INTERNATIONAL STANDARD

ISO 1496-1

Sixth edition
2013-07-01

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

Reference number
ISO 1496-1:2013(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Dimensions and ratings ... **2**
4.1 External dimensions ... 2
4.2 Internal dimensions ... 2
4.3 Minimum internal dimensions ... 2
4.4 Ratings ... 2

5 Design requirements ... **2**
5.1 General ... 2
5.2 Corner fittings ... 3
5.3 Base structure ... 3
5.4 End structure ... 5
5.5 Side structure ... 5
5.6 Walls ... 5
5.7 Door opening ... 5
5.8 Requirements — Optional features ... 6

6 Testing ... **7**
6.1 General ... 7
6.2 Test No. 1 — Stacking ... 7
6.3 Test No. 2 — Lifting from appropriate set of four top corner fittings ... 9
6.4 Test No. 3 — Lifting from the four bottom corner fittings ... 10
6.5 Test No. 4 — Restraint (longitudinal) ... 10
6.6 Test No. 5 — Strength of end walls ... 11
6.7 Test No. 6 — Strength of side walls ... 11
6.8 Test No. 7 — Strength of the roof (where provided) ... 11
6.9 Test No. 8 — Floor strength ... 12
6.10 Test No. 9 — Rigidity (transverse) ... 12
6.11 Test No. 10 — Rigidity (longitudinal) ... 13
6.12 Test No. 11 - Lifting from fork-lift pockets (where fitted) ... 13
6.13 Test No.12 — Shoring slots (where fitted) ... 14
6.14 Test No. 13 — Weatherproofness ... 14

Annex A (normative) **Diagrammatic representation of capabilities appropriate to all types and sizes of general purpose containers, except otherwise stated** ... **15**

Annex B (normative) **Dimensions of fork-lift** ... **23**

Annex C (normative) **Cargo securing systems** ... **25**

Annex D (normative) **Shoring slot system** ... **27**

Bibliography ... **28**

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

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

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	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

— $12{,}5\,\text{mm}^{+5}_{-1{,}5}\,\text{mm} = 1/2\,\text{in}^{+3/16}_{-1/13}\,\text{in}$

— 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

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
1AAA	Nominal container external height minus 241 mm (9 ½ in)	2 330	91 ¾	11 998	39	4 3/8
1AA				11 998	39	4 3/8
1A				11 998	39	4 3/8
1BBB				8 931	29	3 5/8
1BB				8 931	29	3 5/8
1B				8 931	29	3 5/8
1CC				5 867	19	3
1C				5 867	19	3
1D				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.

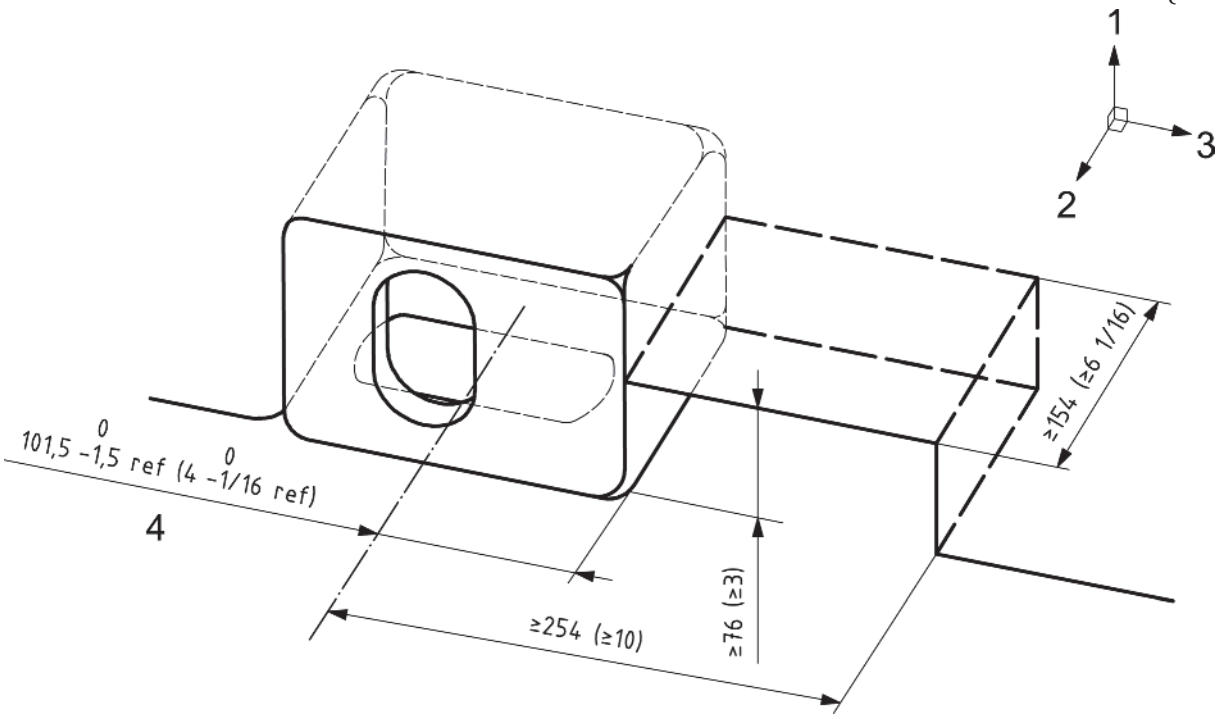
5.3.3 For containers 1 D and 1 DX, the level of the underside of the base structure is not specified, except in so far as it is implied in 5.3.4.

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.

Dimensions in millimetres (inches)



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 lDX, 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, 1AAA, and 1BBB (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, 1AAA, 1AA, 1A, 1AX, 1BBB, 1BB, 1B and 1BX 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, 1C 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 test 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.

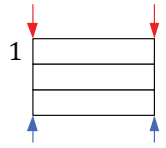
Each corner fitting or equivalent test fitting shall be offset in the same direction by 25,4 mm laterally and 38 mm longitudinally.

Table 3 — Forces to be applied in stacking test

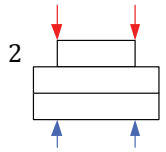
Container designation	Test force per container (all four corners simultaneously)		Test force per pair of end fittings		Superimposed mass represented by test force	
	kN	lbf	kN	lbf	kg	lb
1 EEE 1 EE	3 767	846 854	1 883	423 317	213 360 (see NOTE)	470 380
1A, 1AA, 1AAA and 1AX	3 767	846 854	1 883	423 317	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:

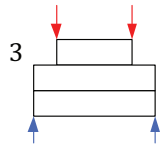
1) Stacking at 1EEE/1EE position and supported in 1EEE/1EE position (96 000 kg);



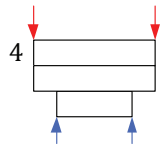
2) Stacking at 1AAA/1AA/1A position and supported in 1AAA/1AA/1A position (41 150 kg);



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 ID 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 tour 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 2 *R*, 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° 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 2 *R-T;*

b) 37° to the horizontal for1 BBB, 1 BB, 1 B and BX containers;

c) 45° to the horizontal for 1 CC, 1 C and 1 CX containers;

d) 60° 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 2 *Rg* 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. 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 mm + 3 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 intercharge 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 that 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.

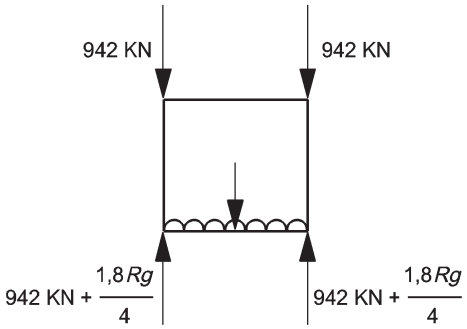
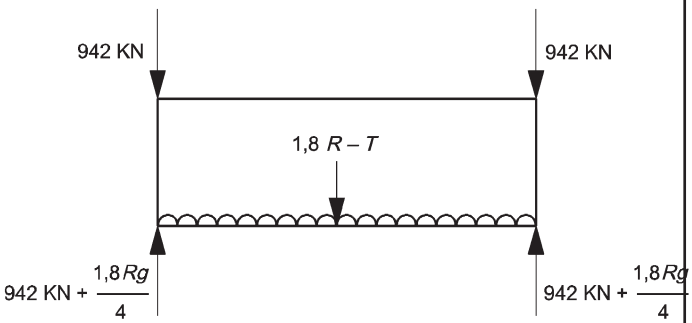
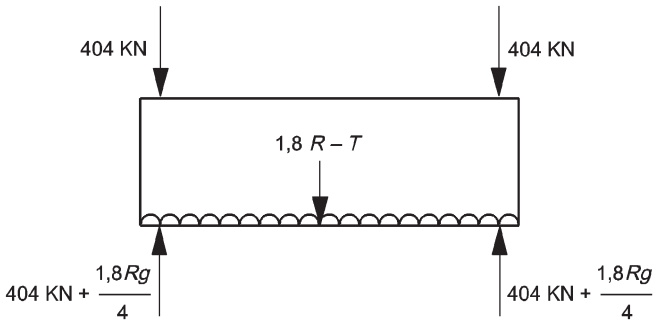
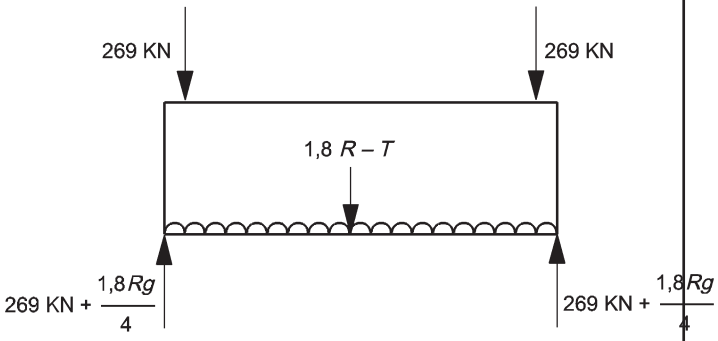
Figure No.	End elevations	Side elevations
A.1a		
	Not Applicable to 1 D and 1DX containers	Not Applicable to 1 D and 1DX containers
A.1b		
		Applicable to 1 EE and 1 EEE containers only
A.1c		
		Applicable to 1 EE and 1 EEE containers only

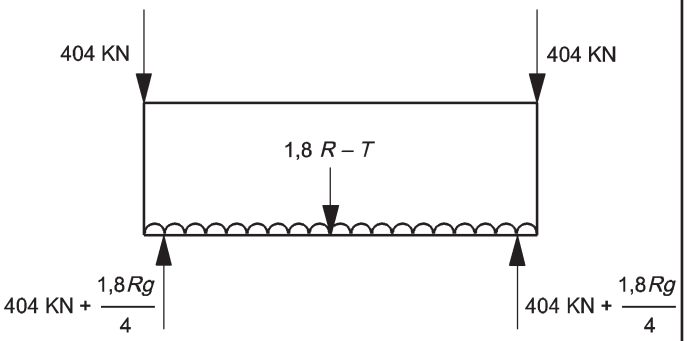
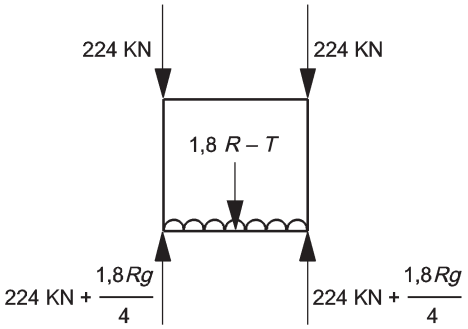
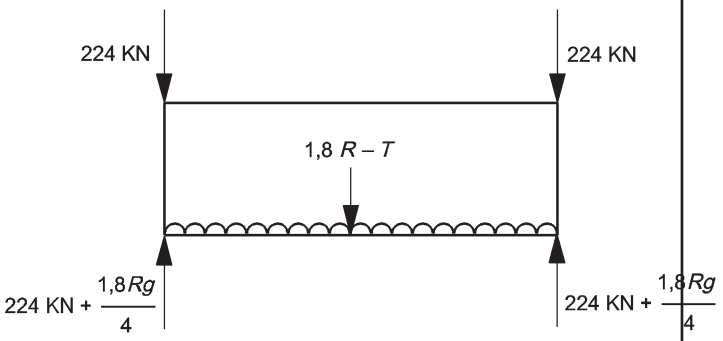
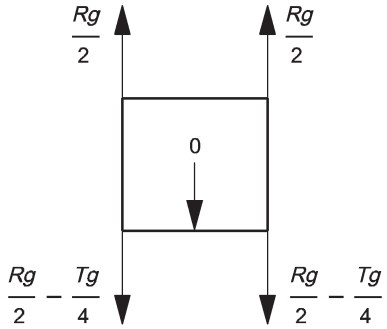
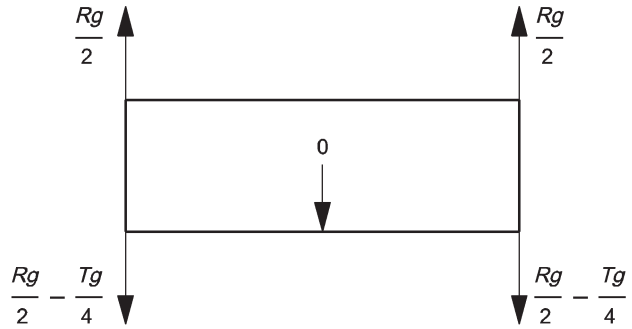
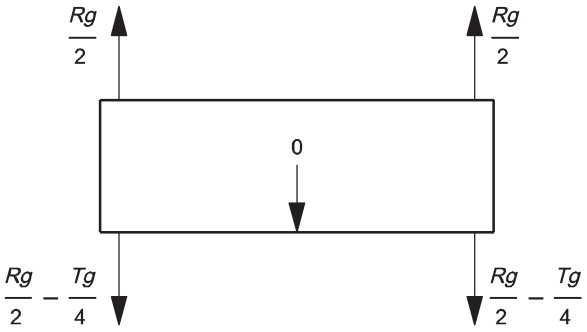
Figure No.	End elevations	Side elevations
A.1d		
		Applicable to 1 EE and 1 EEE containers only
A.1e		
	Applicable to 1D and 1DX containers only	Applicable to 1 D and 1DX containers only
	Top lift	
A.2a		
A.2b		
		Applicable to 1 EE and 1 EEE containers only
	Top lift Test No. 2	

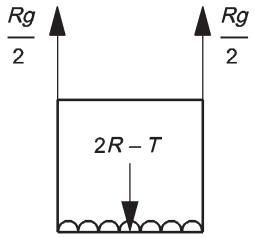
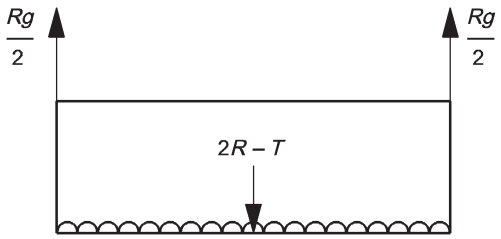
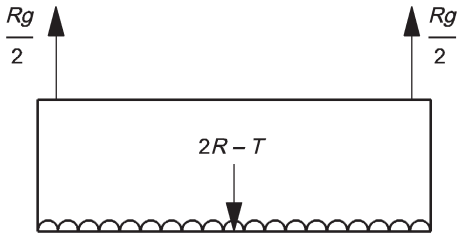
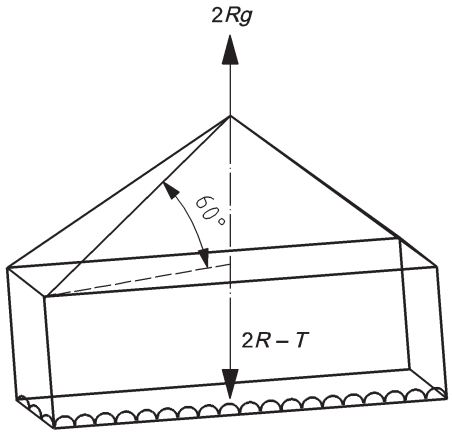
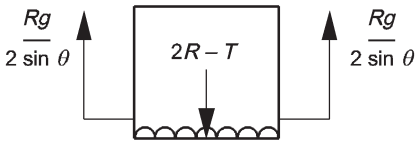
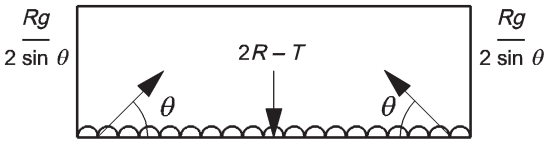
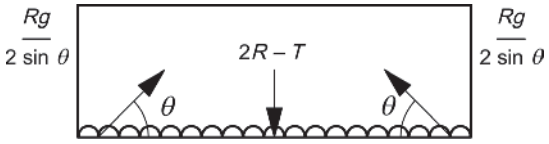
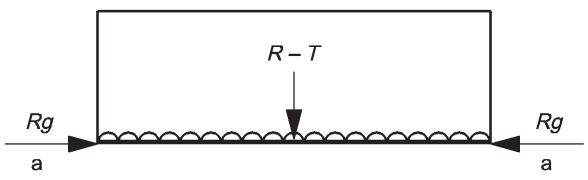
Figure No.	End elevations	Side elevations
A.3a		
	Not applicable to 1 D and 1 DX containers	Not applicable to 1D and 1DX containers
A.3b		
		Applicable to 1 EE and 1 EEE containers only
	Top lift Test No. 2	
A.3c		
	Applicable to 1 D and 1DX containers only	
A.4a		
A.4b		
		Applicable to 1 EE and 1 EEE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

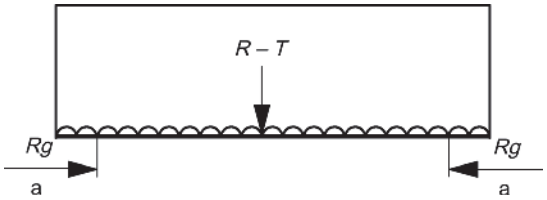
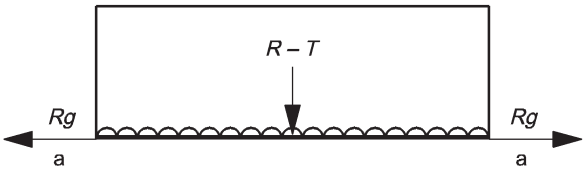
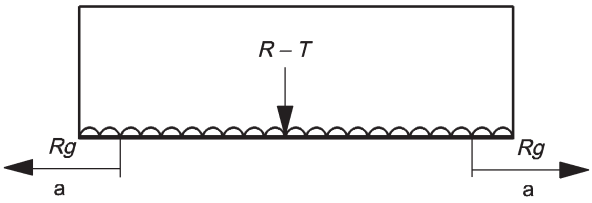
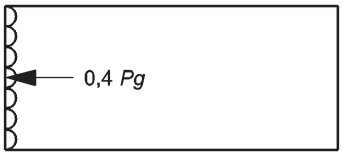
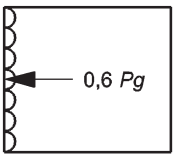
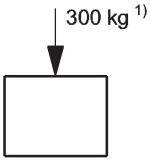
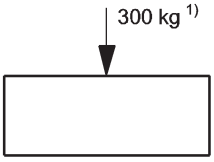
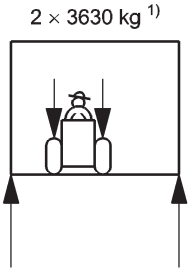
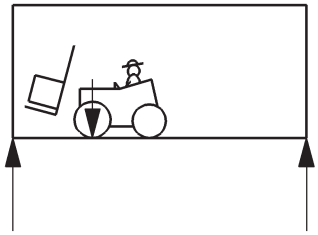
Figure No.	End elevations	Side elevations
A.5b		
		Applicable to 1 EE and 1 EEE containers only
A.6a		
A.6b		
		Applicable to 1 EE and 1 EEE containers only
A.7	End loading Test No. 5	
A.8	Side loading Test No. 6	
	Roof load Test No. 7	
A.9		
	Applicable where a rigid roof is provided	Applicable where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

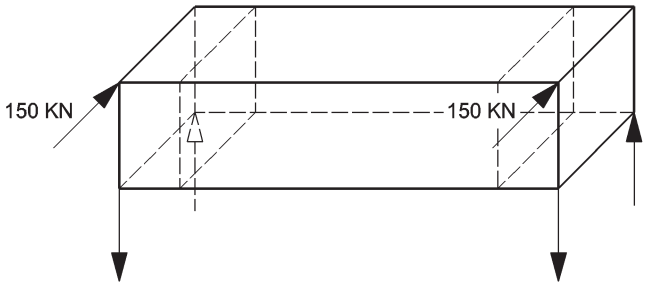
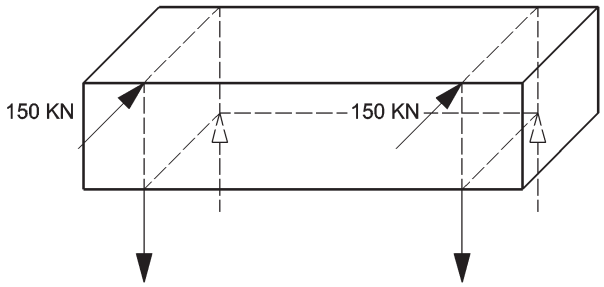
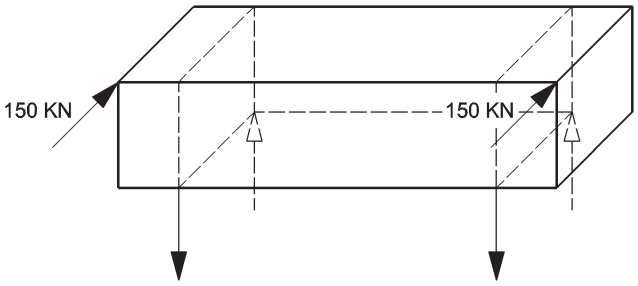
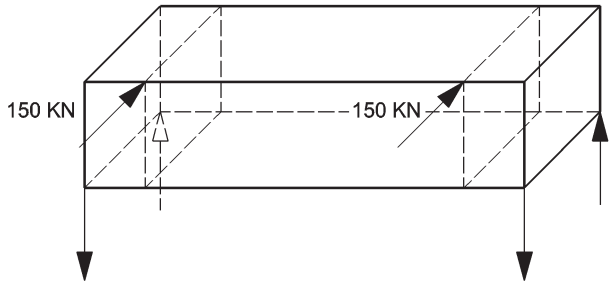
Figure No.	End elevations	Side elevations
A.11a	Rigidity (transverse) Test n° 9 Test force = 150 kN	
		End frame Forced at 45’ position (top corner fitting) and secured at 45’ position (bottom corner fitting)
A.11b		
		End frame Forced at 40’ position (top intermediate fitting) and secured at 40’ position (bottom intermediate fitting)
A11c		
		Forced at 45’ position (top corner fitting) and secured at 40’ position (bottom intermediate fitting)
A.11d		
		Forced at 40’ position (top intermediate fitting) and secured at 45’ position (bottom corner fitting)

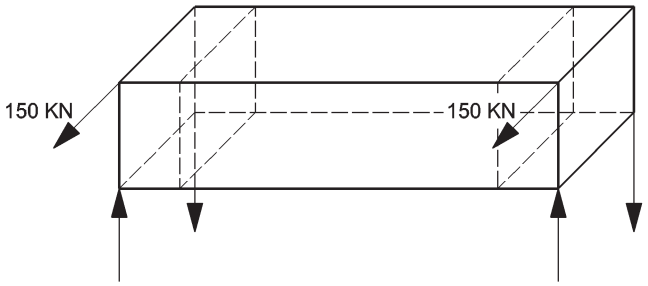
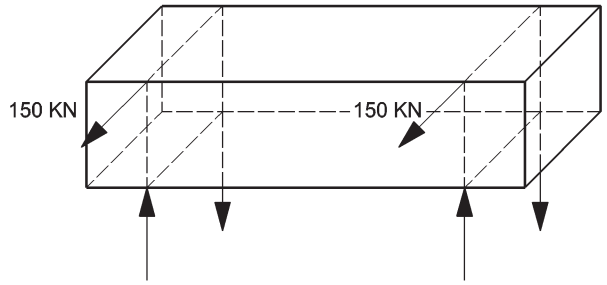
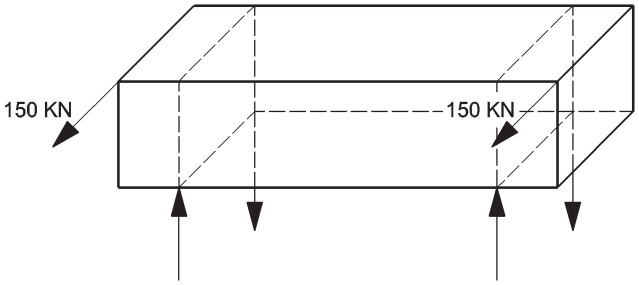
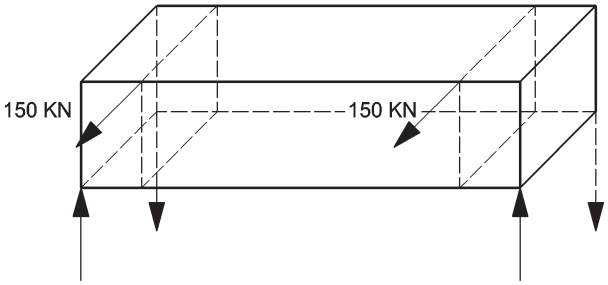
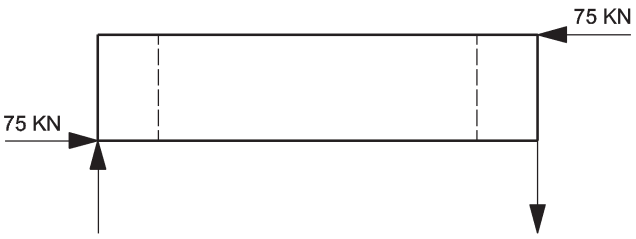
Figure No.	End elevations	Side elevations
A.12a	Rigidity (transverse) Test n° 9 Test force = 150 kN	
		Forced at 45' position (top corner fitting) and secured at 45' position (bottom corner fitting)
A.12b		
		Forced at 40' position (top intermediate fitting) and secured at 40' position (bottom intermediate 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) Test n° 10 Test force = 75 kN	

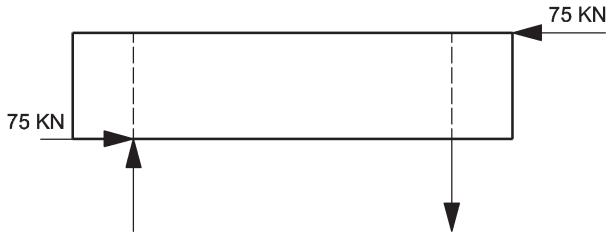
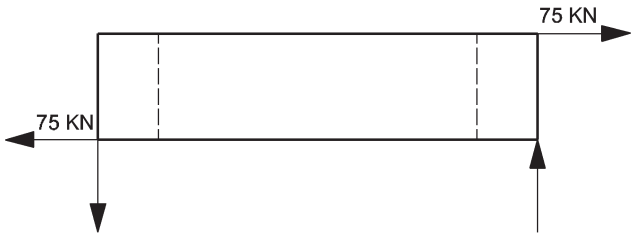
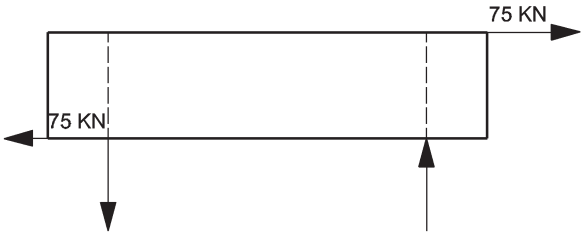
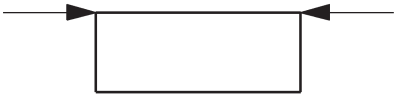
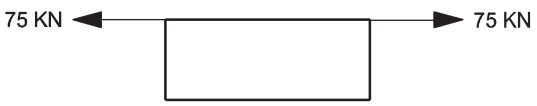
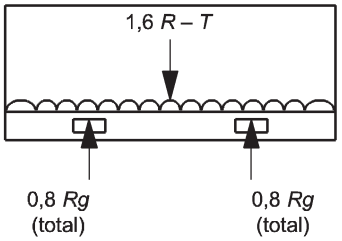
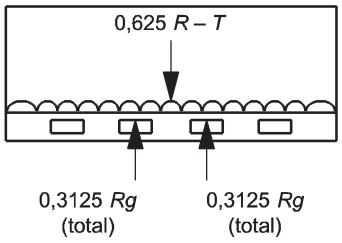
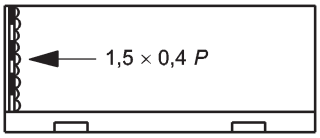
Figure No.	End elevations	Side elevations
		Forced at 45’ position (top corner fitting) and secured at 45’ position (bottom corner fitting)
A.17b		
		Forced at 45’ position (top corner fitting) and secured at 40’ position (bottom intermediate fitting)
A.18a		
		Forced at 45’ position (top corner fitting)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

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

Annex B
(normative)

Dimensions of fork-lift

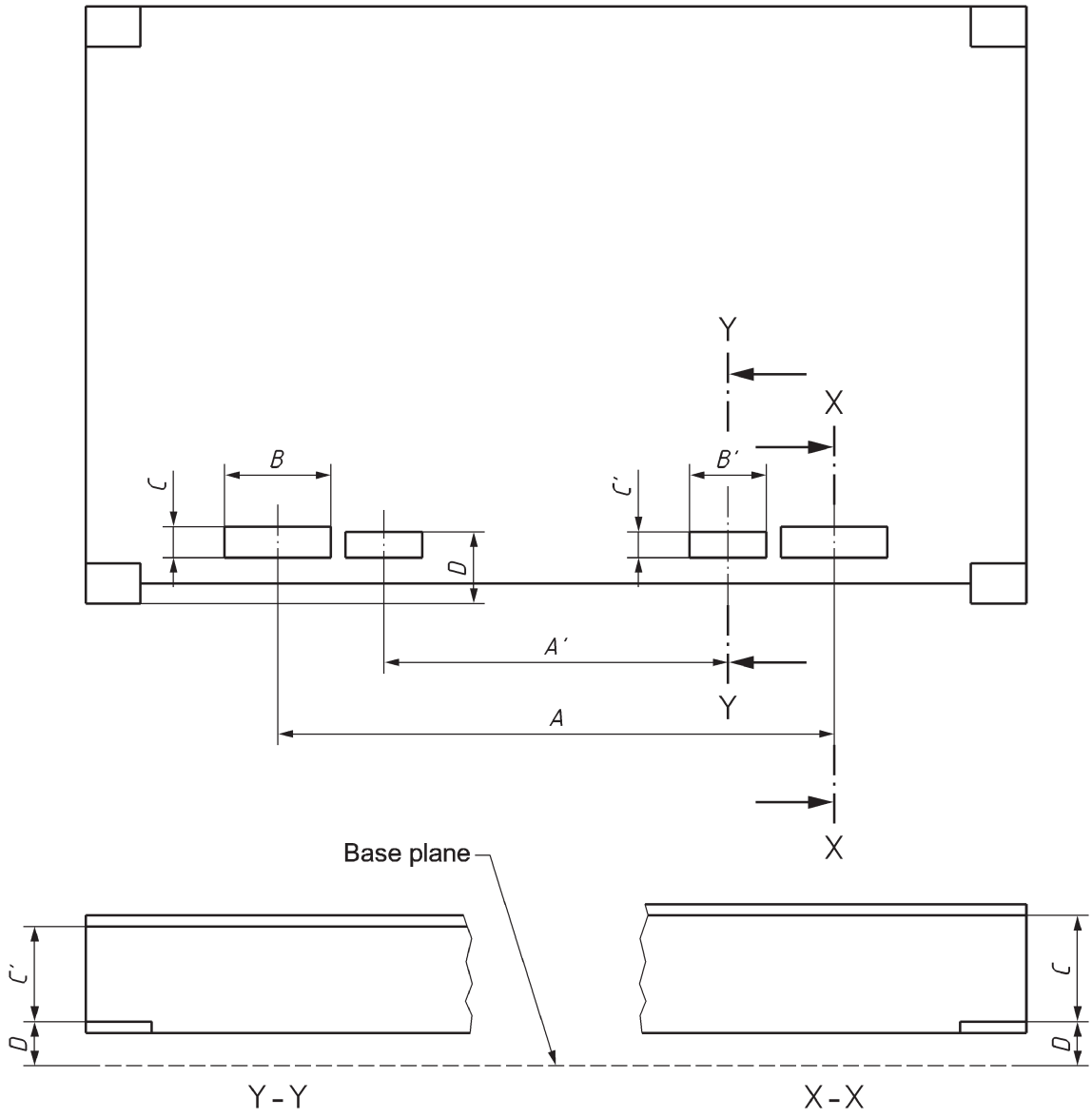


Figure B.1 — (Where provided) (see 5.8.1)

Container	Dimensions													
	Fork-lift pockets for loaded and unloaded containers								Fork-lift pockets for unloaded containers only					
	mm				in				mm			in		
	A	***B***	***C***	***D***	***A***	***B***	***C***	***D***	***A'***	***B'***	***C'***	***A'***	***B'***	***C'***
1 CC, 1 C and 1 CX	2 050 ± 50	355 min.	115 min.	20 min.	81 ± 2	14 min.	4 ½ min.	0,8 min.	900 ± 50	305 min.	102 min.	35 ½ ± 2	12 min.	4 min.
1 D and 1 DX	900 ± 50	305 min.	102 min.	20 min.	35 ½ ± 2	12 min.	4 min.	0,8 min.						
NOTE *C* = Clear opening.														

Annex C
(normative)

Cargo securing systems

(Where provided) (see 5.8.2)

C.1 General

C.1.1 A cargo securing system is designed to restrain the movement of cargo resulting from dynamic forces induced during transportation.

For general purposes containers, cargo securing devices are optional. However, when fitted, they shall comply with the requirements given in C.2.1 to C.2.6.

C.1.2 Cargo securing systems consist of:

— shoring, or

— cargo securing devices, or

— a combination of both.

C.1.3 This annex describes cargo securing devices only. They are permanent fixtures to which lashings (such as ropes, straps, chains, cables, etc.) may be attached.

Such devices are not intended for any other purpose, for example handling or securing containers.

They are either fixed, hinged or sliding eyes, rings or bars.

C.1.3.1 Anchor points are securing devices located in the base structure of the container.

C.1.3.2 Lashing points are securing devices located in any part of the container other than their base structure.

C.2 Design requirements

C.2.1 They shall not infringe on the prescribed minimum internal dimensions as specified in 4.3.

C.2.2 The typical number, N, of cargo securing devices are

a) for anchor points:

— for 1 EEE, 1 EE, 1 AAA, 1AA, 1A,1 AX and 1EE containers, N = 16

— for 1 BBB, 1BB, 1B and 1BX containers, N = 12

— for ICC, IC and ICX containers, N = 10

— for ID and IDX containers, N = 8

b) for lashing points, N is unspecified.

C.2.3 Neither anchor points nor lashing points shall obstruct the door opening dimensions as specified in 5.7.

C.2.4 Cargo securing devices shall provide, on all sides, an unobstructed access for a minimum of 50 mm from any fixed surface to allow for

— passage of the through the aperture of cargo securing devices, or

— attachment of restraint fixtures such as hooks, clips, shackles, bars, etc.

C.2.5 Each anchor point as specified in C.2.2a) and C.2.3 shall be designed and installed to provide a minimum rated load of 1 000 kg applied in any direction.

C.2.6 Each lashing point as specified in C.2.2b) shall be designed and installed to provide a minimum rated load of 500 kg applied in any direction.

C.3 Testing

C.3.1 For proof testing of cargo securing devices, a tensile force equal to 1,5 times the rated load shall be applied, using a hook or shackle having a maximum diameter of 20 mm, the base frame of the container being approximately horizontal.

For cargo-securing devices position at the floor plane along the length of the container, this test force shall be applied in a longitudinal plane and at an angle of 45° to the horizontal (see Figure C.1).

For cargo-securing devices position at the floor plane across the width of the container, this test force shall be applied in a longitudinal plane and at an angle of 45° to the horizontal (see Figure C.1).

For devices installed at the roof plane (or other extreme heights) the test angle shall be 45° downwards.

C.3.2 When containers are fitted with cargo securing devices of different types, at least one device of each type shall be tested.

C.3.3 On completion of the test, neither the cargo securing devices, nor their attachments to the container structure, nor the container structure itself shall show any permanent deformation or abnormality which will render it unsuitable for continuous service at full rated load.

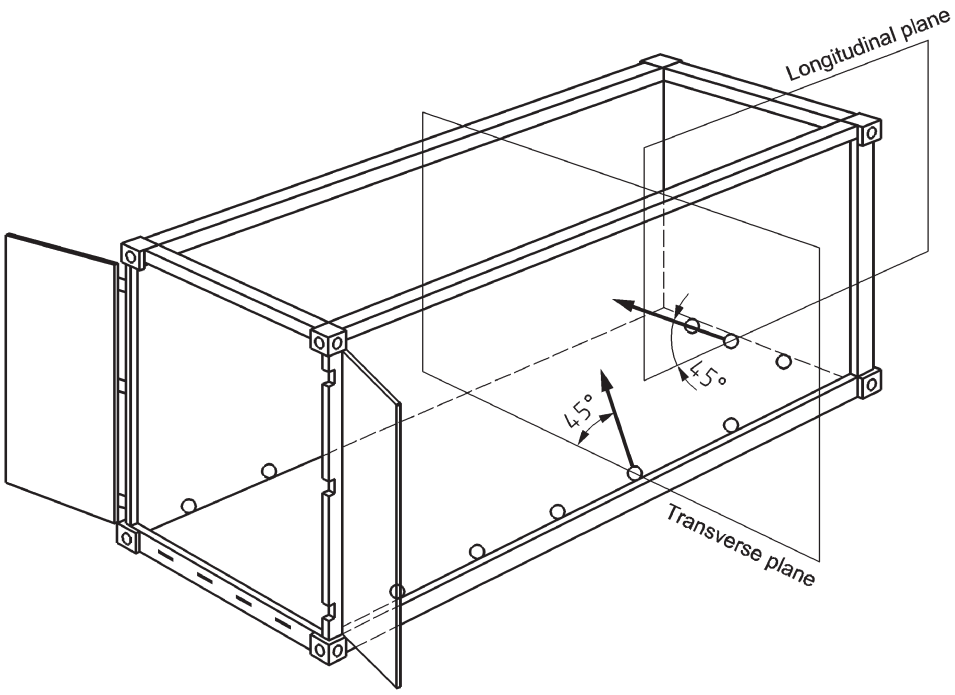


Figure C.1

Annex D
(normative)

Shoring slot system

(Where provided) (see 5.8.3)

D.1 General

D.1.1 A shoring slot system is designed to restrain the cargo from forcing the door open during sudden stops or tilts of the container during transportation. It also serves to restrain dislocated cargo to prevent it from spilling out of a container when the container's doors are opened.

D.1.2 Shoring slot systems consist of shoring slots and one or more cargo securing bars.

D.1.3 The shoring slot is a permanent fixture into which cargo securing bars or boards can be inserted and which will prevent cargo from placing loads in excess of the container's doors' design loads on the doors during sudden motion.

D.2 Design requirements

For general purpose containers the shoring slots shall comply with the requirements given in D.2.1 to D.2.6.

D.2.1 The shoring slots shall not infringe on the prescribed minimum internal dimensions as specified in 4.3.

D.2.2 There shall be a set of two shoring slots in each container located just inward of the rear doors when the doors are in the closed position such that there is a zero clearance between inserted shoring bars and the doors' inner faces. The shoring slots shall be provided at each side wall, from floor to ceiling. The shoring slot design shall provide for a clear container width of at least 2 300 mm (91,55 inches).

D.2.3 The door opening dimensions as specified in 5.7 shall not be obstructed by the shoring slots.

D.2.4 The shoring slots shall be a minimum of 51 mm wide to allow for insertion of one or more shoring bars. The shoring slot shall be fabricated to support a 0.4 *Pg* load applied in the longitudinal direction at any point in the shoring slot.

D.2.5 Supports shall be installed inside each shoring slot to support and hold the shoring bars in place horizontally. The spacing of the shoring supports, in each shoring slot, shall correspond horizontally to each other and be located at least every 380 mm (15 inches) from the floor up. For an eight foot container (a 1A, 1B or 1C container) there shall be a minimum of three (3) supports located in each slot.

D.2.6 Support bars are not part of the container. Bars used should be able to withstand a minimum force of 1 000 kgf (2 205 lbf) in any direction.

D.3 Testing

D.3.1 The shoring system slots must be tested to 1, 5 times 0,4 *P*.

D.3.2 On completion of the tests neither the shoring slots nor the container itself shall show any signs of permanent deformation or abnormality that will render it unsuitable for continuous service at full load.

Bibliography

[1] ISO 8323:1985, *Freight containers — Air/surface (intermodal) general purpose containers — Specification and tests*

ICS 55.180.10
Price based on 28 pages