



UCSF Guide to Shipping with Dry Ice

This guide has been adapted from University of New Hampshire - Office of Environmental Health and Safety; our appreciation to Andy Glode for providing us with this reference material, upon which we created the UCSF Guide to Shipping with Dry Ice

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The most current version of this document can be found at
<http://www.ehs.ucsf.edu/>

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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.

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 OEHS at 476-1300. When shipping hazardous biological materials, refer to the [UCSF Shipment of Biological Materials and Dry Ice Manual](#). When shipping any other hazardous materials, refer to the UCSF 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 OEHS to discuss applicability of shipping regulations.

II. Training Requirements

Federal rules require that anyone wishing to ship dry ice must first have shipping training. OEHS offers appropriate training online which may be accessed through the OEHS webpage. 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 take and pass this training beforehand.

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

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

A. Requirements

There are five basic 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 2. Airborne Express requires a slightly different format; 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. A printable version is included in [Appendix B](#) The label should be affixed to a vertical side of the box (not the top or bottom) and oriented as in Figure 1. The maximum allowable net quantity of dry ice allowed per package is 200 kg.

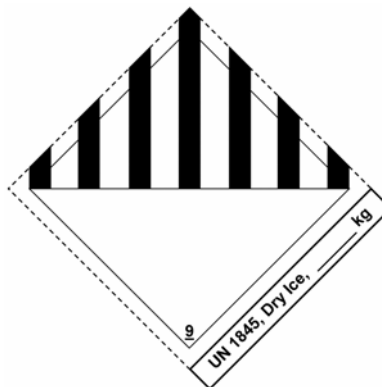


Figure 1. Dry ice label.

FedEx USA Airbill FedEx Tracking Number **839360283475** Form I.D. No. **0200** **Sender's Copy**

1 From Please print and press hard. Sender's FedEx Account Number

Date _____

Sender's Name _____ Phone () _____

Company _____

Address _____

City _____ State _____ ZIP _____

2 Your Internal Billing Reference OPTIONAL

3 To Recipient's Name _____ Phone () _____

Company _____

Address _____ We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address _____ Dept./Floor/Sub/Floor _____

City _____ State _____ ZIP _____

4a Express Package Service Packages up to 150 lbs. Delivery commitment may be later in some areas.

FedEx Priority Overnight Next business morning FedEx Standard Overnight Next business afternoon FedEx First Overnight Exact next business morning delivery to select locations

FedEx 2Day Second business day FedEx Express Saver Third business day

Express Freight Service Packages over 150 lbs. Delivery commitment may be later in some areas.

Day Freight* 1st day FedEx 2Day Freight Second business day FedEx 3Day Freight Third business day

Packaging *Declared value limit \$200

FedEx Envelope* FedEx Pak* Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak Other _____

6 Special Handling Include FedEx address in Section 3.

SATURDAY Delivery Available ONLY for FedEx Priority Overnight and FedEx 2Day to select ZIP codes HOLD Weekday at FedEx Location NOT Available for FedEx First Overnight HOLD Saturday at FedEx Location Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? **One box must be checked.**

No Yes As per attached Shipper's Declaration Yes Shipper's Declaration not required

Dangerous Goods (including Dry Ice) cannot be shipped in FedEx packaging. Cargo Aircraft Only Dry Ice Dry Ice, 9, UN 1845 1 x 6 kg

7 Payment Bill to: Enter FedEx Acct. No. or Credit Card No. below.

Sender Acct. No. in Section 1 will be billed. Recipient Third Party Credit Card Cash/Check

FedEx Acct. No. _____ Exp. Date _____
Credit Card No. _____

Total Packages _____ Total Weight _____ Total Declared Value* \$ _____ .00

8 Release Signature Sign to authorize delivery without obtaining signature.

By signing you authorize us to deliver this shipment without obtaining a signature and agree to indemnify and hold us harmless from any resulting claims. **446**

Try online shipping at fedex.com

By using this Airbill you agree to the service conditions on the back of this Airbill and in our current Service Guide, including terms that limit our liability.

Questions? Visit our Web site at fedex.com or call 1.800.Go.FedEx® 800.463.3339.

Rev. Date 10/01 *Part #157612 ©1994-2001 FedEx® PRINTED IN U.S.A. WCSJ, 02

Figure 2. FedEx Airbill. Highlighted area properly documents 1 box containing 6 kg of dry ice.

Sender Account Number Preprint Format No. **3 Payment** Origin **Airbill Number** **2959950825**

FROM (Company) Street Address _____ City _____ State _____ ZIP _____

Sent by (Name/Dept) _____ Phone (Required) _____ Date _____

2 TO (Company) PLEASE PRINT NEATLY Street Address _____ City _____ State _____ ZIP CODE (Required) _____

Attention: (Name/Dept) _____ Phone (Required) _____

Description *Dangerous Goods Shippers Declaration not required DRY ICE, 9, UN 1845, III, 1 X 5 KGS, 904*

Sender's Signature _____ Date _____ Airborne Signature _____ Date _____

3 Payment Sender will be billed unless marked otherwise. Bill to: Account No. (Required if 3rd Party) Receiver 3rd Party

4 Service Type Express (Letter - 150 lbs) Next Afternoon (Letter - 5 lbs) Second Day (Letter - 150 lbs)

Special Instructions Saturday Delivery Extra charge Express only Not available to all locations Lab Pack Service Hold at Airborne

Declared Value _____ Asset Protection _____ Shipment Valuation \$ _____ .00

Thank You for Shipping with Airborne!

AIRBORNE EXPRESS PO BOX 662, SEATTLE, WA 98111-0662 1-800-247-2676

FOR SHIPMENTS WITHIN U.S. ONLY USE THE INTERNATIONAL AIRWAYBILL FOR SHIPMENTS TO PUERTO RICO

PLEASE TYPE OR PRINT

001 (12/01) 9-08

Figure 3. Airborne Express Airbill. Highlighted area shows format required for 1 box containing 5 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 [UCSF 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
1234 Logan Circle
Atlanta, GA 30318
(880) 351-8600

<http://www.airseaatlanta.com>

All-Pak, Inc.
Corporate One West
1195 Washington Pike
Bridgeville, PA 15017
(800) 245-2283

<http://www.all-pak.com>

CARGOpak Corporation
3215-A Wellington Court
Raleigh, NC 27615
(800) 266-0652

<http://www.cargopak.com>

DG Supplies, Inc.
5 Boxal Drive
Cranbury, NJ 08512
(800) 347-7879

<http://www.dgsupplies.com>

HAZMATPAC, Inc.
5301 Polk St., Bldg. 18
Houston, TX 77023
(800) 923-9123

<http://www.hazmatpac.com>

Inmark, Inc.
220 Fisk Drive S.W.
Atlanta, GA 30336-0309
(800) 646-6275

<http://www.inmarkinc.com>

Polyfoam Packers Corporation
2320 S. Foster Avenue
Wheeling, IL 60090
(888) 765-9362

<http://www.polyfoam.com>

SAF-T-PAK, Inc.
10807-182 Street, Edmonton
Alberta, Canada, T5S 1J5
(800) 814-7484

<http://www.saftpak.com>

Source Packaging of New
England, Inc.
405 Kilvert Street
Warwick, RI 02886
(800) 200-0366

<http://www.sourcepak.com>

Appendix B. Dry Ice Shipping Label

The label below should print with the proper dimensions of a class 9 hazard label (minimum dimensions: 100 mm on a side). Cut around the outside border of the label and affix it a vertical side of the box (not the top or bottom), oriented as shown below. Many printer inks run when exposed to even small amounts of water, such as rain or snow. Therefore, when using this label, cover with clear plastic tape after filling in the weight of dry ice.

