

INTERNATIONAL  
STANDARD

ISO  
1496-4

Second edition

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

Part 4:

**Non-pressurized containers for dry  
bulk**

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ISO 1496-4

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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 document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 104, *Freight containers*, Sub-Committee SC 2, *Specific purpose containers*.

This second edition cancels and replaces the first edition (ISO 1496-4:1991), which has been technically revised.

The main changes are as follows:

- ensure that the main structural tests are consistent with those described in ISO 1496-1;
- introduce testing for box-type bulk containers with bottom discharge;
- reflect the forces on end and side walls when the freight container is being discharged by tipping or rotating;
- ensure that the freight container can operate correctly and safely when fully packed with a bulk cargo.

A list of all parts in the ISO 1496 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document replaces the first edition published in 1991 and brings it into line with other parts of this document including Part 1 which provides information on those tests that are consistent for all freight containers.

Freight containers built to transport non-pressurised bulk cargoes are considered to be special and therefore not produced in large numbers, and often, freight containers built to meet the requirements of ISO 1496-1 are used in their place. However, when the bulk cargo is classified as a dangerous cargo as identified in the United Nations' Recommendations on the Transport of Dangerous Goods - Model Regulations,<sup>[2]</sup> such cargoes must be transported in a bulk container as described in [6.8](#) of those regulations.

A freight container built and tested according to this document are deemed to meet with the requirements for a BK1 or a BK2 bulk container as described in the Recommendations on the transport of Dangerous Goods – Model Regulations.<sup>[2]</sup> To fully meet these requirements the container will need to be:

- rendered siftproof, either by design or by the addition of a siftproof liner,
- fitted with suitable securing means for service equipment required for packing and unpacking.

Containers to be used for the carriage of dangerous goods can be subject to additional international and national requirements as applied by competent authorities.

Freight containers constructed in accordance with ISO 1496-1 may be used for the transport certain non-packed dry bulk solids only if the end walls are strengthened to meet the test requirements of this document and care be taken to ensure that the design loadings are shall not exceeded under operating conditions.

Bulk cargoes that comprise of large particles that have a density greater than 1 200 kg/m<sup>3</sup> and/or are angular can damage the floor structure if dropped from the height of the roof or higher. Such cargoes require additional strengthening to the floor and/or base structure.

The forces involved with packing dry bulk containers are associated with the container being fully horizontal or inclined to a certain degree as stated in the IMO / ILO / UN ECE Code of Practice for packing cargo transport units (CTU Code).<sup>[3]</sup> Containers tested to this document are not designed for packing with the rear end significantly inclined or at 90° to the horizontal.

The marking requirements for these containers need to be in accordance with the principles embodied in ISO 6346.

# Series 1 freight containers — Specification and testing —

## Part 4: Non-pressurized containers for dry bulk

### 1 Scope

This document specifies the basic specifications and testing requirements for series 1 freight containers of the dry bulk container non-pressurized type which are suitable for international exchange and for conveyance by road, rail and sea, including interchange between these forms of transport.

As the density and flow characteristics of dry bulk cargoes vary widely, containers conforming to this document are not expected to be suitable for the carriage of all such cargoes. Therefore, except where otherwise stated, the requirements of this document are minimum requirements.

The container types covered by this document are given in [Table 1](#).

This document does not apply to BK3 flexible bulk containers.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 668:2020, *Series 1 freight containers — Classification, dimensions and ratings*

ISO 830, *Freight containers — Vocabulary*

ISO 1161, *Series 1 freight containers — Corner and intermediate fittings — Specifications*

ISO 1496-1:2013/Amd 1:2016, *Series 1 freight containers — Specification and testing — Part 1: General cargo containers for general purposes*

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

ISO 17712, *Freight containers — Mechanical seals*

EN 13374, *Temporary edge protection*

### 3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

**3.1**  
**dry bulk cargo - non-pressurised, box type**  
container for the transport of dry bulk solids, capable of withstanding the loads resulting from filling, transport motions and discharging of non-packaged dry bulk solids, having filling and discharge apertures and fittings and complying with the requirements of this document

Note 1 to entry: Dry bulk cargo is also known as dry bulk container.

Note 2 to entry: Dry bulk containers are referred to as containers in this document.

**3.1.1**  
**box type 1**  
dry bulk non-pressurized container for tipping discharge having a parallelepiped/ cargo space and a door opening at least at one end

Note 1 to entry: It may also be used as a general-purpose freight container.

**3.1.2**  
**box type 2**  
dry bulk non-pressurized container for tipping discharge having a parallelepiped cargo space with a door opening in either ends or fitted with one or more access hatches

Note 1 to entry: It cannot be used as a general-purpose freight container.

**3.1.3**  
**hopper type**  
dry bulk non-pressurized container for horizontal or vertical discharge without tipping and having no door opening

Note 1 to entry: It may not be used as a general-purpose freight container.

**3.1.4**  
**bottom discharge type**  
dry bulk non-pressurised container for vertical discharge having no door opening

Note 1 to entry: It may not be used as a general-purpose freight container.

**3.2**  
**dry bulk solids**  
assemblies of separate solid particles normally substantially in contact with one another which are, or which may be rendered, capable of fluid flow

**3.3**  
**openings for cargo loading**  
openings provided in a container for the filling of dry bulk solids

**3.4**  
**openings for cargo discharging**  
openings provided in a container for the discharge of dry bulk solids

**3.5**  
**interface for external fumigation equipment**  
point(s) at which the connection between the container and any external fumigation equipment is connected or disconnected

**3.6**  
**dangerous goods**  
substances classified as dangerous by the United Nations committee of experts on the transport of dangerous goods or by the *competent authority* (3.7)



**3.7****competent authority**

authority or authorities designated as such in each country or in each specified case by the governments concerned, for the approval of dry bulk containers

**3.8****bulk density**

mass per unit volume of a dry bulk solid measured when the dry bulk solid is in a loose or non-compacted condition

**3.9****cargo space**

space bounded by the container walls or shell when all apertures are closed

**3.10****access hatch**

personnel access hatch set into a wall or the roof

**3.11****BK1**

sheeted and open top bulk container with rigid bottom (including hopper-type bottom), side and end walls and a non-rigid covering

[SOURCE: Recommendations on the Transport of Dangerous Goods - Model Regulations, United Nations<sup>[2]</sup>]

**3.12****BK2**

totally closed bulk container with a rigid roof, sidewalls, end and floor walls (including hopper-type bottom)

Note 1 to entry: BK2 includes bulk containers with an opening roof, side or end wall that can be closed during transport. Closed bulk containers may be equipped with openings to allow for the exchange of vapour and gases with air and which prevent under normal conditions of transport the release of solid contents as well as the penetration of rain and splash water.

[SOURCE: Recommendations on the Transport of Dangerous Goods - Model Regulations, United Nations<sup>[2]</sup>]

**3.13****BK3**

flexible bulk container with a capacity not exceeding 15 m<sup>3</sup>

Note 1 to entry: BK3 includes liners, attached handling devices and service equipment.

[SOURCE: Recommendations on the Transport of Dangerous Goods - Model Regulations, United Nations<sup>[2]</sup>]

**3.14****siftproof**

impermeable to dry contents including fine solid materials produced during transport

Note 1 to entry: Where a liner is used to make the container sift proof, it shall be made of a suitable material. The strength of the material used for, and the construction of, the liner shall be appropriate to the capacity of the container and its intended use. Joins enclosures of the liner shall withstand pressures and impacts liable to occur under normal conditions of handling and transport. For ventilated bulk containers, any liner shall not impair the operation of ventilating devices.

[SOURCE: Recommendations on the Transport of Dangerous Goods - Model Regulations, United Nations<sup>[2]</sup>]

**3.15**

**arching**

tendency of some solids when transported in bulk to form an arch of material clinging to the roof of a bulk container in the shape of an arch especially during discharge

Note 1 to entry: The process is likely to cause instability in the cargo.

**3.16**

**bridging**

tendency of some solids when transported in bulk to form a bridge of material clinging to a bulk container as if a bridge especially during discharge

Note 1 to entry: The process is likely to cause instability in the cargo.

**3.17**

**rat-holing**

tendency of flows of air or other gases to form enclosed channels through the substance especially during discharge

Note 1 to entry: The process can cause instability in the cargo.

**3.18**

**surge**

tendency of substances to start moving suddenly especially during discharge

Note 1 to entry: The process can cause instability in the load.

**4 Dimensions and ratings** (standards.iteh.ai)

**4.1 External dimensions**

ISO 1496-4

The overall external dimensions and tolerances of the freight containers covered by this document shall be in accordance with ISO 668. 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, box type containers with full access rear doors shall have a minimum internal width of 2 330 mm. This dimension applies when measured at a temperature of 20 °C.

Measurements taken at other temperatures shall be adjusted accordingly.

**4.3 Ratings**

The values of the rating *R*, being the maximum gross mass of the container, shall be those specified in ISO 668.

## 5 Design requirements

### 5.1 General

**Table 1 — Container types (in accordance with ISO 6346:2022, Table E.1)**

Code	Type designation	Type group code
B	Dry bulk cargo - non-pressurised, box type	BU
N	Pressurised and non-pressurised tank container (dry)	
	Hopper type	NH
	Non-pressurised tank	NN

This document includes all container types shown in [Table 1](#) and shall be capable of fulfilling the following requirements.

**5.1.1** The strength requirements for containers are given in ISO 1496-1 (these requirements are applicable to all bulk containers except where otherwise stated). They apply to containers as complete units, except as described in [6.1](#).

**5.1.2** The strength requirements for corner fittings (see also [5.2](#)) shall be in accordance with ISO 1161.

**5.1.3** 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 ISO 1496-1 and demonstrated by those additional tests described in [Clause 6](#) shall not be exceeded in any mode of operation.

**5.1.4** Any closure in a container which, if unsecured, can lead to an unsafe situation, shall be provided with an adequate securing system. Each securing system shall, in so far as is practicable, external indication of the positive securement of that closure in the appropriate operating position.

In particular, doors and closures for openings for cargo loading or openings for cargo discharging shall be capable of being securely fastened in the open or closed position.

The closures of bulk containers shall be such that they remain effective during testing and operations and dynamic movement of the bulk solid due to its bulk density, drop height, the friability of the substance or to arching, bridging, rat-holing, surge or any other similar effect.

**5.1.5** Any removable roof or roof section (not including hinged hatches) 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 the roof is secured.

**5.1.6** All closed containers and all open containers fitted with covers which were designed for them shall be weatherproof as required by test no. 12 (see [6.1.5.12](#)).

**5.1.7** Bulk containers shall be capable of being secured to the satisfaction of customs authorities, for example, in order to conform to the TIR convention.<sup>[5]</sup>

### 5.2 Corner fittings

All containers shall be equipped with top and bottom corner fittings according to ISO 1161. 1EEE and 1EE units shall also have intermediate fittings in the 1AAA/1AA/1A position according to ISO 668.

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 top part of the container, e.g. the level of the top of the closure of a cargo-loading opening.

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 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 1D and 1DX as defined in ISO 668, shall 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 375 mm wide zones defined by the broken lines in ISO 668:2020, Figure B.1.

**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  $12,5 \text{ mm} \begin{smallmatrix} +5 \\ -1,5 \end{smallmatrix}$  mm above the plane of the lower faces of the bottom corner fittings of the container (base plane).

Apart from the bottom corner fittings and bottom side rail, 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 470 mm from the side faces of the bottom corner fittings, and their lower faces shall be at least 5 mm above the base plane 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 [5.10.1](#).

**5.3.2.4** Containers having all their intermediate transverse members spaced 1 000 mm apart or less (or having a flat underside) shall be deemed to conform to these requirements.

**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 ISO 668:2020, Annex B.

**5.3.3** For 1D and 1DX containers, the level of the underside of the base structure is not specified, except insofar 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  $1,8 R$ , and when the container is supported at the corner fittings, 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** 1EEE and 1EE units shall have recesses longitudinally outboard of each of their fittings in the 1AAA/1AA/1A positions. These recesses shall extend vertically to permit full access to the outboard aperture of the fittings in the 1AAA/1AA/1A position, shall extend longitudinally from the longitudinal outward faces of the fittings in the 1AAA/1AA/1A position outboard, to not less than 150 mm from the outboard face (251 mm from the centrelines of the bottom apertures) of the fittings in the