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**Series 1 freight containers —  
Specification and testing —**

**Part 1:  
General cargo containers for general  
purposes**

*Conteneurs de la série 1 — Spécifications et essais —*

*Partie 1: Conteneurs d'usage général pour marchandises diverses*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. [www.iso.org/patents](http://www.iso.org/patents)

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is ISO/TC 104, *Freight containers*, SC 1, *General purpose containers*.

This sixth edition cancels and replaces the fifth edition (ISO 1496-1:1990), which has been technically revised. It also incorporates the Amendments ISO 1496-1:1990/Amd1:1993, ISO 1496-1:1990/Amd2:1998, ISO 1496-1:1990/Amd3:2005, ISO 1496-1:1990/Amd4:2006, ISO 1496-1:1990/Amd5:2006.

ISO 1496 consists of the following parts, under the general title *Series 1 freight containers — Specification and testing*:

- *Part 1: General cargo containers for general purposes*
- *Part 2: Thermal containers*
- *Part 3: Tank containers for liquids, gases and pressurized dry bulk*
- *Part 4: Non-pressurized containers for dry bulk*
- *Part 5: Platform and platform-based containers*

[Annexes A](#) to F form an integral part of this part of ISO 1496.

## Introduction

The following grouping of container types is used for specification purposes in ISO 1496:

### Part 1

|                             |          |
|-----------------------------|----------|
| General purposes            | 00 to 09 |
| Specific purposes           |          |
| — closed, vented/ventilated | 10 to 19 |
| — open top                  | 50 to 59 |

### Part 2

|         |          |
|---------|----------|
| Thermal | 30 to 49 |
|---------|----------|

### Part 3

|                   |          |
|-------------------|----------|
| Tank              | 70 to 79 |
| Bulk, pressurized | 85 to 89 |

### Part 4

|                                     |          |
|-------------------------------------|----------|
| Bulk, non-pressurized (box type)    | 20 to 24 |
| Bulk, non-pressurized (hopper-type) | 80 to 84 |

### Part 5

|                                                                |           |
|----------------------------------------------------------------|-----------|
| Platform (container)                                           | 60        |
| Platform-based with incomplete superstructure and fixed ends   | 61 and 62 |
| Platform-based with incomplete superstructure and folding ends | 63 and 64 |
| Platform-based with complete superstructure                    | 65 to 69  |

NOTE 1 Container types 90 to 99 are reserved for air/surface containers; see ISO 8323.

NOTE 2 The following conversions can be useful when using this part of ISO 1496:

- 5 mm = 3/16 in
- 6 mm = 1/4 in
- $12,5\text{ mm}_{-1,5}^{+5} \text{ mm} = 1/2\text{ in}_{-1/13}^{+3/16} \text{ in}$
- 25 mm = 1 in
- 60 mm = 2 3/8 in
- 250 mm = 9 7/8 in
- 470 mm = 18 1/2 in
- 550 mm = 21 5/8 in
- 750 mm = 29 1/2 in
- 1 000 mm = 39 3/8 in

- 2 134 mm = 7 ft
- 2 261 mm = 7 ft 5 in
- 2 286 mm = 7 ft 6 in

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# Series 1 freight containers — Specification and testing —

## Part 1:

## General cargo containers for general purposes

### 1 Scope

**1.1** This part of ISO 1496 specifies the basic specifications and testing requirements for ISO series 1 freight containers of the totally enclosed general purpose types and certain specific purpose types (closed, vented, ventilated or open top) which are suitable for international exchange and for conveyance by road, rail and sea, including interchange between these forms of transport.

**1.2** The container types covered by this part of ISO 1496 are given in [Table 1](#).

**Table 1 — Container types (in accordance with ISO 6346:1995, Amd 3:2012, Table E 1)**

| Code | Type designation                              | Type group code |
|------|-----------------------------------------------|-----------------|
| G    | General purpose container without ventilation | GP              |
| V    | General purpose container with ventilation    | VH              |
| U    | Open-top Container                            | UT              |
| B    | Dry Bulk Cargo non pressurized, box type      | BU              |
| S    | Named Cargo                                   | SN              |

This part of ISO 1496 does not cover ventilation arrangements, either vented or ventilated.

**1.3** The marking requirements for these containers are given in ISO 6346:1995, Amd 3:2012.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 668:1995, *Series 1 freight containers — Classification, dimensions and ratings*

ISO 830:1999, *Freight containers — Vocabulary*

ISO 1161:1984, *Series 1 freight containers — Corner fittings — Specification*

ISO 6346:1995, *Freight containers — Coding, identification and marking*

ISO 17712, *Freight containers — Mechanical seals*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 830 apply.

## 4 Dimensions and ratings

### 4.1 External dimensions

The overall external dimensions and tolerances of the freight containers covered by this part of ISO 1496 shall be those established in ISO 668 except that open-top containers may be of reduced height, in which case they shall be designated 1 AX, 1 BX, 1CX and 1 DX. No part of the container shall project beyond these specified overall external dimensions.

### 4.2 Internal dimensions

Internal dimensions of containers shall be as large as possible, but in any case shall comply with those given in [4.3](#)

### 4.3 Minimum internal dimensions

The minimum internal dimensions for ISO series 1 general purpose cargo containers are specified in [Table 2](#).

The dimensions apply when measured at a temperature of 20 °C (68 °F). Measurements taken at other temperatures shall be adjusted accordingly.

Where a top corner fitting projects into the internal space specified by [Table 2](#), that part of the corner fitting projecting into the container shall not be considered as reducing the size of the container.

**Table 2 — Minimum internal dimensions**

| Freight container designation | Minimum height                                            | Minimum width |        | Minimum length |    |        |
|-------------------------------|-----------------------------------------------------------|---------------|--------|----------------|----|--------|
|                               |                                                           | mm            | in     | mm             | ft | in     |
| 1 EEE                         |                                                           |               |        | 13 542         | 44 | 5 5/32 |
| 1 EE                          |                                                           |               |        | 13 542         | 44 | 5 5/32 |
| 1 AAA                         | Nominal container external height minus 241 mm (9 1/2 in) | 2 330         | 91 3/4 | 11 998         | 39 | 4 3/8  |
| 1 AA                          |                                                           |               |        | 11 998         | 39 | 4 3/8  |
| 1 A                           |                                                           |               |        | 11 998         | 39 | 4 3/8  |
| 1 BBB                         |                                                           |               |        | 8 931          | 29 | 3 5/8  |
| 1 BB                          |                                                           |               |        | 8 931          | 29 | 3 5/8  |
| 1 B                           |                                                           |               |        | 8 931          | 29 | 3 5/8  |
| 1 CC                          |                                                           |               |        | 5 867          | 19 | 3      |
| 1 C                           |                                                           |               |        | 5 867          | 19 | 3      |
| 1 D                           |                                                           |               |        | 2 802          | 9  | 2 5/16 |

### 4.4 Ratings

The values of the rating *R*, being the gross mass of the container, are those given in ISO 668.

## 5 Design requirements

### 5.1 General

All containers shall be capable of fulfilling the following requirements.

The strength requirements for containers are given in diagrammatic form in [Annex A](#) (these requirements are applicable to all containers except where otherwise stated). They apply to containers as complete units.

The strength requirements for corner fittings (see also [5.2](#)) are given in ISO 1161.

The container shall be capable of withstanding the loads and loadings detailed in [Clause 6](#).

As the effects of loads encountered under any dynamic operating condition should only approach, but not exceed, the effects of the corresponding test loads, it is implicit that the capabilities of containers indicated in [Annex A](#) and demonstrated by the test described in [Clause 6](#) shall not be exceeded in any mode of operation.

Any closure in a container which, if unsecured, could lead to a hazardous situation, shall be provided with an adequate securing system having external indication of the positive securement of that closure in the appropriate operating position.

In particular, doors should be capable of being securely fastened in the open or closed position.

Any removable roof or roof section shall be fitted with locking devices such that an observer at ground level can check (when the container is on a rail or highway carrying vehicle) that its roof is secured.

All closed containers and all open containers fitted with covers which were designed for them shall be weatherproof as required by test No. 13 (see [6.14](#)).

## 5.2 Corner fittings

All containers shall be equipped with top and bottom corner fittings 1EEE and 1EE units shall also have intermediate fittings in the 1 AAA/1 AA/1 A position, according to ISO 1161.

The upper faces of the top corner fittings shall protrude above the top of the container by a minimum of 6 mm (see [5.3.4](#)). The "top of the container" means the highest level of the cover of the container, for example the level of the top of a soft cover. However, if reinforced zones or doubler plates are provided to afford protection to the roof in the vicinity of the top corner fittings, such plates and their securements shall not protrude above the upper faces of the top corner fittings. These plates shall not extend more than 750 mm from either end of the container or on either side of intermediate fittings but may extend the full width.

## 5.3 Base structure

**5.3.1** All containers shall be capable of being supported by their bottom corner fittings only.

**5.3.2** All containers, other than 1 D and 1 DX, shall also be capable of being supported only by load transfer areas in their base structure.

**5.3.2.1** Consequently, these containers shall have end transverse members and sufficient intermediate load transfer areas (or a flat underside) of sufficient strength to permit vertical load transfer to or from the longitudinal member of a carrying vehicle. Such longitudinal members are assumed to lie within the two 250 mm wide zones defined by the broken lines in Annex B of ISO 668:1995.

**5.3.2.2** The lower faces of the load transfer areas, including those of the end transverse members, shall be in one plane located  $12,5^{+5}_{-1,5}$  mm above the plane of the bottom faces of the lower corner fittings of the container. Apart from the bottom corner fittings and bottom side rails, no part of the container shall project below this plane.

However, doubler plates may be provided in the vicinity of the bottom corner fittings to afford protection to the understructure.

Such plates shall not extend more than 550 mm from the outer end and not more than 470 mm from the side faces of the bottom corner fittings, and their lower faces shall be at least 5 mm above the lower faces of the bottom corner fittings of the container.

**5.3.2.3** The transfer of load between the underside of the bottom side rails and carrying vehicles is not envisaged.

The transfer of load between side rails and handling equipment should only occur when provisions have been made in accordance with [5.8.1](#) and [5.8.2](#).

**5.3.2.4** Containers having all their intermediate transverse members spaced at 1 000 mm apart or less (or having a flat underside) shall be deemed to comply with the requirements laid down in [5.3.2.1](#).

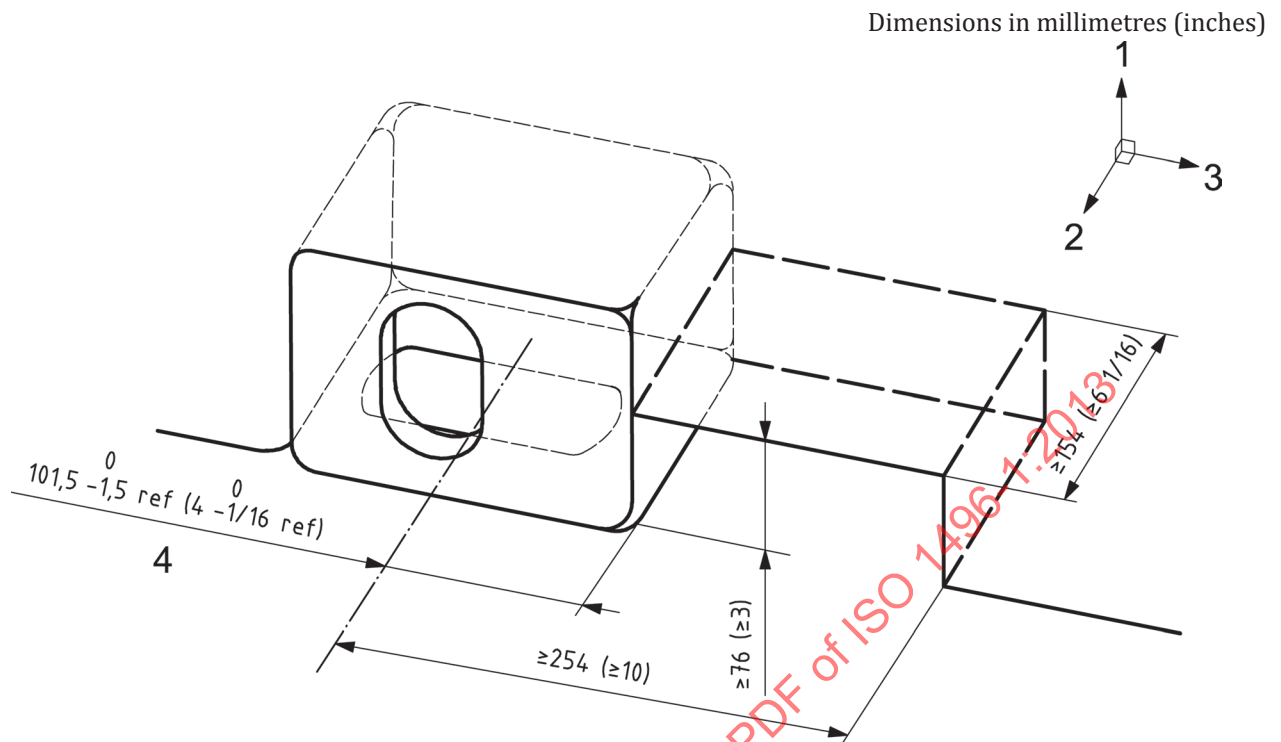
**5.3.2.5** Requirements for containers not having transverse members spaced 1 000 mm apart or less (and not having a flat underside) are given in Annex B of ISO 668:1995.

**5.3.3** For containers 1 D and 1 DX, the level of the underside of the base structure is not specified, except in so far as it is implied in [5.3.4](#).

**5.3.4** For all containers under dynamic conditions, or the static equivalent thereof, with the container having a load uniformly distributed over the floor in such a way that the combined mass of the container and test load is equal to 1,8 R, no part of the base of the container shall deflect more than 6 mm below the base plane (bottom faces of the lower corner fittings).

**5.3.5** The base structure shall be designed to withstand all forces, particularly lateral forces, induced by the cargo in service. This is particularly important where provisions are made for securement of cargo to the base structure of the container.

**5.3.6** 1EEE and 1EE units shall have recesses longitudinally-outboard of each of their fittings in the 1 AAA/1 AA/1 A position. These recesses shall extend vertically to not less than 76 mm above the plane of the bottom faces of the fittings in the 1 AAA/1 AA/1 A position, shall extend longitudinally from the longitudinally outboard faces of the fittings in the 1 AAA/1 AA/1 A position outboard, to not less than 254 mm from the centrelines of the bottom apertures of the fittings in the 1 AAA/1 AA/1 A position and shall extend laterally from the external width of the container inboard not less than 154 mm. See [Figure 1](#).

**Key**

- 1 UP
- 2 outboard
- 3 end of container
- 4 aperture

**Figure 1 — Lower intermediate fitting recess for 45 foot container**

#### 5.4 End structure

For all containers other than 1D and 1DX, the sideways deflection of the top of the container with respect to the bottom of the container, at the time it is under full transverse rigidity test conditions, shall not cause the sum of the changes in length of the two diagonals to exceed 60 mm.

#### 5.5 Side structure

For all containers other than 1D and 1DX, the longitudinal deflection of the top of the container with respect to the bottom of the container, at the time it is under full longitudinal rigidity test conditions, shall not exceed 25 mm.

#### 5.6 Walls

Where openings are provided in end or side walls, the ability of these walls to withstand tests Nos. 5 and 6 shall not be impaired.

#### 5.7 Door opening

Each container shall be provide with a door opening at least at one end.

All door openings and end openings shall be as large as possible.

Closed-type containers designated 1 EEE, 1 AAA, and 1 BBB (Type according ISO 6346:1995, Amd 3:2013, Annex E) shall have a door opening, preferably having dimensions equal to those of the internal cross-section of the containers and, in any case, not less than 2 566 mm high and 2 286 mm wide.

Closed-type containers designated 1 EE, 1 AA, 1 BB and 1 CC (Type according ISO 6346:1995 Amd 3:2013, Annex E) shall have a door opening, preferably having dimensions equal to those of the internal cross-section of the containers, and, in any case, not less than 2 261 mm high, and 2 286 mm wide.

Closed-type containers designated 1E, 1B, 1C and 1D (Type according ISO 6346:1995 Amd 3:2012, Annex E) shall have a door opening, preferably having dimensions equal to those of the internal cross-section of the containers, and, in any case, not less than 2 134 mm high, and 2 286 mm wide.

Container doors should be designed so that entry into the container via either of the doors can be detected by verifying the condition of the seal that has been affixed to the container. All door openings shall be fitted to accept an ISO compliant high security seal (see ISO 17712) in a manner that precludes opening or gapping of either of the doors without first removing the seal.

The design of the container shall be such that the door constrained by the seal must be opened before the other door can be opened. The mechanism in which the seal is fitted shall either be welded to a significant structural member of the container or otherwise be constructed so that the mechanism or seal cannot be removed and the door opened or gapped without first having to break the seal. Seal-affixing mechanisms that do not meet these basic requirements shall not be fitted onto the container.

A securing plate (also known as “custom plate”) shall be installed on the inside, above the mid-point, of the left door in order to prevent the left door from being opened without first opening the right hand door. This plate shall be painted a contrasting colour so it is readily visible when the right hand door is opened. Other design features that form an “interlock” between the two doors or otherwise preclude manipulation and opening of the unsealed door without breaking the seal are equally acceptable.

The door hinges shall either be welded to the door panel or, if affixed with fasteners, affixed with TIR approved fasteners that are further protected from removal by a suitable shield or equivalent design feature. Hinges pin shall be welded in place or otherwise protected to preclude their removal.

An elongated door handle hub (sometimes referred to as a “security hub”) that extends at least 25mm below the rivet hole or pivot point, shall be used on the right hand door to prevent the handle from being removed even if the rivet is removed.

## 5.8 Requirements — Optional features

### 5.8.1 Fork-lift pockets

**5.8.1.1** Fork-lift pockets used for handling 1 CC, 1 C, 1 CX, 1 D and 1 DX containers in the loaded or unloaded condition may be provided as optional features.

Fork-lift pockets shall not be provided on 1 EEE, 1 EE, 1 AAA, 1 AA, 1 A, 1 AX, 1 BBB, 1 BB, 1 B and 1 BX containers.

**5.8.1.2** Where a set of fork-lift pockets has been fitted as in [5.8.1.1](#), a second set of fork-lift pockets may, in addition, be provided on 1 CC, 1 C and 1 CX containers for empty handling only.

**5.8.1.3** The fork-lift pockets, where provided, shall meet the dimensional requirements specified in [Annex C](#) and shall pass completely through the base structure of the container so that lifting devices may be inserted from either side. It is not necessary for the base of the fork-lift pockets to be the full width of the container but it shall be provided in the vicinity of each end of the fork pockets.

### 5.8.2 Cargo securing devices

Cargo securing devices may be provided as optional features in all series 1 general purpose containers. The requirements for such devices are specified in [Annex C](#).

### 5.8.3 Cargo shoring slots

Cargo shoring slots are optional features in all series 1 general purpose containers. The requirements for this feature are specified in [Annex D](#).

## 6 Testing

### 6.1 General

Unless otherwise stated, containers complying with the design requirements specified in [Clause 5](#) shall, in addition, be capable of withstanding the tests specified in [6.2](#) to [6.14](#), as applicable. Containers shall be tested in the condition in which they are designed to be operated. In all cases the forces shall be applied in such a manner that rotation of the planes through which the forces are applied and the container is supported is minimized. The force must be centred over the offset position.

However, the weatherproofness test shall always be performed after all structural tests have been completed.

**6.1.1** The symbol  $P$  denotes the maximum payload of the container to be tested, that is:

$$P = R - T$$

where

$R$  is the rating;

$T$  is the tare.

NOTE  $R$ ,  $P$  and  $T$ , by definition, are in units of mass. Where test requirements are based on the gravitational forces derived from these values, those forces, which are inertial forces, are indicated thus:

$$Rg, Pg, Tg$$

the units of which are in Newton or multiples thereof.

The word “load”, when used to describe a physical quantity to which units may be ascribed, implies mass.

The word “loading”, for example as in “internal loading”, implies force.

**6.1.2** The test loads or loadings within the container shall be uniformly distributed.

**6.1.3** The test load or loading specified in all of the following tests are the minimum requirements.

**6.1.4** The dimensional requirements to which reference is made in the requirements subclause after each test are those specified in:

- a) the dimensional and design requirement clauses of this part of ISO 1496;
- b) ISO 668;
- c) ISO 1161.

### 6.2 Test No. 1 — Stacking

#### 6.2.1 General

This test shall be carried out to prove the ability of a fully loaded container to support a superimposed mass of containers, taking into account conditions aboard ships at sea and the relative eccentricities between superimposed containers.

Cargo securing devices may be provided as optional features in all series 1 general purpose containers.

Table 3 specifies the force to be applied as a test to each pair of corner fittings and the superimposed mass that the test force represents.

## 6.2.2 Procedure

The container shall be placed on four level pads, one under each bottom corner fitting.

The pads shall be centralized under the fittings, and shall be substantially of the same plan dimensions as the fittings. The container shall have a load uniformly distributed over the floor in such a way that the combined mass of the container and the test load is equal to 1,8 R.

The container shall be subjected to vertical forces, applied either to all four corner fittings simultaneously or to each pair of end fittings, at the appropriate level specified in Table 3. The forces shall be applied through a test fixture equipped with corner fittings as specified in ISO 1161, or equivalent fittings which have imprints of the same geometry (i.e. with the same external dimensions, chamfered aperture and rounded edges) as the bottom face of the bottom corner fitting specified in ISO 1161. If equivalent fittings are used, they shall be designed to produce the same effect on the container under the test loads as when corner fittings are used.

In all cases, the forces shall be applied in such a manner that rotation of the planes through which the forces are applied and on which the container is supported is minimized. The force must be centred over off head position.

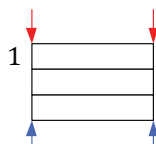
Each corner fitting or equivalent test fitting shall be offset in the same direction by 25,4 mm laterally and 38 mm longitudinally.

**Table 3 — Forces to be applied in stacking test**

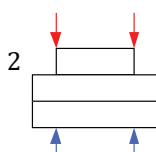
| Container designation | Test force per container (all four corners simultaneously) |         | Test force per pair of end fittings |         | Superimposed mass represented by test force |         |
|-----------------------|------------------------------------------------------------|---------|-------------------------------------|---------|---------------------------------------------|---------|
|                       | kN                                                         | lbf     | kN                                  | lbf     | kg                                          | lb      |
| 1 EEE 1 EE            | 3 767                                                      | 846 854 | 1 883                               | 423 317 | 213 360<br>(see NOTE)                       | 470 380 |
| 1A, 1AA, 1AAA and 1AX | 3 767                                                      | 846 854 | 1 883                               | 423 317 | 213 360                                     | 470 380 |
| 1B, 1BB, 1BBB and 1BX | 3 767                                                      | 846 854 | 1 883                               | 423 317 | 213 360                                     | 470 380 |
| 1C, 1CC and 1CX       | 3 767                                                      | 846 854 | 1 883                               | 423 317 | 213 360                                     | 470 380 |
| 1D and 1DX            | 896                                                        | 201 600 | 448                                 | 100 800 | 50 800                                      | 112 000 |

NOTE The following specifies the stacking loads for 1EEE/1EE containers in different modes:

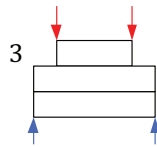
- 1) Stacking at 1EEE/1EE position and supported in 1EEE/1EE position (96 000 kg);



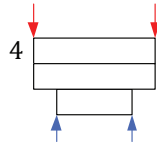
- 2) Stacking at 1AAA/1AA/1A position and supported in 1AAA/1AA/1A position (41 150 kg);



- 3) Stacking at 1AAA/1AA/1A position and supported in 1EEE/1EE position (27 430 kg); and



- 4) Stacking at 1EEE/1EE position and supported in 1AAA/1AA/1A position (41 150 kg).



### 6.2.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.3 Test No. 2 — Lifting from appropriate set of four top corner fittings

### 6.3.1 General

This test shall be carried out to prove the ability of a container, other than a 1 D or a 1 DX container, to withstand being lifted, from appropriate set of four corner fittings, with the lifting forces applied vertically, and the ability of a 1 D or a 1 DX container to withstand being lifted from appropriate set of four top corner fittings with the lifting forces applied at any angle between the vertical and 60° to the horizontal, these being the only recognized methods of lifting these containers by the appropriate set of four corner fittings.

This test shall also be regarded as proving the ability of the floor and base structure to withstand the forces arising from acceleration of the payload in lifting operations.

### 6.3.2 Procedure

The container shall have a load uniformly distributed over the floor in such a way that the combined mass of the container and test load is equal to 2 R, and it shall be carefully lifted from all top corners in such a way that no significant acceleration or deceleration forces are applied.

For a container other than a 1 D or a 1 DX container, the lifting forces shall be applied vertically.

For a 1 D or a 1 DX container, lifting shall be carried out by means of slings, the angle of each leg being at 60° from the horizontal.

For 1 EEE and 1 EE containers, the lifting forces shall be applied vertically from the 1 EEE/1 EE position and separately from the 1 AAA/1 AA/1 A position.

After lifting, the container shall be suspended for 5 min and then lowered to the ground.

### 6.3.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.4 Test No. 3 — Lifting from the four bottom corner fittings

### 6.4.1 General

This test shall be carried out to prove the ability of a container to withstand being lifted, from its four bottom corner fittings, by means of lifting devices bearing on the bottom corner fittings only and attached to a single transverse central spreader beam, above the container.

### 6.4.2 Procedure

The container shall have a load uniformly distributed over the floor in such a way that the combined mass of container and test load is equal to  $2R$ , and it shall be carefully lifted from the side apertures of all four bottom corner fittings in such a way that no significant acceleration or deceleration forces are applied.

Lifting forces shall be applied at:

- a)  $30^\circ$  to the horizontal at both 1 AAA, 1 AA, 1 A and 1 EEE/1 EE positions for 1 EEE and 1 EE containers with internal load of  $2R-T$ ;
- b)  $37^\circ$  to the horizontal for 1 BBB, 1 BB, 1 B and BX containers;
- c)  $45^\circ$  to the horizontal for 1 CC, 1 C and 1 CX containers;
- d)  $60^\circ$  to the horizontal for 1 D and 1 DX containers.

In each case, the line of action of the lifting force and the outer face of the corner fitting shall be no farther apart than 38 mm. The lifting shall be carried out in such a manner that the lifting devices bear on the four bottom corner fittings only.

The container shall be suspended for 5 min and then lowered to the ground.

### 6.4.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.5 Test No. 4 — Restraint (longitudinal)

### 6.5.1 General

This test shall be carried out to prove the ability of a container to withstand longitudinal external restraint under dynamic conditions of railway operations, which implies acceleration of 2 g.

### 6.5.2 Procedure

The container shall have a load uniformly distributed over the floor in such a way that the combined mass of the container and the uniformly distributed test load is equal to  $R$ , and it shall be secured longitudinally to rigid anchor points through the bottom apertures of the bottom corner fittings at one end of the container.

A force of  $2Rg$  shall be applied horizontally to the container through the bottom apertures of the other bottom corner fittings, first towards and then away from the anchor points.

### 6.5.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.6 Test No. 5 — Strength of end walls

### 6.6.1 General

This test shall be carried out to prove the ability of a container to withstand forces under the dynamic conditions referred to in [6.5.1](#).

### 6.6.2 Procedure

The container shall have each end tested when one end is blind and the other equipped with doors. In the case of symmetrical construction, one end only need be tested. The container shall be subjected to an internal loading of 0,4 *Pg*. The internal loading shall be uniformly distributed over the wall under test and arranged to allow free deflection of the wall.

### 6.6.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.7 Test No. 6 — Strength of side walls

### 6.7.1 General

This test shall be carried out to prove the ability of a container to withstand the forces resulting from ship movement.

### 6.7.2 Procedure

The container shall have each side wall tested. In the case symmetrical construction, one side only need be tested.

Each side wall of the container shall be subjected to an internal loading of 0,6 *Pg*. The internal loading shall be uniformly distributed, applied to each wall separately and arranged to allow free deflection of the side wall and its longitudinal members.

Open-top containers fitted with roof bows (types 50 to 53) shall be tested with the roof bows in position.

### 6.7.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.8 Test No. 7 — Strength of the roof (where provided)

### 6.8.1 General

This test shall be carried out to prove the ability of the rigid roof of a container, where fitted, to withstand the loads imposed by persons working on it.

### 6.8.2 Procedure

A load of 300 kg shall be uniformly distributed over an area of 600 mm x 300 mm located at the weakest area of the rigid roof of the container.

### 6.8.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.9 Test No. 8 — Floor strength

### 6.9.1 General

This test shall be carried out to prove the ability of a container floor to withstand the concentrated dynamic loading imposed during cargo operations involving powered industrial trucks or similar devices.

### 6.9.2 Procedure

The test shall be performed using a test vehicle equipped with tyres, with an axle load of 7 260 kg (i.e. 3 630 kg on each of two wheels). It shall be so arranged that all points of contact between each wheel and a flat continuous surface lie within a rectangular envelope measuring 185 mm (in a direction parallel to the axle of the wheel) by 100 mm and that each wheel makes physical contact over an area within this envelope of not more than 142 cm. The wheel width shall be nominally 180 mm and the wheel centres shall be nominally 760 mm. The test vehicle shall be manoeuvred over the entire floor area of the container. The test shall be made with the container resting on four level supports under its four bottom corner fittings, with its base structure free to deflect. The width of the test load is limited to the overall width of the wheels.

### 6.9.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.10 Test No. 9 — Rigidity (transverse)

### 6.10.1 General

This test shall be carried out to prove the ability of a container, other than a 1 D or a 1 DX container, to withstand the transversal racking forces resulting from ship movement.

### 6.10.2 Procedure

The container in tare condition (*T*) shall be placed on four level supports, one under each corner\* fitting, and shall be restrained against lateral and vertical movement by means of anchor devices acting through the bottom apertures of the bottom corner\* fittings. Lateral restraint shall be provided only at a bottom corner\* fitting diagonally opposite to and in the same end frame as a top corner\* fitting to which force is applied. When testing the two end frames separately, vertical restraint shall be applied only at the end frame under test.

Forces of 150 kN shall be applied either separately or simultaneously to each of the top corner\* fittings on one side of the container in lines parallel both to the base and to the planes of the ends of the container. The forces shall be applied first towards and then away from the top corner\* fittings.

In the case of a container with identical ends, only one end need be tested. Where an end is not essentially symmetrical about its own vertical centreline, both sides of that end shall be tested.

For allowable deflections under full test loading, see [5.4](#).

\* Corner means corner or intermediate corner fitting as appropriate.

### 6.10.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.11 Test No. 10 — Rigidity (longitudinal)

### 6.11.1 General

This test shall be carried out to prove the ability of a container, other than a 1 D or a 1 DX container, to withstand the longitudinal racking forces resulting from ship movement

### 6.11.2 Procedure

The container in tare condition ( $T$ ) shall be placed on four level supports, one under each corner fitting, and shall be restrained against longitudinal and vertical movement by means of anchor devices acting through the bottom apertures of the bottom corner fittings. Longitudinal restraint shall be provided only at a bottom corner fitting diagonally opposite to and in the same side frame as a top corner fitting to which force is applied.

Forces of 75 kN shall be applied either separately or simultaneously to each of the top corner fittings on one end of the container in lines parallel both to the base of the container and to the planes of the sides of the container. The forces shall be applied first towards and then away from the top corner fitting.

In the case of a container with identical sides, only one side need be tested. Where a side is not essentially symmetrical about its own vertical centreline, both ends of that side shall be tested.

For allowable deflections under full test loading see [5.5](#).

### 6.11.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

## 6.12 Test No. 11 - Lifting from fork-lift pockets (where fitted)

### 6.12.1 General

This test shall be carried out on any 1 CC, 1 C, 1 CX, 1 D or 1 DX container which is fitted with fork-lift pockets.

### 6.12.2 Procedure

#### 6.12.2.1 1 CC, 1 C, 1 CX, 1 D or 1 DX containers fitted with one set of fork-lift pockets

The container shall have a load uniformly distributed over the floor in such a way that the combined mass of container and test load is equal to  $1,6 R$  and it shall be supported on two horizontal bars, each 200 mm wide, projecting  $1\,828\text{ mm} + 3\text{ mm}$  into the fork-lift pockets, measured from the outside face of the side of the container. The bars shall be centred within the pockets.

#### 6.12.2.2 1 CC, 1 C or 1 CX containers fitted with two sets of fork-lift pockets

The test described in [6.12.2.1](#) shall be applied to the outer pockets.

A second test shall be applied to the (additional) inner pockets. The procedure for this second test shall be as required in [6.12.2.1](#) except that in this case the combined mass of the container and test load shall be equal to  $0,625 R$ , and the bars shall be placed in the inner pockets.

### 6.12.3 Requirements

Upon completion of the test, the container shall show neither permanent deformation which will render it unsuitable for use nor abnormality which will render it unsuitable for use, and the dimensional requirement affecting handling, securing and interchange shall be satisfied.

## 6.13 Test No.12 — Shoring slots (where fitted)

### 6.13.1 Procedure

A 50 mm wide, rigid metal bar is to be inserted in each pair of shoring slot supports so that it runs transversely across the container between the two supports. A load equal to  $0,6 P$  is to be distributed across the middle 915 mm of the bar such that the load is applied horizontally towards the container's doors. The doors shall be fully opened during this test. This load shall be maintained on the bar for at least 2 min.

### 6.13.2 Requirements

At the end of the test neither the shoring slots, the shoring slot supports nor the container itself shall show any permanent deformation or abnormality that will render it unsuitable for continuous service at full load.

The container shall be supported for 5 min and then lowered to the ground.

## 6.14 Test No. 13 — Weatherproofness

### 6.14.1 Procedure

A stream of water shall be applied on all exterior joints and seams of the container from a nozzle of 12,5 mm inside diameter, at a pressure of about 100 kPa (corresponding to a head of about 10 m of water) on the upstream side of the nozzle. The nozzle shall be held at a distance of 1,5 m from the container under test, and the stream shall be traversed at a speed of 100 mm/s.

Procedures involving the use of several nozzles are acceptable provided that each joint or seam is subjected to a water loading no less than which would be given by a single nozzle

### 6.14.2 Requirements

Upon completion of the test, no water shall have leaked into the container.

## Annex A (normative)

### Diagrammatic representation of capabilities appropriate to all types and sizes of general purpose containers, except otherwise stated

NOTE 1 The externally applied forces shown below are for one end or one side only. The loads shown within the containers represent uniformly distributed internal loads only, and such loads are for the whole container.

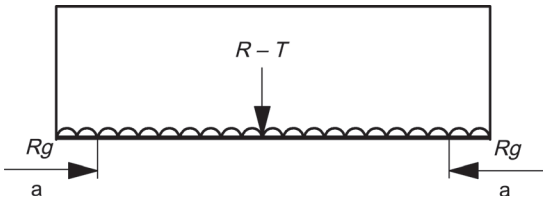
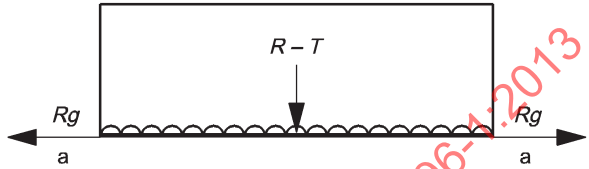
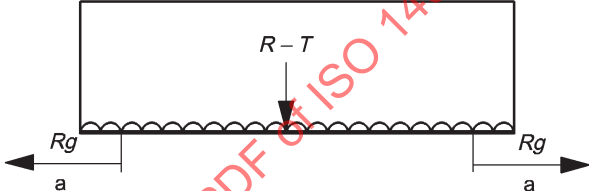
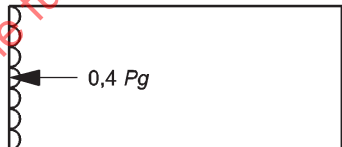
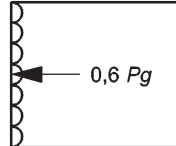
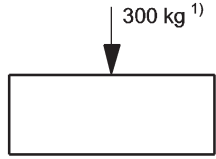
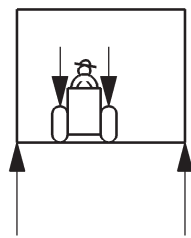
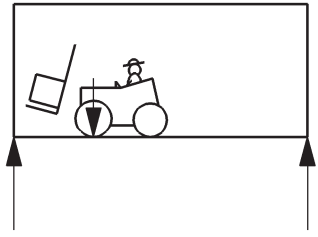
NOTE 2 The figures in this annex correspond to the tests described in 6.2 to 6.13 only where marked.

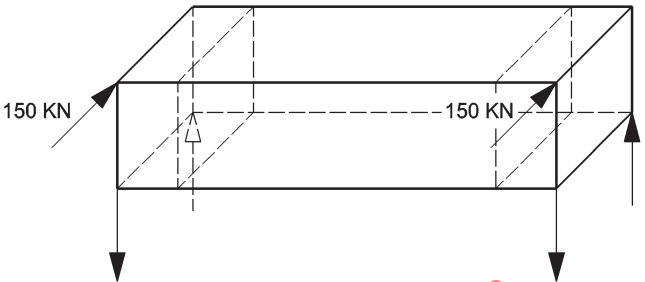
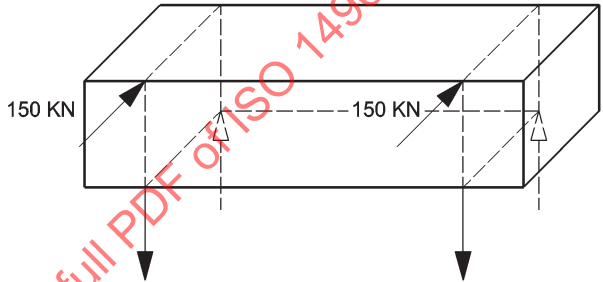
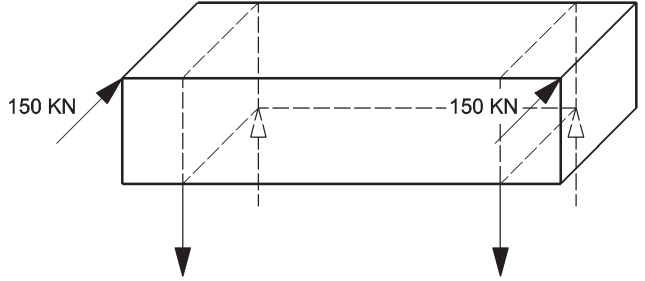
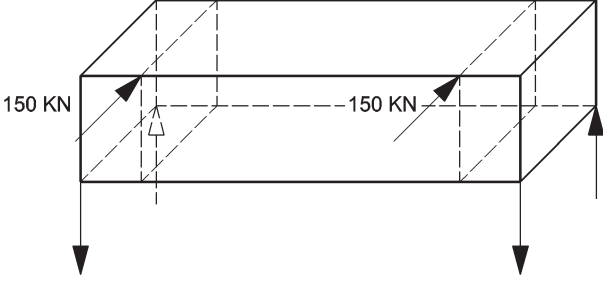
NOTE 3 For definitions of  $R$ ,  $P$  and  $T$ , see 6.1.1.

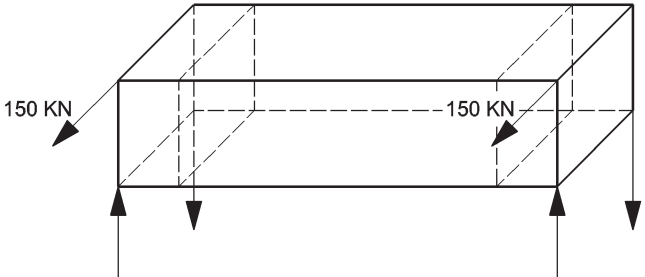
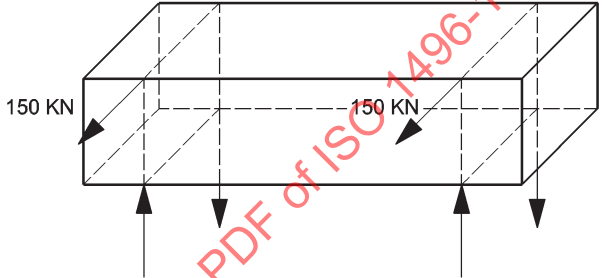
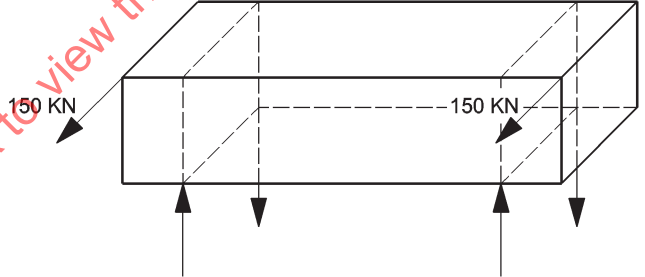
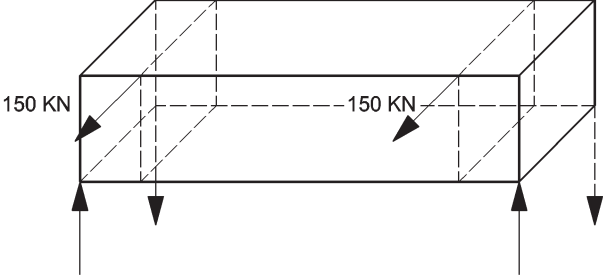
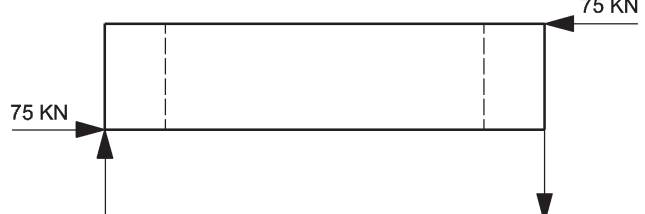
| Fig-<br>ure No. | End elevations                           | Side elevations                              |
|-----------------|------------------------------------------|----------------------------------------------|
| A.1a            |                                          |                                              |
|                 | Not Applicable to 1 D and 1DX containers | Not Applicable to 1 D and 1DX containers     |
| A.1b            |                                          |                                              |
|                 |                                          | Applicable to 1 EE and 1 EEE containers only |
| A.1c            |                                          |                                              |
|                 |                                          | Applicable to 1 EE and 1 EEE containers only |

| Fig-<br>ure No. | End elevations                           | Side elevations                              |
|-----------------|------------------------------------------|----------------------------------------------|
| A.1d            |                                          |                                              |
|                 |                                          | Applicable to 1 EE and 1 EEE containers only |
| A.1e            |                                          |                                              |
|                 | Applicable to 1D and 1DX containers only | Applicable to 1 D and 1DX containers only    |
|                 | Top lift                                 |                                              |
| A.2a            |                                          |                                              |
| A.2b            |                                          |                                              |
|                 |                                          | Applicable to 1 EE and 1 EEE containers only |
|                 | Top lift<br>Test No. 2                   |                                              |

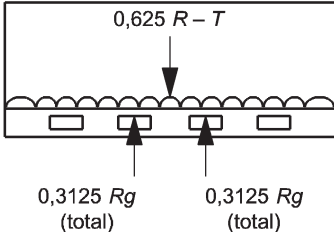
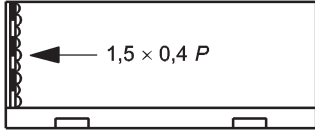
| Figure No. | End elevations                            | Side elevations                              |
|------------|-------------------------------------------|----------------------------------------------|
| A.3a       |                                           |                                              |
|            | Not applicable to 1 D and 1 DX containers | Not applicable to 1D and 1DX containers      |
| A.3b       |                                           |                                              |
|            |                                           | Applicable to 1 EE and 1 EEE containers only |
| A.3c       | <p>Top lift<br/>Test No. 2</p>            |                                              |
|            | Applicable to 1 D and 1DX containers only |                                              |
| A.4a       |                                           |                                              |
| A.4b       |                                           |                                              |
|            |                                           | Applicable to 1 EE and 1 EEE containers only |
| A.5a       | Restraint (longitudinal)                  |                                              |

| Figure No. | End elevations                                                                      | Side elevations                                                                      |
|------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| A.5b       |                                                                                     |    |
|            |                                                                                     | Applicable to 1 EE and 1 EEE containers only                                         |
| A.6a       |                                                                                     |    |
| A.6b       |                                                                                     |    |
|            |                                                                                     | Applicable to 1 EE and 1 EEE containers only                                         |
| A.7        | End loading<br>Test No. 5                                                           |  |
| A.8        | Side loading<br>Test No. 6                                                          |  |
|            | Roof load<br>Test No. 7                                                             |                                                                                      |
| A.9        |  |  |
|            | Applicable where a rigid roof is provided                                           | Applicable where a rigid roof is provided                                            |
|            | Wheel loads<br>Test No. 8                                                           |                                                                                      |
| A.10       |  |  |

| Fig-<br>ure No. | End elevations                                            | Side elevations                                                                                                                     |
|-----------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>A.11a</b>    | Rigidity (transverse)<br>Test n° 9<br>Test force = 150 kN |                                                   |
|                 |                                                           | <p>End frame</p> <p>Forced at 45° position (top corner fitting) and secured at 45° position (bottom corner fitting)</p>             |
| <b>A.11b</b>    |                                                           |                                                  |
|                 |                                                           | <p>End frame</p> <p>Forced at 40° position (top intermediate fitting) and secured at 40° position (bottom intermediate fitting)</p> |
| <b>A.11c</b>    |                                                           |                                                 |
|                 |                                                           | <p>Forced at 45° position (top corner fitting) and secured at 40° position (bottom intermediate fitting)</p>                        |
| <b>A.11d</b>    |                                                           |                                                 |
|                 |                                                           | <p>Forced at 40° position (top intermediate fitting) and secured at 45° position (bottom corner fitting)</p>                        |

| Figure No. | End elevations                                              | Side elevations                                                                                             |
|------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| A.12a      | Rigidity (transverse)<br>Test n° 9<br>Test force = 150 kN   |                           |
|            |                                                             | Forced at 45° position (top corner fitting) and secured at 45° position (bottom corner fitting)             |
| A.12b      |                                                             |                           |
|            |                                                             | Forced at 40° position (top intermediate fitting) and secured at 40° position (bottom intermediate fitting) |
| A.12c      |                                                             |                         |
|            |                                                             | Forced at 45° position (top corner fitting) and secured at 40° position (bottom intermediate fitting)       |
| A.12d      |                                                             |                         |
|            |                                                             | Forced at 40° position (top intermediate fitting) and secured at 45° position (bottom corner fitting)       |
| A.17a      | Rigidity (longitudinal)<br>Test n° 10<br>Test force = 75 kN |                         |

| Fig-<br>ure No. | End elevations                                                                                                                   | Side elevations                                                                                       |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
|                 |                                                                                                                                  | Forced at 45' position (top corner fitting) and secured at 45' position (bottom corner fitting)       |
| A.17b           |                                                                                                                                  |                                                                                                       |
|                 |                                                                                                                                  | Forced at 45' position (top corner fitting) and secured at 40' position (bottom intermediate fitting) |
| A.18a           |                                                                                                                                  |                                                                                                       |
|                 |                                                                                                                                  | Forced at 45' position (top corner fitting) and secured at 45' position (bottom corner fitting)       |
| A.18b           |                                                                                                                                  |                                                                                                       |
|                 |                                                                                                                                  | Forced at 45' position (top corner fitting) and secured at 40' position (bottom intermediate fitting) |
| A.19            | Lashing/securement<br>(The type of loading is inadmissible except an applied in A.3a)                                            |                                                                                                       |
| A.20            | Lashing / securement<br>Not applicable to 10 and 1DX containrrs.                                                                 |                                                                                                       |
| A.21            | Fork-lift pockets<br>Test No. 11<br>Applicable to 1CC, 1C, 1CX and 1DX containers when fitted with one set of fork-lift pockets. |                                                                                                       |

| Fig-<br>ure No. | End elevations                                                                                                                                   | Side elevations                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| A.22            | <p>Fork-lift pockets</p> <p>Test No. 11</p> <p>Applicable to 1CC, 1C, and 1CX containers when fitted with a second set of fork-lift pockets.</p> |  |
| A.23            | <p>Test N°12 Shoring slot (where fitted)</p>                                                                                                     |  |