Environmental Health and Safety

Dry Ice Shipping Instructions

Introduction

Many materials used daily in biomedical research are considered dangerous goods during shipping. Dry Ice is one of these materials. It must be packaged, labeled and accompanied with proper paperwork when used as a preservative for shipping. Federal and international oversight of dangerous goods transport is significant. Safety representatives have prepared this document to assist researchers.

If your package contains hazardous materials other than dry ice, additional training is necessary. Examples of other hazardous materials include human blood, tissue, cell lines; gene transfer vectors, genetically modified organisms, pathogenic organisms, bacterial or viral cultures or supernatants, clinical materials as well as chemicals and radioactive material. When in doubt, call x 6-2919 or 6-3615

Dry ice shipments can be made with FedEx and DHL. DHL requires "known/registered shipper" status. If you would like to use DHL, don't wait till the last minute. "Known Shipper" status may require the laboratory representative to sign forms regarding training in advance but should better ensure the integrity of your package. UPS will accept domestic dry ice medical shipments provided you do the training and observe regulations related to air transport which includes marking and labeling the package. They have a specific label available for purchase. The US Postal Service has extremely restrictive policies concerning shipments of hazardous materials: avoid shipping on dry ice with the US Postal Service.

Training Requirements:
Shipments of dangerous goods must be in compliance with all federal and international regulations which include requirements related to dry ice shipping training. If you are going to package dry ice for shipment or receive a dry ice shipment, you must follow the training certification requirements outlined below.

1. Read this guide. This guide will explain the general provisions relating to the regulation and detailed training in the requirements applicable to dry ice.

2. Submit a signed and completed "Intent to ship Dry Ice Form" and the post-test to the Safety representative. The representative will review this form, and, upon successful completion, will certify you to ship dry ice.

Shipping regulations change frequently, so it is necessary to renew your certification every two years.

Hazard Identification

The rules for shipping Dry Ice are set by the International Civil Aviation Organization under the United Nations and published by the International Air Transport Association (IATA). The Federal Aviation Administration enforces the rules. Each commercial air carrier, courier service and nation can add additional restrictions to air shipments. In the US, domestic ground transport rules parallel air transport rules.

IATA lists dry ice in the regulations as:

UN number	Proper shipping name	Class	Sub Risk	Hazard label	Packing Group	Passenger or Cargo only aircraft limits		Special provision
						Packing instruction	Max quantity	
1845	Dry Ice *Or* Carbon Dioxide, solid	9		Miscellaneous		954	200 kg	A48 A151 A805

Shipping hazards are divided into nine classes. Dry ice is a "miscellaneous" hazard, class 9. It has a United Nations Shipping Number UN 1845 and two correct proper shipping names: "Dry Ice" or "Carbon Dioxide, solid". Packages are restricted to 200 kilograms or less of total dry ice; there are no special testing provisions required for packaging beyond the 954 instructions.

Dry ice is considered hazardous during transportation for three reasons:

1. **Explosion hazard**: Dry ice releases a large volume of carbon dioxide gas as it sublimates. If it is packaged in a sealed container that does not allow for release of the gas, it can explode, causing personal injury or property damage.
2. **Suffocation hazard**: Carbon dioxide gas emitted in a confined space may create an oxygen deficient atmosphere.
3. **Contact Hazard**: Dry ice is a cryogenic material that can cause frostbite upon contact.

Packaging Dry Ice – IATA packing instructions 954:

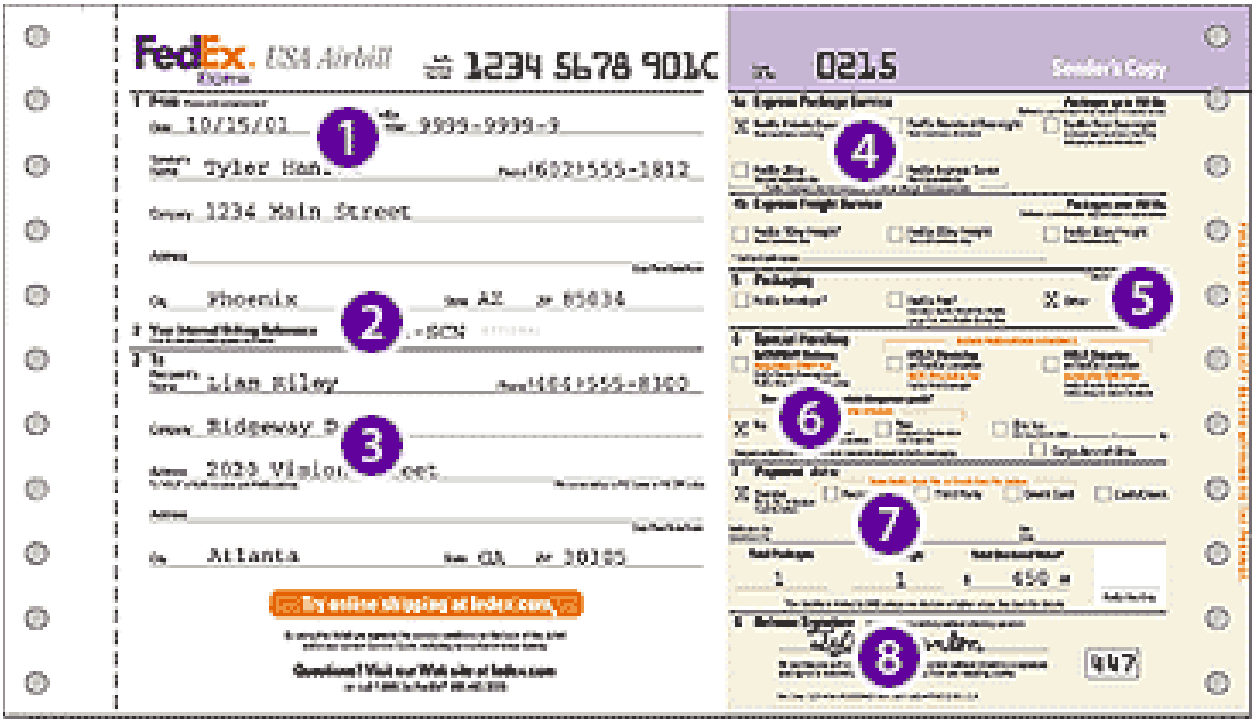
1. **Ventilation**: Packages must allow for release of carbon dioxide gas. Do not seal dry ice in a container with an airtight seal.
2. **Package integrity**: A package containing dry ice must be of adequate strength for the intended use. It must be strong enough to withstand handling normally encountered in transport. It must also be constructed and closed in order to prevent any loss of contents that might be caused by vibration or by changes in temperature, humidity, or altitude.
3. **Package materials**: Do not use plastics that become brittle or permeable at extreme temperatures. Styrofoam boxes must be placed inside cardboard boxes.

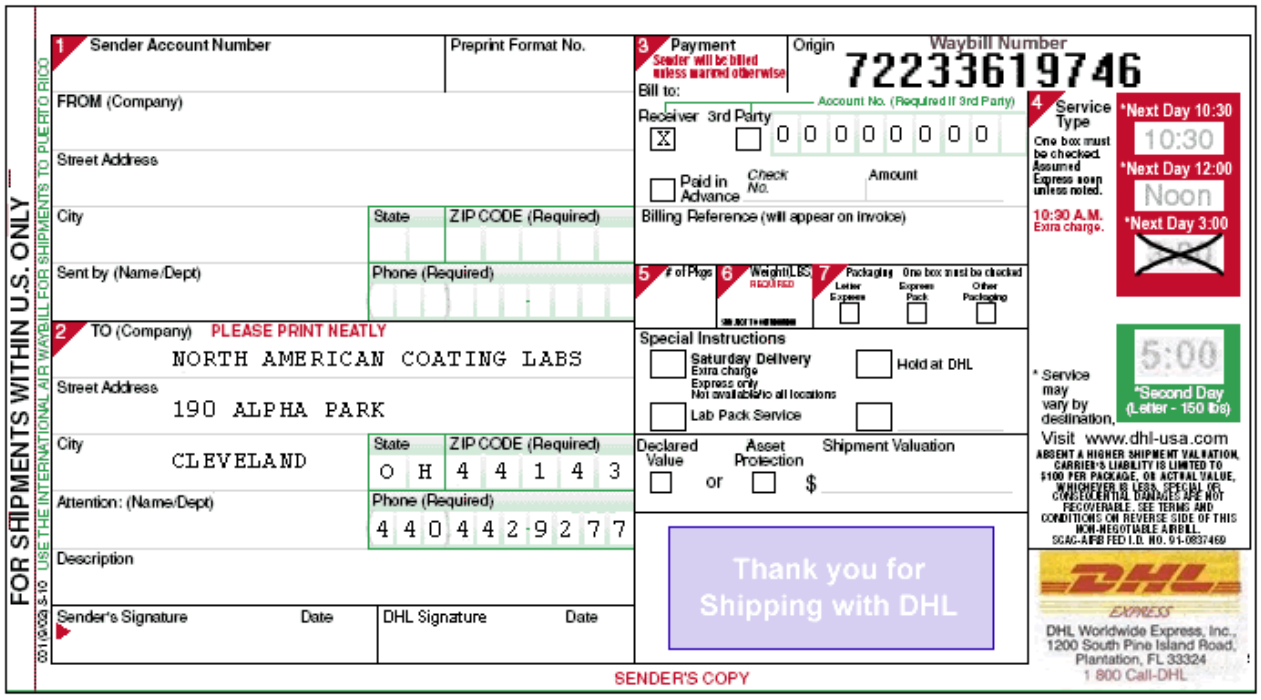
4. Reusing a dry ice box is allowed. If you reuse a box, completely obliterate all unnecessary markings such as hazard labels, addresses, FedEx or other courier labels and barcodes. Only reuse a box if you can personally verify it is not contaminated and its integrity is intact. A box should not be reused if it is torn, cut, stained or if the insulation is cracked or broken.
5. Secure your samples so they will not move freely inside of the insulated box when the dry ice sublimates. This can be accomplished by wedging your samples in place with cardboard or Styrofoam. Fragile containers such as glass tubes or vials should be wrapped with cushioning material.
6. Minimize the volume of air to which the dry ice is exposed in order to slow the rate of sublimation. If there is any air space after you fill your package with dry ice, fill it with packing peanuts or crumpled paper. Consider packing the night before and refilling the sublimated dry ice in the morning.
7. 5-10 pounds (2.27 - 4.54 kilograms) of dry ice per 24 hours is recommended for shipping.
8. Make arrangements with the receiving lab to make sure your package can be accepted on the intended date. Take into account local holidays or closings that might delay package receipt.

Paperwork for Dry Ice

Air bill: The Airbill, also referred to as the airway bill, must include the statement: "**Dry Ice, 9, UN1845, number of packages X net weight of dry ice in kilograms**".

Box 6 on the FedEx Airbill is designed for this purpose. Under "Does this shipment contain dangerous goods?" check the box that reads "Yes, Shipper's Declaration not required"; check the dry ice box and enter the number of packages and the weight in kilos of dry ice.





DHL requires a slightly different format. Under "Special Instructions"; you must write out the statement:

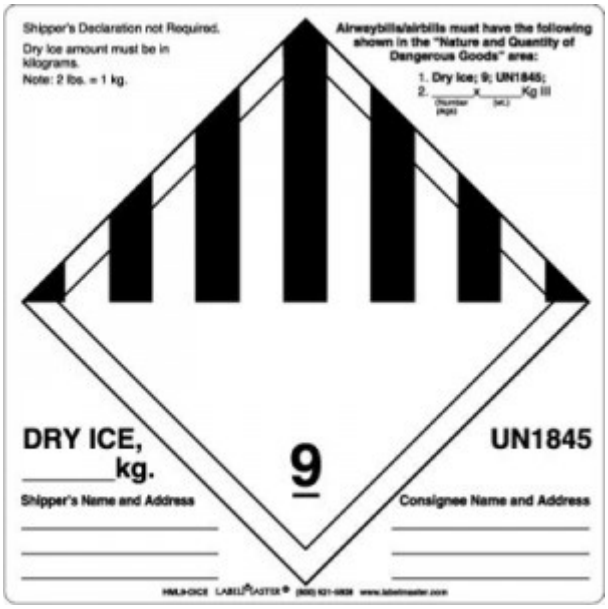
> "**Dangerous Goods, Shippers Declaration not required.**
> **Dry Ice, 9, UN1845, number of packages X net weight of dry ice in kilograms"**

Package Markings for Dry Ice

Labeling: The outermost container must be labeled with a hazard class 9 label, "UN 1845", and the net weight of dry ice in kilograms. The label must be affixed to a vertical side of the box (not the top or bottom) and oriented on point. The maximum allowable net quantity of dry ice allowed per package is 200 kg (440.9 pounds). UPS will not accept packages greater than 150 pounds.

Do not write "specimens", "diagnostic specimens" or "biologicals" on the box. Your package should be refused. These terms have specific definitions in shipping and are subject to specific packaging requirements.

The name, address and phone number of both the sender and the receiver must be on the outside of the box.



Labels may be ordered and can sometimes be found with Fed Ex materials if your department uses them. **Note** that this is a new label. The IATA use date is 1/1/14 and the DOT date is 10/1/14.

Packaging the sample:

Materials must be packed in tightly sealed, parafilmed or taped, labeled primary containers.
Wrap the primary containers with absorbent.
Place all primary containers in a leak-proof secondary container
Include a packing list detailing the number of primary containers, volume of material and contact names, addresses and telephone numbers between the Styrofoam cooler and the cardboard box.

IATA PACKING INSTRUCTION 954 – 2016

OPERATOR VARIATIONS: 2K-07, Al-05, AM-09, AS-11, AV-07, B6-01, CA-08, CZ-04, Fl-02, IP-06, KE-06, LR-07, OM-05, T0-07, TA-07, VN-11

This instruction applies to UN 1845, Carbon dioxide, solid (dry ice) on passenger aircraft and Cargo Aircraft Only.

The General Packing Requirements of Subsection 5.0.2 must also be met.

Additional Packing Requirements

In packages:

(a) must be in packaging designed and constructed to permit the release of carbon dioxide gas and to prevent a build-up of pressure that could rupture the packaging;

(b) the shipper must make arrangements with the operator(s) for each shipment, to ensure ventilation safety procedures are followed;

(c) the Shipper's Declaration requirements of Subsections 8.1 and 10.8.1 are only applicable when the Carbon dioxide, solid (dry ice) is used as a refrigerant for dangerous goods that require a Shipper's Declaration.

(d) when a Shipper's Declaration is not required, the following information, as required by 8.2.3 for the Carbon dioxide, solid (dry ice) must be contained in the "Nature and Quantity of Goods" box on the air waybill when used, or in the appropriate location on alternate transport documentation. Where an agreement exits with the operator, the shipper may provide the information by EDP or EDI techniques. The information should be shown in the following order:

- UN 1845;
- proper shipping name (**Dry ice** or **Carbon dioxide, solid**);
- the number of packages; and
- the net quantity of dry ice in each package.

(e) the net weight of the Carbon dioxide, solid (dry ice) must be marked on the outside of each package. When packages are placed in an overpack, the overpack must be marked on the outside with the net quantity of dry ice in the overpack.

Dry ice used as a refrigerant for other than dangerous goods:

(a) may be shipped in a unit load device or other type of pallet prepared by a single shipper provided that the shipper has made prior arrangements with the operator and the following information must be contained in the “Nature and Quantity of Goods” box on the air waybill when used, or in the appropriate location on alternate transport documentation. Where an agreement exits with the operator, the shipper may provide the information by EDP or EDI techniques. The information should be shown in the following order:

- UN 1845;

- proper shipping name (**Dry ice** or **Carbon dioxide, solid**);
- the number of packages and the net quantity of dry ice in each package if the ULD includes the packages that contain dry ice; or
- the identification number of the ULD and the net quantity of dry ice in each ULD if the dry ice is placed in the dry ice bunker of the ULD or loose in the ULD.

(b) the unit load device, or other type of pallet must allow the venting of the carbon dioxide gas to prevent a dangerous build up of pressure. (the marking and labelling requirements of Section 7 do not apply to the unit load device);

Notes:

1. Refer to the relevant airline's loading procedures for Carbon dioxide, solid (dry ice) limitations.

2. For Air Waybill requirements see 8.2.3. For loading instructions see 9.3.10.

3. For cooling purposes, an overpack may contain Carbon dioxide, solid (dry ice), provided that the overpack meets the requirements of this Packing Instruction.

UN Number	quantity/package Passenger aircraft	quantity/package Cargo only
UN 1845, Carbon dioxide, solid or Dry Ice	200 kg	200 kg

2017
ACCEPTANCE CHECKLIST FOR DRY ICE (Carbon Dioxide, solid) (For use when a Shipper's Declaration for Dangerous Goods is not required)

A checklist is required for all shipments of dangerous goods (9.1.4) to enable proper acceptance checks to be made. The following example checklist is provided to assist shippers and carriers with the acceptance of dry ice when packaged on its own or with non-dangerous goods.

Is the following information correct for each entry?

DOCUMENTATION

	YES	NO*	N/A
The Air Waybill contains the following information in the "Nature and Quantity of Goods" box (8.2.3)			
1. The UN Number "1845", preceded by the prefix "UN"	☐	☐	
2. The words "Carbon dioxide, solid" or "Dry ice"	☐	☐	
3. The number of packages of dry ice (may be in the pieces field of the AWB when they are the only packages in the consignment)	☐	☐	
4. The net quantity of dry ice in kilograms	☐	☐	
Note: *The packing instruction "954" is optional.*			
Quantity			
5. The quantity of dry ice per package is 200 kg or less [4.2]	☐	☐	
PACKAGES AND OVERPACKS			
6. The number of packages containing dry ice delivered as shown on the Air Waybill	☐	☐	
7. Packages are free from damage and in a proper condition for carriage	☐	☐	
8. The packaging conforms with Packing Instruction 954 and the package is vented to permit the release of gas	☐	☐	
Marks & Labels			
9. The UN number "1845" preceded by prefix "UN" [7.1.4.1(a)]	☐	☐	
10. The words "Carbon dioxide, solid" or "Dry ice" [7.1.4.1(a)]	☐	☐	
11. Full name and address of the shipper and consignee [7.1.4.1(b)]	☐	☐	
12. The net quantity of dry ice within each package [7.1.4.1(d)]	☐	☐	
13. Class 9 label affixed [7.2.3.9]	☐	☐	
14. Irrelevant marks and labels removed or obliterated [7.1.1(b); 7.2.1(a)]	☐	☐	☐
Note: *The Marking and labelling requirements do not apply to ULDs containing dry ice*			
For Overpacks			
15. Packaging Use marks and hazard and handling labels, as required must be clearly visible or reproduced on the outside of the overpack [7.1.7.1, 7.2.7]	☐	☐	☐
16. The word "Overpack" marked if marks and labels are not visible [7.1.7.1]	☐	☐	☐
17. The total net quantity of carbon dioxide, solid (dry ice) in the overpack [7.1.7.1]	☐	☐	☐
Note: *The Marking and labelling requirements do not apply to ULDs containing dry ice*			
State and Operator Variations			
18. State and operator variations complied with [2.8]	☐	☐	☐

Comments: _____

_____

Checked by: _____

Place: _____ Signature: _____

Date: _____ Time: _____

*** IF ANY BOX IS CHECKED "NO", DO NOT ACCEPT THE SHIPMENT AND GIVE A DUPLICATE COPY OF THIS COMPLETED FORM TO THE SHIPPER.**