CryoHandy

Transport container for biological samples

Instruction Manual

- Read this Instruction Manual thoroughly and make sure that you fully understand how to handle the container before using it.
- Keep this Instruction Manual handy for future reference whenever needed.
- We shall not be held responsible for any modification conducted by parties other than ourselves.

TAIYO NIPPON SANSO
The Gas Professionals

Contents

1. Safety Precautions

The user of this container should understand all the risks involved with this container. Before using the product, read "1. Safety Precautions" and "2. Before Using the Product" thoroughly to ensure proper use.

These precautions contain important information related to safety. Be certain to observe them.

To ensure your understanding of this Instruction Manual and the safety of this container, the precautions are divided into "DANGER", "WARNING", and "CAUTION".

Indicates that improper use may pose an imminent risk of death, serious injury *1, or extremely serious material damage *2.

Indicates that improper use may pose a potential risk of death, serious injury *1, or serious material damage *2.

Indicates that improper use may pose a risk of minor injury *3 or minor material damage *2.

*1 Serious injury: This refers to loss of sight, injury, burns, electric shock, broken bones, injuries with residual after-effects from poisoning, etc., and injuries requiring hospital admission for treatment or long-term hospital attendance as an outpatient.

*2 Material damage: This refers to extended damage to properties other than the product, including buildings, furniture, livestock, or pets.

*3 Minor injury: This refers to injuries that do not require hospital admission for treatment or long-term hospital attendance as an outpatient.

The following is a list of instructions that need to be observed. Make sure that you understand them fully for safe use.

- When placing the container in a car for transportation, do not place it in a position where there is a risk of gas inhalation by the driver or passenger, in order to prevent death from suffocation due to oxygen deficiency.

- Install a sufficiently effective ventilation system and oxygen meter where the container is used, and constantly monitor the oxygen concentration to make sure it is 19% to 23%.
  There is a risk of suffocation due to oxygen deficiency.
  Bringing your face close to the opening of the container may cause death from suffocation after a single breath because of the extremely low oxygen concentration.

- When filling the container at room temperature with liquid nitrogen, pour it slowly. When the container, at room temperature, is filled with liquid nitrogen, there is a risk of oxygen deficiency due to the extremely low ambient oxygen concentration, caused by large amounts of nitrogen gas arising from rapid evaporation of liquid nitrogen.

- Do not pour large amounts of liquid nitrogen at once. Liquid nitrogen may spurt out due to large amounts of nitrogen gas from rapid evaporation of liquid nitrogen, due to the temperature of the container. Wear protective goggles to protect the eyes from explosive boiling of liquid nitrogen.

- The specified level of liquid nitrogen is up to the top edge of the vial holder inside it. Any extra liquid nitrogen would not be absorbed by the internal absorbent and may spill if the container overturns, causing frostbite.

- Liquid nitrogen may cause frostbite if it comes in contact with the hand or other areas of skin. Wear leather gloves during the liquid nitrogen filling operation.

- When carrying the container, hold the container body. If the lid is held, the container body may come off and drop away from the lid, resulting in a bruised foot. Furthermore, the samples may come out of the container, which may adversely affect their quality.

- Do not seal the container and lid with duct tape or similar.
  Doing so prevents nitrogen gas from leaving, leading to the risk of rupture due to increased internal pressure.

- When taking out samples from the container, use leather gloves or tweezers to handle the vials h. Liquid nitrogen or cold parts may cause frostbite if they come into contact with the hand or other areas of skin.

- If there is condensation on the container and the container is filled with additional liquid nitrogen, there is a risk of rupture due to increased internal pressure, because frozen moisture fills the gap between the container and lid, preventing nitrogen gas from leaving. Do not fill it with additional liquid nitrogen.

2. Before Using the Product

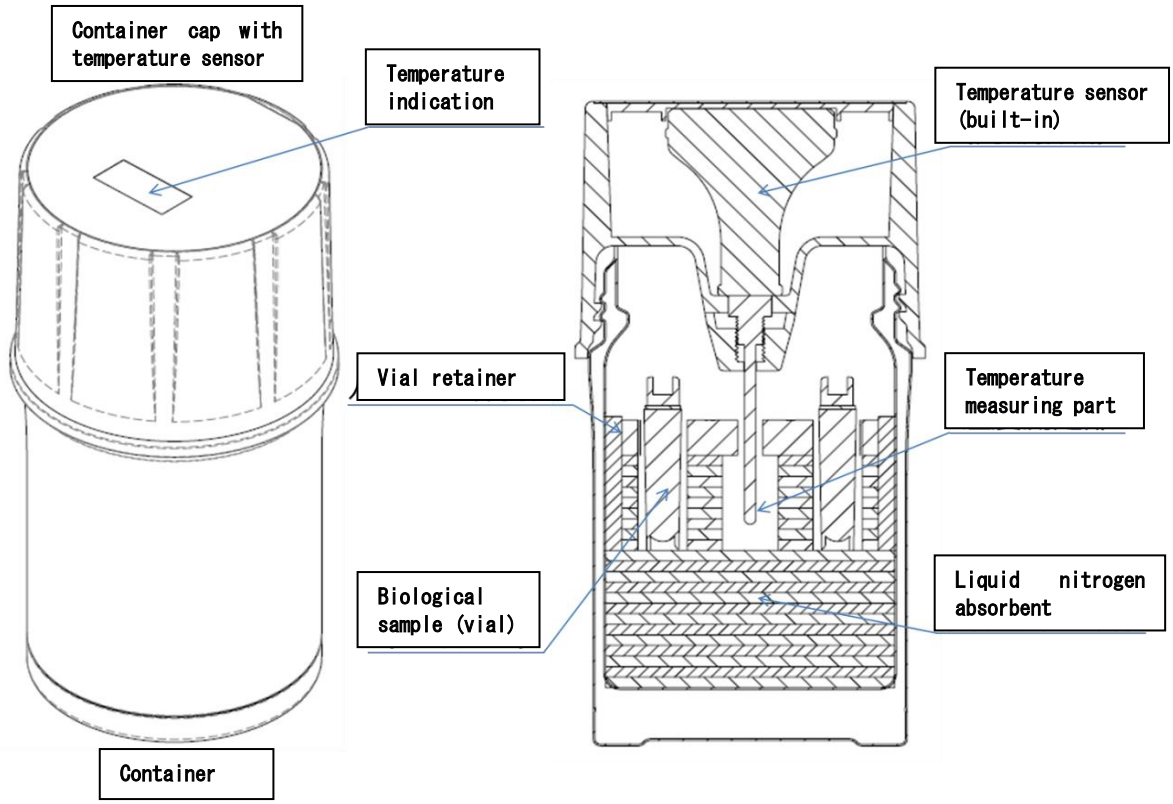
2.1 Usage

This container is designed and manufactured for transporting cryopreserved biological samples, taken out of a cryopreservation unit or freezer, in an indoor environment. This product can be used to safely transport biological samples at stable cryogenic temperatures, due to the temperature sensor installed in the lid displaying the internal temperature of the container.

The container consists of a double-wall vacuum insulation stainless container body, and a lid with a temperature sensor. It contains liquid nitrogen absorbent and a vial holder inside.

When placing the container in a car for transportation, do not place it in a position where there is a risk of gas inhalation by the driver or passenger, in order to prevent death from suffocation due to oxygen deficiency.

The following is a diagram of the container and details of the temperature indicator.



Temperature range	Display sample	Display unit
-196～-100℃	-196℃	1℃
-99～50℃	-27℃	

Pressing the ON/OFF button toggles the display on and off. The indicator is automatically turned off 3 minutes after indicating the temperature. The battery life is 2500 hours under normal use. The measurable temperature range is -196℃ to 50℃. Do not use the lid (temperature sensor) where the ambient temperature falls outside the range of -10℃ to 50℃.

2.2 General precautions

2.2.1 Handling liquid nitrogen

Install a sufficiently effective ventilation system and oxygen meter where the container is used, and constantly monitor the oxygen concentration to make sure it is 19 to 23%. There is a risk of suffocation due to oxygen deficiency. Bringing your face close to the opening of the container may cause death from suffocation after a single breath because of the extremely low oxygen concentration. Do not use any refrigerant other than liquid nitrogen.

This container uses liquid nitrogen as a refrigerant. Inhalation of gas containing low oxygen initially causes facial pallor or flushing, increased heart and breathing rate, labored breathing, and dizziness, and eventually loss of consciousness, convulsions, cessation of breathing, and cardiac arrest, which may result in death.

Read the Safety Data Sheet (SDS) and make sure that you fully understand the information contained therein.

= Physical properties of nitrogen gas =
Appearance Colorless and odorless gas
Specific gravity 0.97 (0.1013 MPa (1 atm), Air=1)
Explosive properties Non flammable
Molecular weight 28.01

= Physical properties of liquid nitrogen =
Appearance Colorless and odorless liquid
Specific gravity 0.809 (0.1013 MPa (1 atm), Water=1)
Boiling point -195.8℃

Effects of oxygen concentration on the human body

Oxygen concentration	Unit	Effects on the human body, etc.
21	%	Normal concentration in the air
21-18	%	No effect
18-16	%	Increased heart and breathing rate, headache
16-14	%	Impaired judgment, elation, mental instability, dizziness, elevation in temperature, cyanosis
< 10	%	Loss of consciousness, CNS damage, convulsions, cyanosis (coma→ slowing of breathing→ cessation of breathing→ cardiac arrest within 6-8 minutes)

2.2.2 Handling the container

When using this container, place it on a level surface. Placing the container in any other way may cause an accident. Before using the container, make sure that you thoroughly read and fully understand "1. Safety Precautions" and "2. Before Using the Product". Always make sure to observe all the warnings and cautions.

Use the container under the following conditions.

Ambient temperature range -10℃ to 50℃

Ambient humidity range 0 to 80%RH (no condensation)

No direct sunlight

When disposing of the container, the appropriate industrial waste disposal procedure must be followed.

2.3 Checklist when transporting biological samples

This container is designed and manufactured for transporting biological samples in an indoor environment. Using it for any other purpose may cause failure or accidents. It may also damage the samples. Make sure to avoid knocking over the container, dropping it, bumping it, and subjecting it to strong vibrations, etc. Otherwise, degradation of the vacuum insulation or damage to the lid or sensor may cause failure or accidents.

- When carrying the container, hold the container body. If the lid is held, the container body may come off and drop away from the lid, resulting in a bruised foot. Furthermore, the samples may come out of the container, which may adversely affect their quality.
- Do not seal the container and lid with duct tape or similar. Doing so prevents nitrogen gas from leaving, leading to the risk of rupture due to increased internal pressure.

3. Major Specifications

The table below shows the major specifications of the container.

Major specifications of the container

Item	Description
Weight when empty	440g
Weight when filled *	690g
Dimensions	98x98x180 mm
Diameter	66 mm
Number of vials stored *	8 (up to 12mm (diameter) x 50mm (height))
Major materials	Container body : Stainless steel
	Lid : PC resin
	Temperature sensor (temperature detector) : Stainless steel
	Vial holder : Expanded polyurethane
	Liquid nitrogen absorbent : Resin processed product
Maintained temperature	-150℃ or lower
Maintains temperature for (with lid)	Approx. 4 hours (see "[Reference] Guidelines for using the container" on page 9)

* "Weight when filled" does not include the weight of samples.

4. Before Using the Product

After purchasing the container, remove the packaging materials after checking for any damage, and check for any scratches or dents on the outer surface of the container. Do not use the container if it has any abnormalities. Even if there are no scratches or dents at the time of purchase, fill it with liquid nitrogen and leave it for about 30 minutes, and check for any frost or condensation on the body or the bottom of the container. If there are any abnormalities, contact your dealer or Taiyo Nippon Sanso and do not use the container.

5. Precautions on Handling the Container

When putting samples in or taking samples out of the container, do so as promptly as possible. Otherwise, the level of evaporative loss of liquid nitrogen increases, and the rise in temperature of the samples may adversely affect their quality.

Install a sufficiently effective ventilation system and oxygen meter where the container is used, and constantly monitor the oxygen concentration to make sure it is 19 to 21%.
There is a risk of suffocation due to oxygen deficiency.
Bringing your face close to the opening of the container may cause death from suffocation after a single breath because of the extremely low oxygen concentration.

When taking out samples from the container, use leather gloves or tweezers to handle the vials. Liquid nitrogen or cold parts may cause frostbite if they come into contact with the hand or other areas of skin.

6. Filling the Container with Liquid Nitrogen

6.1 Checklist when filling the container

Before filling the container with liquid nitrogen, check the interior and exterior of the container for any large scratches or dents. To check for poor vacuum conditions, pour liquid nitrogen and check if frost is formed on the outer surface, and follow the instructions in Troubleshooting in the event of any abnormalities.

Install a sufficiently effective ventilation system and oxygen meter where the container is used, and constantly monitor the oxygen concentration to make sure it is 19 to 23%.
There is a risk of suffocation due to oxygen deficiency.
Bringing your face close to the opening of the container may cause death from suffocation after a single breath because of the extremely low oxygen concentration.

6.2 Method for filling the container with liquid nitrogen

The specified level of liquid nitrogen is up to the top edge of the vial holder inside it. Closing the lid when the container is filled with liquid nitrogen exceeding the specified level may cause failure of the temperature sensor.

When filling the container with liquid nitrogen, do so safely by using a stainless steel Dewar flask (Thermo-Cut), liquid nitrogen container (CEBELL), or liquid nitrogen transfer device (Cryojet).

CEBELL

Thermo-Cut

Liquid nitrogen transfer device (Cryojet)

WARNING

- When filling the container at room temperature with liquid nitrogen, pour it slowly. When the container at room temperature is filled with liquid nitrogen, there is a risk of oxygen deficiency due to the extremely low ambient oxygen concentration, caused by large amounts of nitrogen gas from the rapid evaporation of liquid nitrogen.

- Wear protective goggles during precooling operation to protect the eyes from explosive boiling of liquid nitrogen.

- Do not pour large amounts of liquid nitrogen at once. Liquid nitrogen may spurt out due to large amounts of nitrogen gas from rapid evaporation of liquid nitrogen, depending on the temperature of the container. Liquid nitrogen may cause frostbite if it comes in contact with the hand or other areas of skin. Wear leather gloves during operation.

- Fill the container with liquid nitrogen up to the vial holder inside it. Any extra liquid nitrogen would not be absorbed by the absorbent and may spill if the container overturns, causing frostbite.

Filling procedure

(1) To precool the container, pour about 500g of liquid nitrogen into the container over a period of about 5 minutes, while checking the amount of liquid nitrogen absorbed, and close the lid.

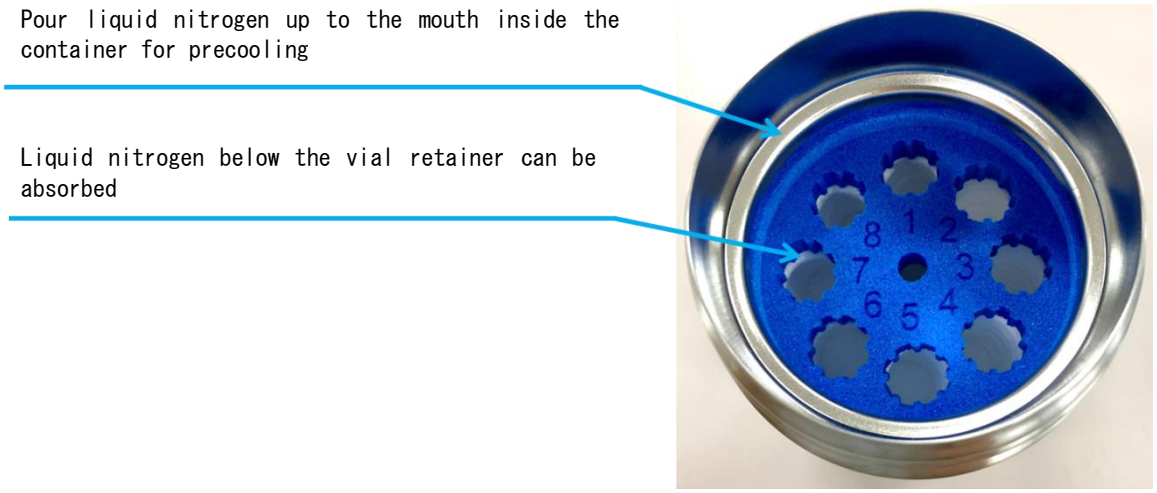
(2) Every 5 minutes, open the lid, add liquid nitrogen up to the mouth inside the container, and keep it stationary.

(3) The amount of liquid nitrogen absorbed reaches maximum in about 30 minutes. When sufficiently precooled, the container can hold about 250g of liquid nitrogen.

(4) Check that the liquid nitrogen is fully absorbed by the absorbent by tilting the container.

Remarks

(1) During the filling operation, keep the container stationary in a place with no direct sunlight or wind.
(2) When inserting samples, the amount of evaporation of liquid nitrogen increases due to heat penetration from the samples.
(3) The required amount of liquid nitrogen varies depending on environmental factors such as air temperature.



If there is condensation on the container and the container is filled with additional liquid nitrogen, there is a risk of rupture due to the increased internal pressure because frozen moisture fills the gap between the container and lid, preventing nitrogen gas from leaving. Do not fill it with additional liquid nitrogen.

[Reference] Guidelines for using the container

Environmental conditions
Room temperature 9℃
Relative humidity 70%
Performance in the above-specified environment
Liquid nitrogen consumed during precooling 1250g
Liquid nitrogen retained 250g
Time maintained at -150℃ 270 minutes (with lid

7. Inspection and Maintenance

7.1 Inspection before use

For the safe transport of samples, check the following before use.

(1) Visual inspection
Visually check the container's outer surface for any frost.

(2) Checking the indication on the temperature sensor
Press the power button of the temperature sensor and check if the display indicates the temperature.

7.2. Taking care of the container

After the container is used, condensation may accumulate inside the container, or leaked samples may contaminate the interior of the container. When cleaning is required, take the following steps.

(1) Rinse the contaminated part inside the container with water.
(2) Wipe off water drops on the interior with a piece of cloth or similar.
(3) Place the container in a well-ventilated place without direct sunlight and dry it out at a temperature of 60℃ or lower.
(4) When using disinfectant ethanol, wipe off sprayed ethanol or let it dry naturally without using a dryer, etc. Otherwise, the ethanol may catch fire.

Avoid removing the vial holder or liquid nitrogen absorbent from the container, because you may not be able to put it back due to deformation. In the case of severe contamination, the absorbent and vial holder also need to be replaced.

8. Troubleshooting

Take the appropriate "Action" by referring to "Phenomenon" and "Cause" in the table below.

Phenomenon	Cause	Action
(1) Higher consumption of liquid nitrogen than normal	Increased evaporative loss of liquid nitrogen due to degradation of vacuum insulation of the container	Stop using the container. Transfer the samples stored in the container to another container.
(2) Frost on the lower part of the container's outer surface	Poor vacuum insulation of the container	
(3) Dents in the container	Excessive shocks during transport of the container	Pour liquid nitrogen and check if frost is formed on the container outer surface. If it is not, thermal insulation is not degraded.
(4) Temperature not displayed	Depleted battery	The battery is built into the temperature sensor and cannot be replaced by disassembly. The entire temperature sensor must be replaced. Contact Taiyo Nippon Sanso. Do not use the container because any rise in temperature in the container cannot be detected, which may adversely affect the quality of samples.
(5) Poor absorption of liquid nitrogen	Wet absorbent due to insufficient drying, or degraded absorbent	Liquid nitrogen may not be absorbed sufficiently if the liquid nitrogen absorbent contains moisture. Dry out the container after use. Liquid nitrogen absorbent is a consumable and needs to be replaced when its performance starts to deteriorate. Contact Taiyo Nippon Sanso.

9. Warranty, Limitation of Liability and Disclaimer

9.1 Warranty

The warranty period of this product is one year from the date of purchase of the container. The functionality and use of the product cannot be guaranteed if it is used without properly abiding by the instructions and information in sections "1. Safety Precautions" and "2. Before Using the Product".

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Taiyo Nippon Sanso ("TNSC") and Matheson Tri-Gas, Inc. neither assume responsibility for any omissions or errors nor assume liability for any damages that result from the use of its products in accordance with the information provided by TNSC and Matheson Tri-Gas, Inc., either verbal or written. TNSC and Matheson Tri-Gas, Inc. warrant only that the parts manufactured by it will be as specified and free of defects.

TNSC and Matheson Tri-Gas, Inc. MAKE NOT OTHER WARRANTEIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMKPLIED, EXCEPT THAT OF TITLE AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

9.2 LIMITATION OF LIABILITY

The remedies of purchaser set forth herein are exclusive and the total liability of TNSC and Matheson Tri-Gas, Inc. with respect to the product, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall TNSC or Matheson Tri-Gas, Inc. be liable for consequential, incidental or special damages, including lost profits.

9.3 Disclaimer

Even during the warranty period the warranty shall be considered VOID and TNSC and Matheson Tri-Gas, Inc. are not responsible for the following:

(1) Items whose warranty period have expired
(2) Damage to samples caused by an accident with the container, or damage from handling, or other equipment, etc.
(3) Accident, failure, or damage caused by improper use by the user such as incorrect operation
(4) Accident or damage caused by use of refrigerants other than liquid nitrogen
(5) Damage or failure caused by storing samples in forms other than vials in the container
(6) Accident, damage, or failure caused by any modification or repair by the customer after delivery (i.e. the date of purchase of the product)
(7) Damage or failure caused by any external reason not controllable by TNSC and/or Matheson Tri-Gas, Inc., including natural disasters, fire, earthquakes, and weather conditions

(8) Accident, damage, or failure caused by any reason not foreseeable based on the scientific and technological standards established at the time of purchase by the customer
(9) Accident, damage, or failure caused by not meeting the usage conditions, such as using the product in a place with no ventilation, a place with direct sunlight, etc.

(10) Accident, damage, or failure related to consumables (temperature sensor, vial holder, absorbent)
(11) Damage or failure caused by any reason not attributable to Taiyo Nippon Sanso and/or Matheson Tri-Gas, Inc., such as the customer neglecting to carry out inspection, etc.
(12) If the unit/container shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion, heat, moisture, vibration, improper specification, misapplication, misuses or other operating conditions outside of the control of TNSC and/or Matheson Tri-Gas, Inc.

10. Contact Information

For inquiries, please contact us at:

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