

Chapter 6.6

Requirements for the construction and testing of large packagings

6.6.1 General

6.6.1.1 The requirements of this Chapter do not apply to:

- packagings for Class 2, except large packagings for articles, including aerosols;
- packagings for Class 6.2, except large packagings for clinical waste of UN No. 3291;
- Class 7 packages containing radioactive material.

6.6.1.2 Large packagings shall be manufactured, tested and remanufactured under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured or remanufactured large packaging meets the requirements of this Chapter.

NOTE: ISO 16106:2006 "Packaging – Transport packages for dangerous goods – Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings – Guidelines for the application of ISO 9001" provides acceptable guidance on procedures which may be followed.

6.6.1.3 The specific requirements for large packagings in 6.6.4 are based on large packagings currently used. In order to take into account progress in science and technology, there is no objection to the use of large packagings having specifications different from those in 6.6.4 provided they are equally effective, acceptable to the competent authority and able successfully to withstand the tests described in 6.6.5. Methods of testing other than those described in RID are acceptable provided they are equivalent and are recognized by the competent authority.

6.6.1.4 Manufacturers and subsequent distributors of packagings shall provide information regarding procedures to be followed and a description of the types and dimensions of closures (including required gaskets) and any other components needed to ensure that packages as presented for carriage are capable of passing the applicable performance tests of this Chapter.

6.6.2 Code for designating types of large packagings

6.6.2.1 The code used for large packagings consist of:

(a) Two Arabic numerals:

50 for rigid large packagings; or


51 for flexible large packagings; and

(b) A capital letter in Latin character indicating the nature of the material, e.g. wood, steel etc. The capital letters used shall be those shown in 6.1.2.6.

6.6.2.2 The letter "W" may follow the Large Packaging code. The letter "W" signifies that the large packaging, although of the same type indicated by the code, is manufactured to a specification different from those in 6.6.4 and is considered equivalent in accordance with the requirements in 6.6.1.3.

6.6.3 Marking

6.6.3.1 **Primary marking:** Each large packaging manufactured and intended for use in accordance with the provisions of RID shall bear durable and legible markings showing:

(a) The United Nations packaging symbol . This symbol shall not be used for any purpose other than certifying that a packaging, a portable tank or a MEGC complies with the relevant requirements in Chapter 6.1, 6.2, 6.3, 6.5, 6.6 or 6.7. For metal large packagings on which the marking is stamped or embossed, the capital letters "UN" may be applied instead of the symbol;

(b) The number "50" designating a large rigid packaging or "51" for flexible large packagings, followed by the material type in accordance with 6.5.1.4.1 (b);

(c) A capital letter designating the packing group(s) for which the design type has been approved:

X for packing groups I, II and III

Y for packing groups II and III

Z for packing group III only;

(d) The month and year (last two digits) of manufacture;

(e) The State authorizing the allocation of the mark; indicated by the distinguishing sign for motor vehicles in international traffic¹;

¹ Distinguishing sign for motor vehicles in international traffic prescribed in the Vienna Convention on Road Traffic (1968).

- (f) The name or symbol of the manufacturer and other identification of the large packagings as specified by the competent authority;
- (g) The stacking test load in kg. For large packagings not designed for stacking the figure "0" shall be shown;
- (h) The maximum permissible gross mass in kilograms.

The primary marking required above shall be applied in the sequence of the sub-paragraphs.

Each element of the marking applied in accordance with (a) to (h) shall be clearly separated, e.g. by a slash or space, so as to be easily identifiable.

6.6.3.2 Examples of the marking:

	50A/X/0501/N/PQRS 2500/1000	For a large steel packaging suitable for stacking; stacking load: 2500 kg; maximum gross mass: 1000 kg
	50H/Y/0402/D/ABCD 987 0/800	For a large plastics packaging not suitable for stacking; maximum gross mass: 800 kg
	51H/Z/0601/S/1999 0/500	For a large flexible packaging not suitable for stacking; maximum gross mass: 500 kg

6.6.4 Specific requirements for large packagings

6.6.4.1 Specific requirements for metal large packagings

- 50A steel
- 50B aluminium
- 50N metal (other than steel or aluminium)

6.6.4.1.1 The large packaging shall be made of suitable ductile metal in which the weldability has been fully demonstrated. Welds shall be skilfully made and afford complete safety. Low-temperature performance shall be taken into account when appropriate.

6.6.4.1.2 Care shall be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.

6.6.4.2 Specific requirements for flexible material large packagings

- 51H flexible plastics
- 51M flexible paper

6.6.4.2.1 The large packaging shall be manufactured from suitable materials. The strength of the material and the construction of the flexible large packagings shall be appropriate to its capacity and its intended use.

6.6.4.2.2 All materials used in the construction of flexible large packagings of types 51M shall, after complete immersion in water for not less than 24 hours, retain at least 85% of the tensile strength as measured originally on the material conditioned to equilibrium at 67% relative humidity or less.

6.6.4.2.3 Seams shall be formed by stitching, heat sealing, glueing or any equivalent method. All stitched seam-ends shall be secured.

6.6.4.2.4 Flexible large packagings shall provide adequate resistance to ageing and to degradation caused by ultraviolet radiation or the climatic conditions, or by the substance contained, thereby rendering them appropriate to their intended use.

6.6.4.2.5 For plastics flexible large packagings where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the large packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.6.4.2.6 Additives may be incorporated into the material of the large packaging to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.6.4.2.7 When filled, the ratio of height to width shall be not more than 2:1.

6.6.4.3 Specific requirements for plastics large packagings

50H rigid plastics

6.6.4.3.1 The large packaging shall be manufactured from suitable plastics material of known specifications and be of adequate strength in relation to its capacity and its intended use. The material shall be adequately resistant to ageing and to degradation caused by the substance contained or, where relevant, by ultraviolet radiation. Low temperature performance shall be taken into account when appropriate. Any permeation of the substance contained shall not constitute a danger under normal conditions of carriage.

6.6.4.3.2 Where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the outer packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, re-testing may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

6.6.4.3.3 Additives may be incorporated in the material of the large packaging to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

6.6.4.4 Specific requirements for fibreboard large packagings

50G rigid fibreboard

6.6.4.4.1 Strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used, appropriate to the capacity of the large packagings and to their intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m² – see ISO 535:1991. It shall have proper bending qualities. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting or corrugated fibreboard shall be firmly glued to the facings.

6.6.4.4.2 The walls, including top and bottom, shall have a minimum puncture resistance of 15 J measured according to ISO 3036:1975.

6.6.4.4.3 Manufacturing joints in the outer packaging of large packagings shall be made with an appropriate overlap and shall be taped, glued, stitched with metal staples or fastened by other means at least equally effective. Where joints are effected by gluing or taping, a water resistant adhesive shall be used. Metal staples shall pass completely through all pieces to be fastened and be formed or protected so that any inner liner cannot be abraded or punctured by them.

6.6.4.4.4 Any integral pallet base forming part of a large packaging or any detachable pallet shall be suitable for mechanical handling with the large packaging filled to its maximum permissible gross mass.

6.6.4.4.5 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the large packaging that might be liable to damage in handling.

6.6.4.4.6 The body shall be secured to any detachable pallet to ensure stability in handling and carriage. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the large packaging.

6.6.4.4.7 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

6.6.4.4.8 Where large packagings are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

6.6.4.5 Specific requirements for wooden large packagings

50C natural wood

50D plywood

50F reconstituted wood

6.6.4.5.1 The strength of the materials used and the method of construction shall be appropriate to the capacity and intended use of the large packagings.

6.6.4.5.2 Natural wood shall be well seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the large packagings. Each part of the large packagings shall consist of one piece or be equivalent thereto. Parts are considered equivalent to one piece when a suitable method of glued assembly is used as for instance Lindermann joint, tongue and groove joint, ship lap or rabbet joint; or butt joint with at least two corrugated metal fasteners at each joint, or when other methods at least equally effective are used.

- 6.6.4.5.3 Large packagings of plywood shall be at least 3-ply. They shall be made of well seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the large packaging. All adjacent plies shall be glued with water resistant adhesive. Other suitable materials may be used with plywood for the construction of the large packaging.
- 6.6.4.5.4 Large packagings of reconstituted wood shall be made of water resistant reconstituted wood such as hard-board, particle board or other suitable type.
- 6.6.4.5.5 Large packagings shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.
- 6.6.4.5.6 Any integral pallet base forming part of a large packaging or any detachable pallet shall be suitable for mechanical handling with the large packaging filled to its maximum permissible gross mass.
- 6.6.4.5.7 The pallet or integral base shall be designed so as to avoid any protrusion of the base of the large packaging that might be liable to damage in handling.
- 6.6.4.5.8 The body shall be secured to any detachable pallet to ensure stability in handling and carriage. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the large packaging.
- 6.6.4.5.9 Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.
- 6.6.4.5.10 Where large packagings are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

6.6.5 Test requirements for large packagings

6.6.5.1 Performance and frequency of test

- 6.6.5.1.1 The design type of each large packaging shall be tested as provided in 6.6.5.3 in accordance with procedures established by the competent authority allowing the allocation of the mark and shall be approved by this competent authority.
- 6.6.5.1.2 Each large packaging design type shall successfully pass the tests prescribed in this Chapter before being used. A large packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes large packagings which differ from the design type only in their lesser design height.
- 6.6.5.1.3 Tests shall be repeated on production samples at intervals established by the competent authority. For such tests on fibreboard large packagings, preparation at ambient conditions is considered equivalent to the provisions of 6.6.5.2.4.
- 6.6.5.1.4 Tests shall also be repeated after each modification which alters the design, material or manner of construction of large packagings.
- 6.6.5.1.5 The competent authority may permit the selective testing of large packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and large packagings which are produced with small reductions in external dimension(s).
- 6.6.5.1.6 (Reserved)
NOTE: For the conditions for assembling different inner packagings in a large packaging and permissible variations in inner packagings, see 4.1.1.5.1.
- 6.6.5.1.7 The competent authority may at any time require proof, by tests in accordance with this section, that serially-produced large packagings meet the requirements of the design type tests.
- 6.6.5.1.8 Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one sample.

6.6.5.2 Preparation for testing

- 6.6.5.2.1 Tests shall be carried out on large packagings prepared as for carriage including the inner packagings or articles used. Inner packagings shall be filled to not less than 98% of their maximum capacity for liquids or 95% for solids. For large packagings where the inner packagings are designed to carry liquids and solids, separate testing is required for both liquid and solid contents. The substances in the inner packagings or the articles to be carried in the large packagings may be replaced by other material or articles except where this would invalidate the results of the tests. When other inner packagings or articles are used they shall have the same physical characteristics (mass, etc) as the inner packagings or articles to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected.

- 6.6.5.2.2** In the drop tests for liquids, when another substance is used, it shall be of similar relative density and viscosity to those of the substance being carried. Water may also be used for the liquid drop test under the conditions in 6.6.5.3.4.4.
- 6.6.5.2.3** Large packagings made of plastics materials and large packagings containing inner packagings of plastic materials - other than bags intended to contain solids or articles - shall be drop tested when the temperature of the test sample and its contents has been reduced to $-18\text{ }^{\circ}\text{C}$ or lower. This conditioning may be disregarded if the materials in question are of sufficient ductility and tensile strength at low temperatures. Where test sample are prepared in this way, the conditioning in 6.6.5.2.4 may be waived. Test liquids shall be kept in the liquid state by the addition of anti-freeze if necessary.
- 6.6.5.2.4** Large packagings of fibreboard shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h.). There are three options, one of which shall be chosen.
- The preferred atmosphere is $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $50\% \pm 2\%$ r.h. The two other options are: $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $65\% \pm 2\%$ r.h.; or $27\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $65\% \pm 2\%$ r.h.
- NOTE:** Average values shall fall within these limits. Short term fluctuations and measurement limitations may cause individual measurements to vary by up to $\pm 5\%$ relative humidity without significant impairment of test reproducibility.
- 6.6.5.3 Test requirements**
- 6.6.5.3.1 Bottom lift test**
- 6.6.5.3.1.1 Applicability**
- For all types of large packagings which are fitted with means of lifting from the base, as a design type test.
- 6.6.5.3.1.2 Preparation of large packaging for test**
- The large packaging shall be loaded to 1.25 times its maximum permissible gross mass, the load being evenly distributed.
- 6.6.5.3.1.3 Method of testing**
- The large packaging shall be raised and lowered twice by a lift truck with the forks centrally positioned and spaced at three quarters of the dimension of the side of entry (unless the points of entry are fixed). The forks shall penetrate to three quarters of the direction of entry. The test shall be repeated from each possible direction of entry.
- 6.6.5.3.1.4 Criteria for passing the test**
- No permanent deformation which renders the large packaging unsafe for carriage and no loss of contents.
- 6.6.5.3.2 Top lift test**
- 6.6.5.3.2.1 Applicability**
- For types of large packagings which are intended to be lifted from the top and fitted with means of lifting, as a design type test.
- 6.6.5.3.2.2 Preparation of large packaging for test**
- The large packaging shall be loaded to twice its maximum permissible gross mass. A flexible large packaging shall be loaded to six times its maximum permissible gross mass, the load being evenly distributed.
- 6.6.5.3.2.3 Method of testing**
- The large packaging shall be lifted in the manner for which it is designed until clear of the floor and maintained in that position for a period of five minutes.
- 6.6.5.3.2.4 Criteria for passing the test**
- (a) Metal and rigid plastics large packagings: no permanent deformation which renders the large packaging, including the base pallet, if any, unsafe for carriage and no loss of contents.
- (b) Flexible large packagings: no damage to the large packaging or its lifting devices which renders the large packaging unsafe for carriage or handling and no loss of contents.

6.6.5.3.3 Stacking test

6.6.5.3.3.1 Applicability

For all types of large packagings which are designed to be stacked on each other, as a design type test.

6.6.5.3.3.2 Preparation of large packaging for test

The large packaging shall be filled to its maximum permissible gross mass.

6.6.5.3.3.3 Method of testing

The large packaging shall be placed on its base on level hard ground and subjected to a uniformly distributed superimposed test load (see 6.6.5.3.3.4) for a period of at least five minutes, large packagings of wood, fibreboard and plastics materials for a period of 24 h.

6.6.5.3.3.4 Calculation of superimposed test load

The load to be placed on the large packagings shall be 1.8 times the combined maximum permissible gross mass of the number of similar large packagings that may be stacked on top of the large packagings during carriage.

6.6.5.3.3.5 Criteria for passing the test

- (a) All types of large packaging other than flexible large packagings: no permanent deformation which renders the large packaging including the base pallet, if any, unsafe for carriage and no loss of contents.
- (b) Flexible large packagings: no deterioration of the body which renders the large packaging unsafe for carriage and no loss of contents.

6.6.5.3.4 Drop test

6.6.5.3.4.1 Applicability

For all types of large packagings as a design type test.

6.6.5.3.4.2 Preparation of large packaging for testing

The large packaging shall be filled in accordance with 6.6.5.2.1

6.6.5.3.4.3 Method of testing

The large packaging shall be dropped onto a non resilient, horizontal, flat, massive and rigid surface in conformity with the requirements of 6.1.5.3.4, in such a manner as to ensure that the point of impact is that part of the base of the large packaging considered to be the most vulnerable.

6.6.5.3.4.4 Drop height

NOTE: Large packagings for substances and articles of Class 1 shall be tested at the packing group II performance level.

6.6.5.3.4.4.1 For inner packagings containing solid or liquid substances or articles, if the test is performed with the solid, liquid or articles to be carried, or with another substance or article having essentially the same characteristics:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

6.6.5.3.4.4.2 For inner packagings containing liquids if the test is performed with water:

(a) Where the substances to be carried have a relative density not exceeding 1.2:

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

(b) Where the substances to be carried have a relative density exceeding 1.2, the drop height shall be calculated on the basis of the relative density (d) of the substance to be carried, rounded up to the first decimal, as follows:

Packing group I	Packing group II	Packing group III
$d \times 1.5$ (m)	$d \times 1.0$ (m)	$d \times 0.67$ (m)

6.6.5.3.4.4 Drop height

NOTE: Large packagings for substances and articles of Class 1, self-reactive substances of Class 4.1 and organic peroxides of Class 5.2 shall be tested at the packing group II performance level.

6.6.5.3.4.5 Criteria for passing the test

6.6.5.3.4.5.1 The large packaging shall not exhibit any damage liable to affect safety during carriage. There shall be no leakage of the filling substance from inner packaging(s) or article(s).

6.6.5.3.4.5.2 No rupture is permitted in large packagings for articles of Class 1 which would permit the spillage of loose explosive substances or articles from the large packaging.

6.6.5.3.4.5.3 Where a large packaging undergoes a drop test, the sample passes the test if the entire contents are retained even if the closure is no longer sift-proof.

6.6.5.4 Certification and test report

6.6.5.4.1 In respect of each design type of large packaging a certificate and mark (as in 6.6.3) shall be issued attesting that the design type including its equipment meets the test requirements.

6.6.5.4.2 A test report containing at least the following particulars shall be drawn up and shall be made available to the users of the large packaging:

1. Name and address of the test facility;
2. Name and address of applicant (where appropriate);
3. A unique test report identification;
4. Date of the test report;
5. Manufacturer of the large packaging;
6. Description of the large packaging design type (e.g. dimensions, materials, closures, thickness, etc) and/or photograph(s);
7. Maximum capacity/maximum permissible gross mass;
8. Characteristics of test contents, e.g. types and descriptions of inner packagings or articles used;
9. Test descriptions and results;
10. The test report shall be signed with the name and status of the signatory.

6.6.5.4.3 The test report shall contain statements that the large packaging prepared as for carriage was tested in accordance with the appropriate provisions of this Chapter and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority.