



University of New Hampshire

UNH Guide to Shipping with Dry Ice

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I. Introduction

The U.S. Department of Transportation (DOT) and the International Air Transport Association (IATA) regulate shipments of dry ice because it is a hazardous material. As a result, specific procedures must be followed when packaging and shipping materials refrigerated with dry ice and a record of training must be kept. Improperly shipping dry ice or other hazardous materials could result in fines or other penalties.

Follow procedures outlined in this guide when your shipment includes *no hazardous materials other than dry ice*. If you are not sure if the material you are sending is considered hazardous, contact EHS at 862-5038. When shipping hazardous biological materials, refer to the UNH Shipment of Biological Materials Manual. When shipping any other hazardous materials, refer to the UNH Shipment of Hazardous Materials Manual.

Packages refrigerated with dry ice are normally shipped by air in order to reach their destinations rapidly. Therefore, information in this guide pertains to air shipments of dry ice only. If you intend to ship your package by other means such as ground, freight, vessel, etc., contact EHS to discuss applicability of shipping regulations.

II. Training Requirements

Federal rules require that anyone wishing to ship dry ice must first have shipping training. If you are going to package dry ice for shipment or sign any type of shipping documentation (such as a FedEx Airbill) for 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 regulations and detailed training in the requirements applicable to dry ice.
2. ***Take the online test.*** Passing grades are 100%. For some questions, more than one answer is correct; you must select the one that is accurate and the most complete. [The test is here.](#)

Shipping regulations change frequently, so it is necessary to renew your certification every two years. Training sessions reviewing the material in this manual are available from EHS. Call 862-5038 to schedule training or to ask questions regarding the shipment of dry ice.

III. Hazard Identification

Dry ice is classified by DOT and IATA as a “miscellaneous” hazard, class 9. 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 packaged in a container that does not allow for release of the gas, it may explode, causing personal injury or property damage.
2. **Suffocation hazard:** a large volume of carbon dioxide gas emitted in a confined space may create an oxygen deficient atmosphere.

3. **Contact hazard:** dry ice is a cryogenic material that causes severe frostbite upon contact with skin.

Packaging dry ice properly will minimize the risk to personnel transporting the material. The explosion hazard will be eliminated with a package designed to vent gaseous carbon dioxide. Suffocation and contact hazards will be greatly reduced by labeling the package correctly, so those who come in contact with it will be aware of the contents.

IV. Packaging Dry Ice

For each shipment, follow the instructions listed below; these instructions are summarized in the checklist in Appendix B. For each shipment, fill out a checklist for the package as a way to help ensure each requirement has been fulfilled, and keep a copy of the completed checklist at least until the package reaches its destination.

A. Requirements

Follow these requirements for shipments of dry ice:

1. **Gas venting:** packages must allow for release of carbon dioxide gas. Dry ice must never be sealed in a container with an airtight seal such as a jar with a threaded lid or a plastic cooler.
2. **Package integrity:** a package containing dry ice must be of adequate strength for intended use. It must be strong enough to withstand the loading and unloading 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 can be rendered brittle or permeable by the temperature of dry ice. This problem can be avoided by using commercially available packages intended to contain dry ice, see Appendix A, Manufacturers of Dry Ice Shipping Containers.
4. **Airbill:** the airbill (also referred to as the air waybill) must include the statement "Dry ice, 9, UN1845, *number of packages X net weight in kilograms.*" FedEx has a check box on their airbill to satisfy this requirement; see Figure 3. Check with your courier to make sure you have made the proper notation on their paperwork.
5. **Labeling:** the outermost container must be labeled with a hazard class 9 label, UN 1845, and net weight of dry ice in kilograms. See Figure 1. The label should be affixed to a vertical side of the box (not the top or bottom) and oriented as in Figure 1. Text size on the label must be at least 12 mm in size for packages larger than 30 kg or L or at least 6 mm in size for packages greater than 5 and up to 30 kg or L. Use professionally printed labels provided by OEHS to ensure proper text size.

6. **Maximum quantity of dry ice:** The maximum allowable net quantity of dry ice allowed per package is 200 kg.

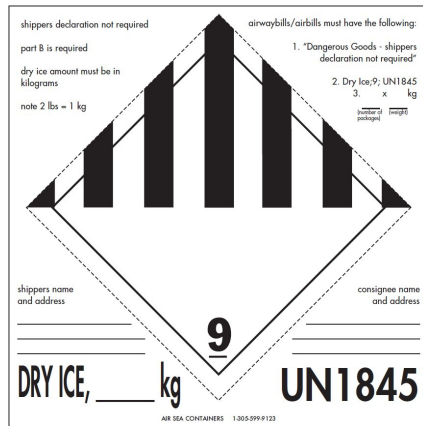


Figure 1. Example of dry ice label.

Figure 3. FedEx Airbill. Highlighted area properly documents 1 box containing 6 kg of dry ice.

B. Recommendations

Note the following recommendations when packaging and labeling dry ice shipments:

- Do not write “specimens” or “diagnostic specimens” on the box. Diagnostic specimens are subject to specific packaging requirements and there should not be any misunderstanding about your shipment. Diagnostic specimens, in shipping terminology, are materials that may be infectious to humans or animals. If you think your samples might be infectious, refer to the UNH Shipment of Biological Materials Manual.
- Reusing a dry ice box is a good use of resources. If you choose to reuse a box, completely obliterate all unnecessary marking such as hazard labels, addresses, FedEx (or other courier) labels and barcodes. Use caution if reusing a box that has been used to ship infectious material or diagnostic specimens. 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.
- Secure your samples in such a way that when the dry ice sublimates, they will not move freely inside of the insulated box. 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.
- 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 other material to reduce the volume of air space.
- Shipments are generally recommended to contain 5-10 pounds (2.27-4.54 kg) of dry ice per 24 hours. Refer to your package manufacturer’s recommendations. Make arrangements with your consignee to make sure your package will be received on its intended delivery date. Take into account local holidays or closings that might delay package receipt.
- Dry ice shipments can be made with FedEx and DHL. UPS and the U.S. Postal Service have extremely restrictive policies concerning shipments of hazardous materials; do not ship dry ice with UPS or the U.S. Postal Service.

Appendix A. Manufacturers of Dry Ice Shipping Containers

Air Sea Atlanta
227 Sandy Springs Place
Sandy Springs, GA 30328
1 (404) 351-8600
<http://www.airseatlanta.com>

Berlin Packaging
18 Ocean Avenue
Newburyport, MA 01950
1(800) 2.BERLIN
<http://www.all-pak.com>

CARGOpak Corporation
3215-A Wellington Court
Raleigh, NC 27615
(800) 266-0652
<http://www.cargopak.com>

DG Supplies, Inc.
4 Corporate Drive - Suite D
Cranbury, NJ 08512
(800) 347-7879
<http://www.dgsupplies.com>

HAZMATPAC, Inc.
7905 Blankenship Drive
Houston, TX 77055
(713) 923-2222
<http://www.hazmatpac.com>

Inmark, Inc.
675 Hartman Road, Suite 100
Austell, GA 30168
1(800) 646-6275
<http://www.inmarkinc.com>

Sonoco ThermoSafe
2320 S. Foster Avenue
Wheeling, IL 60090
(888) 765-9362
<https://www.thermosafe.com>

SAF-T-PAK, Inc.
7466 Candlewood Road
Suite E
Hanover, MD 21076
(800) 814-7484
<http://www.saftpak.com>

Source Packaging of New
England, Inc.
19 Alexander Road
Billerica, MA 01821
(978) 667-3777
<http://www.sourcepak.com>

Appendix B. Checklist for Shipment of Dry Ice

Shipment of Dry Ice by Air

Fill out this form for each shipment of dry ice by air. Retain a copy of completed forms in your records (electronic copy is okay) at least until the shipment has reached its destination.

	Initial
1. Describe material being shipped (i.e., amount of dry ice, what it is refrigerating, and what type of package was used.):	
2. I have taken training for shipment of dry ice in the past two years.	
3. The package:	
a. The outer package is a cardboard box or other durable material;	
b. Allows for venting of carbon dioxide and will not allow pressure to build up.	
c. Displays a class 9 diamond label, and the text "UN1845, dry ice" and the net mass of dry ice on a vertical surface.	
d. The text "UN1845, dry ice" must be at least 12 mm in size for packages larger than 30 kg or L or at least 6 mm in size for packages greater than 5 and up to 30 kg or L.	
4. Shipping documentation such as an airway bill includes the text "UN1845, Dry ice," and the number of packages and the net quantity of dry ice in each package.	
5. Total quantity of dry ice per package does not exceed 200 kg (440.925 lbs)	

I acknowledge that I have followed the steps outlined above.

Print Name:	
Signature:	
Date:	

