

Formula for metric units

$$e_1 = (12.74e_0) / (Rm_1 A_1)^{1/3}$$

Formula for non-metric units

$$e_1 = (144.2e_0) / (Rm_1 A_1)^{1/3}$$

where:

e_0 = Required thickness of the reference stainless steel in mm or inches respectively;

e_1 = Equivalent thickness of the steel used in mm or inches respectively;

Rm_1 = Specified minimum tensile strength of the steel used in deka-newtons per square millimeter or pounds per square inch respectively; and

A_1 = Specified minimum percentage elongation of the steel used multiplied by 100 (for example, 20 percent times 100 equals 20). Elongation values used must be determined from a 50 mm or 2 inch test specimen.

(c) Air pressure in excess of ambient atmospheric pressure may not be used to load or unload any lading which may create an air-enriched mixture within the flammability range of the lading in the vapor space of the tank.

(d) A bulk packaging may not be loaded with a hazardous material that:

(1) Is at a temperature outside of the packaging's design temperature range; or

(2) Except as otherwise provided in this subchapter, exceeds the maximum weight of lading marked on the specification plate.

(e) *UN portable tanks.* (1) A UN portable tank manufactured in the United States must conform in all details to the applicable requirements in parts 172, 173, 178 and 180 of this subchapter.

(2) *UN portable tanks manufactured outside the United States.* A UN portable tank manufactured outside the United States, in accordance with national or international regulations based on the UN Recommendations on the Transport of Dangerous Goods which is an authorized packaging under §173.24 of this subchapter, may be filled, offered and transported in the United States, if the §172.101 Table of this subchapter authorizes the hazardous material for transportation in the UN portable tank and it conforms to the applicable T codes, and tank provision codes, or other special provisions assigned to the hazardous material in Column (7) of the Table when manufactured in a

country other than the United States. In addition, the portable tank must be—

(i) Conform to applicable provisions in the UN Recommendations on the Transport of Dangerous Goods (see §171.7 of this subchapter) and the requirements of this subpart;

(ii) Be capable of passing the prescribed tests and inspections in part 180 of this subchapter applicable to the UN portable tank specification;

(iii) Be designed and manufactured according to the ASME Code (see §171.7 of this subchapter) or a pressure vessel design code approved by the Associate Administrator;

(iv) Be approved by the Associate Administrator when the portable tank is designed and constructed under the provisions of an alternative arrangement (see §178.274(a)(2) of this subchapter); and

(v) The competent authority of the country of manufacture must provide reciprocal treatment for UN portable tanks manufactured in the United States.

[Amdt. 173-224, 55 FR 52612, Dec. 21, 1990, as amended at 56 FR 66266, Dec. 20, 1991; Amdt. 173-234, 58 FR 51532, Oct. 1, 1993; Amdt. 173-243, 60 FR 40038, Aug. 4, 1995; Amdt. 173-252, 61 FR 28676, June 5, 1996; Amdt. 173-255, 61 FR 50624, Sept. 26, 1996; 66 FR 33426, June 21, 2001]

§ 173.25 Authorized packagings and overpacks.

(a) Authorized packages containing hazardous materials may be offered for transportation in an overpack as defined in §171.8 of this subchapter, if all of the following conditions are met:

(1) The package meets the requirements of §§173.21 and 173.24 of this subchapter.

(2) The overpack is marked with the proper shipping name and identification number, and labeled as required by this subchapter for each hazardous material contained therein unless markings and labels representative of each hazardous material in the overpack are visible.

(3) Each package subject to the orientation marking requirements of §172.312 of this subchapter is packed in the overpack with its filling holes up and the overpack is marked with package orientation marking arrows on two

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opposite vertical sides of the overpack with the arrows pointing in the correct direction of orientation.

(4) The overpack is marked with a statement indicating that the inside (inner) packages comply with prescribed specifications when specification packagings are required, unless specification markings on the inside packages are visible.

(5) Packages containing Class 8 (corrosive) materials in Packing Group I or Division 5.1 (oxidizing) materials in Packing Group I may not be overpacked with any other materials.

(b) Shrink-wrapped or stretch-wrapped trays may be used as outer packagings for inner packagings prepared in accordance with the limited quantity provisions or consumer commodity provisions of this subchapter, provided that—

(1) Inner packagings are not fragile, liable to break or be easily punctured, such as those made of glass, porcelain, stoneware or certain plastics; and

(2) Each complete package does not exceed 20 kg (44 lbs) gross weight.

(c) Hazardous materials which are required to be labeled POISON may be transported in the same motor vehicle with material that is marked or known to be foodstuffs, feed or any edible material intended for consumption by humans or animals provided the hazardous material is marked, labeled, and packaged in accordance with this subchapter, conforms to the requirements of paragraph (a) of this section and is overpacked as specified in §177.841(e) of this subchapter or in an overpack which is a UN 1A2, 1B2, or 1N2 drum tested and marked for a Packing Group II or higher performance level.

[Amdt. 173-165, 48 FR 28099, June 20, 1983, as amended by Amdt. 173-224, 55 FR 52612 Dec. 21, 1990; 56 FR 66266, Dec. 20, 1991; Amdt. 173-234, 58 FR 51532, Oct. 1, 1993; Amdt. 173-214, 59 FR 67491, Dec. 29, 1994; 64 FR 10776, Mar. 5, 1999]

§ 173.26 Quantity limitations.

When quantity limitations do not appear in the packaging requirements of this subchapter, the permitted gross weight or capacity authorized for a packaging is as shown in the packaging

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specification or standard in part 178 or 179, as applicable, of this subchapter.

[Amdt. 173-224, 55 FR 52612, Dec. 21, 1990]

§ 173.27 General requirements for transportation by aircraft.

(a) The requirements of this section are in addition to the requirements in §173.24 and apply to packages offered or intended for transportation aboard aircraft. Notwithstanding any Packing Group III performance level specified in Column 5 of the §172.101 table, the required performance level for packages containing Class 4, 5, or 8 materials, when offered or intended for transportation aboard aircraft, is at the Packing Group II performance level, unless otherwise excepted from performance requirements in subpart E of this part.

(b) Packages authorized on board aircraft. (1) When Column 9a of the §172.101 table indicates that a material is “Forbidden”, that material may not be offered for transportation or transported aboard passenger-carrying aircraft.

(2) When Column 9b of the §172.101 table indicates that a material is “Forbidden”, that material may not be offered for transportation or transported aboard aircraft.

(3) The maximum quantity of hazardous material in a package that may be offered for transportation or transported aboard a passenger-carrying aircraft or cargo aircraft may not exceed that quantity prescribed for the material in Column 9a or 9b, respectively, of the §172.101 table.

(4) A package containing a hazardous material which is authorized aboard cargo aircraft but not aboard passenger aircraft must be labeled with the CARGO AIRCRAFT ONLY label required by §172.402(c) of this subchapter and may not be offered for transportation or transported aboard passenger-carrying aircraft.

(c) Pressure requirements. (1) Packagings must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during transportation aboard aircraft.