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Module 5: Packaging

Introduction

Hazardous materials transportation is a highly regulated industry, for good reason. Regulation protects the handlers of these hazardous materials and the environment in which we live.

Shipping hazardous materials in improper packagings not only risks damaging the environment and hurting your employees, but could also be costly to your business.

Take a look at the DOT requirements for the packaging of hazardous materials using the Hazardous Materials Table (HMT) and Part 173 of the Hazardous Materials Regulation.

Objectives

1. Define packaging according to the HMR.
2. Identify the shipper's responsibility as it relates to hazardous materials packages and packaging, and any exceptions to these requirements.
3. Identify special types of packaging required for a variety of hazardous materials, including general and specific requirements and exceptions.
4. Identify requirements and exceptions related to Limited Quantities, Agricultural Products, Materials of Trade, and Lab Packs.
5. Identify required methods for handling damaged or leaking hazardous materials packages.
6. Identify U.S. Department of Defense (DOD) packaging certification requirements.
7. Identify requirements for overpacks.

Who Must Comply With the HMR?

Who is required to comply with the HMR? According to section 171.2 of the HMR, anyone who offers or accepts a hazardous material shipment for transportation must comply with the HMR. Providers of packagings used in the transportation of hazardous materials must comply as well.

You are regulated if you: manufacture, sell, inspect, test, retest, repair, rebuild, prepare, accept, or offer packagings for the transportation of hazardous materials in commerce.

No person, individual or company may offer or accept a hazardous material for transportation in commerce unless the shipment complies with the HMR.

Purpose of Packaging Requirements

If you transport hazardous materials in commerce within the jurisdiction of the United States, you are regulated and must comply with the HMR.
The main function of HMR packaging requirements is to assure that hazardous materials stay in the package during transportation.

**Definitions**

The packaging of hazardous materials has its own vocabulary. Common terms take on new meanings when applied to the HMR. Refer to the glossary in the “How to Use the HMR” booklet located under the Resources button, and the HMR definitions in sections 171.8, 178.2, 178.601, 178.700, 178.801, and 180.350 for definitions related to the packaging of hazardous materials for transportation.

**Package**

The term ‘package’ refers to the packaging plus its contents, and is used throughout the HMR.

**Packaging**

The term ‘packaging’ refers to a receptacle and any other components or materials necessary to perform its containment function in conformance with the minimum packaging requirements of the HMR. A package must meet minimum packaging requirements.

Packagings include: fiberboard boxes, drums, jerricans, portable tanks, cargo tanks, tank cars, multiunit tank car tanks, cylinders, and containers other than freight containers and overpacks.

**Non-Compliance with HMR**

You may not offer a hazardous material shipment in any mode unless it is prepared in accordance with the HMR.

**Carrier/Shipper Functions**

If you are a carrier who repackages a hazardous material for any reason, you are preparing the shipment for transportation. You must repackage the material in accordance with all applicable HMR provisions.

It makes no difference that you are not the original shipper; you are functioning as a shipper. More than one person can perform an “offeror” or shipper function for the same shipment.

Each person performing an offeror function is accountable for HMR packaging responsibilities.
Package Inspections
You must package hazardous materials for transportation in any mode as specified in the HMR. The initial carrier and the U.S. Department of Transportation and its designated agencies are authorized to inspect hazardous materials packages for HMR compliance. They may inspect for methods of manufacture, packing, closure, and storage of hazardous materials that affect safety in transportation.

Packaging Requirements

Packaging Requirements
The HMR prescribes packaging authorizations for the transport of hazardous materials. In the HMT, Columns (8A), (8B), and (8C) direct you to specific packaging requirements for each hazardous material.

The correct packaging is determined by the hazard class/division of the material, the packing group, and the quantity of materials being shipped. For this module, we are assuming that the material has been properly classified and assigned a proper shipping name.

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Hazardous materials descriptions and proper shipping names</th>
<th>Hazard class or Division</th>
<th>Identification Numbers</th>
<th>PG</th>
<th>Special provisions (§ 172.109)</th>
<th>Packaging (§ 173.30)</th>
<th>Quantity limitations (see §§ 173.27 and 173.79)</th>
<th>Vessel stowage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Acetal</td>
<td>3</td>
<td>UN1098</td>
<td>II</td>
<td>202, 242</td>
<td>5 L</td>
<td>50 L</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Acetaldehyde</td>
<td>3</td>
<td>UN1089</td>
<td>II</td>
<td>202, 242</td>
<td>5 L</td>
<td>50 L</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Acetaldehyde ammonia</td>
<td>9</td>
<td>UN1841</td>
<td>II</td>
<td>202, 242</td>
<td>5 L</td>
<td>50 L</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Acetaldhey oxide</td>
<td>3</td>
<td>UN1841</td>
<td>II</td>
<td>202, 242</td>
<td>5 L</td>
<td>50 L</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Acetic acid, glacial or Acetic acid solution, with more than 80 percent acid by mass</td>
<td>8</td>
<td>UN2789</td>
<td>II</td>
<td>202, 242</td>
<td>5 L</td>
<td>50 L</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Acetic acid solution, not less than 50 percent but not more than 80 percent acid by mass</td>
<td>8</td>
<td>UN2790</td>
<td>III</td>
<td>202, 242</td>
<td>5 L</td>
<td>50 L</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Acetic acid solution, with more than 10 percent and less than 50 percent</td>
<td>8</td>
<td>UN2790</td>
<td>III</td>
<td>202, 242</td>
<td>5 L</td>
<td>50 L</td>
<td>E</td>
</tr>
</tbody>
</table>

Identify the Hazardous Materials
To select the proper packaging, you must first turn to the Hazardous Materials Table, which is located in section 172.101 of the HMR. You will need to identify the material’s proper shipping name, hazard class, and identification number in Columns 2, 3, and 4.
Determine the Packing Group

The next step is to determine the packing group using Column 5. The packing group is indicated by the roman numerals I, II, or III. These reflect the degree of danger within certain hazard classes.

Packing Group I represents the greatest danger, Packing Group II represents a medium danger, and Packing Group III represents a lesser danger.

Identify Packaging Exceptions

Exceptions are in the HMR for anyone to use, when applicable. Each exception stands on its own. You may only use the packaging exception if it appears in Column 8A of the HMT for the specific material you are offering.

A special permit is issued in writing from the USDOT in Washington, DC, on a case-by-case basis. They are not found in the HMT, or anywhere in the HMR.

Special Permits are limited to those materials, regulations, conditions, and persons named in the special permit, and typically need to be renewed every 2 years.

Follow across the HMT to Column 8 “Packaging (Section 173.***).”

- Column (8A) provides exceptions to the packaging requirements if certain conditions are met
- Column (8B) provides authorized packaging for non-bulk
- Column (8C) provides authorized packaging for bulk

To find the reference section, replace the asterisks after 173 in the heading with the references found in Columns (8A), (8B), and (8C). For instance, an entry of 242 in column (8C) refers you to section 173.242.

Remember: Column (8A) lists exceptions, not special permits.

Limited Quantities

Limited Quantity, when specified as such in a section applicable to a particular material, means the maximum amount of a hazardous material for which there is a specific labeling or packaging exception.

Except for Class 7 materials prepared in accordance with subpart I of Part 173, a package prepared in accordance with applicable limited quantity requirements in Part 173 and offered for transportation by any mode other than air must display the limited quantity marking described in section 172.315(a)(1).

When you ship hazardous material as a Limited Quantity, it is excepted from specification packaging and placarding in all modes of transportation.
Except for Division 6.1 PG I materials or materials transported by aircraft, a limited quantity is excepted from labeling.

**Non-Bulk/Bulk Exceptions**

**Exceptions**

If Column (8A) contains the entry “none,” then you must comply with the specific packaging sections, listed in Columns (8B) or (8C). You must also comply with a specific packaging section when the package does not meet the requirements of the section referenced in Column (8A).

**Non-Bulk Packaging**

Column (8B) refers you to the section in Part 173 of the HMR that contains the non-bulk packaging authorizations. A shipper may choose any appropriate packaging listed in the authorization section shown in Column (8B).

**Specific Packaging Authorities**

In the packaging section, it is important to read the heading of each paragraph as well as the entire packaging section. Also, read any other sections mentioned within the section.

Some paragraphs might specify packaging for other than the material you are shipping. Other sections provide exceptions from specific packaging authorizations; that is, in addition to the exceptions listed in Column (8A).

<table>
<thead>
<tr>
<th>(8A)</th>
<th>(8B)</th>
<th>(8C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>202</td>
<td>242</td>
</tr>
<tr>
<td>155</td>
<td>204</td>
<td>240</td>
</tr>
<tr>
<td>150</td>
<td>203</td>
<td>242</td>
</tr>
<tr>
<td>154</td>
<td>202</td>
<td>243</td>
</tr>
</tbody>
</table>
Packaging for Flammable Liquids (Non-Bulk)

It is important to become acquainted with the different types of packagings in each of the packaging sections. Non-bulk packaging for liquids is found in sections 173.201, 173.202, and 173.203.

As with all packagings in Subparts E and F of Part 173, these provisions do not apply to Class 1 and Class 7 materials.

If a shipper wanted to package gasoline in 55-gallon metal drums, section 173.202 offers a choice of drums made from steel, aluminum, or other metals.

Review section 173.202 to see specifically what it says about packaging requirements for gasoline in 55-gallon metal drums.

Non-Bulk Packagings for Liquid Hazardous Materials

Notice that section 173.202(a) specifies that non-bulk packagings used for a shipment of gasoline must meet three sets of requirements:

- The general packaging requirements of Subpart B of Part 173
- The requirements for PG I or PG II materials in Part 178
- The particular requirements of special provisions in Column 7 of the HMT

Bulk Packaging

For example, 8,000 gallons of gasoline will be shipped in a cargo tank. Column (8C), the bulk packaging column, contains the reference 242 for the entry “gasoline.”

This means that section 173.242 offers a selection of bulk packagings that you could use for this shipment. Section 173.242 provides a list of rail cars, portable tanks, cargo tanks, and intermediate bulk containers that may be used, and the conditions for their use.
Selecting Packaging Types

In selecting a packaging, you must also consider quantity and modal limitations that may restrict your choices. For example, in section 173.202(c), single packagings are not authorized for the transportation of gasoline by passenger aircraft.

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Hazardous materials descriptions and proper shipping names</th>
<th>Hazard class or Division</th>
<th>Identification Numbers</th>
<th>PG</th>
<th>Label Codes</th>
<th>Special provisions (§ 172.102)</th>
<th>UN Packaging (§ 175.01)</th>
<th>Quantity limitations (see §§ 173.27 and 176.70)</th>
<th>Vessel stowage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline, non-pressurized, toxic, flammable, n.e.s., not refrigerated liquid</td>
<td>UN1001</td>
<td>2.3</td>
<td>UN1001</td>
<td>2.3</td>
<td>2.1</td>
<td>6</td>
<td>306, 302</td>
<td>None</td>
<td>Forbidden</td>
</tr>
<tr>
<td>Gasoline, non-pressurized, toxic, n.e.s., not refrigerated liquid</td>
<td>UN1002</td>
<td>2.3</td>
<td>UN1002</td>
<td>2.3</td>
<td>2.1</td>
<td>6</td>
<td>306, 302, 304</td>
<td>None</td>
<td>Forbidden</td>
</tr>
</tbody>
</table>

**UN Standard Packagings**

Performance testing requirements for all packaging designs are contained in Part 178. Packagings tested to meet the Part 178 performance requirements are called “UN Standard Packagings.”

Section 171.8 defines “UN standard packaging” as a packaging conforming to standards in the UN Recommendations on the Transport of Dangerous Goods.

**Standards**

Every UN standard packaging must be marked with the appropriate United Nations certification mark, which contains the ID code letters and number(s) preceded by the UN symbol.

In addition, the specification packaging must be marked with a letter to indicate the packing group performance level.

For example: “X” performs to the level of PG I, and may also be used for PG II and III; “Y” performs to the level of PG II, and may also be used for PG III; and “Z” performs to the level of PG III, and may not be used for any other packing group.

The specification packaging must also be marked with a number designating the specific gravity for liquids or maximum gross mass (in kilograms) for solids of the tested packaging design.

UN standard packagings, such as intermediate bulk containers (IBCs,) can be built and tested to a variety of performance levels and capacities. It is very important that the UN standard you select is authorized for the packing group of the material you want to ship. The package must be tested for the specific gravity or mass for the hazardous material being shipped.
Activity: Think It Through

Using the scenario provided and the information in this module, determine the Packing Group

Scenario:
You are shipping 29 kilograms of Acetaldehyde ammonia. According to section 172.101 of the HMT the packaging requirement is PGIII. You have found a fiberboard box that has been tested to Packing Group II performance requirements. The box is marked 4G/Y29, indicating a UN specification 4G.

Question:
Can you ship this hazardous chemical in the fiberboard 4G/Y29 container?

Answer:
Yes, the fiberboard 4G/Y29 container may be used to ship the hazardous chemical.

Package Marking Requirements
All UN non-bulk packagings are required to be marked in a method similar to that shown here in the graphic. The marking must include the following:

- The hydrostatic test pressure for single and composite packagings intended for liquids, or the letter “S” for packagings intended for solids or inner packagings.
- The last two digits of the year of manufacture; the state or country authorizing allocation of the mark.
- The name and address or registered symbol of the manufacturer or approval agency certifying compliance with Part 178.

Packaging Requirements
The HMR prescribes general packaging requirements for all hazardous materials, while certain hazardous materials must meet additional specific packaging requirements.

General packaging requirements: address package design, construction and content limitations. These general requirements are written to prevent the release of hazardous material, the reduction in effectiveness of the package, and the mixing of gases or vapors that could reduce the package effectiveness.

Specific packaging requirements address specific situations particular to passenger railcars, passenger aircraft, cargo aircraft, and vessels, as well as quantity limitations for each of these types of vessels.

General Packaging Requirements
Many liquid hazardous materials expand when heated. For this reason, all containers of liquid hazardous materials must have vacant space or outage. This space is also referred to as “ullage” or “vapor space.” In other words, the packaging must not be entirely full.
Closure Requirements
In addition to the requirements for outage, also called vapor space, containers of liquid hazardous materials must be tightly and securely closed. A combination package containing liquid hazardous materials must be packed so that closure on the inner packages remains upright.

They must be packed and cushioned to prevent breakage or leakage.

Packagings used for solids that may become liquid during transportation must be capable of containing the material in a liquid state.

General Packaging Requirements Summary
In summary, general packaging requirements are found in:

- Section 173.24 and include packaging design criteria and filling limits based on the physical nature of the material to be packaged.
- Additional general packaging requirements are located in section 173.24a for non-bulk; section 173.24b for bulk; and section 173.27 for air transportation.

Specific Packaging Requirements
Column 9 lists the quantity limitations for hazardous materials transported by passenger rail and passenger aircraft, as well as for shipments by cargo aircraft.

When Column (9A) of the HMT indicates a material is “Forbidden,” it may not be offered for transportation aboard passenger aircraft or passenger rail.

The word “Forbidden” in Column (9B) indicates it may not be offered for transportation on a cargo aircraft.

Air Shipments
Hazardous material packaging for air shipments must be designed and constructed to prevent leakage caused by altitude and temperature changes. Additionally, air shipments of hazardous materials must meet not only the general packaging requirements for transportation by aircraft, but also the UN standard or DOT specification packaging requirements as appropriate.

Inner Containers
Packaging closures must be held securely in place by positive means to prevent leakage. Combination packaging containing certain hazardous liquids must contain sufficient non-reactive absorbent materials to absorb any leakage.

Where absorbent material is required and the outer packaging is not leak-tight, you must use a leak proof liner, plastic bag or other means of containment.
Cylinders

All cylinders transported by air must have protection to prevent operation of or damage to valves. Equip cylinders with securely attached valve caps or protective head rings, or place cylinders in a box or crate. Vented closures are used to reduce internal pressure and prevent the unintentional release of the product.

Aircraft may not transport:

- Cargo tanks
- Tank cars or
- Packages with vented closures

Exceptions

Column (8A) of the HMT references specific exceptions to packaging requirements. In addition, the HMR provides general exceptions that may apply to small quantities of some classes of hazardous materials.

Limited vs. Small Quantities

The criteria for determining “small quantities” and exceptions for small quantities of certain hazardous materials are found in section 173.4 of the HMR.

The term “small quantity” is not synonymous with the term “Limited Quantity.” The definition for “Limited Quantity” is found in section 171.8 of the HMR. These two terms have entirely different meanings and uses. Both are excepted from specification packaging.

Packaging Small Quantities for Highway and Rail

Some small quantities are subject only to section 173.4 of the HMR. When transported domestically by highway or rail in conformance with this section, quantities of Division 2.2 (except aerosols with no subsidiary hazard), Class 3, Division 4.1, Division 4.2 (PG II and III), Division 4.3 (PG II and III), Division 5.1, Division 5.2, Division 6.1, Class 7, Class 8, and Class 9 materials are not subject to any other requirements provided they comply with all of section 173.4.

Further, the shipper certifies conformance with this section by marking the outside of the package with the statement “This package conforms to 49 CFR 173.4 for domestic highway or rail transport only.” The gross mass of the completed package does not exceed 29 kg (64 pounds).

Agricultural Products

Section 173.5 of the HMR contains exceptions for farmers when they transport agricultural products, other than hazardous wastes, between fields of their own farm, or to or from their farm.

Agricultural products are defined as hazardous materials used to support farming operations, and include but are not limited to fertilizers, pesticides, soil amendments, and fuel.

Agricultural products are limited to materials in Classes 3, 8, 9, and Divisions 2.1, 2.2, 5.1, and 6.1.
Agricultural Products - Transportation Between Fields
Farmers transporting agricultural products other than gases between fields of the same farm using local roads are excepted from the requirements in the HMR. The farmer must be an intrastate private motor carrier.

This exception does not apply to Class 2 gases, such as liquefied petroleum gas or anhydrous ammonia.

To use this exception, you must use the agricultural products on your own farm. Each state must authorize these exceptions by law or regulation. You must comply with all state requirements.

Agricultural Products Exceptions
Farmers transporting agricultural products to or from a farm, within 150 miles of the farm, are excepted from the requirements in Subpart G (Emergency Response Information), and Subpart H (Training), and specification packaging requirements.

They must comply with:

- Subpart C – Shipping Papers
- Subpart D – Marking
- Subpart E – Labeling
- Subpart F – Placarding

These exceptions apply if:

- The material is transported by a farmer who is an intrastate private motor carrier.
- The total amount of agricultural product transported on a single motor vehicle does not exceed:
  - 7,300 kg (16,094 lbs.) of ammonium nitrate fertilizer classified as Division 5.1, PG III, in a bulk packaging
  - 1,900 L (502 gallons) for liquids or gases, or 2,300 kg (5,070 lbs.) for solids, of any other agricultural products
- The movement and packaging are in conformance with state laws and regulations.
- Each person preparing agricultural products for shipment or transporting agricultural products must be instructed in applicable requirements.

Materials of Trade (MOTs)
All requirements and exceptions for Materials of Trade transported by motor vehicle are found in Section 173.6 of the HMR. Materials of Trade are defined as a hazardous material, other than a hazardous waste, that is carried on a motor vehicle for at least one of the three following purposes:

- To protect the health and safety of the motor vehicle operator or passengers
- To support the operation or maintenance of a motor vehicle or auxiliary equipment
- To directly support a principal business that is other than transportation by motor vehicle, in the case of a private motor carrier

Materials of Trade (MOTs) - Quantity Limitations Apply
To qualify for the Materials of Trade exception, the materials must be less than the quantity limitations outlined in Section 173.6(a). Except for a diluted mixture of Class 9 material, the aggregate gross weight of all Materials of Trade on a motor vehicle may not exceed 200 kg (440 lbs.).
Materials of Trade (MOTs) - Packaging Requirements
Each material must be packaged in the manufacturer’s original packaging or a packaging of equal or greater strength. The packaging must be leak tight for liquids and gases, sift proof for solids, and securely closed, secured against movement, and protected against damage. Outer packagings are not required for receptacles that are secured in cages, bins, boxes or compartments. Gasoline must be in DOT-authorized or OSHA-approved metal or plastic cans. Cylinders and pressure vessels must conform to the HMR, except that outer packagings are not required.

Materials of Trade (MOTs) - Operator Information
Vehicle operators must be informed of the presence of hazardous materials and the requirements of the MOTs exception, including the reportable quantity, if applicable, and the requirements contained in section 173.6, when transporting materials of trade.

Lab Packs
Waste materials classed in specific Hazard Classes or Divisions are excepted from the HMR specification packaging requirements for combination packages, also called lab packs, if:

- Packaged in certain types of combination packagings in accordance with section 173.12(b)
- Transported for disposal or recovery
- Transported by highway only

Lab Packs - Outer Packaging
For lab packs, the outer packaging must be a:

- UN1A2, UN1B2 or UN1N2 metal drum, a UN1D plywood drum, a UN1G fiber drum, or a UN1H2 plastic drum, tested and marked to at least the Packing Group III performance level for liquids or solids
- Double-walled UN4G fiberboard box made out of 500 pound burst-strength fiberboard fitted with a polyethylene liner at least 3 mils (0.003 inches) thick
- UN11G fiberboard intermediate bulk container (IBC) or a UN11HH2 composite IBC, fitted with a polyethylene liner at least 6 mils (0.006 inches) thick

Gross weight may not exceed 205 kg. Any lab pack drum must be tested and marked as authorized at least for Packing Group III materials. The outer packaging may contain only one hazard class.

Lab Packs – Inner Packaging
Maximum container capacity:

- Inner packagings of glass must not be over 4 liters capacity
- Inner packagings of metal or plastic must not be over 20 liters capacity

Inner packagings of liquids must be surrounded by enough compatible absorbent material to absorb all of the liquid content.
Lab Packs - Prohibited Materials

The following waste materials may not be packaged as lab packs:

- A material poisonous-by-inhalation
- A temperature-controlled material unless it complies with section 173.21(f)(1)
- A Division 3.1 Packing Group I material
- Chloric acid
- Oleum (fuming sulfuric acid)

### Activity: Matching

Draw a line from the exception identified in the left column to the applicable scenario in the right column.

<table>
<thead>
<tr>
<th>Exceptions</th>
<th>Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited vs. Small Quantities</td>
<td>Transporting a chemical that is not a Class 2 gas between fields for the same farm</td>
</tr>
<tr>
<td>Materials of Trade (MOTs)</td>
<td>Transporting a chemical via rail that does not exceed 29 kg (64 pounds)</td>
</tr>
<tr>
<td>Agriculture Products</td>
<td>Waste materials being shipped in a UN1N2 metal drum not exceeding 205 kg (452 pounds) in gross weight</td>
</tr>
<tr>
<td>Lab Packs</td>
<td>Shipping a material in the manufacturer’s original packaging via a motor vehicle but not exceeding 200 kg (440 pounds)</td>
</tr>
</tbody>
</table>
Leaking or Damaged Hazmat Packages
You may place damaged or leaking packages of hazardous materials and spilled or leaked hazardous materials in a metal or plastic removable-head salvage drum. The drum must be compatible with the material.

Standards
The salvage drum used must be of a specific type, tested and marked for Packing Group III or higher performance standards; or a “Salvage Drum” manufactured and marked prior to October 1, 1993. The drum capacity must not exceed 450 liters or 119 gallons. When necessary, each salvage drum must contain enough absorbent and cushioning material that it is compatible with the hazardous materials to prevent excessive package movement, and absorbs all free liquid at the time of closing.

Markings and Labels
You must mark the salvage drum with the proper shipping name of the hazardous material inside the packaging, the name and address of the consignee, and the word(s) “Salvage” or “Salvage Drum.” You must properly label the drum for the material it contains. The ID Number marking is not required on salvage drums.

Shipping Papers
The shipper of a hazardous material in a salvage drum must prepare shipping papers for the material in accordance with the HMR.

Overpack Requirements
When a salvage drum is used to ship a damaged or leaking package, the salvage drum is not subject to HMR overpack requirements.

Packaging Solid or Semi-Solid Hazardous Wastes
You may place hazardous wastes that are required to be shipped in a closed-head drum in an equivalent open-head drum, provided the wastes contain solids or semi-solids that would make placement of the wastes in a closed-head drum impractical.

U.S. Department of Defense Packaging
You must package hazardous materials offered for transportation by, for, or to the U.S. Department of Defense (DOD) in accordance with the HMR, or in DOD-certified packagings of equal or greater strength and efficiency. This rule includes commercial shipments under government contract.
Reshipment
Hazardous materials offered by DOD under these provisions may be reshipped by any shipper to any consignee as long as the packaging hasn’t been altered or damaged.

Hazardous Materials Sold by DOD
Hazardous materials sold by DOD in packaging not marked in accordance with the HMR may be shipped from DOD installations; but the DOD must certify in writing that the strength and efficiency of the packaging is equal to or greater than that of the packaging required by the HMR.

DOD Certification
For each shipment, shippers must obtain the certification, in duplicate, from DOD. Shippers must provide the originating carrier with a copy and retain the other copy for at least one year.

Special Permits
Special permits are waivers from specific requirements of the HMR.

DOT will only issue a special permit, however, when you show you can provide a level of safety and public protection equal to that provided by compliance with the portion of the HMR from which you seek the waive.

Special permits are usually specific as to the hazardous material, the hazard class, the regulations affected, and any special safety provisions necessary.

Special permits that are granted are assigned their own individual number, for example, DOT-SP 8451.

Unless exempted by provisions of the special permit, the number must be marked on the package and on the shipping paper in association with the shipping description for the material. Other sections that address the use of special permits are located in sections 172.203(a), 172.301(c), 172.302(c), and 173.22a.

Packages and Overpacks
You may offer authorized packages of hazardous materials for transportation packed in an overpack.

Packages may not contain prohibited material and must meet standard packaging requirements. Overpacks are not packages. Overpacks are used to consolidate packages that could, under normal conditions, be offered and transported individually.

Packaging and Overpacks: Overpacks
You must mark an overpack with the proper shipping name and ID Number of each material contained, and label it for each material contained.

If all relevant inner package markings and labels are visible, however, overpack marking and labeling may be omitted.
Overpack Arrows and Specification Packaging
The overpack is marked with the word “OVERPACK” when specification packagings are required, unless specification markings on the inside packages are visible.

If the packages inside the overpack are required to be packed with closures upward, the overpack must be marked with orientation arrows (pointing in the upward direction) on two opposite vertical sides of the overpack.

Prohibited Overpacks
You may not overpack packages containing Class 8 (corrosive) materials, PG I, or Division 5.1 (oxidizing) materials, PG I, with any other hazardous materials.

Poisons in Overpacks
Guidelines for the transportation of hazardous materials required to be labeled “POISON” or ”TOXIC” include:

- If marked, labeled, packaged, and overpacked in accordance with the HMR, may be transported with foodstuffs, feed, or any other edible material.
- Overpack in UN1A2, UN1B2, or UN1N2 drums
- Drums must meet the PGII or higher standards

These requirements are found in section 173.25(c).

Reuse, Reconditioning, and Remanufacture
When meeting the conditions of section 173.28, certain packagings may be used more than once to transport hazardous materials. Some non-bulk packaging used more than once must be retested and/or reconditioned as required by section 173.28(b)-(d).

Before reuse, packagings subject to the leakproofness test with air shall be:

- Retested without failure in accordance with section 178.604 using an internal air pressure of at least 48 kPa (7.0 psig) for PG I, and 20 kPa (3.0 psig) for PG II and PG III
- Marked with the letter “L,” with the name and address or symbol of the person conducting the test, and the last two digits of the year the test was conducted

You may review the reuse provisions for specific types of packages in section 173.28.

Empty Packaging
If a packaging has been emptied, but not cleaned and purged, and contains only residue, you may not offer it for transportation – unless you offer it in the same manner as before being emptied.

This includes proper closure of all openings and valves. The conditions and exceptions associated with this requirement are found in section 173.29.
**Packaging Compatibility**

It is the responsibility of the person offering a hazardous material for transportation to ensure that such packagings are compatible with their lading. This particularly applies to corrosivity, permeability, softening, premature aging, and embrittlement.

Plastic used in packagings and receptacles must be of a type compatible with the lading and may not be permeable to an extent that a hazardous condition is likely to occur during transportation, handling, or refilling.

Parts 178, 179, and 180 provide standards for the manufacture, testing and certification of packagings.

**Summary**

You have completed all the material for module 5. You should be able to:

- Define package and packaging according to the HMR.
- Identify the shipper's responsibility as it relates to hazardous materials packages and packagings, and any exceptions to these requirements.
- Identify special types of packagings required for a variety of hazardous materials, including general and specific requirements and any exceptions.
- Identify requirements and exceptions related to Limited Quantities, Agricultural Products, Materials of Trade, and Lab Packs.
- Identify required methods for handling damaged or leaking hazmat packages.
- Identify U.S. Department of Defense (DOD) packages and certification requirements.
- Identify overpack packaging requirements.

**References**