Dry Shipper for Air-Transport

User Manual

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I、Overview

Henan Tianchi Cryogenic Mechanical Equipment Manufacturing Co., Ltd. is a high-tech enterprise specializing in the R&D, production, and sales of liquid nitrogen biological containers and related products.

Our main product line includes:

Liquid Nitrogen Biological Containers
Wide-Neck Liquid Nitrogen Containers
Self-Pressurizing Liquid Nitrogen Containers
Liquid Nitrogen Level Alarms
Various Accessories

Application Fields:

Animal Husbandry: Cryogenic storage of livestock semen and embryos.

Healthcare: Cryogenic storage of human stem cells, plasma, internal organs, etc., as well as dermatological treatments.

Research Institutions: Culture vessels and storage equipment for vaccines, viruses, and other microorganisms.

Industrial Sector: Cryogenic treatment of molds, tools, and blades, as well as mechanical shrink-fitting assembly.

Guided by our corporate mission of "Service, Health, Future," we uphold the philosophy of "Making the World Fall in Love with Chines Manufacturing." We adhere to a quality policy of "Continuous Improvement, Pursui Excellence" and strive tirelessly towards our corporate vision of "Building a Centennial Tianchi, Creating a Global Brand."

Our products comply with environmental standards and have obtained both domestic and international certifications, including ISO 9001 and CE via SGS.

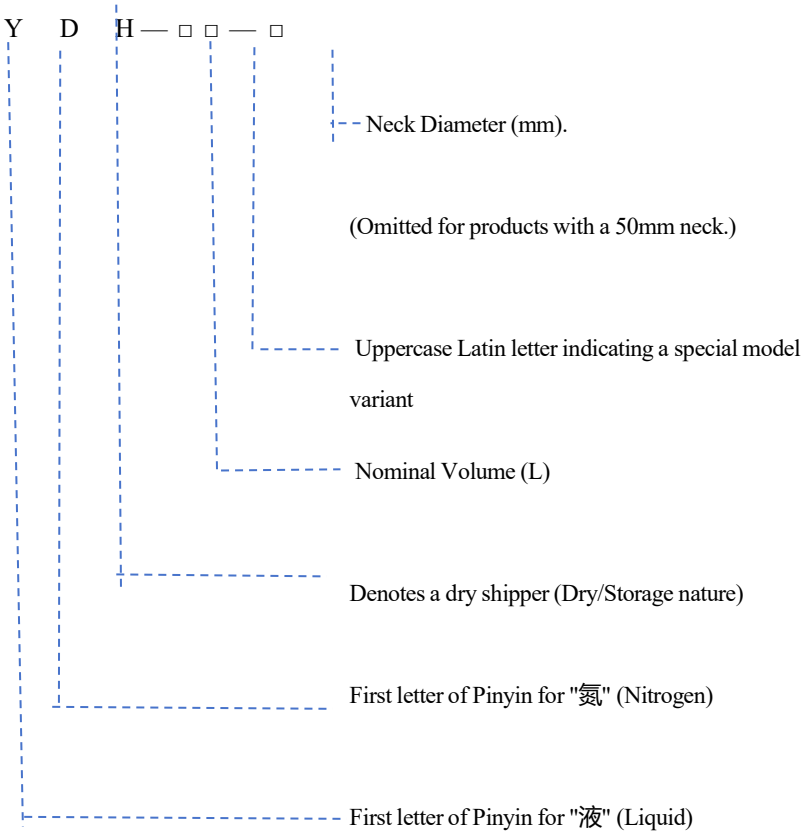
TcCryo consistently operates under the service principle of "Starting from Customer Needs, Ending with Customer Satisfaction." We maintain a user-experience-centric approach, continuously enhancing our technological capabilities and service standards.

II 、 Glossary of Product Terms

No.	Term	Definition
1	Geometric Volume	The internal volume of the inner vessel determined by its geometric dimensions (excluding the neck tube).
2	Adsorption Capacity	The volume of liquid nitrogen that can be held by the adsorbent material when fully saturated and the container is in a dry (non-evaporating) state.
3	Neck Diameter	The internal diameter of the neck tube.
4	Outer Diameter	The external diameter of the product's outer shell (excluding any reinforcing ribs).
5	Height	The maximum axial length of the product, excluding the lid/plug and any carrying handles.
6	Tare Weight	The weight of the product when the inner vessel contains ambient air, includes the lid/plug, and excludes any canisters or racks.
7	Static Liquid Nitrogen Holding Time / Evaporation Loss	The duration (in days) for a fully charged, pre-cooled, and thermally stabilized product (without canisters) to completely evaporate under static conditions.

8	Dry Storage Duration	The length of time the container remains below -135°C after the adsorbent is fully saturated with liquid nitrogen and transitions to a dry storage state.
9	Service Life	The period from the product's manufacture until its static liquid nitrogen holding time falls below 40% of the original factory specification.

III 、Product Model Naming Convention



Examples1： YDH-3: Denotes a liquid nitrogen biological container with a 3L nominal volume and a 50mm neck diameter.

Examples2：YDH-10-125: Denotes a liquid nitrogen biological transport container with a 10L nominal volume and a 125mm neck diameter.

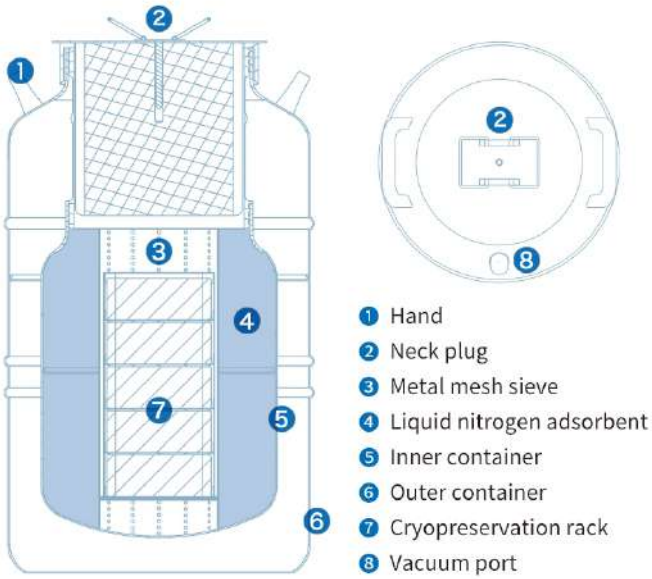
Project	**Unit**	**YDH-2-35**	**YDH-3**	**YDH-4-80**	**YDH-6-80**
Effective volume	L	2	3	4	6
Nitrogen adsorption volume	L	1	1.3	1.8	2.4
Static nitrogen evaporation rate	L/d	0.10	0.15	0.9	0.21
Working days	d	9	9	9	11
Storage capacity					
Canister size	mm	φ25*120	φ47*200	Φ76*276	Φ76*200
Number of 2.0ml cryotubes	ea	N/A	N/A	N/A	N/A
Number of cryovials with -25 cell	ea	N/A	N/A	N/A	N/A
Number of cryovials with -100 cell	ea	N/A	N/A	N/A	N/A
Number of blood bags - 50ml	ea	N/A	N/A	N/A	N/A
Number of blood bags - 100ml	ea	N/A	N/A	N/A	N/A
Outline dimensio					
Caliber	mm	35	50	80	80
Height	mm	410	470	505	510
Outer diameter	mm	180	224	224	283
Empty weight	kg	2.7	3.8	5.5	6.1

Project	**Unit**	**YDH-10-125**	**YDH-15-216**	**YDH-25-216**
Effective volume	L	10	15	25
Nitrogen adsorption volume	L	6	7	10
Static nitrogen evaporation rate	L/d	0.4	0.89	0.89
Working days	d	15	7	11
Storage capacity				
Canister size	mm	81*85*225	139*141*168	139*141*280
Number of 2.0ml cryotubes	ea	100	300	500
Number of cryovials with -25 cell	ea	4	N/A	N/A

Number of cryovials with -100 cell	ea	N/A	3	5
Number of blood bags - 50ml	ea	6	N/A	11
Number of blood bags - 100ml	ea	N/A	N/A	11
Outline dimensio				
Caliber	mm	125	216	216
Height	mm	595	585	665
Outer diameter	mm	304	385	375
Empty weight	kg	9	12.7	12.5

IV、Product Structure Diagram

(This illustration serves as a general representation of the product series. Specific models may feature structural variations. Please refer to the configuration sheet for precise details.)



V 、Key Components and Features

The container is primarily constructed from an outer shell, inner vessel, neck tube, multi-layer insulation, liquid nitrogen adsorbent, and storage racks (Refer to Figure 1).

1.The outer shell and inner vessel are constructed from aluminum alloy plate, offering advantages of light weight, high strength at cryogenic temperatures, and corrosion resistance.

2. The neck tube is made of Fiber Reinforced Plastic (FRP), characterized by its high mechanical strength and low thermal conductivity.

3. The multi-layer insulation utilizes aluminum foil with excellent reflective properties as radiation shields and materials with low thermal conductivity and low out gassing rates as spacers, thereby minimizing heat transfer via radiation.

4. The annular space between the outer shell and inner vessel is maintained under high vacuum to suppress heat transfer via gas convection. Furthermore, an adsorbent with high capacity at cryogenic temperatures is used within this vacuum space to ensure long-term, stable, and reliable performance, resulting in a service life of no less than 5 years.

5. The liquid nitrogen is retained within the inner vessel by an adsorbent material. This design ensures no spillage occurs, even if the container is tilted or overturned.

VI 、Operating Instructions

1. Before use, inspect the product for external quality. If any defects are found, notify our company within 5 working days of receiving the product (contact details on the back cover).

2.This product series is primarily designed for transportation and transfer. During transport, protect the product from impacts that could damage the vacuum layer. Avoid placing the container upside down. For necessary protection, consider using ancillary packaging materials such as an air transport case.

3. When refilling the container with liquid nitrogen indoors, ensure windows and doors are open to prevent severe oxygen depletion in the operating environment.

4. For new containers or those that have warmed to ambient temperature, pre-cool with a small amount of liquid nitrogen first. Once thermal equilibrium is nearly reached (i.e., vigorous boiling subsides), fill completely with liquid nitrogen. After the adsorbent is fully saturated, drain any excess liquid nitrogen. Ensure the adsorbent is fully saturated before each use.Use a pump or long-stemmed funnel for filling,

inserting the filling tube near the bottom of the container.Leave clearance at the container neck for nitrogen gas to escape.The liquid nitrogen level must not exceed the bottom plane of the neck tube.Avoid skin contact with liquid nitrogen to prevent frostbite.

5. Within the first 2-3 hours after initially placing frozen materials into the container, assign personnel to periodically check the outer surface for condensation or frost formation. The presence of either indicates a loss of vacuum integrity, which will cause rapid evaporation of the liquid nitrogen and render the container unusable. While the probability is low, often resulting from improper handling during shipping, this observation is crucial to prevent potential loss of stored materials.

6. Note that the outer shell withstands atmospheric pressure during use and transport. Severe impact or crushing force can cause dents in the outer shell, leading to product failure.

7. The container is designed exclusively for storing and transporting liquid nitrogen. Strictly prohibit the use with liquid oxygen.

8. The inner vessel operates at atmospheric pressure. Do not pressurize it with gas or seal the container opening for use.

9. The neck tube is the passage for liquid nitrogen and stored materials. Avoid scratching or damaging the inner wall.

10. The vacuum sealing assembly is critical for maintaining the vacuum insulation. If damaged, the vacuum will be lost, and the product must be taken out of service. Do not tamper with or open the vacuum sealing assembly.

11. Store the container in a cool, well-ventilated, and dry environment.

12. As this product involves specialized technology, any malfunction requires returning the container to our company for inspection and repair.

VII 、Warranty Coverage

Our liquid nitrogen biological containers are warranted against defects in materials and workmanship under normal use for a period of one (1) year from the date of receipt by the user. Should a defect impacting functionality be confirmed as due to manufacturing causes within this period, the following terms apply:

1. If, during the initial filling with liquid nitrogen, the container surface exhibits excessive condensation or frost formation, our company will be responsible for free repair or replacement.

2.If, during initial testing prior to first use, the product's static liquid nitrogen holding time is found to be below the specified standard, our company will be responsible for free repair or replacement.

3.Within the one-year period, should a malfunction be confirmed as a quality issue attributable to our manufacturing process, our company will be responsible for inspecting or repairing the product.

4.Requirements for Service:To request warranty service, the complete container with all accessories, along with the corresponding Product Certificate bearing matching serial numbers and a copy of the purchase receipt, must be returned to our company for inspection and processing.

Voided Warranty Conditions:The "Three Guarantees" (repair, replacement, return) will not apply under any of the following circumstances:

1. The user tampers with or opens the vacuum sealing assembly, resulting in its damage or the breakage of the valve core seal.

2.The product is not used in accordance with the Operating Instructions and relevant regulations, leading to damage such as:Dents in the outer shell Scratches or damage to the neck tube Deformation or leakage due to internal pressure Corrosion of the inner vessel.

VIII 、Testing and Calculation of Static Liquid Nitrogen Holding Time

1. The static liquid nitrogen holding time of the product is tested using the weighing method.

2. The test must be conducted under an ambient temperature of 20°C ± 3°C and at atmospheric pressure. Furthermore, the test must not be performed in a location with direct airflow or ventilation.

3.For the test, the container must have a liquid nitrogen fill level of no less than 50% (100% for products below 3L capacity), without any canisters inserted, and with the lid/plug secured. After standing statically for 72 hours, the average daily evaporation rate (q_m) of the product under test is determined via the weighing method over a subsequent 3-day period.

4. The scale (platform scale or electronic digital scale, etc.) used for the weighing method must have a maximum capacity not exceeding 5 times the weight of the product when filled with liquid nitrogen and an accuracy equal to or better than 1/3000.

5. The static liquid nitrogen holding time (t) of the product is calculated by the following formula:

$$\mathbf{t = (m - m_e) / q_m}$$

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

Where:
t = Static liquid nitrogen holding time (days, d)
$\mathbf{q_m}$ = Daily evaporation rate of the product under test (kg/d)
m = Total mass of the product when filled with liquid nitrogen (kg)
$\mathbf{m_e}$ = Tare weight of the product (kg)

Note: The testing and calculation of the product's static liquid nitrogen holding time are performed in accordance with the GB/T 5458-2012 standard.

If the test is not conducted under the specified ambient temperature and atmospheric pressure, or if the resolution of the measuring instrument differs from the standard requirements, the calculated value may deviate from the actual static liquid nitrogen holding time of the product.

IX 、 Appendices / Additional Information

Each product is shipped with one copy each of the User Manual and the Product Certificate. Please inspect these contents upon unboxing. Should you have any questions, please relay the information to our Sales Department within 5 working days.