
**Series 1 freight containers — Handling and
securing**

Conteneurs de la série 1 — Manutention et fixation

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[ISO 3874:1997](#)

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Contents		Page
1	Scope	1
2	Normative references	1
3	Definitions	2
4	Basic requirements	2
	4.1 General.....	2
	4.2 Packing, loading and emptying.....	3
	4.3 Stowage and securing of cargo.....	3
5	Handling	4
	5.1 Handling by specified lifting methods	4
	5.2 Handling by unspecified lifting methods.....	4
6	Specified lifting methods	4
	6.1 General.....	4
	6.2 Top lift spreaders.....	6
	6.3 Top lift sling	7
	6.4 Bottom lift sling	9
	6.5 Side lift: Method 1	10
	6.6 Side lift: Method 2.....	11
	6.7 Side lift: Method 3.....	13
	6.8 End lift: Method 1.....	13
	6.9 End lift: Method 2.....	14
	6.10 Fork lifts.....	15
7	Landing and supporting	16
8	Stacking on the ground	17
9	Securing during transport	17
	9.1 General.....	17
	9.2 Securing on board a ship.....	18
	9.3 Securing of container for road and rail transport.....	25
Annex A Bibliography		29

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3874 was prepared by Technical Committee ISO/TC 104, *Freight containers*, Subcommittee SC 1, *General purpose containers*. [ISO 3874:1997](https://standards.iso.org/iso/standards/sist/3874:1997)

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This fifth edition cancels and replaces the fourth edition (ISO 3874:1988), of which it constitutes a technical revision. It is planned that the physical and functional requirements for the securing devices will be attached as amendments to this International Standard, whereas the rationale for these requirements will be given in a type 3 Technical Report.

Annex A of this International Standard is for information only.

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Series 1 freight containers — Handling and securing

1 Scope

This International Standard specifies methods of handling and securing series 1 freight containers built and tested to comply with the latest editions of ISO 1496-1 to ISO 1496-5.

NOTE — Freight containers built according to specifications contained in earlier editions of ISO 1496 may not possess the same capabilities.

This International Standard defines basic principles and procedures to ensure safe operation of containers in all surface modes of transport.

Methods of handling and securing are described for both loaded and empty containers. The conditions for lifting different types of loaded and empty containers are laid down in clause 6.

2 Normative references

The following standards contain provisions, which, through reference in this text, constitute provisions of this International Standard. At the time of the publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 830:—¹⁾, *Freight containers — Vocabulary*.

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

ISO 1496-1:1990, *Series 1 freight containers — Specification and testing — Part 1: General cargo containers for general purposes*.

ISO 1496-2:1998, *Series 1 freight containers — Specification and testing — Part 2: Thermal containers*.

ISO 1496-3:1995, *Series 1 freight containers — Specification and testing — Part 3: Tank containers for liquids, gases and pressurized dry bulk*.

ISO 1496-4:1991, *Series 1 freight containers — Specification and testing — Part 4: Non-pressurized containers for dry bulk*.

ISO 1496-5:1991, *Series 1 freight containers — Specification and testing — Part 5: Platform and platform-based containers*.

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

1) To be published. (Revision of ISO 830:1981)

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 830 and the following apply.

3.1

empty container

container in the tare condition

3.2

loaded container

container in other than tare condition

3.3

eccentricity of the centre of gravity

longitudinal and/or lateral horizontal differences between the centre of gravity of any container (empty or loaded, with or without fittings and appliances) and the geometric centre of the diagonals of the centres of the four bottom corner fittings

3.4

mobile centre of gravity

centre of gravity of a container loaded with liquid, bulk, hanging or similar cargo which is liable to move under dynamic conditions

3.5

securing device

device used to secure containers

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NOTE — They are in direct contact with the corner fittings of the container or between the transportation means and corner fittings of the container.

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4 Basic requirements

4.1 General

Users of this International Standard should use caution regarding conditions which may place loads on the containers or on the handling or securing devices. These include deterioration of the container or devices, loosening and over-tightening of devices, slackness of cargo within containers, eccentric loading and excessive environmental conditions such as high wind, ice, wave action, etc.

NOTE — Slackness is a general term which includes shifting of cartons, shifting and settlement of bulk cargoes, liquids having a free surface, etc.

4.1.1 The requirements of all relevant national and international regulations shall be complied with.

4.1.2 The container and any equipment which may be used in its operation shall be adequately maintained.

4.1.3 Doors, lids, closures, removable or foldable parts and any loose equipment shall be properly secured.

4.1.4 All personnel engaged in handling and securing operations shall have received proper instructions, especially with regard to safety matters.

4.1.5 It is necessary to know whether the container is empty or loaded; unless otherwise ascertained, a container shall be treated as loaded.

4.1.6 Strong winds and other environmental conditions can have an effect on handling equipment and additional care shall be taken when operating in such conditions.

4.2 Packing, loading and emptying

4.2.1 When a cargo is packed, loaded, and secured where necessary, this shall be carried out in accordance with good and recommended practices so that the cargo does not impose on the container forces in the excess of those for which it has been designed and so that the fundamental requirements specified in 4.2.2 to 4.2.4 are complied with.

4.2.2 The equipment used for loading and emptying the container shall only impose loads which are not in excess of those for which the container was designed.

4.2.3 The total mass of all items packed and loaded into the container, including dunnage, securing equipment and similar equipment, shall not exceed the maximum permitted payload, i.e. the maximum permissible operating gross mass minus the tare.

4.2.4 The cargo shall be distributed throughout the container to ensure that the centre of gravity is kept as central and as low as possible

- to avoid excessive tilting;
- to avoid overstressing either the container or the handling equipment;
- to avoid unacceptable vehicle axle loading;
- to avoid lack of vehicle stability;
- to avoid unacceptable load concentrations.

Eccentricity of the centre of gravity for the loaded container varies with the distribution of load within the container; designers of containers and handling equipment should take this fact into account. As an example, when 60 % of the load by mass is distributed in 50 % of the container length measured from one end (see figure 1), the eccentricity corresponds to 5 %.

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4.3 Stowage and securing of cargo

The cargo shall be stowed and secured to prevent damage which might otherwise result from dynamic conditions encountered during handling and transportation.

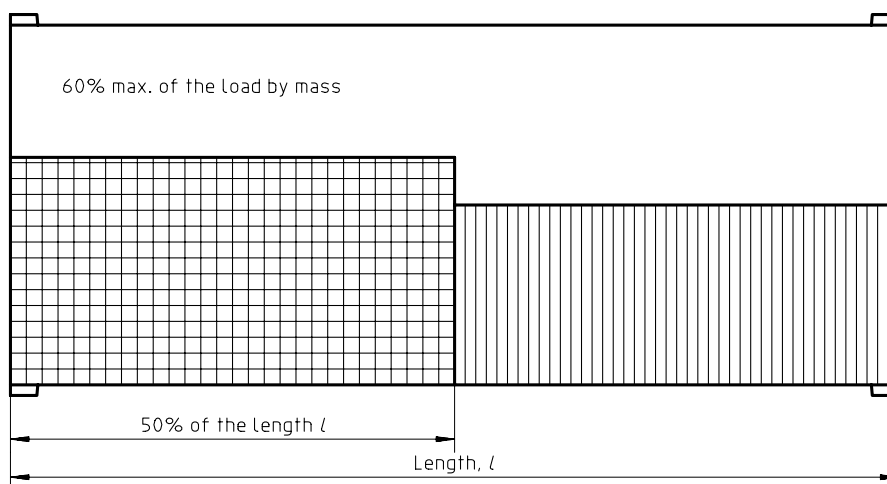


Figure 1 — Load distribution

5 Handling

5.1 Handling by specified lifting methods

(See clause 6.)

5.1.1 Care shall be taken to ensure that the equipment used is suitable for the load and is safely attached to the container and that the container is free to be handled.

5.1.2 In the case of a single-point lift, special attention should be paid to the risk of the container tilting owing to eccentricity of the centre of gravity.

5.1.3 Care shall be taken when lifting a container whose centre of gravity is mobile or eccentric, e.g. a tank container, a bulk container, a container with a liquid bulk bag, a container with hanging cargo or a thermal container with a refrigerating unit (integral or clip-on).

5.2 Handling by unspecified lifting methods

Containers may be handled by methods other than those specified in clause 6 but only after careful evaluation of the equipment by means of which the container is to be handled and of the methods of operation envisaged, with respect to international container standards.

6 Specified lifting methods

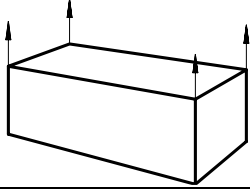
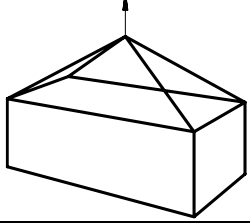
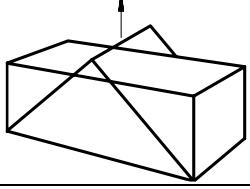
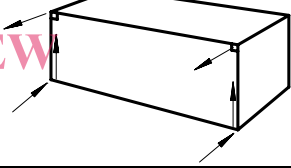
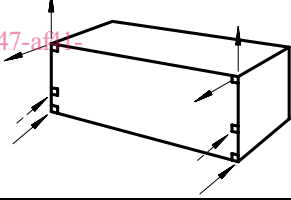
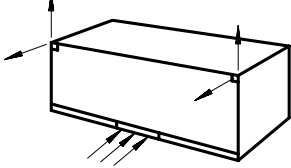
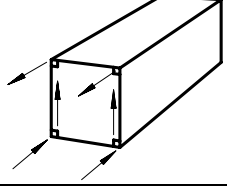
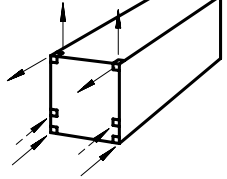
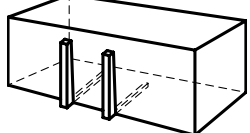
6.1 General

6.1.1 The lifting methods specified in 6.2 to 6.10 are summarized in table 1.

6.1.2 The headings "Allowed" and "Not allowed" used in tables 3 to 5 and tables 7 to 12 refer to the specified lifting methods applied to differing types and sizes of containers and take into account the stresses on containers of differing types of design, their loads, where applicable, and the safety of the operation.

NOTE — There could be exceptions in cases when combinations of container types, size, load, design and operating condition could not be taken into account in tables 3 to 5 and tables 7 to 12. Such situations should be carefully evaluated by those competent to do so in order to decide whether a safe and satisfactory operation can be ensured. An explanation of the size designations referred to in tables 3 to 12 is given in table 2.

Table 1 — Summary of specified lifting methods

Subclause	Description	Illustration
6.2	Top lift spreader	
6.3	Top lift sling	
6.4	Bottom lift sling	
6.5	Side lift : method 1	
6.6	Side lift : method 2	
6.7	Side lift : method 3	
6.8	End lift : method 1	
6.9	End lift : method 2	
6.10	Fork-lift	

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Table 2 — Size designations referred to in tables 3 to 12

Nominal length		External height			
m	ft	< 2 438 mm (8 ft 0 in)	2 438 mm (8 ft 0 in)	2 591 mm (8 ft 6 in)	2 896 mm (9 ft 6 in)
12	40	1AX	1A	1AA	1AAA
9	30	1BX	1B	1BB	1BBB
6	20	1CX	1C	1CC	-
3	10	1DX	1D	-	-

NOTE — All units have a nominal width of 2 438 mm (8 ft 0 in).

6.2 Top lift spreaders

See figure 2.

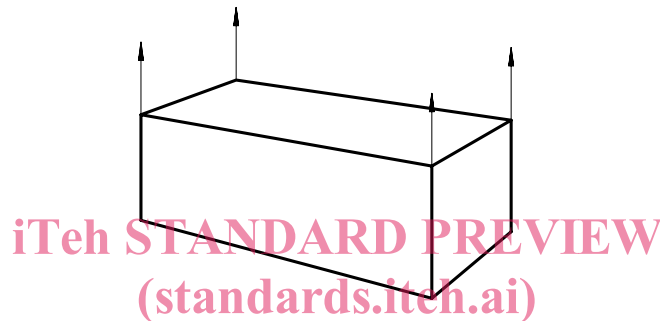


Figure 2 — Lifting by means of a top lift spreader

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- 6.2.1 The container is lifted by means of a spreader designed to lift containers by the top apertures of the four top corner fittings, the lifting forces being applied vertically.
- 6.2.2 Lifting devices shall be properly engaged. Gathering devices shall impinge on corner fittings only.
- 6.2.3 The applicability of top lift spreaders is given in table 3.
- 6.2.4 Folding platform-based containers (codes PL and PC; see ISO 6346), when empty and in the folded condition, may be handled in interlocked piles. The total mass of the pile shall not exceed the maximum gross mass (rating) according to ISO 668.

Table 3 — Applicability of top lift spreaders

Key : Allowed Not allowed (or not applicable)

Empty container													Container type	ISO 6346	Loaded container												
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX			AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX
													General purpose	GP,VH													
													Open top	UT													
													Bulk: non-pressurized/box	BU													
													Thermal	RE,RT RS													
													Tank for liquids and gases	TN,TD TG													
													Bulk: non-pressurized/hopper pressurized	BK													
													Platform	PL				1)			1)			1)		1)	
													Platform -based	complete and fixed ends	PF												
														fixed free standing posts	PF												
														complete and folding ends, erected condition	PC												
														folding free standing posts, erected condition	PC												
														complete and folding ends, folded condition	PC												
														folding free standing posts, folded condition	PC												
													Platform-based with complete superstructure and open-sided	PS													

1) Top lift possible with extensions only.

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6.3 Top lift sling

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See figure 3.

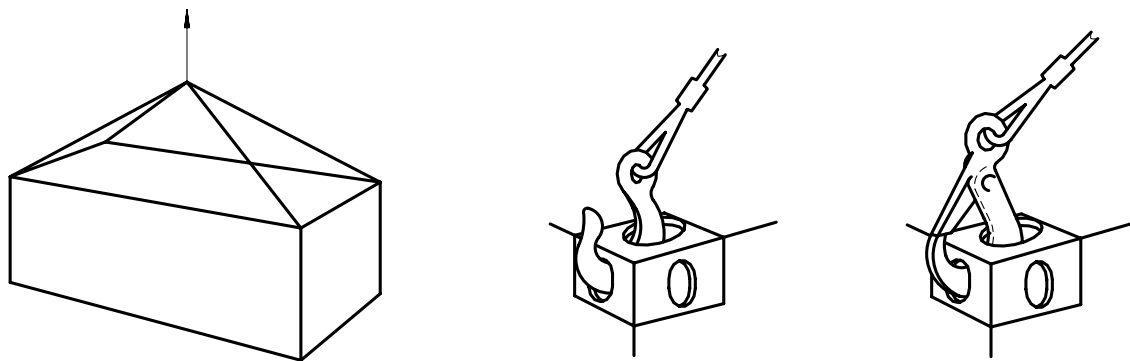


Figure 3 — Lifting by means of a top lift sling

6.3.1 The container is lifted by all four top corner fittings with forces applied other than vertically.

6.3.2 Lifting devices shall be properly engaged. Hooks shall always be placed in an inward to outward direction.

6.3.3 The applicability of top lift slings is given in table 4.

6.3.4 Folding platform-based containers (codes PL and PC; see ISO 6346), when empty and in the folded condition, may be handled in interlocked piles. The total mass of the pile shall not exceed the maximum gross mass (rating) according to ISO 668.

Table 4 — Applicability of top slings

Key : Allowed Not allowed (or not applicable)

Empty container													Container type	ISO 6346	Loaded container													
AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX			AAA	AA	A	AX	BBB	BB	B	BX	CC	C	CX	D	DX	
													General purpose	GP,VH												2)		
													Open top	UT												2)	2)	
													Bulk: non-pressurized/box	BU												2)	2)	
1)	1)	1)		1)	1)	1)		1)	1)		1)		Thermal	RE,RT RS												2)		
													Tank for liquids and gases	TN,TD TG												2)	2)	
													Bulk: non-pressurized/hopper pressurized	BK												2)	2)	
													Platform	PL														
													Platform-based	complete and fixed ends	PF													
														fixed free standing posts	PF													
														complete and folding ends, erected condition	PC													
														folding free standing posts, erected condition	PC													
														complete and folding ends, folded condition	PC													
														folding free standing posts, folded condition	PC													
													Platform-based with complete superstructure and open-sided	PS														

- 1) Centre of gravity may be eccentric.
- 2) For 1D and 1DX containers, the lifting forces shall be applied at an angle not less than 60° to the horizontal, see figure 4.

NOTE — Centre of gravity may be mobile, e.g. liquid, bulk or hanging loads.

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Dimensions in metres

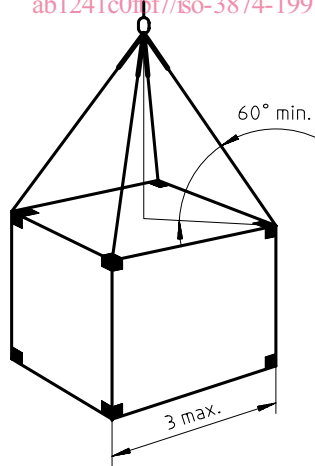


Figure 4 — Application of lifting forces (1D and 1DX containers)