

LABGIC

操作说明书

Operations Manual



Liquid Nitrogen Biological Container
液氮生物容器

2024.3版

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第一章 概述

我公司长期致力于低温生物储存、真空绝热、深冷处理的研究、开发及系统集成，提供低温应用的完整技术方案、产品设计及专用低温设备的制造。

我公司主要产品有液氮生物容器、大口径液氮容器、自增压式液氮容器、低温治疗器、液氮液位报警器、低温温度监测仪、液氮生物储存系统、制氮机及各种附件。

我公司产品应用领域：

畜牧行业：牲畜精液、胚胎的冷冻储存；

医疗行业：人体干细胞、血浆、内脏器官等的冷冻储存以及治疗皮肤病等；

科研单位：疫苗、病毒及其它微生物的培养箱及储存设备；

工业领域：工模具、刀具、刃具的深冷处理，机械冷装配等。

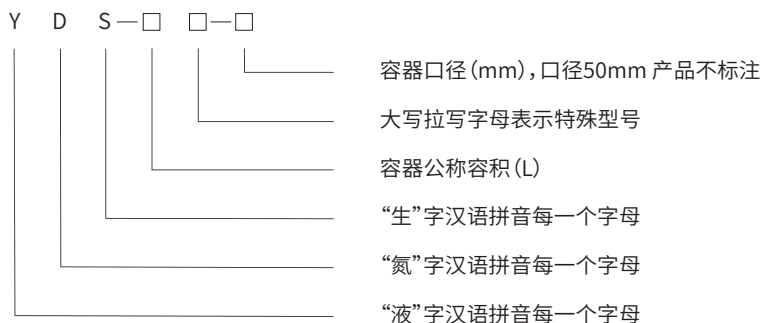
我公司始终坚持“以质量起飞、靠科技腾达”的兴企策略，率先在全国同行业中建立“低温储存研发中心”，拥有科学的管理机制、高效的技术队伍。

我公司注重信誉，讲究服务。在销售产品的同时，为用户提供最经济、最合理的解决方案以及国内外最新行业信息。

第二章 产品部分名词术语

术语	定义
几何容积	由内胆内缘几何尺寸(不含颈管)所限定的空间体积
口径	颈管的内直径
外径	产品外壳筒体不含筋的外直径
高度	产品外形不含盖塞和提筒沿筒体轴向的最大长度
空重	产品在内胆为室温空气,带盖塞,不放提筒时的质量
静态液氮保存期	产品注入液氮预冷,不放提筒达到热平衡后,再盛满液氮静态放置全部挥发完的天数
产品寿命	从产品出厂使用至液氮保存期低于出厂指标40%的时间间隔

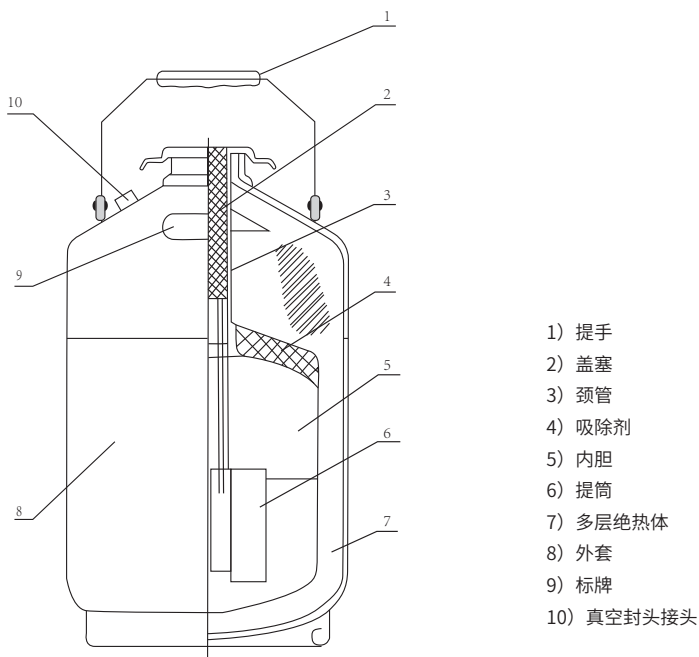
第三章 产品型号编制方法



示例1: YDS-30表示公称容积30L,口径50mm的液氮生物容器。

示例2: YDS-50B-80表示公称容积50L,口径80mm的液氮生物运输容器。

第四章 产品结构示意图



第五章 产品主要结构及其特点

容器主要由外壳、内胆、颈管、多层绝热体、提筒等组成。

- 1、容器外壳、内胆采用铝合金板制作，具有重量轻、低温下强度高、耐腐蚀等特点。
- 2、颈管采用玻璃钢制作，具有机械强度高、导热系数小等特点。
- 3、多层绝热体采用反射性能特别优良的铝箔为反射屏，采用导热系数小，放气速率低的材料为隔热材料，以减少热辐射。
- 4、容器外壳与内胆间的夹层为高真空状态，以防止气体的热对流，并采用在低温状态下吸附量大的吸附剂，以保证容器的性能长期稳定可靠，产品寿命不低于5年。

第六章 产品使用须知

1、用户使用产品前，应开箱检查产品外观质量，如发现容器外观有缺陷，在收到产品后5个工作日内，将此信息返回我公司（联系方式见封底）。代、经销单位则按代、经销协议有关条款执行。

2、该系列液氮生物容器产品分贮存、运输两大类型。贮存型容器主要用于室内液氮和冷冻物品的静置贮存，不能作车载运输使用；为满足运输的使用条件，运输型容器作了专门的防震设计，该类容器除可静置贮存外，还可在充装液氮状态下作运输使用，但应避免碰撞和剧烈震动。

3、若在室内对容器补充液氮，请注意要打开门窗操作，防止操作环境中严重缺氧。

4、新容器或已解冻复温的容器，在使用前必须先充入少量液氮预冷，接近热平衡（气化不剧烈）后再注满液氮。充装液氮时，宜用泵或长管漏斗，其充注管要插至接近容器底部，并须在容器口部留有空隙，让氮气排出。注入容器内的液氮液面高度不能超过颈管下端平面。操作中应避免人体与液氮接触，以免引起冻伤。

5、在容器初次放入冷冻物品后的2~3个小时内，建议用户落实专人，定时观察容器外表面是否出现冷凝水或有结霜现象，如出现这两种情况，表明容器的真空度已恶化，将引起容器内的液氮在很短的时间内挥发完，容器便不能正常使用。出现这种现象的概率虽然很小，有可能是由于未按产品要求进行装卸、运输所致，但为避免冷冻物品的损失，这种观察很有必要。

6、请注意，容器外壳已承受使用、运输环境的大气压压力，在使用或运输过程中，如发生严重碰撞或重压，将会使容器外壳表面发生凹陷，导致产品损坏或失效。

7、容器为液氮贮存、运输而设计，严禁盛装液氧。

8、容器的内胆属常压工作状态，不允许随意采取充气加压或密封容器口的方法使用。

9、颈管是液氮和冷冻物品进出的通道，使用时切勿划伤管壁。

10、容器真空封口接头是保持容器夹层真空的关键部件，一旦受到破坏，将立即导致容器夹层真空恶化，产品不能继续使用，因此，用户不得擅自打开容器真空封口接头。

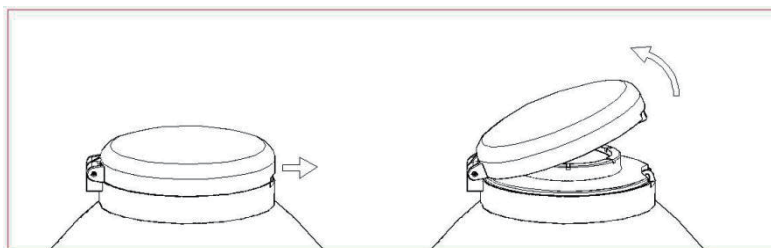
11、检查容器内液氮贮存量，可使用称重法，也可采用液面尺、细木或竹杆插入液氮视其结霜高度（液面高度）的方法，切勿用空心管插入，以免液氮从管内冲出飞溅伤人。使用中注意及时补充液氮，对容器补充液氮时，其液位的高度不得高于容器颈管的下端平面。操作及取放冷冻物品时，请注意要轻拿轻放。

12、容器如需清洗，先用中性洗涤剂洗刷，再用不高于50℃的温水冲洗干净。洗后应使内胆干燥（最好采用热风吹干，其温度不高于50℃）并冷却至常温后，再充入液氮。

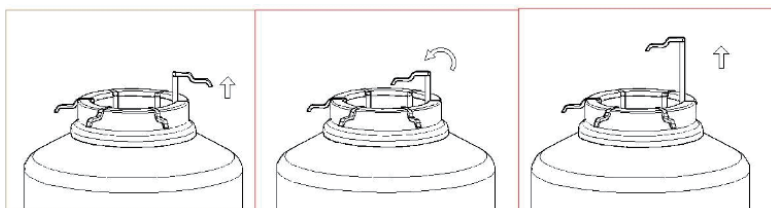
13、容器应放在阴凉、通风、干燥的环境中；长期贮存时应注意定时检查液面和容器外表面有无冷凝水和结霜现象。

14、容器盖的开启、关闭方法。为防止非正常的振动、碰撞等原因造成容器盖（未加锁时）的意外开启，我公司产品装配的带锁扣的容器盖采用了独特的自锁结构设计。用户在开启、关闭容器盖时，应按如下方式操作：

在容器盖上锁处，伸入手指（食指和中指）扣住上盖边缘朝外施加并维持一定的力，然后向上翻转即可打开容器盖（如图）。关闭容器盖时，当听见轻微“咔嚓”一声，表明容器盖的关闭已到位，上盖和底座之间已形成了自锁。



15、提筒的正确提取方法。用手握住一个提筒的提勾，垂直向上提起约40 ~ 80 mm，然后将提勾旋转180°，再垂直向上将整个提筒从容器中提取出来（如图）。按照前述办法，便可以一一将容器中的所有提筒提取出来。



16、本产品由于涉及多项专业技术，因而出现故障后，只能将容器返回我公司进行检查和维修。

第七章 产品质量保证范围

本公司生产的液氮生物容器产品在正常使用情况下，自用户收货之日算起，一年内如发现确因产品制造原因而影响使用的，按下述办法执行：

1、容器初次充注液氮时，如发现容器表面出现有大量冷凝水、结霜等异常现象，我公司负责免费维修或调换。

2、容器初次使用前进行测试时，如发现产品静态液氮保存期低于标准的规定，我公司负责免费维修或调换。

3、在一年内，当产品出现确属我公司制造上的质量问题，我公司负责对产品进行检查或维修。

4、若需维修或调换，必须发运附件齐全容器，以及编号相符的产品合格证、购物凭证复印件等回公司检查办理。

若出现下列情况之一，我公司概不实行“三包”：

1、用户擅自打开容器真空封口接头，造成容器真空封口接头破坏或阀芯封签破损的。
2、将贮存型容器在充满液氮或放有冷冻物品情况下，作车载运输使用，致使产品出现质量问题的。

3、未按产品使用须知及有关规定要求使用产品，造成产品损坏。如将贮存型容器作运输型容器使用，容器外壳产生凹陷、颈管被划伤、受内压变形或者泄漏、内胆被腐蚀等情况的。

注：如产品出现质量问题，我司负责维修、调换本产品，不作液氮和保存物的理赔事宜。

第八章 产品静态液氮保存期的测试、计算方法

- 1、产品静态液氮保存期采用称重法测试。
- 2、测试需在环境温度为 $20^{\circ}\text{C}\pm 3^{\circ}\text{C}$ 和常压情况下进行，同时测试不能在直接通风的场地进行。
- 3、测试应在容器液氮充满率不低于50%（3L以下产品充满率为100%），不放提筒，盖上盖塞，静置48 h后，用称重法测出3d内被测产品的平均日蒸发量 q_m 。
- 4、称重法所使用的衡器（台秤或电子式数字秤等）最大称量不应大于产品装满液氮时的5倍，其精度应优于或等于三千分之一。
- 5、产品静态液氮保存期 t 由下式计算：

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

式中： t —静态液氮保存期，天数 d ；

q_m —被测产品的日蒸发量， kg/d ；

m —产品注满液氮时的总质量， kg ；

m_e —产品空重， kg 。

注：产品静态液氮保存期的测试与计算均按GB/T 5458-1997标准执行。当未按上述规定的环境温度及大气压进行测试，或计量器具最小分度值与标准要求有差异时，计算数值与产品实际静态液氮保存期可能有偏差。

第九章 其它

本产品装箱时附产品使用说明书、合格证等各1份，请用户在开箱时注意检查，如有疑问，请将信息于5个工作日内反馈回我公司销售部。

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Chapter I Overview

Our company has long been devoted to the research, development and system integration of low-temperature biological storage, vacuum insulation and cryogenic treatment, providing complete technical solutions for low-temperature applications, product design and manufacturing of special low-temperature equipment.

Our main products include liquid nitrogen biological containers, large-diameter liquid nitrogen containers, self-pressurized liquid nitrogen containers, cryotherapy devices, liquid nitrogen liquid level alarms, low temperature temperature monitors, liquid nitrogen biological storage systems, nitrogen generators and Various accessories.

My company's product application areas:

Livestock industry: frozen storage of livestock semen and embryos;

Medical industry: frozen storage of human stem cells, plasma, internal organs, etc., and treatment of skin diseases, etc .;

Scientific research insitution: incubators and storage equipment for vaccines, viruses and other microorganisms;

Industrial field: cryogenic treatment of tools, tools, cutting tools, mechanical cold assembly, etc.

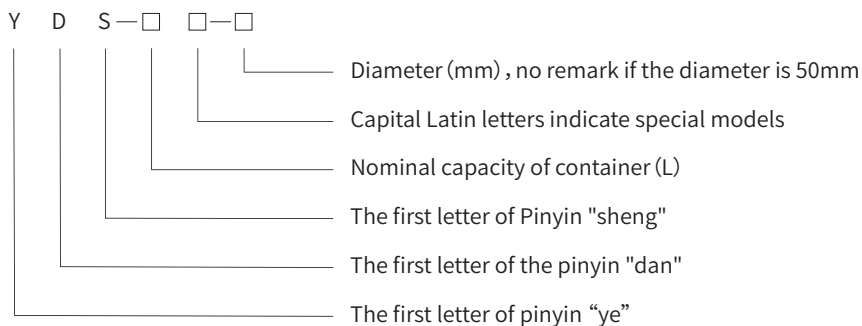
Our company has always adhered to the strategy of "taking off with quality and relying on science and technology", taking the lead in establishing a "low-temperature storage R & D center" in the same industry in the country, with a scientific management mechanism and efficient technical team.

Our company pays attention to credibility and pays attention to service. While selling products, it provides users with the most economical and reasonable solutions and the latest industry information at home and abroad.

Chapter II Product terminology

Terminology	Definition
Geometric capacity	The space defined by the geometric dimensions of the inner edge of the inner tank (excluding the neck tube).
Diameter	The inner diameter of the neck tube.
Outer diameter	The outer diameter of the product shell cylinder does not contain ribs.
Height	The shape of the product does not include the maximum length of the cover plug and the lifting barrel along the axial direction of the barrel.
Empty weight	The weight of the product when the air in the inner tank is in normal temperature, with a lid plug, and without the barrel.
Static liquid nitrogen storage period	The product is injected into liquid nitrogen for pre-cooling, after the lifting cylinder is reached to reach thermal equilibrium, then the liquid is filled with liquid nitrogen and placed statically for all days.
Product life	The time interval from when the product leaves the factory until the storage period of liquid nitrogen is below 40% of the factory target.

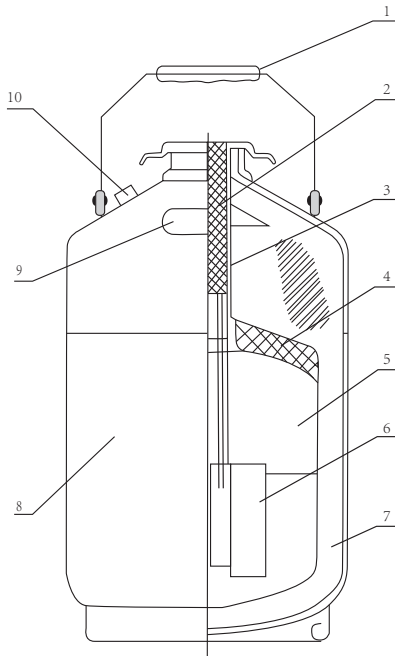
Chapter III Product model compilation method



Example 1: YDS-30 refer to a liquid nitrogen container with capacity of 30L and diameter of 50mm.

Example 2: YDS-50B-80 refer to a liquid nitrogen container with capacity of 50L and diameter of 80mm, and it is suit for liquid nitrogen transportation.

Chapter IV The product structure diagram



- 1) Handle
- 2) Plug
- 3) Neck Tube
- 4) Adsorbent
- 5) Inner Vessel
- 6) Canister
- 7) Multi-layer Insulation
- 8) Outer Shell
- 9) Nameplate
- 10) Evacuating Nozzle

Chapter V

Product main structure and its characteristics

The container is mainly composed of an outer shell, an inner liner, a neck tube, a multi-layer insulation body, a lifting barrel, etc. (see Figure).

1. The container shell and inner tank are made of aluminum alloy, which has the characteristics of light weight, high strength at low temperature and corrosion resistance.

2. The neck tube is made of glass fiber reinforced plastic, which has the characteristics of high mechanical strength and small thermal conductivity.

3. Multi-layer insulation adopts aluminum foil with excellent reflection performance as the reflection screen, and adopts materials with small thermal conductivity and low outgassing rate as thermal insulation materials to reduce heat radiation.

4. The interlayer between the container shell and the liner is in a high vacuum state to prevent thermal convection of the gas, and an adsorbent with a large adsorption capacity at a low temperature is used to ensure the long-term stability and reliability of the container performance and product life is not less than 5 year.

Chapter VI Product usage instructions

1. Before using the product, the user should open the box to check the appearance quality of the product. If the appearance of the container is found to be defective, within 5 working days after receiving the product, return this information to our company (see the back cover for contact details). Agents and distributors will be subject to the relevant provisions of the agent and distributor agreement.

2. The series of liquid nitrogen biological container products are divided into two types of storage and transportation. The storage type container is mainly used for the static storage of indoor liquid nitrogen and frozen items, and cannot be used for vehicle transportation. In order to meet the transportation conditions, the transport type container has been specially designed for shockproof. It can also be used for transportation under the state of filling with liquid nitrogen, but collision and severe vibration should be avoided.

3. If replenishing the container with liquid nitrogen indoors, please pay attention to the operation of opening doors and windows to prevent severe oxygen deficiency in the operating environment.

4. New containers or containers that have been thawed and rewarmed must be filled with a small amount of liquid nitrogen for pre-cooling before use, and close to thermal equilibrium (not vigorous gasification) before being filled with liquid nitrogen. When filling liquid nitrogen, it is advisable to use a pump or a long tube funnel. The filling tube should be inserted close to the bottom of the container, and there must be a gap in the mouth of the container to allow nitrogen to be discharged. The height of the liquid nitrogen in the container should not exceed the level of the lower end of the neck tube. Avoid touching the human body with liquid nitrogen during operation to avoid frostbite.

5. Within 2 to 3 hours after the container is first placed in a frozen item, it is recommended that the user implement a special person to regularly observe whether there is condensation or frost on the outer surface of the container. If these two conditions occur, it indicates the vacuum degree of the container has deteriorated, which will cause the liquid nitrogen in the container to evaporate in a short time, and the container cannot be used normally. Although the probability of this phenomenon is very small, it may be due to failure to load, unload and transport according to product requirements. However, in order to avoid the loss of frozen items, such observation is necessary.

6. Please note that the container shell has been subjected to the atmospheric pressure of the use and transportation environment. During use or transportation, if a severe collision or heavy pressure occurs, the surface of the container shell will be dented, resulting in product damage or failure.

7. The container is designed for storage and transportation of liquid nitrogen. Liquid oxygen is strictly prohibited.

8. The inner tank of the container is under normal pressure, and it is not allowed to use the method of inflation and pressure or sealing the mouth of the container at will.

9. The neck tube is the channel for liquid nitrogen and frozen items to enter and exit.

10. The container vacuum sealing joint is the key component to maintain the container interlayer vacuum. Once damaged, it will immediately cause the container interlayer vacuum to deteriorate and the product can no longer be used. Therefore, the user should not open the container vacuum sealing joint without authorization.

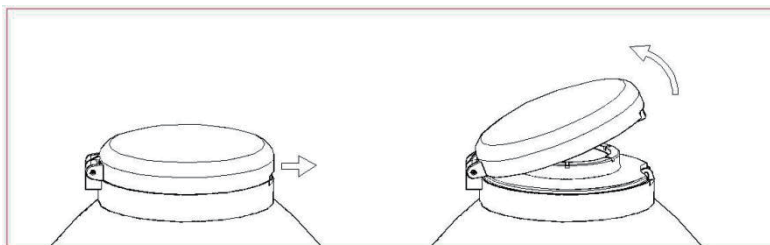
11. Check the storage amount of liquid nitrogen in the container. You can use the weighing method, or use a liquid level ruler, fine wood or bamboo rod to insert liquid nitrogen according to its frost height (liquid level). Do not insert it with a hollow tube to avoid Liquid nitrogen rushed out of the pipe and hurt people. During use, pay attention to timely replenishing liquid nitrogen. When replenishing liquid nitrogen in the container, the height of its liquid level should not be higher than the lower end plane of the neck tube of the container. When handling and handling frozen items, please take care of them.

12. If the container needs to be cleaned, first wash it with neutral detergent, then rinse it with warm water not higher than 50 °C. After washing, the liner should be dried (preferably dried with hot air, its temperature is not higher than 50 °C) and cooled to normal temperature, then filled with liquid nitrogen.

13. The container should be placed in a cool, ventilated, dry environment; during long-term storage, pay attention to regularly check the liquid surface and the outer surface of the container for condensation and frost.

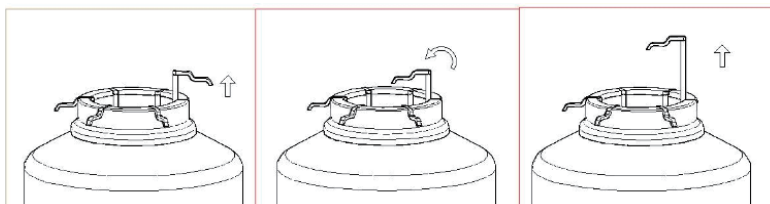
14. How to open and close the container lid. In order to prevent the accidental opening of the container lid (when not locked) caused by abnormal vibration and collision, the container lid equipped with a buckle of our company adopts a unique self-locking structure design. When opening and closing the container lid, the user should operate as follows:

At the lock of the container lid, insert your fingers (index finger and middle finger) to buckle the edge of the lid to apply and maintain a certain force outward, and then flip up to open the container lid (see Figure). When closing the container lid, a slight “click” sound is heard, indicating that the closure of the container lid is in place, and a self-lock has been formed between the upper lid and the base.



15. The correct extraction method of the canister

Hold the lifting hook of a canister with your hand, lift it vertically about 40 ~ 80 mm, and then rotate the lifting hook 180°, and then vertically lift the entire lifting cylinder out of the container (Figure 3). According to the aforementioned method, all the lifting drums in the container can be extracted one by one.



16. Since this product involves many professional technologies, after failure, the container can only be returned to our company for inspection and maintenance.

Chapter VII Product quality assurance scope

If the liquid nitrogen biological container product produced by the company is used normally, and it is found that the use of the product is indeed affected by the manufacturing of the product within one year from the date of receipt by the user, the following measures shall be taken:

1. When the container is filled with liquid nitrogen for the first time, if a large amount of condensate or frost appears on the surface of the container, our company is responsible for free maintenance or replacement.

2. When the container is tested before the first use, if it is found that the product's static liquid nitrogen storage period is lower than the standard, our company is responsible for free maintenance or replacement.

3. Within one year, when the product appears to be a quality problem that our company manufactures, our company is responsible for checking or repairing the product.

4. If you need to repair or replace, you must ship the container with complete accessories, as well as the product certificate with the same number and a copy of the shopping voucher to the company for inspection.

If one of the following situations occurs, the warranty will become invalid automatically:

1. The user opens the container vacuum sealing joint without authorization, causing damage to the container vacuum sealing joint or damage to the valve core seal.

2. The storage container is used for vehicle transportation when it is filled with liquid nitrogen or with frozen items, resulting in product quality problems.

3. Failure to use the product in accordance with the instructions for use of the product and related regulations requires product damage. If the storage type container is used as a transport type container, the outer shell of the container is depressed, the neck tube is scratched, deformed or leaked by the internal pressure, and the inner tank is corroded.

4. If the product has quality problems, our company is responsible for the maintenance and replacement of this product, and does not deal with liquid nitrogen and preservation matters.

Chapter VIII Test and calculation method of product static liquid nitrogen storage period

1.The static liquid nitrogen storage period of the product is tested by weighing method.

2.The test needs to be conducted at an ambient temperature of $20\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ and normal pressure. At the same time, the test cannot be conducted in a directly ventilated site.

3.The test should be carried out after the liquid nitrogen filling rate of the container is not less than 50% (the filling rate of products under 3L is 100%). Measure the average daily evaporation of product q_m .

4.The maximum weight of the weighing instrument (table scale or electronic digital scale, etc.) used in the weighing method should not be greater than 5 times when the product is filled with liquid nitrogen, and its accuracy should be better than or equal to 1/3000.

5.The product static liquid nitrogen storage period t is calculated by the following formula:

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

t —Static liquid nitrogen storage period, d;

q_m —Daily evaporation of the tested product, kg/d;

m —The total weight of the product when it is filled with liquid nitrogen, kg;

m_e —The product empty weight, kg.

Note: The test and calculation of the product's static liquid nitrogen storage period are performed in accordance with GB / T 5458-1997 standard. When the test is not performed according to the above-mentioned ambient temperature and atmospheric pressure, or the minimum division value of the measuring instrument is different from the standard requirements, the calculated value may deviate from the actual static liquid nitrogen storage period of the product.

Chapter IX Others

This product is associated with the product instruction manual, certificate of conformity, etc. Please pay attention to check when open the package. If you have any questions, please contact the sales department of our company within 5 working days.



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