Envirotainer°

The Active Cold Chain

CryoSure® systems
User Manual

container,
X1, X2, X5, X11

Doc No. UM-CRYO-3030
Version 4

www.envirotainer.com

RECORD OF REVISION

VER. NO.	REVISION
4	**REVISED:**

1.1.1 Product specification

- Removed sublimation rate

- Updated weight of systems

- Added weight of product holder

- Divided total weights

1.2 Technical details

- Rearranged product info and added illustrations of all product holders

- Added info concerning possibility to opt out the product holder

- Added security seal

- Added logger and tracker

2.3 Symbols on the CryoSure® system

- Removed information regarding **UN3481**. The product it referred to (old tracker) is no longer in use.

- Added information regarding necessary declaration to the AWB if the system includes a *Live monitoring* service.

3.3.1 Product loading and **3.3.3 Product unloading**

- Added info and steps concerning security seal

3.3.2 Shipping of loaded product

- Removed specified documents to include in step 3.
  Stated "Ensure necessary documents are in the document pouch". Due to local variations.

New chapters:

- **2.1 Symbols**

- **3.1 Monitoring devices explained**

Updated admonitions to reflect the correct definition in chapter **2.1 Symbols**.

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TABLE OF CONTENTS

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1. INTRODUCTION

The CryoSure® system is designed for global shipping and storage of pharmaceutical products, clinical trial materials, vaccines, cell & gene therapy, biospecimens and specialty medicines that are required to be kept below -70°C (-94°F).

The CryoSure® system uses a unique patented technology combined with dry ice. It is a **reusable** shipping system which offers both mechanical protection of the shipped product and maintains load space temperature below -70°C (-94°F) (average between -74°C and -80°C / -101°F and -112°F).

- Maintains temperature control consistently below -70°C (-94°F)

- Suitable for any destination, domestic or international, and by ground or air, covering the entire shipment duration including delays and customs without the need to re-charge

- Provides mechanical protection during transport by ground or air

The CryoSure® system comes in four different sizes, with product space volume from 1 L to 11,1 L. The temperature control duration is intended to last throughout the shipment without recharging.

These systems will be pre-charged with dry ice at an Envirotainer® facility and be delivered to a second location where temperature-sensitive materials can be loaded into the dewar for transit or storage.

1.1 OVERVIEW

The CryoSure® product line consist of four different sizes.

1.1.1 PRODUCT SPECIFICATION

Table 1 Product specification

CryoSure® system	X1	X2	X5	X11
Autonomous duration*	>8 days	>21 days	>13 days	>15 days
Payload opening	Ø 9 cm (Ø 3.5")	Ø 9 cm (Ø 3.5")	Ø 15,2 cm (Ø 6")	Ø 21,3 cm (Ø 8.4")
Dry-ice payload	1,2 kg (2.5 lb.)	3,5 kg (7.7 lb.)	3,2 kg (7.2 lb.)	5,5 kg (12 lb.)
Product payload	1 L (35.1 oz.)	1,6 L (57.3 oz.)	5 L (177.2 oz.)	11,1 L (391.7 oz.)
Product space (DxH)	8,1x19,5 cm (3.2x7.7")	8,1x31,9 cm (3.2x12.6")	14,3x31,5 cm (5.6x12.4")	20,7x33,2 cm (8.1x13.1")
Outer dimensions of box (WxLxH)	27x27x42,4 cm (10.6x10.6x16.7")	29,6x29,6x58,9 cm (11.7x11.7x23.2")	33,6x33,6x58,9 cm (13.2x13.2x23.2")	45,6x45,6x64,2 cm (18x18x25.3")
Total weight (excl. product load)	5,1 kg (11.2 lb.)	9,8 kg (21.6 lb.)	11,3 kg (24.8 lb.)	19,3 kg (42.4 lb.)
Product holder	0,1 kg (0.3 lb.)	0,2 kg (0.5 lb.)	0,5 kg (1.1 lb.)	1,1 kg (2.5 lb.)
Total weight with product holder (excl. product load)	5,2 kg (11.5 lb.)	10 kg (22.1 lb.)	11,8 kg (25.9 lb.)	20,4 kg (45 lb.)

* When exposed to ISTA 7D summer profile

1.1.2 PAYLOAD

Table 2 Vials configuration

CryoSure® version	# of 2 mL vials	2 mL vials configuration
CryoSure® X1	20	Canister holding 2 bags; 10 vials/bag
CryoSure® X2	80	Canister holding 16 canes without sleeves; 5 vials/cane
	70	Canister holding 14 canes with sleeves; 5 vials/cane
CryoSure® X5	300	Canister holding 60 canes without sleeves; 5 vials/cane
	200	2 boxes oriented vertically; 100 vials/box
CryoSure® X11	600	120 canes without sleeves in bags; 5 vials/cane
	500	Rack holding 5 boxes; 100 vials/box

1.2 TECHNICAL DETAILS

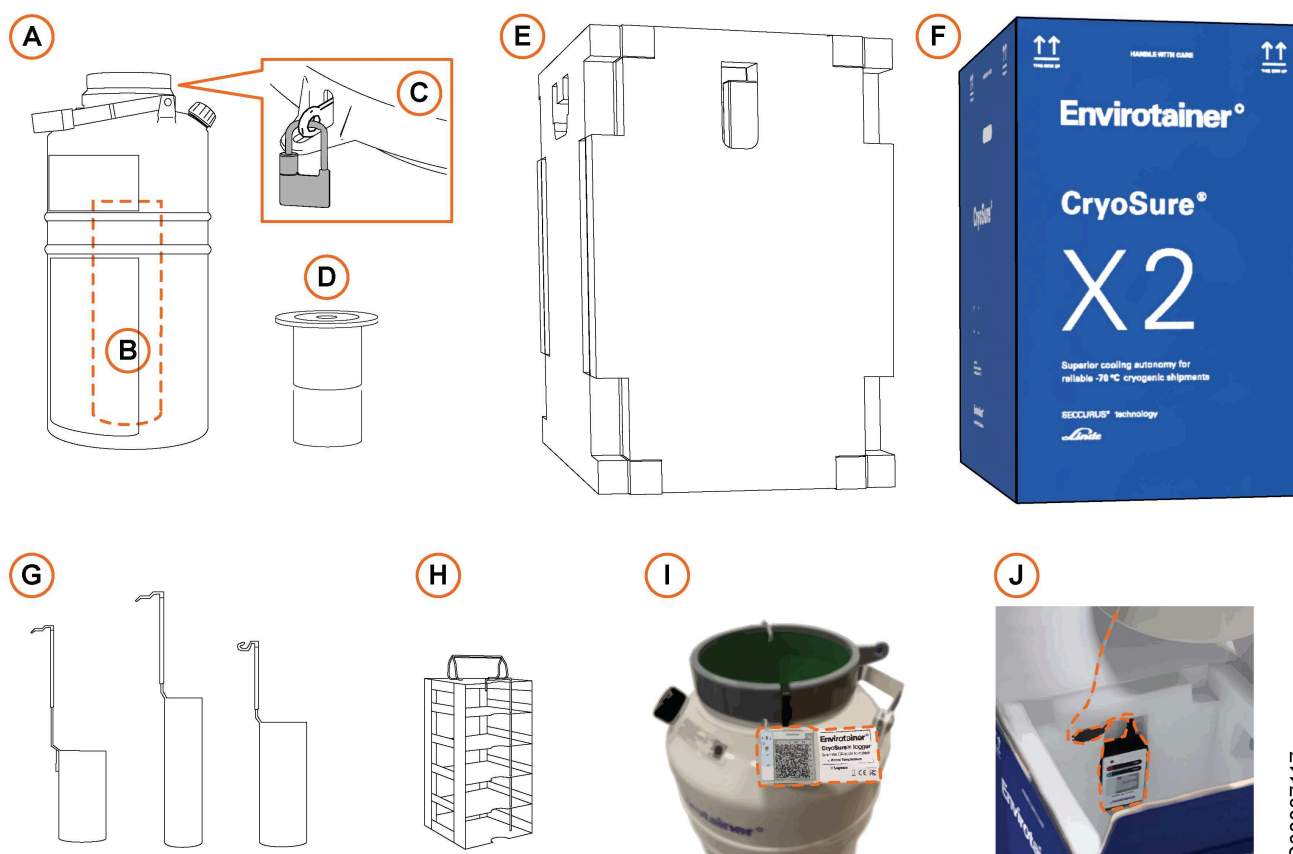A complete CryoSure® system is comprised of the following components:

Fig. 1 The CryoSure® system.

Table 3 CryoSure® system features

Pos	Name	Description
A	Dewar	Insulated aluminum container that holds the dry ice pellets and material to be preserved.
B	Product space	To place the product holder in.
C	Security seal	A uniquely numbered seal is attached to the dewars neck before shipment to a lessee. An additional security seal, to be used after loading of the products, is added to the envelope where the shipment documentation can be found.
D	Insulating lid	Cap and insulating cork used to close the dewar opening while allowing carbon dioxide vapor from sublimating dry ice inside the dewar to still vent freely outside the dewar.
E	Foam inserts	Reusable packaging positioned between the dewar and cardboard box that protects the dewar from handling damage: (one (1) bottom, one (1) top, and one (1) main insert for the sides).
F	Cardboard box	External packaging. Shipping, safety, and regulatory stickers are applied to the exterior of the cardboard box as appropriate.
G	Product holder *(standard for X1, X2, and X5)	Cylindrical stainless-steel container with handle for loading materials into, removing materials from, or holding materials within the storage zone of the dewar.
H	Product holder *(standard for X11)	Stainless-steel rack with handle for loading materials into, removing materials from, or holding materials within the storage zone of the dewar.
I	Logger *Shipment report*	Temperature logger with a probe that is inserted into the product space to capture the internal temperature.
J	Tracker *Live monitoring*	Real-time tracker with a probe that is inserted into the product space to capture the internal temperature. Records the unit´s location during the shipment.

> ⓘ   **NOTE!**
>
> *When booking on the Envirotainer® Portal, customers may opt out of using the standard product holder for their shipment depending on the type of product being shipped.*

1.3 INTENDED USE

Pre-charged CryoSure® systems are delivered with dry ice already loaded inside. In normal operation, users are never required to handle dry ice.

The CryoSure® system is designed for global shipping and storage of pharmaceutical products, clinical trial materials, vaccines, cell & gene therapy, biospecimens and specialty medicines that are required to be kept below -70°C (-94°F).

The CryoSure® system offers both mechanical protection of the shipped product and maintains load space temperature below -70°C (-94°F) throughout the shipping duration.

Refer to **2. Safety**.

⚠️   CAUTION!

Biological materials used with the CryoSure® systems are limited to Biological Substance Category B materials specified under UN 3373 and exceptions defined in IATA 3.6.2.2.3.
No pathogenic Category A materials (UN 2814, UN 2900) or medical or clinical wastes (UN 3291) shall be used with the CryoSure® systems.

1.4 CONTACT

For contact information to our operations centers, refer to www.envirotainer.com.

For questions regarding this manual or the CryoSure® systems, send an e-mail to support@envirotainer.com.

1.5 OPERATING CONDITIONS

Ambient temperatures, humidity, improper orientation of system and mechanical shock does not impact the CryoSure® system temperature levels.

2. SAFETY

- Read the manual before handling and operating the CryoSure® system.

- Read the Safety Data Sheet for dry ice **(UN1845)**.

- Pay attention to warning stickers and texts attached to the CryoSure® system.

2.1 SYMBOLS

2.1.1 SYMBOLS IN THE MANUAL

The following symbols are used in the manual:

⚠️ WARNING!
Indicates a possible danger that **can** lead to death or serious injury if necessary measures are not taken.

⚠️ CAUTION!
Indicates a possible hazard that **can** lead to injury or material / equipment damage if necessary measures are not taken.

ℹ️ NOTE!
Practical information or tips on how to perform a procedure.

2.2 SHIPPING REGULATIONS

The United States Department of Transportation **(DOT)** and related international government agencies regulate shipments containing dry ice and biological materials. In addition, the International Air Transport Association **(IATA)** maintains standards that guide airline polices regarding dry ice and biological material shipments. Users of a pre-charged CryoSure® system should review and follow all appropriate government and carrier requirements for labeling and packaging shipments containing dry ice or biological materials.
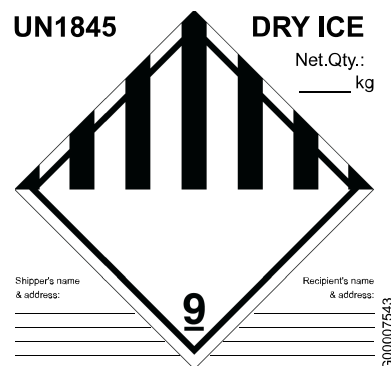
2.3 SYMBOLS ON THE CRYOSURE® SYSTEM

Fig. 2

→

> ⚠️ **WARNING!**
>
> **UN1845** (Dry ice) is solidified carbon dioxide. At normal atmospheric pressure, dry ice sublimates to carbon dioxide vapor at approximately -78.5°C (-109.3°F). Dry ice is very cold, and contact with dry ice or areas cooled by dry ice can cause frostbite. The CryoSure® pre-charged system is delivered with dry ice already loaded inside. In normal operation, it should not be necessary for users of a pre-charged CryoSure® system to handle dry ice. The interior spaces and surfaces of a pre-charged dewar are very cold, and users are advised to wear appropriate gloves when interacting with the interior of the dewar or items recently removed from the interior. The carbon dioxide evolved by sublimation of dry ice can create potentially hazardous carbon dioxide-enriched and/or oxygen-deficient atmospheres. Users of dry ice or dry ice-containing systems are recommended to evaluate the potential for atmospheric hazards in their working environment and take appropriate steps to address such hazards (for example, by using air monitoring devices and adequate ventilation).
>
> If Envirotainer® *Live monitoring* service is used, include the following declaration to the AWB: **"Not restricted, as per Special Provision A199"**

2.4 CLEANLINESS OF PRODUCT

The CryoSure® system is cleaned using VIRKON™ solution and Isopropyl alcohol according to Envirotainer® instruction **SOP-ENV-0229** and **SOP-ENV-0234**.

3. USING THE CRYOSURE® SYSTEM

3.1 MONITORING DEVICES EXPLAINED

The following devices/services may be added and booked on the Envirotainer® Portal.

> ⚠️ **CAUTION!**
>
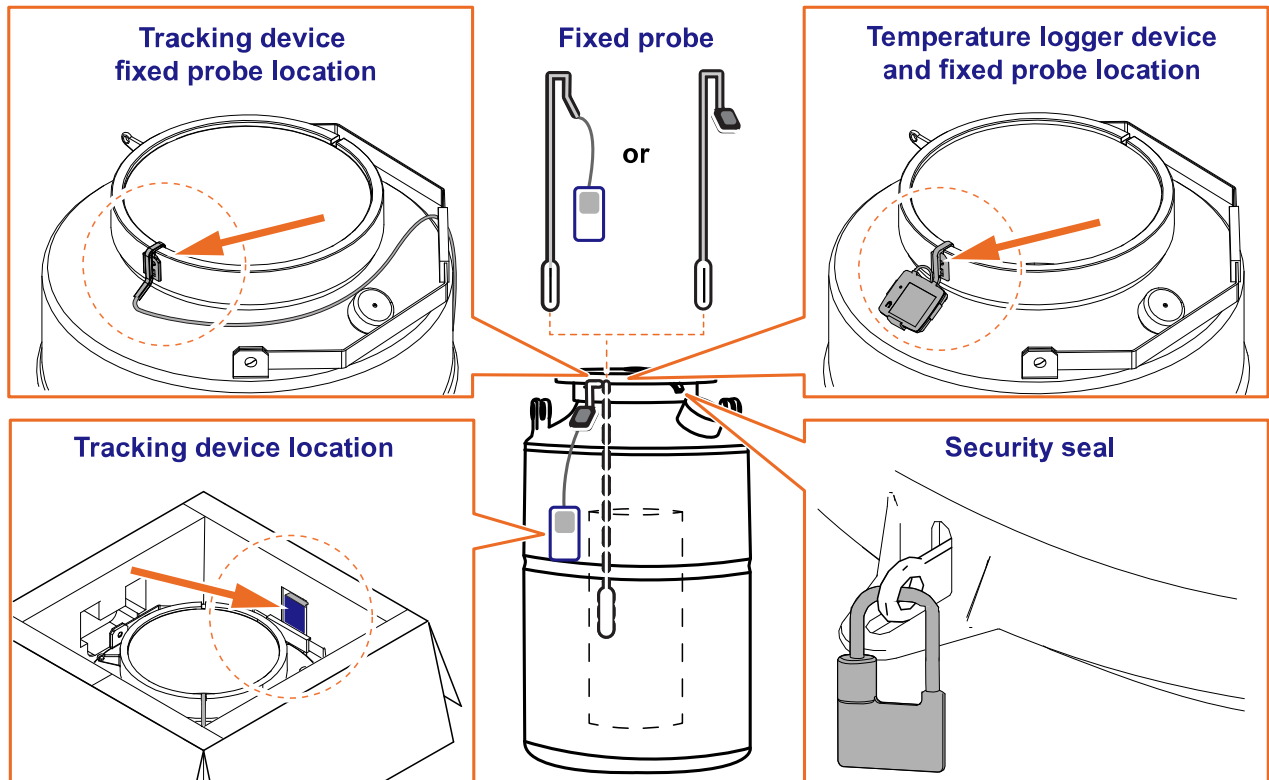> Keep the devices in their original position

Fig. 3

3.1.1 LOGGER DEVICE

The temperature logger device will be mounted on the neck of the dewar as part of the *Shipment report* services.

3.1.2 TRACKING DEVICE

The tracking device will be secured in a special compartment within the protective foam packaging on the inside of the box as part of the *Live monitoring* services.

3.1.3 FIXED PROBE

Either the logger or the tracking device will be attached with the fixed probe solution.

3.1.4 SECURITY SEAL

Always use a security seal **P/N 959** to secure the lid in the correct position.

3.2 PREPARING A SHIPMENT

It is recommended to have the product pre-conditioned to -70°C (-94°F) or below -78.5°C (-109.3°F) for the CryoSure® system to operate within the specified temperature regulating duration. Using the CryoSure® to cool the product will reduce the temperature regulating duration.

3.3 OPERATING INSTRUCTIONS

1. Product loading, **3.3.1 Product loading**.

2. Shipping CryoSure® system, **3.3.2 Shipping of loaded product**.
    - Remove old labels and documents.
    - Prepare new labels and documents for cardboard box.

3. Receiving CryoSure® system and removing products, **3.3.3 Product unloading**.

4. Returning/shipping CryoSure® system to Envirotainer® or a new destination, **3.3.4 Returning of the system**.
    - Remove any biological product materials and associated packaging from the dewar.
    - Remove old labels and documents.
    - Prepare new labels and documents for cardboard box.

3.3.1 PRODUCT LOADING

1. Inspect the outer packaging. If the cardboard box is too worn for use, contact Envirotainer® for support.
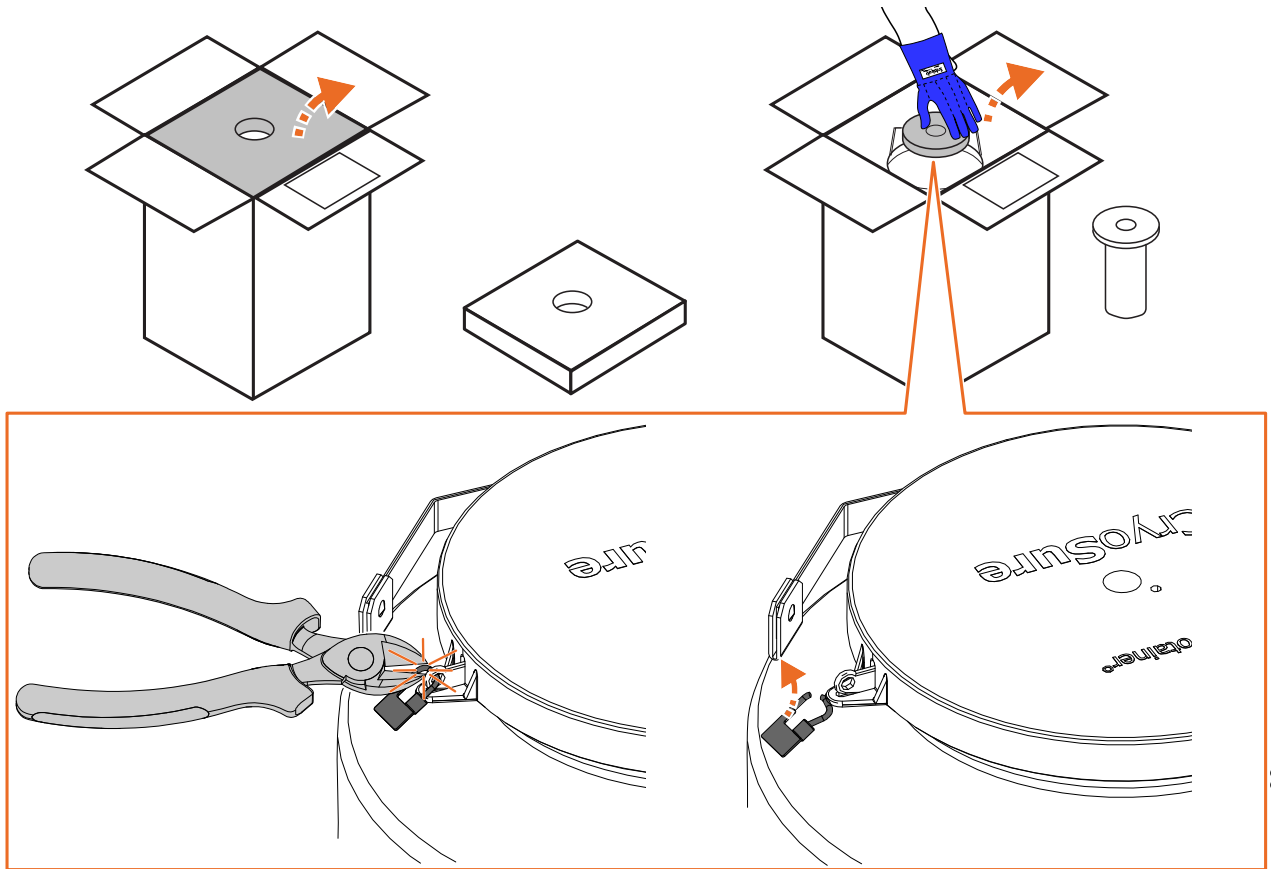   Refer to **1.4 Contact**

Fig. 4

2. Opening the box:

   2a. Open the box and set aside the top foam.

   > ⚠ CAUTION!
   >
   > Keep the top foam

   2b. Cut the security seal.

   2c. Wearing safety gloves, remove the lid. Place the lid to one side, together with the tracker and probe (if any).
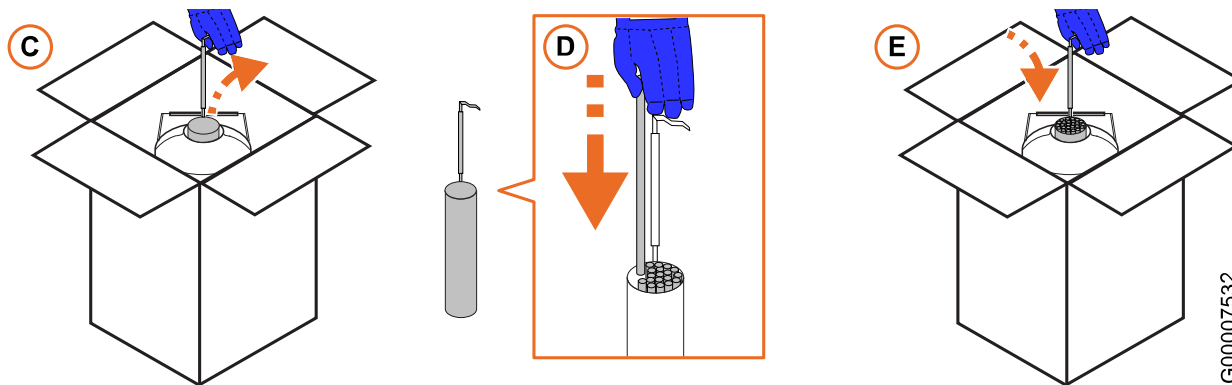
   > ⚠ CAUTION!
   >
   > Keep the lid

→

Fig. 5

3. Loading the product:

   3a. Lift the product holder by its handle and remove it from the dewar.

   3b. Load the product into the product holder. Follow all applicable government and carrier requirements for packaging the product.
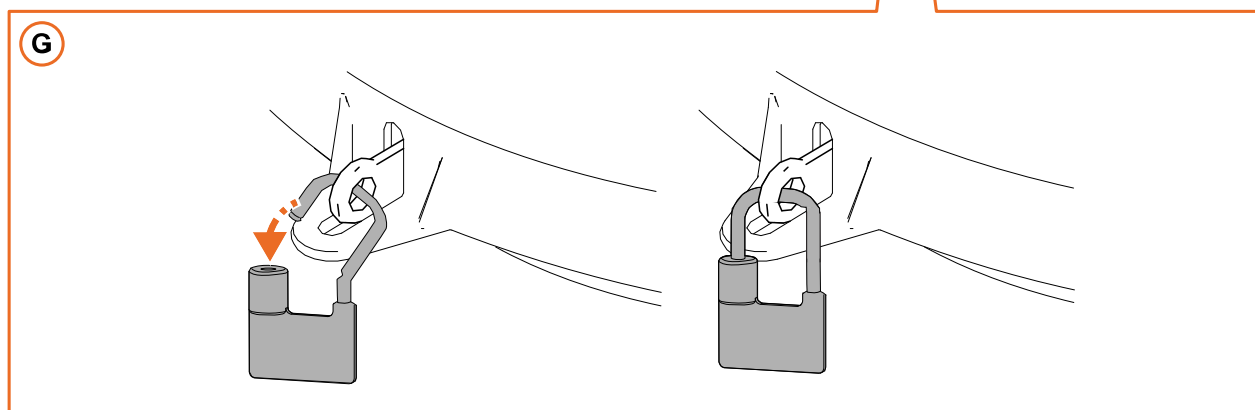
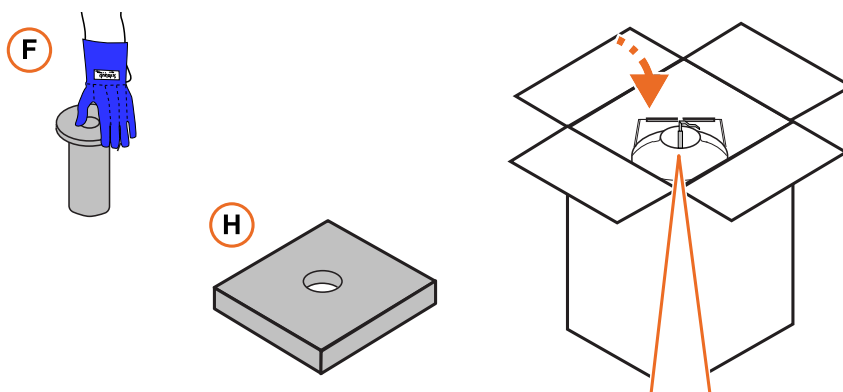   **3c.** Lift the product holder into the dewar.

Fig. 6

4. Place the following items back in place:

   4a. lid (wearing safety gloves)

   4b. security seal, securing the lid to the dewar

   4c. top foam.

3.3.2 SHIPPING OF LOADED PRODUCT

> ⚠️ **CAUTION!**
>
> After the dewar has been loaded with product and properly packaged with all required components, labels need to be applied to the exterior of the cardboard box in accordance with government
> (e.g., US DOT, EU ADR) regulations and carrier (e.g., IATA) requirements.
>
> Please ensure that all needed documents according to the correspondent regulations are on hand (for example shippers declaration, pro forma invoices and packing lists).

1. Remove or cover all labels on the cardboard box:

    • the label of the parcel carrier

    • the dangerous goods label **(UN1845)** where you are notified as **consignee**
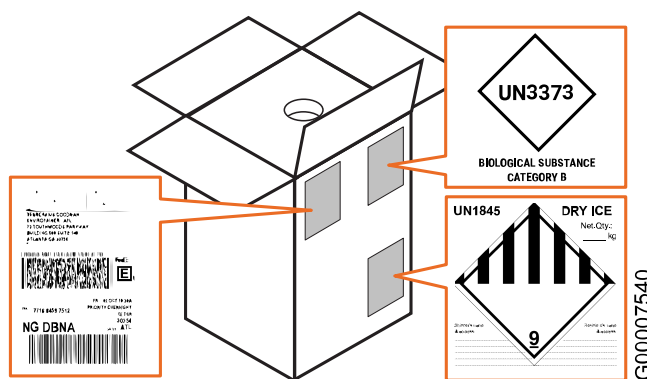
Fig. 7

2. Apply the labels to the exterior of the box in accordance with government regulations and carrier requirements.

3. Ensure necessary documents are in the document pouch.

4. Close and seal the cardboard box with a clear tape.

5. Take necessary steps in order to inform selected carrier that the parcel is ready for pick-up.
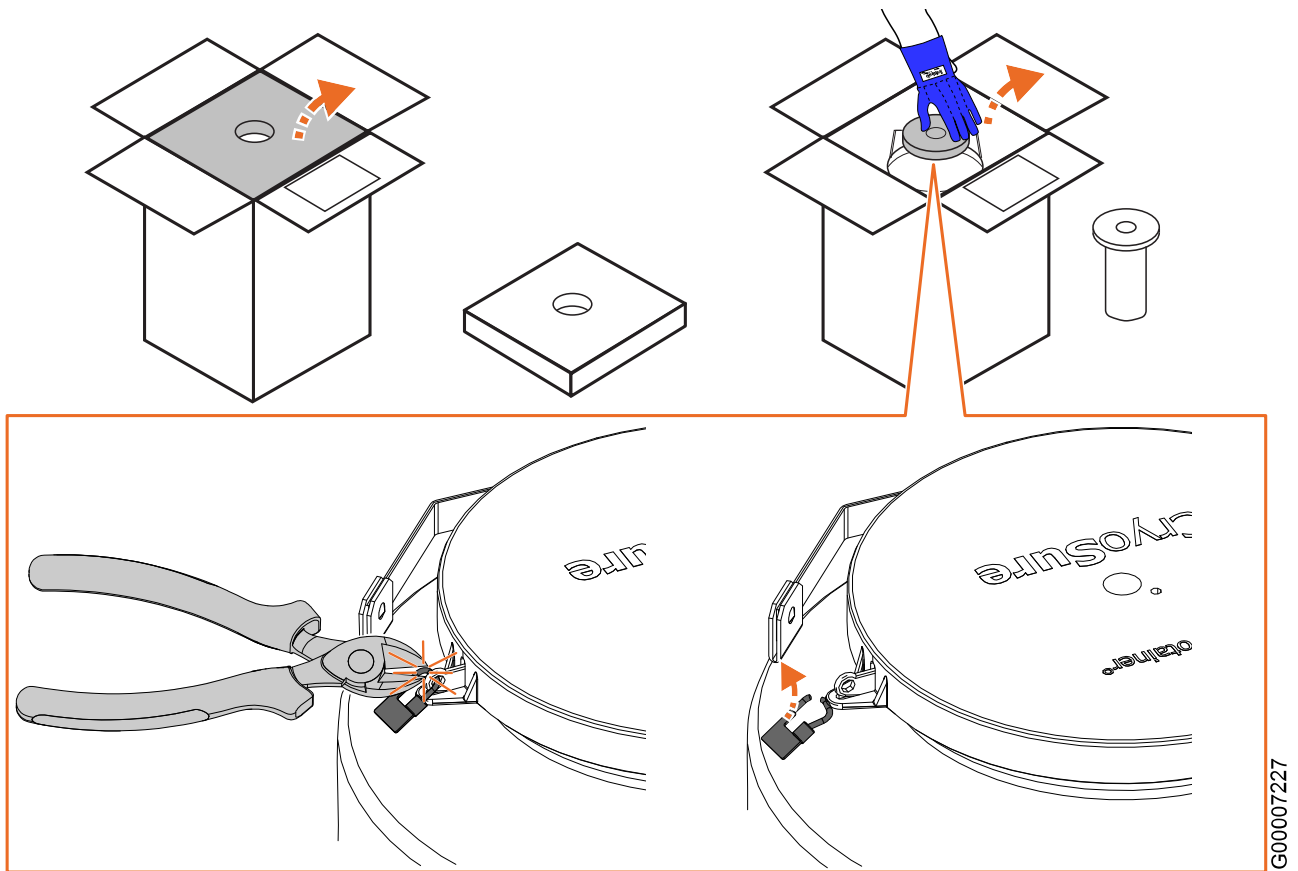
3.3.3 PRODUCT UNLOADING

Fig. 8

1.   Unpacking:

   1a. Open the box and set aside the top foam.

   > ⚠ **CAUTION!**
   >
   > Keep the top foam

   1b. Cut the security seal.

   1c. Wearing safety gloves, remove lid. Place the lid to one side.

   > ⚠ **CAUTION!**
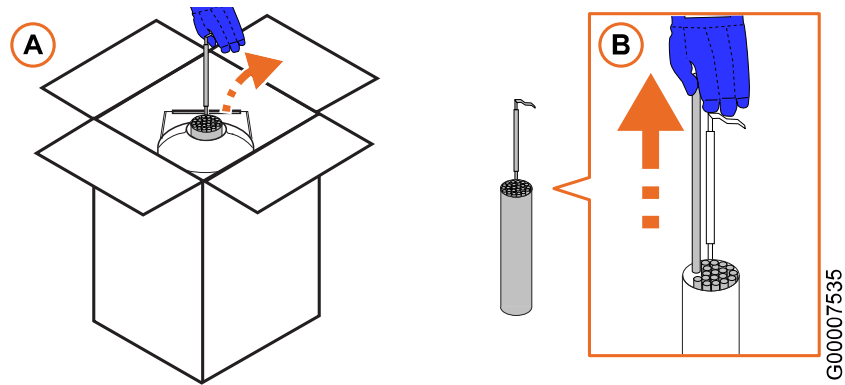   >
   > Keep the lid

Fig. 9

2.   Unloading product:

    2a. Lift the product holder by its handle and remove it from the dewar.

    2b. Remove the product from the product holder. Store or use the product as defined by procedures.

3.   Prepare the next shipment.

- If loading new product into the dewar, follow step **3b** and onwards of the **3.3.1 Product loading** procedure to prepare the shipment.

- If sending the CryoSure® system to its next destination, follow step **3c** and onwards of the **3.3.1 Product loading** procedure to prepare the shipment.

3.3.4 RETURNING OF THE SYSTEM

If you have booked a pick-up service from Envirotainer®, a prepaid shipping return label is included in a folder on the inside of the cardboard box.

If you have not pre-booked the pick-up service, contact Envirotainer® support to place an order for the service. Otherwise, follow steps **1** and **2** below to prepare the CryoSure® system for return.

1.   Remove any biological product materials and associated packaging from the dewar.

2.   Remove or cover all labels on the cardboard box:

  •   the label of the parcel carrier

  •   the dangerous goods label **(UN1845)** where you are notified as **consignee**
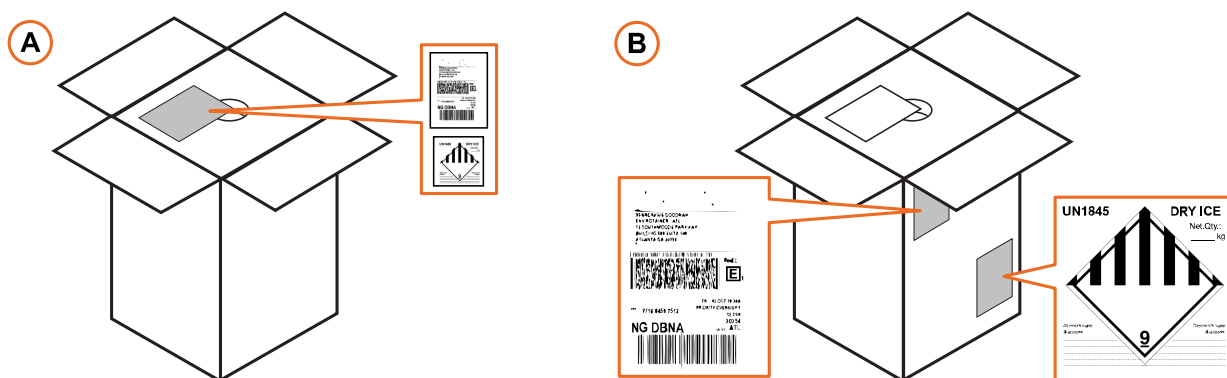
  •   the dangerous goods label **(UN 3373)**

Fig. 10

3.   Preparing the documents and labels.

  3a.   Remove the folder **"Return"** from the cardboard box. In the folder you find the pre-printed labels you need for returning the CryoSure® product:

   •   the pre-paid label of the parcel carrier, where you are notified as **Sender**

   •   the dangerous goods label **(UN1845)**, where you are notified as **Shipper**

  3b.   Peel and apply both labels and put them on the cardboard box.
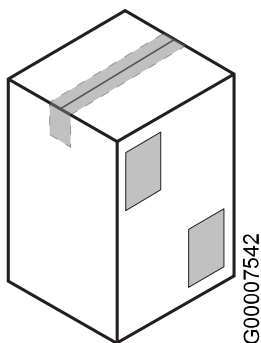

Fig. 11

4.   Close the cardboard box, and seal with a clear tape.

5.   Inform Envirotainer® that the CryoSure® system is ready for pick-up.
   Upon your advice, Envirotainer® arranges with the parcel carrier a pick-up.

3.4 MONITOR THE AUTONOMY DURATION LEFT ON YOUR CRYOSURE® SYSTEM

Every time a CryoSure® system is released, a unique QR code sticker is printed and placed on the outside of the cardboard box. By scanning the QR code with your smartphone, you will get access to the DuraWatch® service which provide information about this unique shipment, including how many days and hours of cooling capacity is remaining.

In addition to cooling capacity remaining, DuraWatch® also provides:

- Contact details to schedule pickup of the CryoSure® system

- Shipping route information

- Product details (dewar dimension and other measurements)

- User Manual

The QR code can be scanned by anyone handling the CryoSure® system and not only the customer placing the CryoSure® orders. However, information in DuraWatch® is non-sensitive. For any detailed information around a CryoSure® order you still need to login to the Envirotainer® Portal.

Envirotainer Engineering AB

www.envirotainer.com