

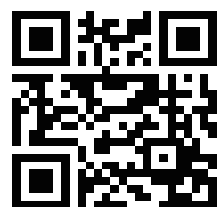
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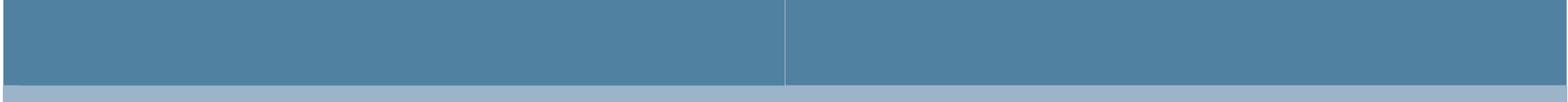
Haier

Liquid Nitrogen Container User's Manual

Model:
YDS series
YDH series



- Before using, please read the manual thoroughly.
- Our company reserves the right to the interpretation of the manual.
- For the product appearance, please make the object as the standard.
- After reading the manual, please keep it along with the invoice properly.
- Product technology or software is subject to upgrade without notice.



The produce is designed and manufactured according to the national standard GB/T5458-2012 Liquid Nitrogen Biological Container, which is mainly composed of the liner, case and multi-layer insulator with high vacuum interlayer. The features of the product are as follow:



- The liner and shell of the container are made of antirust aluminum alloy plate with the advantages of light weight, high strength and corrosion resistance.
- Neck tube is made of fiber glass with the features of high mechanical strength and low thermal conductivity, etc.
- The multi-layer insulator adopts aluminum foil with especially excellent reflection performance as the reflecting screen and the material with low thermal conductivity and low deflation rate as the thermal insulation materials, in order to reduce the thermal radiation.



The interlayer between the shell and liner of the container is in high vacuum to prevent heat convection of the gas and adopts adsorbent with high adsorbing capacity in low temperature to guarantee the container' s reliable performance for a long time. The vacuum life of the product is not less than 5 years.

We apology that because of product improvement, the liquid nitrogen product you purchased may be not completely consistent with the drawings in the manual. The content of the manual is subject to change without notice.

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Storage Period Test and Calculation Method of Static Liquid Nitrogen Product

1. The storage period of static liquid nitrogen product is tested with weighing method.
2. Test should be performed under $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ambient temperature and atmospheric pressure; meanwhile, it should not be performed in direct ventilated area.
3. The test should be performed with charging rate of nitrogen in the container not less than 50% (charging rate of product less than 3L is 100%), without the lifting barrel being released, and the cover plug covered, and measure the daily average evaporation capacity q_m of the tested product in 3 d by weighing method after 48 hours' standing.
4. The maximum weighing capacity of the weighing apparatus (platform scale or electronic digital scale, etc.) used in weighing method should not be more than 5 times the capacity of product fully charged, and the precision should be at least 3 thousandth.
5. The storage period t of static liquid nitrogen product is calculated by the following formula:

$$t = \frac{m - m_e}{q_m}$$

Where,

t ---static liquid nitrogen storage period, d;

q_m ---daily evaporation capacity of measured product, kg/d;

m ---total mass when the product is filled with liquid nitrogen, kg;

m_e ---empty weight of product , kg.

Notes: Storage period test and calculation of static liquid nitrogen product is performed in accordance with GB/T 5458-2012. When the test is not performed under the prescribed ambient temperature and barometric pressure, or the minimum division value of measuring apparatus differs from the standard requirement, there may be deviation between the calculated value and the actual storage period of the static liquid nitrogen product.

Liquid Nitrogen Perfusion Method

To prevent vacuum decrease or lose resulted from container damage, please perform perfusion in accordance with the following method strictly during the first perfusion and subsequent refilling process:

- 1.Fill the liquid nitrogen into new container or rewarming container slowly with a funnel (or delivery pipe).
- 2.Let the liquid nitrogen stand in the container for 2 hours to cool the inside completely.
- 3.After 2 hours' (cooling) standing, refill the liquid nitrogen to the required level.
- 4.If the container is perfused from the boosted liquid source, make sure that the source container is under low pressure safe condition.
- 5.Keep in mind to wear appropriate safe equipments: mask,low-temperature protective gloves and apron.
- 6.Never overfill the liquid nitrogen in the container. The overfilled liquid nitrogen decreases the temperature of the case quickly which causes leakage in the vacuum nozzle set, resulting in instant or advanced vacuum failure.

Liquid Nitrogen Extraction

1. Extraction of liquid from the container shall be performed through self-boosted liquid nitrogen pump or pouring method.
2. Always wear appropriate safety equipment: mask, gloves and apron.

Dear users,

Thank you for using this product, in order to get you better read this manual and use of this product, and prevent personal injury and damage accidents, please read carefully and comply with the following contents in this manual.

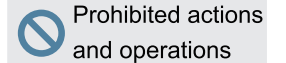
Safety Precautions



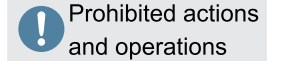
WARNING If the precautions of the warning sign are not followed, it could cause death or serious injury to people.



WARNING If the precautions of the warning sign are not followed, it could cause death or injury to people, damages to storage tank and related property loss.



Prohibited actions and operations



Prohibited actions and operations



! Liquid nitrogen container is divided into two types: storage and transport. The storage type of container is mainly used to stationary storage for indoor liquid nitrogen and frozen goods, not used for car transport; in order to satisfy the use condition for transport, the transport type of container is specially designed of shockproof. Except for the stationary storage, this kind of container can also be transported filled with liquid nitrogen, but it should avoid collisions and violent vibration.

! If liquid nitrogen is refilled indoors, please notice that you should open the doors and windows to prevent severe hypoxia in the operating environment.

! Before use, the new container or the thawed container with rewarming should be filled a small amount of liquid nitrogen for precooling. After it approaches the heat balance (the gasification is not severe), refill the liquid nitrogen. The pump or long tube funnel is suitable for filling the liquid nitrogen. Its filling pipe should be inserted near the container bottom and it should leave a gap at the mouth of the container and let the nitrogen go out. The filling level of liquid nitrogen in the container should not be over the bottom surface of the neck tube. Avoid body contacting with the liquid nitrogen during the operation, otherwise it may cause cold injury.

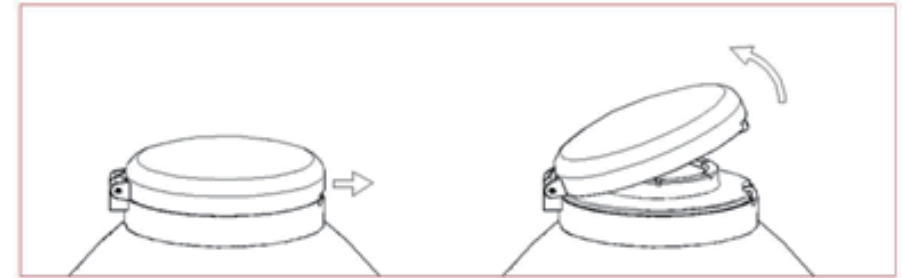
! After the frozen goods are placed in container for the first time within 2 ~ 3 hours, it should arrange a special person who regularly observes whether the external surface of the container appears condensate water or frost phenomenon. If both cases occur, it shows that container vacuum has been lost. The liquid nitrogen in container will be volatilized in a very short period and the container can not be used normally. Please contact the after-sales service staffs in time.

- ! The container case is under the atmospheric pressure in use and transport environments. During the use and transport, the case surface of the container is subject to sink because of serious collisions or heavy load, so it causes that product is damaged or disabled.
- ! To avoid cold injury, when liquid nitrogen is filled in, taken out and stored, and the container and cooling items with liquid nitrogen are transferred, please wear safety equipments such as mask, low-temperature protective gloves and apron. Do not expose any skin of the body.
- ⊘ The container is designed for storage and transport of liquid nitrogen and forbidden to fill other liquids.
- ⊘ The container liner is operated in normal pressure. Do not allow to take the use methods of pressure charger or sealing the mouth of the container randomly.
- ⊘ The neck tube is the passage for the liquid nitrogen and frozen goods out and in. Do not cut the tube wall in use.
- ⊘ Do not disconnect the vacuum sealing connector of the container without permission, which is the key component to keep the vacuum in the container interlayer. Once it is destroyed, the vacuum in the container interlayer will be lost immediately. The product can no longer be used.
- ⊘ It can use weighing method, or insert liquid level ruler, thin rod or bamboo rod into the liquid nitrogen to view the frost level (liquid level) for checking the storage capacity of the container. Do not insert hollow pipe to avoid the liquid nitrogen rushing out from the pipe and splashing on persons.
- ⊘ Forbid to place items on the container cover and seal the neck mouth.
- ! Please notice that the liquid nitrogen is supplemented in time during use. The liquid level should not be over the bottom surface of the neck tube of the container for supplement.
- ! The cap plug of the liquid nitrogen container is made of heating insulation material, which can not only prevent the evaporation of liquid nitrogen, but also fix the canister. So avoid wear as possible and extend its life when it opens and closes.
- ! It should use transport drums for transporting liquid nitrogen. It should install the liquid nitrogen container on the wooden support, and place and fix soft cushion during transportation for liquid nitrogen. Use filler to separate the containers. Avoid bump and impacts. Take strict precautions against container dumping. With loading and unloading, please also take strict precautions against impact on liquid nitrogen container. Do not drag the liquid nitrogen container along the ground randomly.

Opening and Closing of Container Cover

To prevent accidental opening of container cover (when not locked) due to abnormal vibration, collision, etc, the container cover equipped on the product with lock buckle adopts a unique self-lock structure design. When opening or closing the container cover, users should operate as follows:

At the lock on the container cover, insert your fingers (index finger and middle finger) to pull the upper edge of the cover outward with a certain amount of force, and then turn upward to open the container cover (as shown in the illustration). When closing the container cover, it indicates that the cover has been closed in place when you hear a light sound of “click”, and self-lock is formed between the upper cover and base.



Lifting Method of Lifting Barrel

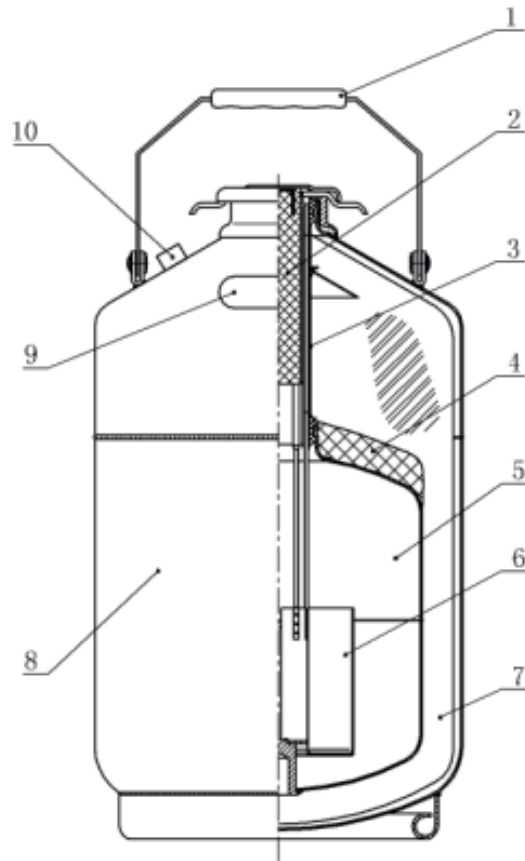
Hold the lifting hook of a lifting barrel with hands and lift it upward 40-80 mm vertically, then rotate the lifting hook 180°, and lift the entire lifting barrel out of the container vertically (as shown in the illustration).

All the lifting barrels can be lifted out of the container by following the methods above.



Product Structure Diagram

YDS Series Product Diagram



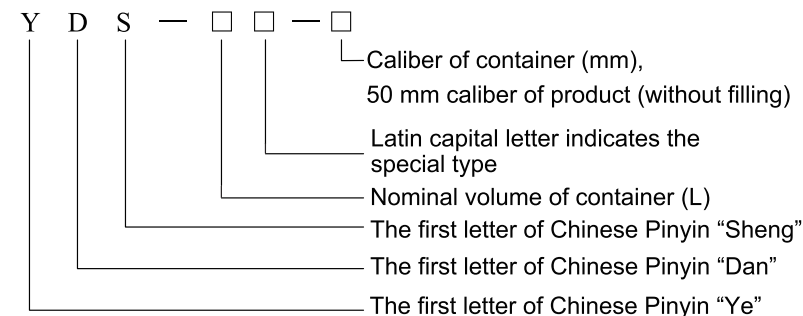
- | | | |
|-------------------------------|---------------------------------|-------------------|
| 1. Lifting handle | 2. Cover plug | 3. Neck tube |
| 4. Absorbent | 5. Liner | 6. Lifting barrel |
| 7. Multi-layer heat insulator | 8. Case | |
| 9. Label | 10. Connector of vacuum sealing | |

- ! If it is required to clean the liner, please dump the container repeatedly until the foreign materials are out; or use cleaner to suck out the dirt in the liner. Do not use the water to clean the container liner.
- ! The container should place in a cool, ventilated and dry environment; please notice: regularly inspect the liquid level and if the external surface of the container appears condensate water or frost phenomenon.
- ⊘ In order to avoid that the container cover (without a lock) is opened accidentally because of the abnormal vibration and collisions, our product is installed a unique self-lock structure of container cover with lock buckle. When the user opens or closes the container cover, please follow the operation method to operate and avoid the person injury.
- ⊘ Forbid to disconnect the connectors of the container vacuum sealing, otherwise the product will be no longer used.
- ⊘ This product is involved in a number of professional technologies. After a failure occurs, the user shall not maintenance it without approval to avoid injuries. Please contact after-sales professionals for inspection and maintenance.
- ! Always keep the containers in vertical state.
- ! During transferring, please be careful and prevent liquid nitrogen spilling and splashing.
- ! If the liquid nitrogen splashes on the clothes or safety dressing, take off them immediately; forbid to wear shoes such as boots and so on for operation. Once the liquid nitrogen gets in the shoes, the feet will get cold injury seriously.
- ! Seek immediate medical attention for any cold injury caused by liquid nitrogen.
- ⊘ Forbid to jam the mouth of the container filled with liquid nitrogen by any method, otherwise it is dangerous to explode with boost.
- ⊘ Because the emission of the nitrogen vapor will run out of oxygen in the air and may cause asphyxia and even death. Do not store or use of liquid nitrogen container in poor ventilation area.
- ! An empty container should lid the plug in to avoid liquid nitrogen absorber absorbing moisture from the atmosphere, which reduces the absorption ability of liquid nitrogen.
- ⊘ The container is avoided from strong vibration and collisions as possible. Otherwise it is damaged and the vacuum is lost.
- ⊘ Do not allow to make pressure charger for use or sealing the mouth of the container randomly.

Some Names and Terms of Product

No.	Terms	Definition
1	Geometric volume	A space volume is limited by the geometric volume of liner 's inner edge(excluding neck tube).
2	Caliber	Internal diameter of neck tube.
3	Outer diameter	Outer diameter for barrel body of product case (excluding rib).
4	Height	The product appearance (excluding the cap plug) and maximum length of the canister along axial direction of barrel body.
5	Empty weight	The weight when the liner is air at room temperature and the product is with the cap plug and without the canister.
6	Storage period of static liquid nitrogen	After the product is filled with liquid nitrogen for precooling and reaches the heating balance without canister, refilled with liquid nitrogen and placed in static, the days before all liquid nitrogen volatilizes.
7	Product life	The time period from use at delivery to the storage life of liquid nitrogen less than 40% of the factory index.
8	Static evaporation loss test	Test for measurement evaporation loss of liquid nitrogen in the static state after the liquid nitrogen absorber absorbs liquid nitrogen and reaches heating balance.
9	Daily evaporation capacity of static liquid nitrogen	The evaporation amount of liquid nitrogen in its absorber during one day apart in static evaporation loss test (the value is the reference value under normal state).

Compilation Method for Product Model



Example 1: YDS-30 indicates 30L nominal volume, 50mm caliber of liquid nitrogen biological container.

Example 2: YDS-50B-80 indicates 50L nominal volume, 80mm caliber of liquid nitrogen biological container in transport type.