PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

Subpart A—General

Sec.
173.1 Purpose and scope.

173.2 Hazardous materials classes and index to hazard class definitions.
173.2a Classification of a material having more than one hazard.
173.3 Packaging and exceptions.
173.4 Small quantity exceptions.
173.5 Agricultural operations.
173.5a Oilfield service vehicles.
173.6 Materials of trade exceptions.
Research and Special Programs Administration, DOT

173.7 U.S. Government material.
173.8 Exceptions for non-specification packagings used in intrastate transportation.
173.9 Transport vehicles or freight containers containing lading which has been fumigated.
173.10 Tank car shipments.
173.12 Exceptions for shipment of waste materials.
173.13 Exceptions for Class 3, Divisions 4.1, 4.2, 4.3, 5.1, 6.1, and Classes 8 and 9 materials.

Subpart B—Preparation of Hazardous Materials for Transportation

173.21 Forbidden materials and packages.
173.22 Shipper’s responsibility.
173.22a Use of packagings authorized under exemptions.
173.23 Previously authorized packagings.
173.24 General requirements for packagings and packages.
173.24a Additional general requirements for non-bulk packagings and packages.
173.24b Additional general requirements for bulk packagings.
173.25 Authorized packagings and overpacks.
173.26 Quantity limitations.
173.27 General requirements for transportation by aircraft.
173.28 Reuse, reconditioning and remanufacture of packagings.
173.29 Empty packagings.
173.30 Loading and unloading of transport vehicles.
173.31 Use of tank cars.
173.32 Qualification, maintenance and use of portable tanks other than Specification IM portable tanks.
173.32a Approval of Specification IM portable tanks.
173.32b Periodic testing and inspection of Specification IM portable tanks.
173.32c Use of Specification IM portable tanks.
173.33 Hazardous materials in cargo tank motor vehicles.
173.34 Qualification, maintenance, and use of cylinders.
173.35 Hazardous materials in intermediate bulk containers.
173.36 General packaging requirements for poisonous materials required to be packaged in cylinders.

Subpart C—Definitions, Classification and Packaging for Class 1

173.50 Class 1—Definitions.
173.51 Authorization to offer and transport explosives.
173.52 Classification codes and compatibility groups of explosives.
173.53 Provisions for using old classifications of explosives.
173.54 Forbidden explosives.
173.55 [Reserved]
173.56 New explosives—Definition and procedures for classification and approval.
173.57 Acceptance criteria for new explosives.
173.58 Assignment of class and division for new explosives.
173.59 Description of terms for explosives.
173.60 General packaging requirements for explosives.
173.61 Mixed packaging requirements.
173.62 Specific packaging requirements for explosives.
173.63 Packaging exceptions.

Subpart D—Definitions, Classification, Packing Group Assignments and Exceptions for Hazardous Material Other Than Class 1 and Class 7

173.115 Class 2, Divisions 2.1, 2.2, and 2.3—Definitions.
173.116 Class 2—Assignment of hazard zone.
173.117-173.119 [Reserved]
173.120 Class 3—Definitions.
173.121 Class 3—Assignment of packing group.
173.122 Class 4, Divisions 4.1, 4.2 and 4.3—Definitions.
173.123 Class 4—Assignment of packing group.
173.124 Class 5, Division 5.1—Definition and assignment of packing groups.
173.125 Class 5, Division 5.2—Definitions and types.
173.126 Class 5, Division 5.2—Assignment of packing group.
173.127 Class 6, Division 6.1—Definitions.
173.128 Assignment of packing group and hazard zones for Division 6.1 materials.
173.129 Class 6, Division 6.2—Definitions, exceptions and packing group assignments.
173.130 Class 7—Definitions.
173.131 Class 7—Assignment of packing group.
173.132 Class 8—Definitions.
173.133 Class 8—Assignment of packing group.
173.134 Class 9—Definitions.
173.135 Class 9—Assignment of packing group.
173.136 Other Regulated Materials (ORM)—Definitions.
173.137 Other Regulated Materials—Assignment of packing group.
173.138 Exceptions for Division 5.1 (oxidizers) and Division 5.2 (organic peroxides).
173.139 Exceptions for Division 6.1 (poisonous materials).
173.140 Exceptions for Class 8 (corrosive materials).
173.141 Exceptions for Class 9 (miscellaneous hazardous materials).
173.142 Exceptions for ORM materials.
Pt. 173

Subpart E—Non-bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

173.158 Nitric acid.
173.159 Batteries, wet.
173.160 Bombs, smoke, non-explosive (corrosive).
173.161 Chemical kits.
173.162 Gallium.
173.163 Hydrogen fluoride.
173.164 Mercury (metallic and articles containing mercury).
173.166 Air bag inflators, air bag modules and seat-belt pretensioners.
173.170 Black powder for small arms.
173.171 Smokeless powder for small arms.
173.172 Aircraft hydraulic power unit fuel tank.
173.173 Paint, paint-related material, adhesives and ink and resins.
173.174 Refrigerating machines.
173.181 Pyrophoric materials (liquids).
173.182 Barium azide—50 percent or more water wet.
173.183 Nitrocellulose base film.
173.184 Highway or rail fusee.
173.185 Lithium batteries and cells.
173.186 Matches.
173.187 Pyrophoric solids, metals or alloys, n.o.s.
173.188 White or yellow phosphorous.
173.189 Batteries containing sodium or cells containing sodium.
173.192 Packaging for certain Packing Group I poisonous materials.
173.193 Bromoacetone, methyl bromide, chloropicrin and methyl bromide or methyl chloride mixtures, etc.
173.194 Gas identification sets.
173.195 Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution).
173.196 Infectious substances (etiologic agents).
173.197 Regulated medical waste.
173.198 Nickel carbonyl.
173.201 Non-bulk packagings for liquid hazardous materials in Packing Group I.
173.202 Non-bulk packagings for liquid hazardous materials in Packing Group II.
173.203 Non-bulk packagings for liquid hazardous materials in Packing Group III.
173.204 Non-bulk, non-specification packagings for certain hazardous materials.
173.211 Non-bulk packagings for solid hazardous materials in Packing Group I.
173.212 Non-bulk packagings for solid hazardous materials in Packing Group II.
173.213 Non-bulk packagings for solid hazardous materials in Packing Group III.
173.214 Packagings which require approval by the Associate Administrator for Hazardous Materials Safety.
173.216 Asbestos, blue, brown, or white.
173.217 Carbon dioxide, solid (dry ice).
173.218 Fish meal or fish scrap.
173.219 Life-saving appliances.
173.220 Internal combustion engines, self-propelled vehicles, and mechanical equipment containing internal combustion engines or wet batteries.
173.221 Polymeric beads, expandable.
173.222 Wheelchairs equipped with wet electric storage batteries.
173.224 Packaging and control and emergency temperatures for self-reactive materials.
173.225 Packaging requirements and other provisions for organic peroxides.
173.226 Materials poisonous by inhalation, Division 6.1, Packing Group I, Hazard Zone A.
173.227 Materials poisonous by inhalation, Division 6.1, Packing Group I, Hazard Zone B.
173.228 Bromine pentfluoride or bromine trifluoride.
173.229 Chloric acid solution or chlorine dioxide hydrate, frozen.

Subpart F—Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

173.240 Bulk packaging for certain low hazard solid materials.
173.241 Bulk packagings for certain low hazard liquid and solid materials.
173.242 Bulk packagings for certain medium hazard liquids and solids, including solids with dual hazards.
173.243 Bulk packaging for certain high hazard liquids and dual hazard materials which pose a moderate hazard.
173.244 Bulk packaging for certain pyrophoric liquids (Division 4.2), dangerous when wet (Division 4.3) materials, and poisonous liquids with inhalation hazards (Division 6.1).
173.245 Bulk packaging for extremely hazardous materials such as poisonous gases (Division 2.3).
173.247 Bulk packaging for certain elevated temperature materials (Class 9) and certain flammable elevated temperature materials (Class 3).
173.249 Bromine.

Subpart G—Gases; Preparation and Packaging

173.300 [Reserved]
173.30a Approval of independent inspection agency.
173.30b Approval of non-domestic chemical analyses and tests.
173.30c General requirements for shipment of compressed gases in cylinders and spherical pressure vessels.
173.30d Charging of cylinders with non-liquefied compressed gases.
Research and Special Programs Administration, DOT

Pt. 173

173.303 Charging of cylinders with compressed gas in solution (acetylene).
173.304 Charging of cylinders with liquefied compressed gas.
173.305 Charging of cylinders with a mixture of compressed gas and other material.
173.306 Limited quantities of compressed gases.
173.307 Exceptions for compressed gases.
173.308 Cigarette lighter or other similar device charged with fuel.
173.309 Fire extinguishers.
173.314 Compressed gases in tank cars and multi-unit tank cars.
173.315 Compressed gases in cargo tanks and portable tanks.
173.316 Cryogenic liquids in cylinders.
173.317 Cryogenic liquids in cargo tanks.
173.318 Cryogenic liquids in tank cars.
173.319 Cryogenic liquids; exceptions.
173.321 Ethylamine.
173.322 Ethyl chloride.
173.323 Ethylene oxide.
173.324 Organic phosphates mixed with compressed gas.
173.325 Gas generator assemblies.
173.326 Nitrogen dioxide, liquefied, or dinitrogen tetroxide, liquefied.
173.327 Nitric oxide.
173.328 Tungsten hexafluoride.
173.329 Tear gas devices.

Subpart H [Reserved]

Subpart I-Class 7 (Radioactive) Materials

173.401 Scope.
173.403 Definitions.
173.410 General design requirements.
173.411 Industrial packagings.
173.412 Additional design requirements for Type A packages.
173.413 Requirements for Type B packages.
173.415 Authorized Type A packages.
173.416 Authorized Type B packages.
173.417 Authorized fissile materials packages.
173.418 Authorized packages—pyrophoric Class 7 (radioactive) materials.
173.419 Authorized packages—oxidizing Class 7 (radioactive) materials.
173.420 Uranium hexafluoride (fissile excepted and non-fissile).
173.421 Excepted packages for limited quantities of Class 7 (radioactive) materials.
173.422 Additional requirements for excepted packages containing Class 7 (radioactive) materials.
173.423 Requirements for multiple hazard limited quantity Class 7 (radioactive) materials.
173.424 Excepted packages for radioactive instruments and articles.
173.425 Table of activity limits—excepted quantities and articles.
173.426 Excepted packages for articles containing natural uranium or thorium.
173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).
173.428 Empty Class 7 (radioactive) materials packaging.
173.431 Activity limits for Type A and Type B packages.
173.433 Requirements for determining $A_1$ and $A_2$ values for radionuclides and for the listing of radionuclides on shipping papers and labels.
173.434 Activity-mass relationships for uranium and natural thorium.
173.435 Table of $A_1$ and $A_2$ values for radionuclides.
173.441 Radiation level limitations.
173.442 Thermal limitations.
173.443 Contamination control.
173.447 Storage incident to transportation—general requirements.
173.448 General transportation requirements.
173.453 Fissile materials—exceptions.
173.457 Transportation of fissile material, controlled shipments—specific requirements.
173.459 Mixing of fissile material packages.
173.461 Demonstration of compliance with tests.
173.462 Preparation of specimens for testing.
173.465 Type A packaging tests.
173.466 Additional tests for Type A packagings designed for liquids and gases.
173.467 Tests for demonstrating the ability of Type B and fissile materials packagings to withstand accident conditions in transportation.
173.468 Test for LSA-III material.
173.469 Tests for special form Class 7 (radioactive) materials.
173.471 Requirements for U.S. Nuclear Regulatory Commission approved packages.
173.472 Requirements for exporting DOT Specification Type B and fissile packages.
173.473 Requirements for foreign-made packages.
173.474 Quality control for construction of packaging.
173.475 Quality control requirements prior to each shipment of Class 7 (radioactive) materials.
173.476 Approval of special form Class 7 (radioactive) materials.

Subparts J-O [Reserved]

Appendix A to Part 173 [Reserved]
Appendix B to Part 173—Procedure for Testing Chemical Compatibility and Rate of Permeation in Plastic Packaging and Receptacles
§ 173.1 Purpose and scope.

(a) This part includes:

(1) Definitions of hazardous materials for transportation purposes;

(2) Requirements to be observed in preparing hazardous materials for shipment by air, highway, rail, or water, or any combination thereof; and

(3) Inspection, testing, and retesting responsibilities for persons who retest, recondition, maintain, repair and rebuild containers used or intended for use in the transportation of hazardous materials.

(b) A shipment of hazardous materials that is not prepared in accordance with this subchapter may not be offered for transportation by air, highway, rail, or water. It is the responsibility of each hazmat employer subject to the requirements of this subchapter to ensure that each hazmat employee is trained in accordance with the requirements prescribed in this subchapter. It is the duty of each person who offers hazardous materials for transportation to instruct each of his officers, agents, and employees having any responsibility for preparing hazardous materials for shipment as to applicable regulations in this subchapter.

(c) When a person other than the person preparing a hazardous material for shipment performs a function required by this part, that person shall perform the function in accordance with this part.

(d) In general, the Hazardous Materials Regulations (HMR) contained in this subchapter are based on the Recommendations of the United Nations Committee of Experts on the Transport of Dangerous Goods and are consistent with international regulations issued by the International Civil Aviation Organization (ICAO Technical Instructions) and the International Maritime Organization (IMDG Code). However, the HMR are not consistent in all respects with the UN Recommendations, the ICAO Technical Instructions or the IMDG Code, and compliance with the HMR will not guarantee acceptance by regulatory bodies outside of the United States.


§ 173.2 Hazardous materials classes and index to hazard class definitions.

The hazard class of a hazardous material is indicated either by its class (or division) number, its class name, or by the letters “ORM–D”. The following table lists class numbers, division numbers, class or division names and those sections of this subchapter which contain definitions for classifying hazardous materials, including forbidden materials.

<table>
<thead>
<tr>
<th>Class No.</th>
<th>Division No. (if any)</th>
<th>Name of class or division</th>
<th>49 CFR reference for definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>Forbidden explosive</td>
<td>173.21</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td>Explosives</td>
<td>173.54</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Explosives (with a mass explosion hazard)</td>
<td>173.50</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Explosives (with a projection hazard)</td>
<td>173.50</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Explosives (with predominately a fire hazard)</td>
<td>173.50</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Explosives (with no significant blast hazard)</td>
<td>173.50</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Very insensitive explosives; blasting agents</td>
<td>173.50</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Extremely insensitive detonating substances</td>
<td>173.50</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Flammable gas</td>
<td>173.115</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Non-flammable compressed gas</td>
<td>173.115</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Poisonous gas</td>
<td>173.115</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Flammable and combustible liquid</td>
<td>173.120</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Flammable solid</td>
<td>173.124</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Spontaneously combustible material</td>
<td>173.124</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Dangerous when wet material</td>
<td>173.124</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Oxidizer</td>
<td>173.127</td>
</tr>
</tbody>
</table>
§ 173.2a Classification of a material having more than one hazard.

(a) Classification of a material having more than one hazard. Except as provided in paragraph (c) of this section, a material not specifically listed in the §172.101 table that meets the definition of more than one hazard class or division as defined in this part, shall be classed according to the highest applicable hazard class of the following hazard classes, which are listed in descending order of hazard:

1. Class 7 (radioactive materials, other than limited quantities).
2. Division 2.3 (poisonous gases).
3. Division 2.1 (flammable gases).
4. Division 2.2 (nonflammable gases).
5. Division 6.1 (poisonous liquids), Packing Group I, poisonous-by-inhalation only.
6. A material that meets the definition of a pyrophoric material in §173.124(b)(1) of this subchapter (Division 4.2).
7. A material that meets the definition of a self-reactive material in §173.124(a)(2) of this subchapter (Division 4.1).
8. Class 3 (flammable liquids), Class 8 (corrosive materials), Division 4.1 (flammable solids), Division 4.2 (spontaneously combustible materials), Division 4.3 (dangerous when wet materials), Division 5.1 (oxidizers) or Division 6.1 (poisonous liquids or solids other than Packing Group I, poisonous-by-inhalation). The hazard class and packing group for a material meeting more than one of these hazards shall be determined using the precedence table in paragraph (b) of this section.
10. Class 9 (miscellaneous hazardous materials).

(b) Precedence of hazard table for Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1, and 6.1. The following table ranks those materials that meet the definition of Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1 and 6.1.

**Precedence of Hazard Table**

[Table not included in this text representation]
§ 173.3 49 CFR Ch. I (10-1-98 Edition)

PRECEDENCE OF HAZARD TABLE—Continued

[Hazard class and packing group]

| 4.2 | 4.3 | 5.1 | 5.1 | 5.1 | 5.1 | 6.1, I | 6.1, I oral | 6.1, I dermal | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 8, I | 8, II | 8, II | 8, III | 8, III |
|-----|-----|-----|-----|-----|-----|------|------------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 6.1, III | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | ........................ | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

1 There are at present no established criteria for determining Packing Groups for liquids in Division 5.1. For the time being, the degree of hazard is to be assessed by analogy with listed substances, allocating the substances to Packing Group I, great; II, medium; or III, minor danger.

2 Substances of Division 4.1 other than self-reactive substances.

3 Denotes an impossible combination.

4 For pesticides only, where a material has the hazards of Class 3, Packing Group III, and Division 6.1, Packing Group III, the primary hazard is Division 6.1, Packing Group III.

NOTE 1: The most stringent packing group assigned to a hazard of the material takes precedence over other packing groups; for example, a material meeting Class 3 PG II and Division 6.1 PG I (oral toxicity) is classified as Class 3 PG I.

NOTE 2: A material which meets the definition of Class 8 and has an inhalation toxicity by dusts and mists which meets criteria for Packing Group I specified in §173.133(a)(1) must be classed as Division 6.1 if the oral or dermal toxicity meets criteria for Packing Group I or II. If the oral or dermal toxicity meets criteria for Packing Group III or less, the material must be classed as Class 8.

(c) The following materials are not subject to the provisions of paragraph (a) of this section because of their unique properties:

(1) A Class 1 (explosive) material that meets any other hazard class or division as defined in this part shall be assigned a division in Class 1. Class 1 materials shall be classed and approved in accordance with §173.56 of this part;

(2) A Division 5.2 (organic peroxide) material that meets the definition of any other hazard class or division as defined in this part, shall be classed as Division 5.2;

(3) A Division 6.2 (infectious substance) material that also meets the definition of another hazard class or division, other than Class 7, or that also is a limited quantity Class 7 material, shall be classed as Division 6.2;

(4) A material that meets the definition of a wetted explosive in §173.124(a)(1) of this subchapter (Division 4.1). Wetted explosives are either specifically listed in the §172.101 table or are approved by the Associate Administrator for Hazardous Materials Safety (see §173.124(a)(1) of this subchapter); and

(5) A limited quantity of a Class 7 (radioactive) material that meets the definition for more than one hazard class or division shall be classed in accordance with §173.423.


§ 173.3 Packaging and exceptions.

(a) The packaging of hazardous materials for transportation by air, highway, rail, or water must be as specified in this part. Methods of manufacture, packing, and storage of hazardous materials, that affect safety in transportation, must be open to inspection by a duly authorized representative of the initial carrier or of the Department. Methods of manufacture and related functions necessary for completion of a DOT specification or U.N. standard packaging must be open to inspection by a representative of the Department.

(b) The regulations setting forth packaging requirements for a specific material apply to all modes of transportation unless otherwise stated, or unless exceptions from packaging requirements are authorized.

(c) Salvage drums. Packages of hazardous materials that are damaged, defective, or found leaking and hazardous materials that have spilled or leaked may be placed in a metal or plastic removable head salvage drum that is compatible with the lading and shipped for repackaging or disposal under the following conditions:

(1) Except as provided in paragraph (c)(7) of this section, the drum must be a UN 1A2, 1B2, 1N2 or 1H2 tested and marked for Packing Group III or higher performance standards for liquids or solids and a leakproofness test of 20