INTRODUCTION

Occasionally DRI employees need to ship samples preserved in acidic solutions or other small quantities of corrosive materials. The most cost effective and least onerous method of shipping corrosive materials is in excepted quantities provided excepted quantity shipping is an option noted in the IATA Table of Dangerous Goods for the corrosive liquid you are shipping and the liquid to be shipped can be packaged in very small quantities (30 ml or less per inner package) with the total number of inner packages contained in the outer package¹ limited as well.

Note: Corrosive liquids and solids are not permitted in checked luggage, carry-on baggage or via airmail.

REQUIRED TRAINING for HAZARDOUS MATERIALS/DANGEROUS GOODS SHIPPERS

All shippers of dangerous goods (including dry ice only packages) are required by law to have applicable training. Before shipping any hazardous material, 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 you package and paperwork 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.

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. Note: if the willful violation results in death or bodily injury to any person, the maximum prison sentence doubles.

¹ 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).
HAZARD IDENTIFICATION/EXCEPTED QUANTITY ALLOWED

Corrosive materials are defined by IATA dangerous goods regulations as substances which by chemical action can cause severe damage when in contact with living tissue or, in the case of leakage, will materially damage or even destroy, other goods or the means of transport. The definition of corrosive material for the purposes of transportation is further defined in the US Department of Transportation regulation (49 CFR 173.136) as follows:

(a) For the purpose of this subchapter, “corrosive material” (Class 8) means a liquid or solid that causes full thickness destruction of human skin at the site of contact within a specified period of time. A liquid, or a solid which may become liquid during transportation, that has a severe corrosion rate on steel or aluminum based on the criteria in §173.137(c)(2) is also a corrosive material. Whenever practical, in vitro test methods authorized in §173.137 of this part or historical data authorized in paragraph (c) of this section should be used to determine whether a material is corrosive.

(b) If human experience or other data indicate that the hazard of a material is greater or less than indicated by the results of the tests specified in paragraph (a) of this section, PHMSA may revise its classification or make the determination that the material is not subject to the requirements of this subchapter.

(c) Skin corrosion test data produced no later than September 30, 1995, using the procedures of part 173, appendix A, in effect on September 30, 1995 (see 49 CFR part 173, appendix A, revised as of October 1, 1994) for appropriate exposure times may be used for classification and assignment of packing group for Class 8 materials corrosive to skin.

Hazardous materials meeting the above definition are classified by DOT and IATA as Class 8 materials. Examples of commonly transported corrosive materials are inorganic acids, such as hydrochloric, nitric, phosphoric and sulfuric acids; organic acids, such as acetic acid; inorganic bases, such as sodium, potassium and ammonium hydroxide as well as a variety of chemicals that one may not readily recognize as corrosives such as phosphorus pentoxide, zinc chloride, stannic chloride, sodium hypochlorite (hypochlorite solution) and hydrogen peroxide >20%.

In order to determine whether the corrosive material you wish to ship qualifies for excepted quantity, refer to the Table 4.2 in the IATA Dangerous Goods Regulations, Section 4 (except below). Locate your chemical (column B), then look in column F to determine excepted quantity code assigned to that chemical. Excepted Quantity (EQ) codes are explained in IATA Table 2.6A
# DRI Guidelines for Shipping Excepted Quantities of Corrosive Materials by Air

*(IATA/ICAO Regulations)*

<table>
<thead>
<tr>
<th>UN/ID No.</th>
<th>Proper Shipping Name/Description</th>
<th>Class or Div. (Sub Risk)</th>
<th>Hazard Label(s)</th>
<th>PG</th>
<th>EQ (see 2.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2789</td>
<td>Acetic Acid, Glacial</td>
<td>8 (3)</td>
<td>Corrosive &amp; Flamm. liquid</td>
<td>II</td>
<td>E2</td>
</tr>
<tr>
<td>2031³</td>
<td>Nitric Acid other than red fuming with &gt; 20% but less than 65% nitric acid</td>
<td>8</td>
<td>Corrosive</td>
<td>II</td>
<td>E0⁴</td>
</tr>
<tr>
<td>2031³</td>
<td>Nitric Acid other than red fuming with 20% or less nitric acid</td>
<td>8</td>
<td>Corrosive</td>
<td>II</td>
<td>E2</td>
</tr>
<tr>
<td>2031³</td>
<td>Nitric Acid other than red fuming with &gt; 65% but &lt; 70% nitric acid</td>
<td>8 (5.1)</td>
<td>Corrosive &amp; Oxidizer</td>
<td>II</td>
<td>E0⁴</td>
</tr>
<tr>
<td>1807</td>
<td>Phosphoric Pentoxide</td>
<td>8</td>
<td>Corrosive</td>
<td>II</td>
<td>E2</td>
</tr>
<tr>
<td>1840</td>
<td>Zinc Chloride Solution</td>
<td>8</td>
<td>Corrosive</td>
<td>III</td>
<td>E1</td>
</tr>
<tr>
<td></td>
<td>Phosphoric anhydride, see Phosphoric Pentoxide (UN 1807)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## IATA Table 2.6A
Excepted Quantity Codes for Table 4.2 (2.6.4.1)

<table>
<thead>
<tr>
<th>EQ Code</th>
<th>Maximum net quantity per inner package</th>
<th>Maximum net quantity per outer package</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td>Not permitted as Excepted Quantity</td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>30 g/30 ml</td>
<td>1 kg/1 L</td>
</tr>
<tr>
<td>E2</td>
<td>30 g/30 ml</td>
<td>500 g/500 ml</td>
</tr>
<tr>
<td>E3</td>
<td>30 g/30 ml</td>
<td>300 g/300 ml</td>
</tr>
<tr>
<td>E4</td>
<td>1 g/1 ml</td>
<td>500 g/500 ml</td>
</tr>
<tr>
<td>E5</td>
<td>1 g/1 ml</td>
<td>300 g/300 ml</td>
</tr>
</tbody>
</table>

² Note: proper shipping names are listed in bold. In the examples above, phosphoric anhydride is not a proper shipping name. If you do not use the listed proper shipping name, your package will be rejected.

³ Some chemicals may have multiple packing groups (PG) associated with them, depending on concentration that affect hazard.

⁴ NOTE: A notation of E0 means the chemical may not be shipped excepted quantity.
QUANTITY LIMITS FOR EXCEPTED CORROSIVE MATERIALS

1. Inner Packaging. In most, if not all cases, the inner packaging may contain no more than 30 ml/30 g of a corrosive material regardless of packing group (PG).

2. Outer Packaging. The total amount of corrosive material packaged together in the same outer packaging may not exceed the amount listed as the maximum net quantity per outer package. In the examples of corrosive materials listed in table I this amounts 500 ml/500 grams for PG II corrosive materials or 1000 ml (1L)/1000 grams (1 Kg) for PG III corrosive materials.

PACKAGING COMPONENTS FOR EXCEPTED QUANTITIES

Packages of excepted quantities of corrosive materials must include three basic components:

1. Inner (primary) packaging, such as a vial, jar, etc. Do not completely fill inner packaging because space for expansion of liquids must be available (i.e., liquids must not completely fill inner packaging at a temperature of 55ºC/13ºF). Inner package closures must be held securely in place with tape, wire, metal crimps or other positive means.

2. Intermediate (secondary) packaging, such as a sturdy zip lock or similar plastic bag. Use good quality bags that can be well sealed. Intermediate packaging must contain enough absorbent materials to absorb all the contents of the primary container. Absorbent material must be compatible with the material it is protecting.

3. Outer packaging, such as a fibreboard (cardboard) box. FedEx boxes may not be used for dangerous goods shipment, including excepted quantity shipments. In addition, corrosive materials may not be shipped in envelopes, Tyvek sleeves or other non-rigid mailers. The dimensions of the outer box must be at least 100 mm (~4 inches) on two of the three sides. The complete package as prepared for transport must be capable of withstanding, as demonstrated by testing which is appropriately documented, without breakage or leakage of inner packaging and without signification reduction of effectiveness. Two performance tests are required:

   a. Drop Test. Drop a representative package from a height of 1.8 m (5.9 feet) direction onto a solid unyielding surface.
      - One drop flat on the base
      - One drop flat on the top
      - One drop flat on the longest side
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(IATA/ICAO Regulations)

- One drop flat on the shortest side and
- One drop on a corner

b. Compressive Load Test. Apply a force to the top surface of a representative package equivalent to the total weight of identical packages stacked to a height of 3 meters for a duration of 24 hours.

PACKAGE LABELING AND MARKING

The outer package must display the following marks and labels:

1. Dangerous Goods in Excepted Quantity Label (see figure 1). An Excepted Quantities of Dangerous Goods Label must be filled out and affixed to the outer packaging. Minimum size for this label is 100 x 100 mm (4 x 4 inches) and it must conform to the shape, color, format and text of the label in figure 1.

   Figure 1—Excepted Quantity Label

   ![Excepted Quantity Label](image)

   For corrosive materials, this label must display an 8 (hazard class number) under the E. Use a black permanent marker to write in the hazard class number. If the outer package containing excepted quantities is included in an overpack, this label must also be clearly visible or appear on the overpack too.

2. The Name and Address of the Shipper and consignee, unless using a FedEx ShipManager generated shipping label, which contains this information.

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5 When reusing shipping boxes, completely obliterate all unnecessary labels and marks.
REQUIRED DOCUMENTATION

For shipment to the 50 U.S. states, no hazard (shipper’s) declaration is required and you do not have to access or enter any data into the dangerous goods screens when using FedEx ShipManager; however if you use a paper FedEx airbill you must check the box in Section 6 “Dangerous Goods no Shipper’s Declaration Required” and add above the FedEx Tracking number the statement “Dangerous Goods in Excepted Quantities”.

International shipments of excepted quantities, including shipments to Guam and Puerto Rico, may have different requirements or be subject to export/import or TSCA regulations. Before shipping dangerous goods overseas, even in excepted quantities, please check with your carrier.

ADDITIONAL INFORMATION

Full details about shipping excepted quantities by air are located in Section 2.6 of the IATA DGR. For additional information or questions about the information contained in this guideline, email to dgshipping@dri.edu. More information on hazardous materials/dangerous goods shipping is posted on the DRI shipping pages, http://www.dri.edu/dangerous-goods-shipping.