

TABLE 1—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON PASSENGER-CARRYING AIRCRAFT

Maximum net quantity per package from Column 9a of the § 172.101 table	Maximum authorized net capacity of each inner packaging	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 0.5L	0.5L	0.5L.
Greater than 0.5L, not greater than 1L	0.5L	1L.
Greater than 1L, not greater than 5L	1L	5L.
Greater than 5L, not greater than 60L	2.5L	10L.
Greater than 60L, not greater than 220L	5L	25L.
Greater than 220L	No limit	No limit.
Solids:		
Not greater than 5 kg	0.5 kg	1 kg.
Greater than 5 kg, not greater than 25 kg	1 kg	2.5 kg.
Greater than 25 kg, not greater than 200 kg	5 kg	10 kg.
Greater than 200 kg	No limit	No limit.

TABLE 2—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON CARGO AIRCRAFT

Maximum net quantity per package from Column 9b of the § 172.101 table	Maximum authorized net capacity of each inner packaging	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 2.5L	1L	1L.
Greater than 2.5L, not greater than 30L	2.5L	2.5L.
Greater than 30L, not greater than 60L	5L	10L.
Greater than 60L, not greater than 220L	5L	25L.
Greater than 220L	No limit	No limit.
Solids:		
Not greater than 15 kg	1 kg	2.5 kg.
Greater than 15 kg, not greater than 50 kg	2.5 kg	5 kg.
Greater than 50 kg, not greater than 200 kg	5 kg	10 kg.
Greater than 200 kg	No limit	No limit.

(g) Cylinders. For any cylinder containing hazardous materials and incorporating valves, sufficient protection must be provided to prevent operation of, and damage to, the valves during transportation, by one of the following methods:

(1) By equipping each cylinder with securely attached valve caps or protective headrings; or

(2) By boxing or crating the cylinder.

(h) Tank cars and cargo tanks. Any tank car or cargo tank containing a hazardous material may not be transported aboard aircraft.

[Amdt. 173-224, 55 FR 52612, Dec. 21, 1990, as amended at 56 FR 66266, Dec. 20, 1991; Amdt. 173-138, 59 FR 49133, Sept. 26, 1994; 65 FR 58629, Sept. 29, 2000; 66 FR 45380, Aug. 28, 2001]

§ 173.28 Reuse, reconditioning and re-manufacture of packagings.

(a) *General.* Packagings and receptacles used more than once must be in such condition, including closure devices and cushioning materials, that they conform in all respects to the prescribed requirements of this subchapter. Before reuse, each packaging must be inspected and may not be reused unless free from incompatible residue, rupture, or other damage which reduces its structural integrity.

(b) *Reuse of non-bulk packaging.* A non-bulk packaging used more than once must conform to the following provisions and limitations:

(1) A non-bulk packaging which, upon inspection, shows evidence of a reduction in integrity may not be reused unless it is reconditioned in accordance with paragraph (c) of this section.

(2) Before reuse, packagings subject to the leakproofness test with air prescribed in §178.604 of this subchapter shall be—

(i) Retested without failure in accordance with §178.604 of this subchapter using an internal air pressure (gauge) of at least 48 kPa (7.0 psig) for Packing Group I and 20 kPa (3.0 psig) for Packing Group II and Packing Group III; and

(ii) 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. Symbols, if used, must be registered with the Associate Administrator.

(3) Packagings made of paper, plastic film, or textile are not authorized for reuse;

(4) Metal and plastic drums and jerricans used as single packagings or the outer packagings of composite packagings are authorized for reuse only when they are marked in a permanent manner (e.g., embossed) in mm with the nominal (for metal packagings) or minimum (for plastic packagings) thickness of the packaging material, as required by §178.503(a)(9) of this subchapter, and—

(i) Except as provided in paragraph (b)(4)(ii) of this section, conform to the following minimum thickness criteria:

Maximum capacity not over	Minimum thickness of packaging material	
	Metal drum or jerrican	Plastic drum or jerrican
20 L	0.63 mm (0.025 inch)	1.1 mm (0.043 inch).
30 L	0.73 mm (0.029 inch)	1.1 mm (0.043 inch).
40 L	0.73 mm (0.029 inch)	1.8 mm (0.071 inch).
60 L	0.92 mm (0.036 inch)	1.8 mm (0.071 inch).
120 L	0.92 mm (0.036 inch)	2.2 mm (0.087 inch).
220 L	0.92 mm (0.036 inch) ¹ .	2.2 mm (0.087 inch).
450 L	1.77 mm (0.070 inch)	5.0 mm (0.197 inch).

¹Metal drums or jerricans with a minimum thickness of 0.82 mm body and 1.09 mm heads which are manufactured and marked prior to January 1, 1997 may be reused. Metal drums or jerricans manufactured and marked on or after January 1, 1997, and intended for reuse, must be constructed with a

minimum thickness of 0.82 mm body and 1.11 mm heads.

(ii) For stainless steel drums and jerricans, conform to a minimum wall thickness as determined by the following equivalence formula:

Formula for Metric Units

$$e_1 = \frac{21.4 \times e_0}{\sqrt[3]{Rm_1 \times A_1}}$$

Formula for U.S. Standard Units

$$e_1 = \frac{21.4 \times e_0}{\sqrt[3]{(Rm_1 \times A_1)/145}}$$

where:

e_1 = required equivalent wall thickness of the metal to be used (in mm or, for U.S. Standard units, use inches).

e_0 = required minimum wall thickness for the reference steel (in mm or, for U.S. Standard units, use inches).

Rm_1 = guaranteed minimum tensile strength of the metal to be used (in N/mm² or for U.S. Standard units, use psi).

A_1 = guaranteed minimum elongation (as a percentage) of the metal to be used on fracture under tensile stress (see paragraph (c)(1) of this section).

(5) Plastic inner receptacles of composite packagings must have a minimum thickness of 1.0 mm (0.039 inch).

(6) A previously used non-bulk packaging may be reused for the shipment of hazardous waste, not subject to the reconditioning and reuse provisions of this section, in accordance with §173.12(c).

(7) Notwithstanding the provisions of paragraph (b)(2) of this section, a packaging otherwise authorized for reuse may be reused without being leakproofness tested with air provided the packaging—

(i) Is refilled with a material which is compatible with the previous lading;

(ii) Is refilled and offered for transportation by the original filler;

(iii) Is transported in a transport vehicle or freight container under the exclusive use of the refiller of the packaging; and

(iv) Is constructed of—

(A) Stainless steel, monel or nickel with a thickness not less than one and one-half times the minimum thickness

prescribed in paragraph (b)(4) of this section;

(B) Plastic, provided the packaging is not refilled for reuse on a date more than five years from the date of manufacture marked on the packaging in accordance with §178.503(a)(6) of this subchapter; or

(C) Another material or thickness when approved under the conditions established by the Associate Administrator for reuse without retesting.

(c) *Reconditioning of non-bulk packaging.* (1) For the purpose of this subchapter, reconditioning of metal drums is:

(i) Cleaning to base material of construction, with all former contents, internal and external corrosion, and any external coatings and labels removed;

(ii) Restoring to original shape and contour, with chimes (if any) straightened and sealed, and all non-integral gaskets replaced; and

(iii) Inspecting after cleaning but before painting. Packagings that have visible pitting, significant reduction in material thickness, metal fatigue, damaged threads or closures, or other significant defects, must be rejected.

(2) For the purpose of this subchapter, reconditioning of a non-bulk packaging other than a metal drum or a UN 1H1 plastic drum includes:

(i) Removal of all former contents, external coatings and labels, and cleaning to the original materials of construction;

(ii) Inspection after cleaning with rejection of packagings with visible damage such as tears, creases or cracks, or damaged threads or closures, or other significant defects;

(iii) Replacement of all non-integral gaskets and closure devices with new or refurbished parts, and cushioning and cushioning materials; and components including gaskets, closure devices and cushioning and cushioning material. (For a UN 1H1 plastic drum, replacing a removable gasket or closure device with another of the same design and material that provides equivalent performance does not constitute reconditioning); and

(iv) Ensuring that the packagings are restored to a condition that conforms

in all respects with the prescribed requirements of this subchapter.

(3) A person who reconditions a packaging manufactured and marked under the provisions of subpart L of part 178 of this subchapter, shall mark that packaging as required by §178.503(c) and (d) of this subchapter. The marking is the certification of the reconditioner that the packaging conforms to the standard for which it is marked and that all functions performed by the reconditioner which are prescribed by this subchapter have been performed in compliance with this subchapter.

(4) The markings applied by the reconditioner may be different from those applied by the manufacturer at the time of original manufacture, but may not identify a greater performance capability than that for which the original design type had been tested (for example, the reconditioner may mark a drum which was originally marked as 1A1/Y1.8 as 1A1/Y1.2 or 1A1/Z2.0).

(5) Packagings which have significant defects which cannot be repaired may not be reused.

(d) *Remanufacture of non-bulk packagings.* For the purpose of this subchapter, remanufacture is the conversion of a non-specification, non-bulk packaging to a DOT specification or U.N. standard, the conversion of a packaging meeting one specification or standard to another specification or standard (for example, conversion of 1A1 non-removable head drums to 1A2 removable head drums) or the replacement of integral structural packaging components (such as non-removable heads on drums). A person who remanufactures a non-bulk packaging to conform to a specification or standard in part 178 of this subchapter is subject to the requirements of part 178 of this subchapter as a manufacturer.

(e) *Non-reusable containers.* A packaging marked as NRC according to the DOT specification or UN standard requirements of part 178 of this subchapter may be reused for the shipment of any material not required by this subchapter to be shipped in a DOT

specification or UN standard packaging.

[Amdt. 173-224, 55 FR 52614, Dec. 21, 1990, as amended at 56 FR 66266, Dec. 20, 1991; 57 FR 45460, Oct. 1, 1992; Amdt. 173-241, 59 FR 67491, 67492, Dec. 29, 1994; 60 FR 7627, Feb. 8, 1995; Amdt. 173-241, 60 FR 26805, 26806, May 18, 1995; Amdt. 173-255, 61 FR 50624, 50265, Sept. 26, 1996; 61 FR 51495, Oct. 2, 1996; Amdt. 173-254, 62 FR 14338, Mar. 26, 1997; 64 FR 10776, Mar. 5, 1999; 64 FR 44428, Aug. 16, 1999; 66 FR 45183, 45379, 45380, Aug. 28, 2001]

§ 173.29 Empty packagings.

(a) General. Except as otherwise provided in this section, an empty packaging containing only the residue of a hazardous material shall be offered for transportation and transported in the same manner as when it previously contained a greater quantity of that hazardous material.

(b) Notwithstanding the requirements of paragraph (a) of this section, an empty packaging is not subject to any other requirements of this subchapter if it conforms to the following provisions:

(1) Any hazardous material shipping name and identification number markings, any hazard warning labels or placards, and any other markings indicating that the material is hazardous (e.g., RQ, INHALATION HAZARD) are removed, obliterated, or securely covered in transportation. This provision does not apply to transportation in a transport vehicle or a freight container if the packaging is not visible in transportation and the packaging is loaded by the shipper and unloaded by the shipper or consignee;

(2) The packaging—

(i) Is unused;

(ii) Is sufficiently cleaned of residue and purged of vapors to remove any potential hazard;

(iii) Is refilled with a material which is not hazardous to such an extent that any residue remaining in the packaging no longer poses a hazard; or

(iv) Contains only the residue of—

(A) An ORM-D material; or

(B) A Division 2.2 non-flammable gas, other than ammonia, anhydrous, and with no subsidiary hazard, at an absolute pressure less than 280 kPa (40.6 psia); at 20 °C (68 °F); and

(3) Any material contained in the packaging does not meet the defini-

tions in §171.8 of this subchapter for a hazardous substance, a hazardous waste, or a marine pollutant.

(c) A non-bulk packaging containing only the residue of a hazardous material covered by table 2 of §172.504 of this subchapter—

(1) Does not have to be included in determining the applicability of the placarding requirements of subpart F of part 172 of this subchapter; and

(2) Is not subject to the shipping paper requirements of this subchapter when collected and transported by a contract or private carrier for reconditioning, remanufacture or reuse.

(d) Notwithstanding the stowage requirements in Column 10a of the §172.101 table for transportation by vessel, an empty drum or cylinder may be stowed on deck or under deck.

(e) Specific provisions for describing an empty packaging on a shipping paper appear in §172.203(e) of this subchapter.

(f) [Reserved]

(g) A package which contains a residue of an elevated temperature material may remain marked in the same manner as when it contained a greater quantity of the material even though it no longer meets the definition in §171.8 of this subchapter for an elevated temperature material.

[Amdt. 173-224, 55 FR 52614, Dec. 21, 1990, as amended by Amdt. 173-227, 56 FR 49989, Oct. 2, 1991; Amdt. 173-231, 57 FR 52939, Nov. 5, 1992; Amdt. 173-251, 61 FR 28676, June 5, 1996; Amdt. 173-260, 62 FR 1236, Jan. 8, 1997; 64 FR 10776, Mar. 5, 1999]

§ 173.30 Loading and unloading of transport vehicles.

A person who loads or unloads hazardous materials into or from a transport vehicle or vessel shall comply with the applicable loading and unloading requirements of parts 174, 175, 176, and 177 of this subchapter.

[Amdt. 173-94, 41 FR 16064, Apr. 15, 1976]

§ 173.31 Use of tank cars.

(a) General. (1) No person may offer a hazardous material for transportation in a tank car unless the tank car meets the applicable specification and packaging requirements of this subchapter or, when this subchapter authorizes the use of a non-DOT specification tank