(b) *Additional marking*. In addition to markings required in paragraph (a) of this section, each IBC must be marked as follows in a place near the markings required in paragraph (a) of this section that is readily accessible for inspection. Where units of measure are used, the metric unit indicated (e.g., 450 L) must also appear.

(1) For each rigid plastic and composite IBC, the following markings must be included:

(i) Rated capacity in L of water at 20 °C (68 °F);

(ii) Tare mass in kilograms;

(iii) Gauge test pressure in kPa;

(iv) Date of last leakproofness test, if applicable (month and year); and

(v) Date of last inspection (month and year).

(2) For each metal IBC, the following markings must be included on a metal corrosion-resistant plate:

(i) Rated capacity in L of water at 20 °C (68 °F);

(ii) Tare mass in kilograms;

(iii) Date of last leakproofness test, if applicable (month and year);

(iv) Date of last inspection (month and year);

(v) Maximum loading/discharge pressure, in kPa, if applicable;

(vi) Body material and its minimum thickness in mm; and

(vii) Serial number assigned by the manufacturer.

(3) Markings required by paragraph (b)(1) or (b)(2) of this section may be preceded by the narrative description of the marking, e.g. ''Tare Mass: * * *'' where the ''* * *'' are replaced with the tare mass in kilograms of the IBC.

(4) For each fiberboard and wooden IBC, the tare mass in kg must be shown.

(5) Each flexible IBC may be marked with a pictogram displaying recommended lifting methods.

(6) For each composite IBC, the inner receptacle must be marked with at least the following information:

(i) The code number designating the IBC design type, the name and address or symbol of the manufacturer, the date of manufacture and the country authorizing the allocation of the mark as specified in paragraph (a) of this section;

(ii) When a composite IBC is designed in such a manner that the outer casing is intended to be dismantled for transport when empty (such as, for the return of the IBC for reuse to the original consignor), each of the parts intended to be detached when so dismantled must be marked with the month and year of manufacture and the name or symbol of the manufacturer.

[Amdt. 178–103, 59 FR 38068, July 26, 1994, as amended by Amdt. 178–119, 62 FR 24743, May 6, 1997; 64 FR 10782, Mar. 5, 1999; 65 FR 50462, Aug. 18, 2000; 65 FR 58632, Sept. 29, 2000; 66 FR 33451, June 21, 2001; 66 FR 45387, Aug. 28, 2001]

§ 178.704 General IBC standards.

(a) Each IBC must be resistant to, or protected from, deterioration due to exposure to the external environment. IBCs intended for solid hazardous materials must be sift-proof and water-resistant.

(b) All service equipment must be so positioned or protected as to minimize potential loss of contents resulting from damage during IBC handling and transportation.

(c) Each IBC, including attachments, and service and structural equipment, must be designed to withstand, without loss of hazardous materials, the internal pressure of the contents and the stresses of normal handling and transport. An IBC intended for stacking must be designed for stacking. Any lifting or securing features of an IBC must be of sufficient strength to withstand the normal conditions of handling and transportation without gross distortion or failure and must be positioned so as to cause no undue stress in any part of the IBC.

(d) An IBC consisting of a packaging within a framework must be so constructed that:

(1) The body is not damaged by the framework;

(2) The body is retained within the framework at all times; and

(3) The service and structural equipment are fixed in such a way that they cannot be damaged if the connections between body and frame allow relative expansion or movement.

(e) Bottom discharge valves must be secured in the closed position and the discharge system suitably protected

from damage. Valves having lever closures must be secured against accidental opening. The open or closed position of each valve must be readily apparent. For each IBC containing a liquid, a secondary means of sealing the discharge aperture must also be provided, e.g., by a blank flange or equivalent device.

(f) IBC design types must be constructed in such a way as to be bottom-lifted or top-lifted as specified in §§ 178.811 and 178.812.

[Amdt. 178–103, 59 FR 38068, July 26, 1994, as amended at 66 FR 45386, Aug. 28, 2001]

§ 178.705 Standards for metal IBCs.

(a) The provisions in this section apply to metal IBCs intended to contain liquids and solids. Metal IBC types are designated:

(1) 11A, 11B, 11N for solids that are loaded or discharged by gravity.

(2) 21A, 21B, 21N for solids that are loaded or discharged at a gauge pressure greater than 10 kPa (1.45 psig).

(3) 31A, 31B, 31N for liquids or solids.

(b) Definitions for metal IBCs:

(1) *Metal IBC* means an IBC with a metal body, together with appropriate service and structural equipment.

(2) *Protected* means providing the IBC body with additional external protection against impact and abrasion. For example, a multi-layer (sandwich) or double wall construction or a frame with a metal lattice-work casing.

(c) Construction requirements for metal IBCs are as follows:

(1) *Body*. The body must be made of ductile metal materials. Welds must be made so as to maintain design type integrity of the receptacle under conditions normally incident to transportation.

(i) The use of dissimilar metals must not result in deterioration that could affect the integrity of the body.

(ii) Aluminum IBCs intended to contain flammable liquids must have no movable parts, such as covers and closures, made of unprotected steel liable to rust, which might cause a dangerous reaction from friction or percussive contact with the aluminum.

(iii) Metals used in fabricating the body of a metal IBC must meet the following requirements:

(A) For steel, the percentage elongation at fracture must not be less than 10,000/Rm with a minimum of 20 percent; where Rm = minimum tensile strength of the steel to be used, in N/mm^2; if U.S. Standard units of psi are used for tensile strength then the ratio becomes 10,000 × (145/Rm).

(B) For aluminum, the percentage elongation at fracture must not be less than 10,000/(6Rm) with an absolute minimum of eight percent; if U.S. Standard units of psi are used for tensile strength then the ratio becomes 10,000 × 145 / (6Rm).

(C) Specimens used to determine the elongation at fracture must be taken transversely to the direction of rolling and be so secured that:

$$Lo = 5d$$

or

$$Lo = 5.65 \sqrt{A}$$

where:

Lo = gauge length of the specimen before the test
d = diameter
A = cross-sectional area of test specimen.

(iv) Minimum wall thickness:

(A) For a reference steel having a product of Rm X Ao = 10,000, where Ao is the minimum elongation (as a percentage) of the reference steel to be used on fracture under tensile stress, (Rm X Ao = 10,000 X 145; if tensile strength is in U.S. Standard units of pounds per square inch) the wall thickness must not be less than:

Capacity (C) in liters[1]	Wall thickness (T) in mm			
	Types 11A, 11B, 11N	Types 21A, 21B, 21N, 31A, 31B, 31N		
		Unprotected	Protected	Unprotected
C ≤ 1000	2.0	1.5	2.5	2.0
1000 < C ≤ 2000	T=C/2000 + 1.5	T=C/2000 + 1.0	T=C/2000 + 2.0	T=C/2000 + 1.5
2000 < C ≤ 3000	T=C/2000 + 1.5	T=C/2000 + 1.0	T=C/1000 + 1.0	T=C/2000 + 1.5

[1] Where: gallons = liters X 0.264.