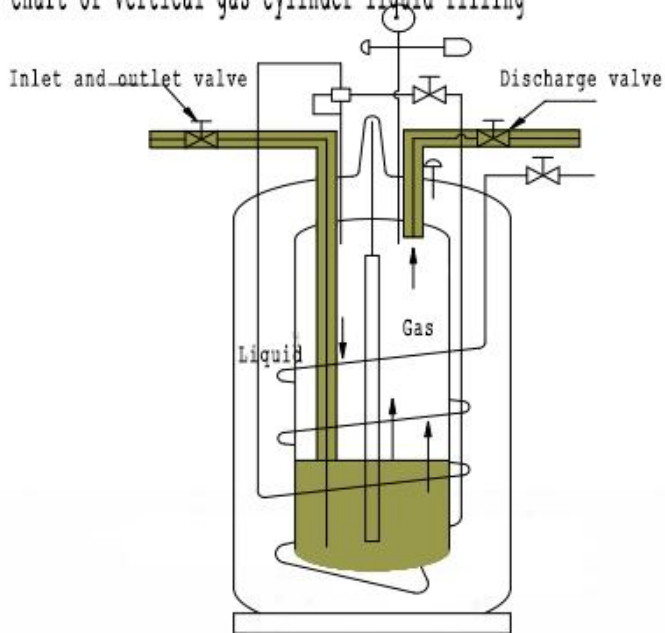
Note: Another two important factors for the abnormal pressure increasing the degree of supersaturation and overfilling of the cryogenic liquid.

4.3.2 Filling by differential pressure

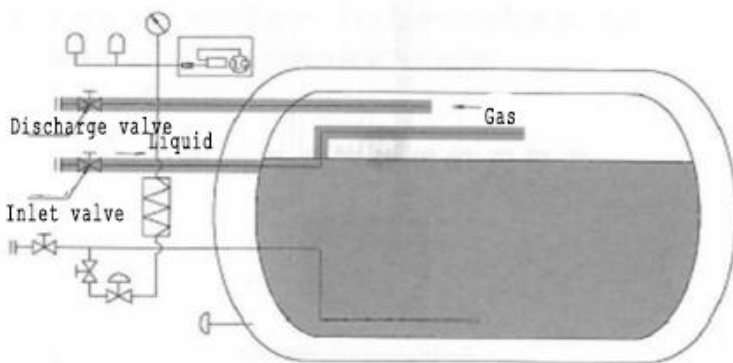
1. Connect the cylinder inlet and outlet valves by a special conveying hose with the supply source and tighten them.
2. Open the discharge valve and inlet & outlet valve of the cylinder, then open the supplying valve to start filling.
3. During the filling process, check the pressure inside the bottle through the pressure gauge and adjust the discharge valve to maintain the pressure at 0.07~0.1MPa (10~15 psi).
4. When the required filling quality is reached, close the inlet and outlet valves (filling shut-off valve), discharge valve and supply valve.
5. Remove the transfer hose and remove the cylinder from the scale.



Flow chart of vertical gas cylinder liquid filling



Flow chart of horizontal cylinder filling

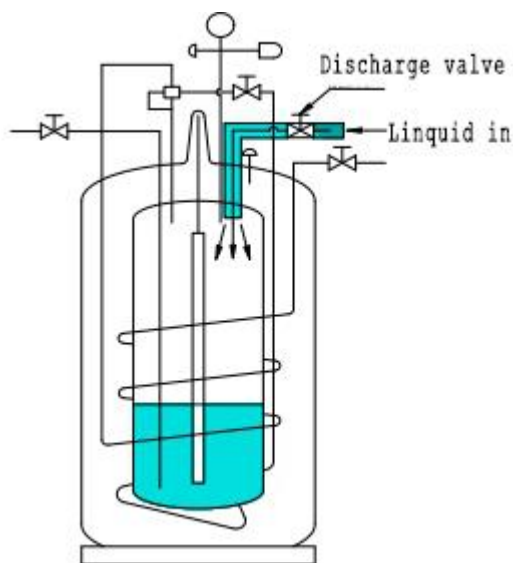


4.3.3 Filling with a centrifugal pump

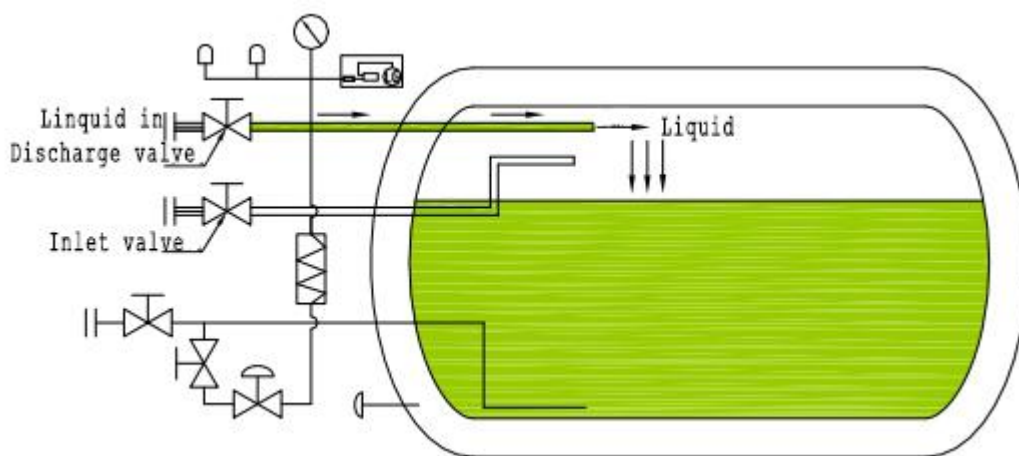
Filling with a centrifugal pump can reduce the loss of media during the filling process, and the liquid can be pumped into the cylinder without emptying. The liquid enters the cylinder through the discharge valve. The pressure gauge value should be closely noticed during the filling process. When it is close to the safety valve, lifting pressure or the rated pressure of the pump, the pump should be stopped immediately. The outlet pressure should be smaller than the safety valve. Lifting pressure cryogenic centrifugal pump should be chosen. If the user wants to complete the filling with the centrifugal pump, please consult our company for details.



Flow chart of vertical gas cylinder liquid filling



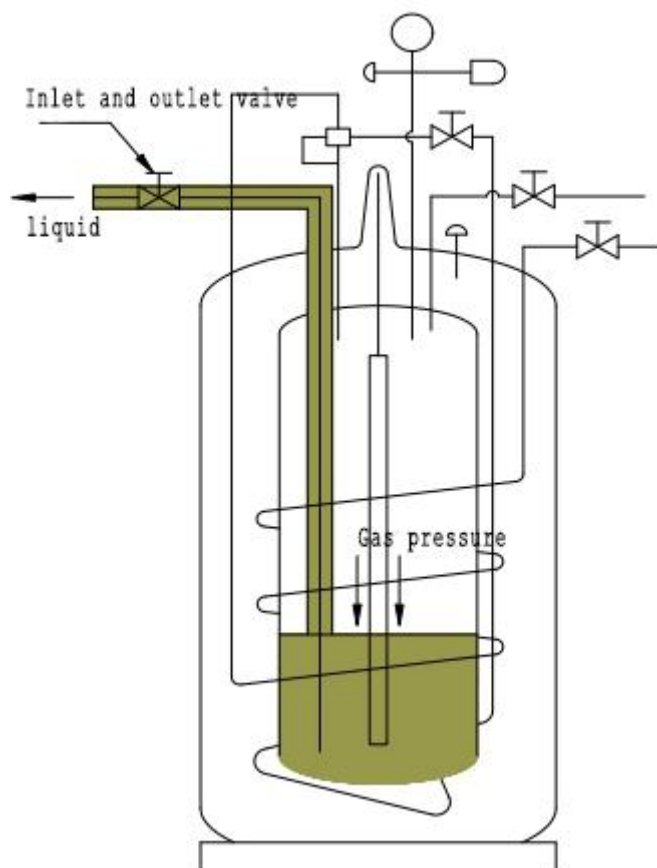
Flow chart of horizontal cylinder filling



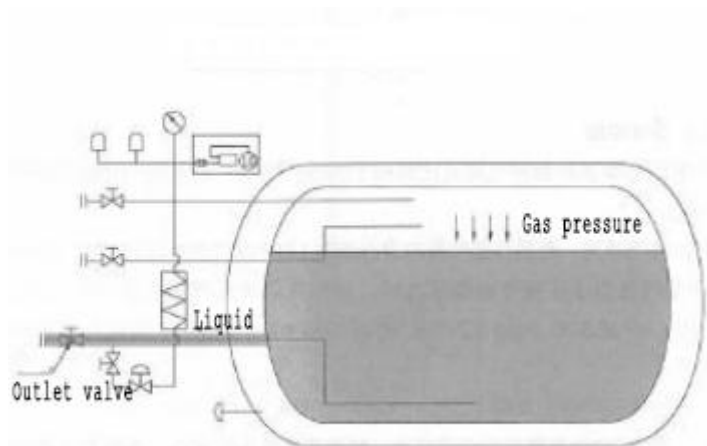
4.4 Liquid supply

1. Connect the inlet and outlet valve to the receiving source with a special conveying hose and tighten it without leakage.
2. Open the receiving source valve, then open the inlet and outlet valve or the outlet shut-off valve of the cylinder to start the liquid supply.
3. When the pressure inside the bottle is less than that of the receiving device, please first open the pressure-increasing(cut-off) valve to pressurize before liquid supply.
4. Close the receiving valve , the inlet and outlet valve or the outlet shutoff valve and then remove the delivery hose.

Flow chart of liquid supply



Flow chart of horizontal cylinder





4.5 Single cylinder gas supply

1. Connect the gas service valve to the receiving source with a special conveying hose and tighten it without leakage.
2. Open the gas service valve and the supercharger (cutoff) valve.
3. Open the receiving source valve to obtain a continuous and stable gas.
4. Close the gas service valve and supercharger valve to stop the gas supply.
5. Close the receiving source valve and remove the delivery hose.

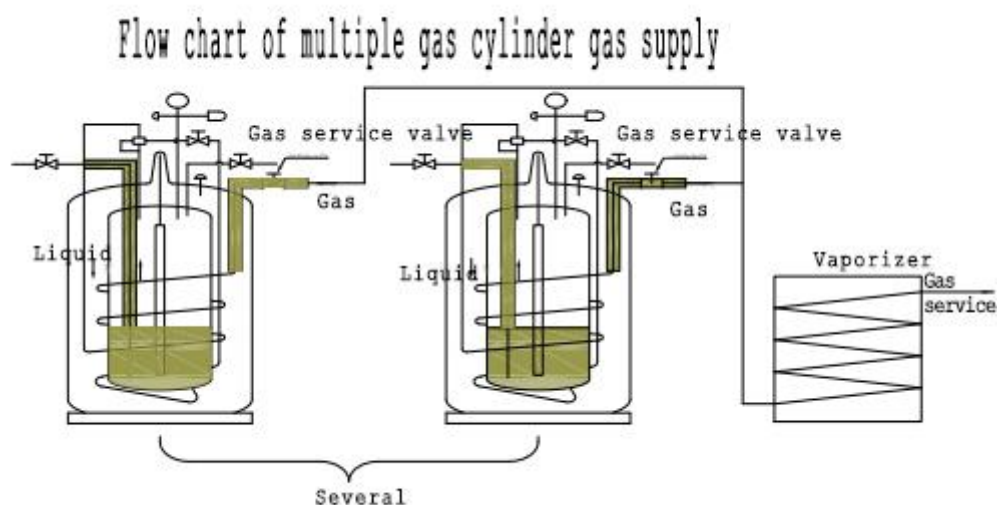
Caution: If the required gas flow increases, the temperature of the supplied gas will decrease.

4. **Note:** When using natural gas, the vaporization amount of the vertical gas cylinder vaporizer is $6 \text{ N} \cdot \text{m}^3/\text{h}$, the gasification amount of the horizontal medium pressure and high pressure gas cylinder is about $7.8 \text{ N} \cdot \text{m}^3/\text{h}$, and the ultrahigh pressure gasification amount is about $15.7 \text{ N} \cdot \text{m}^3/\text{h}$.
5. **Note:** When using carbon dioxide, the vaporization amount of the vertical gas cylinder vaporizer is $3.9 \text{ N} \cdot \text{m}^3/\text{h}$, the gasification amount of the horizontal medium pressure and high pressure gas cylinder is about $5.1 \text{ N} \cdot \text{m}^3/\text{h}$, and the ultrahigh pressure gasification amount is about $10.2 \text{ N} \cdot \text{m}^3/\text{h}$.
6. **Note:** When using liquid oxygen, and liquid argon the gasification volume of vertical gas cylinder is about $9.2 \text{ N} \cdot \text{m}^3/\text{h}$, and the gasification amount of horizontal medium pressure and high pressure gas cylinder is about $12 \text{ N} \cdot \text{m}^3/\text{h}$, and about $24 \text{ N} \cdot \text{m}^3/\text{h}$ with ultra-high pressure

4.6 Multiple gas cylinder gas supply

1. According to the amount of gas need, the user can connect several cylinders to the vaporizer.
2. Open the gas cylinder valve and supercharger valve.
3. Open the receiving source valve to obtain a continuous and stable gas.
4. Close the gas service valve and supercharger valve to stop the gas supply.
5. Close the receiving source valve and remove the delivery hose.

Note: To control the supply gas temperature, generally a thermometer is required at the outlet of the vaporizer.





4.7 Liquid retention

The liquid left in the bottle should be left 2~3L, so that the bottle is in a cold state and will not be converted into a "hot bottle".

5. Maintenance

Please read the front contents of the safety protection section before servicing the cylinder. Never operate with pressure. Open the discharge valve to discharge pressure before maintenance. Check your tools before cleaning the liquid oxygen bottle to ensure then clean and oil-free. After each repairment, it must be checked to ensure no leakage point.

5.1 Leak detection

In order to ensure the normal operation of the cylinder, the system must scheduled for leak detection. If there is a leak, it should be repaired immediately. The leakage point can be accurately determined by soapywater.

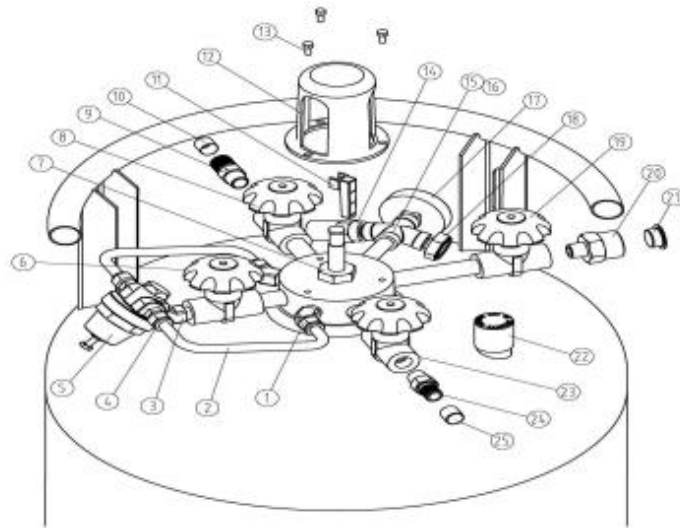
5.2 Leak repair

Any leaks must be repaired as soon as they are discovered:

- a) If the thread leakage is in the rear joint pipe, close the valve first and disassemble the connection, check whether the thread surface is damaged. If no damage, clean the joint thread surface, and reassemble it with the specified sealing tape; if obviously damaged, Please replace the connector and reassemble it.
- b) If a leak is found at the roof of the safety valve, pressure gauge or bursting disc and the combination regulator valve ferrule joint, the discharge valve must be opened to reach atmospheric pressure before service. After reinstallation, check the pressure leak.
- c) If the valve or its bottom leaks, please open the discharge valve to release to atmospheric pressure. If the inlet and outlet valve leaks, the liquid and gas in the bottle should be completely emptied, and then operate according to the shut-off valve installation procedure.

5.3 Parts List

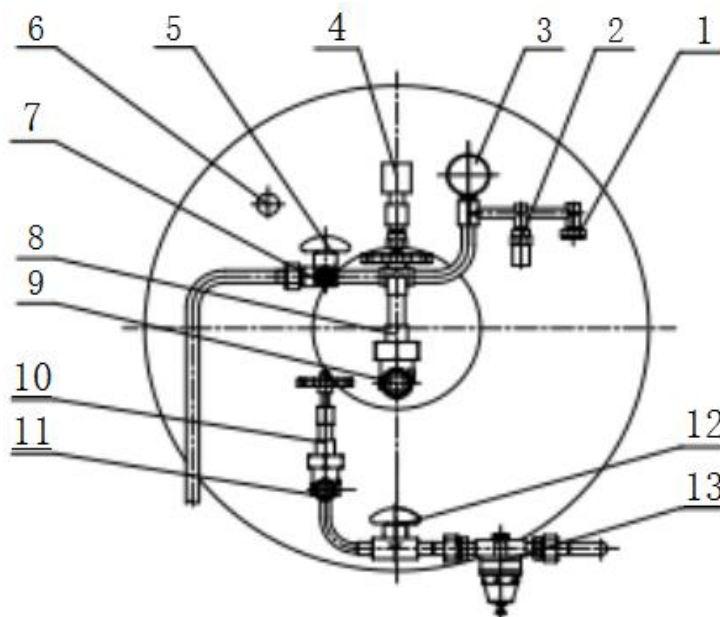
List of vertical bottle accessories



Item	Quantity	Accessory Name
1	2	135° ferrule point NPT1/4- ϕ 10
2	2	Ferrule brass tube $\Phi 10 \times 1$
3	1	135° card sleeve joint NPT1/4-NPT3/8
4	2	Straight ferrule joint NPT1/4- ϕ 10
5	1	Combined pressure regulating valve 0.86MPa/2.06 MPa /2.76 MPa
6	1	Supercharge stop valve
7	1	Buoyancy liquid level gauge
8	1	Discharge valve
9.1	1	Connector CGA440 (oxygen)
9.2	1	Connector CGA295 (nitrogen, argon, natural gas, carbon dioxide)
10	1	Dust cover
11	1	Buoyancy indicator
12	1	Liquid level gauge shield
13	3	M5 \times 10 bolt
14	1	Safety valve 1.59MPa/2.41MPa/3.45MPa for medium LNG safety valve 2.4MPa/3.45MPa/4.15MPa
15	1	Cross connector
16	1	Cylinder short tube
17	1	Pressure gauge 0~2.5MPa/ 0~4MPa/0~6MPa
18	1	2.4MPa/3.6MPa/5.17MPa bursting disc device
19	1	Gas service valve
20	1	Connector CGA540/ CGA580/ CGA320
21	1	Dust cover
22	1	Vacuum shield
23	1	Inlet and outlet valve
24	1	Connector CGA440/ CGA295
25	1	Dust cover



List of horizontal gas cylinder accessories



Item	Quantity	Accessory name
1	1	Bursting disc device 2.4MPa/3.6MPa/5.17MPa
2	1	Safety valve 1.89mpa / 2.86mpa / 3.45mpa for medium LNG safety valve 2.4mpa / 3.45mpa / 4.15mpa
3	1	Pressure gauge 0 ~ 2.5 MPa / 0 ~ 4 MPa / 0 ~ 6 MPa
4	1	Liquid level gauge
5	1	Discharge valve DN15 PN4.0
6	1	Vacuum shield
7	1	Discharge joint (G5/8, M27 2)
8	1	Inlet shut-off valve DN25, PN4.0
9	1	Inlet connector (G5/8, M36 × 2)
10	1	liquid outlet valve DN10, PN4.0
11	1	liquid outlet joint (G5/8, M27 × 2)
12	1	Supercharge valve stop valve DN10, PN4.0
13	1	Pressurized (pressure regulating) valve 0.86MPa/2.06MPa/3.3MPa



5.4 Fault list

Fault	Possible reason	Solution
Pressure or boost speed too fast	Small gas amount	If the amount of used gas is too small, the booster stop valve should be activated in time.
	Overfilling	If the filling is excessive, the pressure inside the bottle may rise sharply after the filling is completed. Don't overfill or discharge some.
	Vacuum Loss	Sweating or even frosting on the surface of the bottle, return it to the factory for repair.
Too low pressure	Excessive gas consumption	Refer to the instruction, use it according to the recommended maximum gas consumption and supercharging capacity.
	Combined regulator or boost regulator closed	Open combination regulator or boost regulator
	Combined pressure regulator or boost regulator is not working properly	Test whether the combined pressure regulator or boost regulator is working properly when setting pressure
	Combined pressure regulator or boost regulator is set too low	Set it to the required value
	For leaks	Check whether there is frosting or air leakage sound at the valve of the bottle, and go air tightness test
	Liquid temperature is too low	Open the combined regulator or boost regulator, much time for pressurizing or pressurize by external pressure.
	Safety valve lifting under low pressure	Safety valve's lighting pressure setting is not suitable. Have an appropriate safety valve
	Icing in the bottle	When filling , vapor enters the pipe and is purged with hot nitrogen.
	Bad pressure gauge	Replace it
Cylinder is full but no pressure force display	Bad pressure gauge	Replace it
	Bad bursting disc	Replace bursting disc
	Safety valve does not return or is damaged	When the safety valve is not returned, it is usually caused by ice blockage. It needs to be poured on the safety valve with hot water. Or tap the safety valve with a rubber hammer to return it. If still not returned, replace it.
	The valve can't close tightly	Repair or replace the valve.
Cylinder is full but no liquid bit display	The aluminum rod is separated from the level gauge.	The level gauge is removed, the aluminum rod is reconnected, reinstalled, and do the airtight test .
	The level gauge floats broken (displayer is broken)	Replace the float (replace the new instrument and fill it)
Frosting at the lower part of the bottom	Boosting with booster circuit	If the pressure in the bottle is lower than the set value of the combined regulator, it is a normal situation.



Spiral frosting in the lower part of the bottom of the bottle.	Vaporizing liquid into a gas by vaporizing circuit	normal
Frosting on the neck of the bottle	Level gauge leakage	Check the connection of the level gauge for leaks. After draining the pressure , replace the gasket, reinstallation and airtight test.
	Pipeline leakage on combined regulating valve	tighten the joint, air tight test
Even frosting on the bottle body	Excessive gas consumption	normal
Safety valve frequently lifting	Loss of vacuum	Refund to the factory
	Safety valve set valve is low	Reset safety valve opening pressure
The gas supply temperature is too low	The gas consumption is too large	Refer to maximum gas consumption

6. Emergency measures

6.1 Dressing requirements for emergency handlers

Eyes or exposure skin to cryogenic fluids can result in cold burns which is similar to burns. Protect the parts of the body which may touch cryogenic liquids by wearing special protective equipment and utensils.

6.2 In a fire condition

At this time, all valves which are connected to the gas and liquid phase, should be closed in time. When the valve cannot be closed or the leak cannot be blocked, don't spray the liquid directly with water. It is recommended to use a dry powder (preferably potassium carbonate) fire extinguisher.

6.3 When relieving overpressure

At this time, the discharge valve should be opened in time to discharge the overpressure gas in the bottle as soon as possible until the safety valve returns to the normal position. When discharging oxygen into the air, it should be determined in advance that there is no open flame, no flammable materials nearby, and no pedestrians passing. If the exhaust gas has a poor pressure-reducing effect, on move the cylinder to an open area, connect the delivery hose, and open the inlet and outlet valves to vent while the discharge valve is vented.

Note: Liquids that are emptied are not allowed to drain into underground drains.

6.4 When the inner tank leaks accidentally

At this time, if the inner tank is in excess pressure due to internal liquid leakage, it will cause



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an accident, The liquid in the bottle should be carefully discharged or into other intact bottles as soon as possible. Where conditions permit, the bad bottles are transferred to a without flame, flammable materials, or pedestrians for emergy treatment.

6.5 When the valve is frozen

If the valve is frozen, it should be defrosted with clean, oil-free warm water or hot nitrogen before it is operated. Do not use a hammer or other object to strike forcibly.

7. Regular inspection

7.1 Inspection agency and its inspectors

The gas cylinder periodic inspection agency shall work in accordance with the “Specifications for the Approval of Special Equipment Inspection and Testing Institutions” (TSG Z7001), to obtain the periodic inspection approval certificate for gas cylinders, conduct regular inspections of gas cylinders in strict accordance with the approved inspection scope, and to be supervised the quality supervision department.

The inspector should obtain the qualification certificate of the cylinder inspector, and the non-destructive testing personnel of the cylinder should obtain the corresponding non-destructive testing qualification certificate.

7.2 Main duties of the gas cylinder inspection agency:

- (1) Conduct regular inspections of gas cylinders, issue inspection reports, and be responsible for their correctness;
- (2) Replace the detachable cylinder valve and other accessories, and the chosen bottle valve manufactured by the company with the corresponding bottle valve manufacturing license;
- (3) Apply color and color ring to the surface of the cylinder, and make the inspection mark according to the regulations;
- (4) Entrusted by the owner of the gas cylinder, eliminate the function (flattening or solution) of the reported abandoned cylinder ;

7.3 Work arrangement Inspection

The cylinder manufacturer and filling company should send the filling unit should promptly send the gas cylinders that when cylinders to the place with corresponding qualifications for regular inspection.

When the gas cylinder periodic inspection agency receives the gas cylinder for inspection, it should conduct the inspection in time. It is forbidden to repair, weld, dig, disassemble and refurbish cylinders and its valves.

7.4 Inspection cycle and retirement limit

7.4.1 Welded insulated gas cylinders

Test them every 3 years. If there is any problem in the inspection or use that affects the thermal insulation performance, it should be sent to the manufacturer with the corresponding qualification or the unit entrusted by the original manufacturer for maintenance or repair.



7.4.2 Treatment beyond the service life

For welded adiabatic cylinders (including gas cylinders for welded adiabatic vehicles), if the adiabatic performance cannot meet the requirements or cannot be repaired, it should be scrapped.

7.5 Advanced inspection

If the cylinder is found to have one of the following conditions, while using it should be inspected in advance:

- (1) There is serious corrosion, damage or doubt about its safety and reliability;
- (2) The winding layer of the wound cylinder is seriously damaged;
- (3) The inventory or deactivation time is more than one inspection period;
- (4) Re-application of a motor vehicle after a traffic accident that may affect the safe use of the vehicle gas cylinder;
- (5) Other circumstances in which regular inspection is required in accordance with the cylinder inspection standard and where the inspection personnel (or filling personnel) deem it necessary to test in advance.

7.6 Gas cylinder inspection before treatment

The gas in the bottle should be recovered and treated before the gas cylinder is inspected periodically. Recycling and disposal must follow the requirements here:

- (1) The residual gas contained in the toxic and flammable gas cylinders should be recycled in an environmentally friendly manner and should not be discharged into the atmosphere;
- (2) After confirming that the pressure drop in the cylinder is zero, remove the bottle valve;
- (3) Gas cylinders containing flammable gas should be replaced; cylinders with flammable liquefied gases such as liquefied petroleum gas should be internally treated by means of steam purging or other methods that do not damage the material of the bottle or do not degrade the material properties of the bottle. Meet the specified safety requirements, otherwise, the air tightness test with compressed air is strictly forbidden.

7.7 Items and requirements for inspection:

- (1) The items and requirements for periodic inspection of various types of gas cylinders should comply with the relevant safety technical specifications and relevant national standards;
- (2) Periodic inspection of should be carried out one by one. Gas cylinders or bottle valves which have been welded, repaired, dug, disassembled or refurbished should be scrapped during the inspection;
- (3) The inspection agency should ensure that the gas cylinders and cylinder valves that pass the inspection can be safely used one inspection cycle under normal use conditions, if not cylinder should be scrapped. And the cylinder valves should be replaced.

7.8 Records and reports of the inspection

The periodic inspection agency should fill in the inspection records carefully. After that, the relative report should be issued in time for the qualified or scrapped gas cylinders. Inspection records and reports should be true and accurate.

7.9 Eliminate the use of functional processing



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The treatment of eliminating the use of the exhaust gas bottle is handled by the designated unit of the local quality supervision department. Elimination of the use of functional processing should be used in an unrecoverable manner such as flattening or disassembling the bottle, and drilling or breaking the thread of the bottle shouldn't be used.

The organization or unit that undertakes the elimination of enabling gas cylinders should register the cylinders , and report to the municipal quality supervision department every year. The exhaust gas bottle should be reported to the gas cylinder owner for registration and cancellation of the use of gas cylinders.

In order to avoid the scrapped gas cylinder from being repaired or refurbished, it is forbidden for the cylinder filling unit or the inspection agency to resell the reported exhaust gas cylinder which has not been removed from use.

8. After-sales service

In order to continuously improve the quality of our products and offer better serve our customers, we sincerely hope that users can provide valuable opinions and suggestions on the shortcomings of products such as of designing, manufacturing and appearance quality. We sincerely welcome users to propose your opinions to our company, we will promptly adopt your proper suggestions and improve ourselves in time.

Product warranty card

Warranty instructions:

1. The warranty card is necessary for you to seek special maintenance if your cylinder breaks down during use. Please keep it properly (it will not be replaced if lost).

2. This product is guaranteed for 12 months (vacuum for 24 months) from purchasing date on the invoice.

Maintenance caused by bad quality may be free of charge within the warranty period.

3. Maintenance fee (repair fee + parts fee + transportation fee) will be charged for the following repairs even within the warranty period, :

No warranty card or the warranty card is lost;

The warranty card is incorrectly filled, altered or inconsistent with the receipt;

Failures or damages caused by the user's fault because of not using the product according to the operating instructions;

Faults caused by self-maintenance or by third parties without written permission of our company;

Fault or damage caused by accidents.

1. Please fill in the "feedback form user" and return it to our company within one month after the purchasing date, so as we can establish the quality assurance file in time. Please fill in the form below and cut it out along the dotted line.



User feedback sheet

User' s name: _____

User' s address: _____

Contact: _____

Tel: _____

Fax: _____

E - mail: _____

Article no. : _____

Purchasing date : _____

Sales company: _____

Your kind comments and Suggestions :



Maintenance record (for maintenance personnel from the manufacturer and its company)

Times	Content	Signature	User' s Signature	Date
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				



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