

# Guideline for Shipping Items<sup>1</sup> on Dry Ice that are Not Dangerous Goods

## INTRODUCTION

Dry ice is a hazardous material; therefore the U.S. Department of Transportation (DOT) and the International Air Transport Association (IATA) regulate shipments containing dry ice. This guideline describes how non-dangerous goods with dry ice are to be packaged for using Federal Express (in accordance with IATA Dangerous Goods Regulations). This guideline applies only to items shipped with dry ice that are not otherwise dangerous goods (e.g., are not flammable, infectious, toxic, diagnostic specimens, oxidizers, reactive, etc.).

For the purposes of this guideline, the term ‘inner package’ refers to the container holding the materials being shipped (such as a vial, bottle, etc.). The term ‘outer package’ refers to the container holding and protecting the inner package (usually a cardboard box).

## REQUIRED TRAINING for SHIPPING DRY ICE

All shippers of dangerous goods (including dry ice only packages) are required by law to have applicable training. Before shipping any hazardous material, including dry ice only packages, please ensure you have completed the DRI hazardous material shipper’s training course and that your training is still current. (Training expires every 2 years.) This document serves only as a guideline and does not constitute training. To help ensure your package is prepared correctly, it is highly recommended that you have it inspected and the airbill (if not using FedEx Manager Software to generate our shipping labels) reviewed by a trained DRI employee prior to tendering your package for shipment. To make those arrangements, complete the DRI Dangerous Goods Shipping Request Form, [http://oldintranet.dri.edu/Services/Safety/Forms/shipping\\_request.php](http://oldintranet.dri.edu/Services/Safety/Forms/shipping_request.php).

## PENALTIES FOR NON-COMPLIANCE

Penalties for non-compliance with shipping regulations can be significant. In addition to potential public safety implications, each violation of the regulations may result in a civil penalty of up to \$75,000 or in the case of death, serious illness or severe injury to any person or substantial destruction of property, \$175,000. There is no minimum civil penalty except for violations related to training. When a violation continues for more than one day, each day constitutes a separate offense. In addition, persons who willfully violate the regulations may be subject to criminal prosecution with penalties of up to \$500,000 and/or five years imprisonment. Should the willful violation result in death or bodily injury to any person, the maximum prison sentence doubles.

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<sup>1</sup> This guideline applies when your shipment contains *no hazardous material OTHER THAN dry ice*. If you are not sure about the applicability of these guidelines, please contact NNSC Shipping and Receiving (DGshipping @dri.edu) prior to preparing your shipment. Packages refrigerated with dry ice are normally shipped by air in order to reach their destinations rapidly. Therefore this guide only pertains to air shipments of dry ice only packages. If you want to ship your packages by other means (ground, freight, vessel, etc), please contact DGshipping@dri.edu to discuss applicable shipping regulations.

In addition, because the IATA regulations are updated annually, it is highly recommended that the most current version of the IATA regulations be referenced to ensure none of the information contained in this guideline has changed since the guideline’s revision date.

## HAZARD IDENTIFICATION

Dry ice is classified by DOT and IATA as a 'miscellaneous' hazard, class 9 (see Table 1). 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 the 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.

**Table 1-- IATA Classification of Dry Ice (Section 4.2)**

Proper Shipping Name	CARBON DIOXIDE, SOLID or Dry Ice
UN/NA Identification Number	UN 1845
Class or Division	9
Hazard Label	Miscellaneous
Packing Group	
Packing Instructions	954 (IATA Section 5)
Maximum Quantity/Package for Limited Quantity	Forbidden to ship as Limited Quantity
Passenger/Cargo Aircraft	200 Kg
Cargo Aircraft Only	200 Kg
Special Provisions	A48 (package test not required) A151(load limit provision) A805(special provisions for dry ice use in overpack)

## PACKAGING DRY ICE

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.

Per IATA packaging instruction 954, inner and outer packages must be of good quality. Dry ice does not require specification packaging, but the general provisions described below must be observed

1. For liquids in inner packages, closures (caps, lids) must be held secure by positive means, such as tape. Expansion of liquids must be considered due to temperature and elevation changes. Containers of liquids must have sufficient ullage (headspace) to allow for expansion. This is not a consideration if the container is specifically designed not to have ullage (as in volatile organic sample containers).

2. The dry ice must be in outer packaging designed and constructed to permit the release of carbon dioxide gas that forms, preventing the build-up of pressure that could rupture the packaging. This can be done by not taping all the seams between the dry ice and the outer packaging.
3. Arrangements between the shipper and transporter must be made for each shipment to ensure ventilation safety procedures are followed. For Federal Express, completing the USA Airbill or noting dry ice when completing the shipping label using the FedEx ShipManager Software, will satisfy this requirement.
4. Inner packaging must be packed, secured, or cushioned to prevent breakage or leakage.
5. Absorbent material is not required.
6. Orientation labels (Up Arrows) are not required.

#### MARKING (IATA, Section 7.1)

1. All package markings must be in English.
2. All markings must be durable and in the correct location.
3. Abbreviations are not acceptable unless otherwise specified in the regulations.
4. Only relevant markings are allowed on the outer package. All other markings must be obliterated.
5. The outer package must be of such a size that there is adequate space to affix all required markings and labeling (see IATA 5.0.2.13.4).
6. The package must be marked with the following information (See Packing Use Marking, IATA 7.1.4):
  - Proper shipping name: CARBON DIOXIDE, SOLID or Dry Ice. (Either name is acceptable).
  - UN Identification Number: UN 1845
  - The full name and address of the shipper and consignee (location where it is being shipped)
  - The net weight of Carbon Dioxide, Solid must be marked on the outside of the package. The weight must be in Kilograms. (2.2 pounds = 1 Kg)

#### LABELING (IATA Section 7.2)

1. The outer package must be of sufficient size to affix all labels.
2. Only relevant labels are allowed on the outer package. All other labels must be removed or obliterated.
3. All labels must be durable, in correct location and secure.
4. For Carbon Dioxide, Solid, a Class 9 label is required. This label must be designed and sized as specified in IATA 7.2.2.3. The proper labels (see Attachment A, figures 1) are available at both the NNSC and SNSC shipping and receiving desk.
5. The label must not be folded or affixed in a manner that parts of the same label appear on different sides of the outer package.
6. Labels should be affixed on the package adjacent to the shipper or consignee's address (See example of a completed package configuration in Attachment A, figure 2).

## DOCUMENTATION

Most shipments of dangerous goods must be accompanied by two shipping documents: a “USA Airbill” and a “Shipper’s Declaration for Dangerous Goods”, however the latter is not required for dry ice only packages so the “Nature and Quantity of Goods” on the airbill<sup>2</sup> must show

- Proper Shipping Name
- Hazard Class or Division Number
- UN or NA Identification Number
- Number of Packages
- New quantity (in Kg) per package)

## ADDITIONAL RECOMMENDATIONS for DRY ICE SHIPMENTS

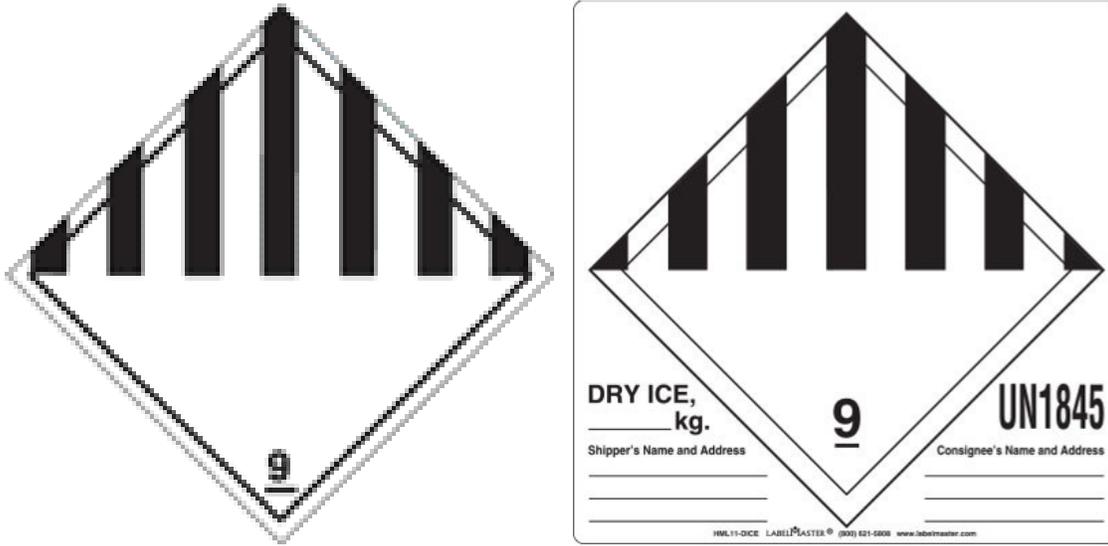
1. Do not write 'specimens' or 'diagnostic specimens' on the box. Diagnostic specimens are subject to specific packaging requirements and there should not be any misunderstanding about your shipment. Diagnostic specimens, in shipping terminology, are materials that may be infectious to humans or animals. If you think your samples might be infectious, contract [DGshipping@dri.edu](mailto:DGshipping@dri.edu) for help
2. Reusing a dry ice box can be 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. When reusing boxes with a preprinted Class 9 labels ensure the label complies with the current regulations. 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.
3. Secure your samples in such a way that when the dry ice sublimates, the samples 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.
4. Minimize the volume of air to which the dry ice is exposed. This will 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.
5. 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.
6. Dry ice shipments can be made with FedEx. UPS and the U.S. Postal Service have extremely restrictive policies concerning the shipment of hazardous materials; do not ship dry ice with UPS or the U. S. Postal Service.

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<sup>2</sup> If using FedEx ShipManager software to generate your shipping labels, you will enter your dry ice information on-line and it will appear on the label generated; therefore, a separate paper airbill is not required.

## Attachment A

Figure 1—Examples of acceptable labels for dry ice shipments (not to specified size)



Class 9—Miscellaneous Label<sup>1</sup>

Dry Ice Label<sup>1,2</sup>

Figure 2—Example of a properly labeled and marked outer package containing non-dangerous goods with dry ice

Shipper <sup>2</sup> : P.I. Scientist NNSC 55 Parkway Ave. Anytown, NV 89555
Ship To <sup>2</sup> : Research Whiz SNSC 55 El Camino St. My Town, CA 98525
<sup>3</sup> Carbon Dioxide, Solid UN 1845 wt. of dry ice in Kg

<sup>1</sup>No writing may extend into the diamond portion of either label. Doing so will not only cause package rejection and return to DRI for correction, but could cause FAA to launch an audit of DRI's shipping practices.

<sup>2</sup>You do not need to include separate shipper or consignee information on this label or the outside of the box when using a printed FedEx Shipping label or paper airbill, which will have this information on it.

<sup>3</sup>You do not have to mark the package with the information in this box if using the dry ice label shown on the right in Figure 1 above. Be sure you include the weight of dry ice in Kg on the label.