INTERNATIONAL STANDARD

ISO 4118

Third edition
2005-10-15

Air cargo — Non-certified containers for the lower deck of large-capacity aircraft — Specification and testing

Fret aérien — Conteneurs non certifiés de pont inférieur d'aéronefs gros porteurs — Spécifications et essais

Reference number
ISO 4118:2005(E)

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

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 4118 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 9, *Air cargo and ground equipment*.

This third edition cancels and replaces the second edition (ISO 4118:1996), of which it constitutes a technical revision. It also incorporates Technical Corrigendum ISO 4118:1996/Cor.1:1999.

Introduction

Throughout this International Standard, the minimum essential criteria are identified by use of the key word “shall”. Recommended criteria are identified by use of the key word “should” and, while not mandatory, are considered to be of primary importance in providing safe, economical and practical air transport containers. Deviation from recommended criteria should only occur after careful consideration and thorough service evaluation have shown alternative methods to provide an equivalent level of safety.

Air cargo — Non-certified containers for the lower deck of large-capacity aircraft — Specification and testing

1 Scope

This International Standard specifies the requirements for lower-deck containers in large-capacity aircraft which do not require airworthiness certification when loaded under the conditions of compartment restraint and/or, where applicable according to aircraft type, ISO 8097 (NAS 3610) equivalent base-plate restraint.

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 4116, *Air cargo equipment — Ground equipment requirements for compatibility with aircraft unit load devices*

ISO 8097:2001, *Aircraft — Minimum airworthiness requirements and test conditions for certified air cargo unit load devices* (endorsement of NAS 3610, tenth edition)

ISO 11242, *Aircraft — Pressure equalization requirements for cargo containers*

Federal Aviation Regulations (FAR) 14CFR Part 25, *Airworthiness standards: Transport category airplanes, Section 25.853, Compartment interiors* [1)]

European Aviation Safety Agency CS-25, *Certification Specifications for Large Aeroplanes* [2)]

NOTE Informative references are given in the Bibliography.

3 Dimensions and ratings

External contours, dimensions and ratings of applicable containers are shown in Table 1.

---

1) FAR Part 25 constitute the USA government's transport aircraft airworthiness regulations, and can be obtained from the following address:

US Government Printing Office, Mail Stop SSOP, Washington DC 20402-9328, USA.

2) EASA CS-25 constitute the European governments' transport aircraft airworthiness regulations, and can be obtained from the following address:

European Aviation Safety Agency (EASA), Postfach 101253, D-50452 Cologne, Germany.

They are also available from its website: www.easa.eu.int.

Table 1 — Ratings and contour dimensions of non-certified containers

Name of container and nominal dimensions mm (in)	Rating (maximum gross mass) kg (lb) [a]	Contours and external dimensions	IATA identification code (according to IATA 40/1) [b]
Half-width contoured container, 2 337 mm (92 in) wide, with base dimensions 1 534 mm × 1 562 mm (60,4 in × 61,5 in)	1 588 kg (3 500 lb)	Annex A	DKC
Half-width contoured container, 2 007 mm (79 in) wide, with base dimensions 1 534 mm × 1 562 mm (60,4 in × 61,5 in)	1 588 kg (3 500 lb)	Annex B	DKE/DKN
Half-width rectangular container, with base dimensions 1 534 mm × 1 562 mm (60,4 in × 61,5 in)	1 588 kg (3 500 lb)	Annex C	DKP
Full-width contoured container, 4 064 mm (160 in) wide, with base dimensions 1 534 mm × 3 175 mm (60,4 in × 125 in)	3 175 kg (7 000 lb)	Annex D	DLF
Full-width rectangular container, with base dimensions 1 534 mm × 3 175 mm (60,4 in × 125 in)	3 175 kg (7 000 lb)	Annex E	DLP
Half-width contoured container, 1 562 mm (61,5 in) wide, with base dimensions 1 534 mm × 1 194 mm (60,4 in × 47 in)	1 225 kg (2 700 lb)	Annex F	DPE/DPN
Full-width contoured container, 3 175 mm (125 in) wide, with base dimensions 1 534 mm × 2 438 mm (60,4 in × 96 in)	2 449 kg (5 400 lb)	Annex G	DQF
Full-width rectangular container, with base dimensions 1 534 mm × 2 438 mm (60,4 in × 96 in)	2 449 kg (5 400 lb)	Annex H	DQP
Full-width contoured container, 4 064 mm (160 in) wide, with base dimensions 2 235 mm × 3 175 mm (88 in × 125 in)	4 627 kg (10 200 lb)	Annex I	DAF
Full-width contoured container, 4 064 mm (160 in) wide, with base dimensions 2 438 mm × 3 175 mm (96 in × 125 in)	5 103 kg (11 250 lb)	Annex J	DMF
Low-height, full-width contoured container, 2 438 mm (96 in) wide, with base dimensions 1 534 mm × 1 562 mm (60,4 in × 61,5 in)	1 134 kg (2 500 lb)	Annex K	DKH
Low-height, half-width contoured container, 2 007 mm (79 in) wide, with base dimensions 1 534 mm × 1 562 mm (60,4 in × 61,5 in)	1 134 kg (2 500 lb)	Annex L	DKG

[a] Actual maximum gross mass shall comply with the aircraft's Weight and Balance Manual.

[b] Carriage of non-certified containers in any cargo compartment must be allowed by each individual aircraft type's Weight and Balance Manual.

4 Design requirements

4.1 General

4.1.1 Non-certified lower-deck containers for aircraft shall meet the requirements of this International Standard and those of the manufacturer of the aircraft on which they will be loaded.

4.1.2 Provisions should be made for closing and sealing the container to meet customs clearance and security requirements.

4.1.3 The basic container shall consist of a complete enclosure (base, top, four sides) with door.

4.1.4 The structure shall be designed to provide the maximum usable internal volume available within the limits of structural design, including door.

4.1.5 The tare of the container shall be kept to a minimum, consistent with the requirements and within the limits of sound design practice.

4.1.6 If required, means of fork-lifting the container shall be provided in accordance with the appropriate annexes.

4.1.7 Stacking capability is not required.

4.1.8 Robustness, reliability and maintainability shall be major factors in the design, commensurate with planned service life.

4.1.9 The materials and processes used in the construction shall be capable of withstanding extremely hard usage for a cost-related life. Materials shall be suitably sealed against liquid absorption to ensure no deterioration in strength under normal environmental conditions.

4.1.10 The materials used shall be fire-resistant, in accordance with appropriate regulatory requirements. Refer to FAR 25.853 or CS-25.853.

4.1.11 No surfaces or edges shall present sharp or rough edges potentially injurious to personnel or cargo.

4.1.12 Insofar as atmospheric conditions may affect the performance of the container or any part thereof, it should be taken into account that during transportation, these conditions range from +70 °C to –54 °C (+160 °F to –65 °F) in temperature, with relative humidity from 20 % to 85 %. These are the mean temperature and humidity figures worldwide without taking into account extremes in temperature such as those experienced in arctic, sub-polar, or desert regions. This, however, is not a test requirement.

4.1.13 Component parts shall be replaceable by interchange with new or repaired ones. Panel assemblies should be replaceable by interchange with new or repaired ones.

4.2 Base construction

4.2.1 The base shall be smooth and free from rough or sharp edges which may be hazardous to personnel, cargo, airplane, ramp, and terminal handling equipment. The base shall be structurally attached to, and an integral part of, the container assembly. The construction shall be designed for strength and durability to withstand harsh treatment during its service life. It shall have a high resistance to impact and wear. Where attachment of the container body to the base is required, this shall be accomplished by the use of normal hand tools.

4.2.2 Care shall be exercised in the design and construction of the base to ensure that flatness of the lower surface and edge members can be maintained in service and is of adequate strength to minimize bowing and to facilitate conveyance.

4.2.3 All base edges, corners, and restraint space shall have dimensions as shown in Figures 1 and 1A.

4.2.4 The base design shall provide support and ease of movement at the equally distributed rating on minimum conveyor systems as defined in ISO 4116.

4.2.5 Where optional forklift capability is provided, the minimum forklift entry size should be 102 mm (4 in) high by 305 mm (12 in) wide, with chamfered protected edges.

4.2.6 Where provided, there shall be forklift entries at least on the two long sides, although three-way entry is preferred on K-size and P-size units.

4.2.7 On L-size units, the distance between the inner edges of the optional forklift entries shall be not less than 813 mm (32 in), and on K-size units not less than 355 mm (14 in).

4.2.8 The optional base forklift tine entry and separation should be designed so that the base panel of the unit imparts no more than 9 550 N/m^2 (200 lbf/ft^2) to the supporting conveyor systems.

4.3 Body construction

4.3.1 It is essential that the container integrity be maintained throughout its transportation because the container interfaces directly with the aircraft system. Imposed loads shall be sustained by the base and the body. The materials and methods of construction must, therefore, be adequate for this task.

4.3.2 The sides, roof, and door(s) shall be of a minimum weight commensurate with maximum stability during both ground handling and air transportation.

4.3.3 Access for loading is generally required on one or both longer sides, although positions may vary to suit individual requirements.

4.3.4 The roof shall be flush, such that any protrusions do not cause damage in contact with the aircraft's cargo compartment ceiling. The top of the container shall be self-draining and designed for easy snow removal.

4.3.5 There shall be no intrusions between the base edges, as defined in Figures 1 and 1A base details typical for all edges, and the container body within a depth of 28 mm (1,12 in) from the base edges.

4.3.6 Two flush handles or straps shall be located on each panel side for manual movement handling of the container. Each handle shall provide space suitable for gripping with a gloved hand, and shall be able to withstand a 445 daN (1 000 lbf) pull in any direction.

4.3.7 To facilitate repair and assembly, component parts shall be readily removable with hand tools and shall be interchangeable.

4.3.8 Any gussets in the door opening shall be of minimum size, consistent with the strength and/or deflection requirements.

4.3.9 The minimum height dimension of the unit load device shall be 1 600 mm (63 in) for standard height containers and 1 118 mm (44 in) for low height containers.

4.4 Doors

4.4.1 Doors shall be designed to avoid finger-pinching hazards and be of sufficient strength to contain load during air and ground transportation.

4.4.2 The door(s) shall have a minimum number of securing devices to sustain the handling loads at maximum gross mass without unlocking. These devices are required to secure the door(s) in a positive position. They should be so located that they cannot damage, or become damaged by, an adjacent container. No tools shall be required to operate the door(s) or the securing devices.

4.4.3 Positive means should be considered to restrain the door(s) in the open position.

4.4.4 Handles, straps or hand holds shall be provided on each door for handling the door and for manual movement of the container. These devices shall be able to withstand a 445 daN (1 000 lbf) pull in any direction. They shall provide an area equivalent to 152 mm (6 in) wide by 76 mm (3 in) deep for gripping with a gloved hand. They shall be designed so they can cause no damage to adjacent units.

4.5 Tie-down fittings

Provision may be made for internal securing of the load, such as ring tie-down fittings and/or seat-track fittings, these being preferably attached to the base at the corners. Each tie-down fitting shall be capable of supporting a 890 daN (2 000 lbf) load in any direction.

4.6 Placard holders

4.6.1 One or more placard holders to accept destination placards of standard size A5 [i.e. 210 mm × 148 mm (8-1/4 in × 5-7/8 in)] shall be provided. The upper edge of the holder shall not be more than 1 020 mm (40 in) from the bottom of the base.

4.6.2 The placard holder should have the alternative capability of being used as a board for chalk or grease pencil markings.

4.7 Testing and performance

4.7.1 Pressure equalization and rapid compression

4.7.1.1 For normal flight conditions, a minimum vent area of 5 cm^2/m^3 (0,02 in^2/ft^3) of container internal volume shall be provided if the door seal venting area is not sufficient.

4.7.1.2 For rapid decompression in the event of an aircraft emergency, the container shall include a minimum decompression vent area of 100 cm^2/m^3 (0,45 in^2/ft^3) of container internal volume, to become open in a duration of less than 0,2 s when submitted to a maximum pressure differential from inside of 14 kPa (2,0 lb/in^2), if the door seal area is not sufficient to fulfill this venting requirement. If the specific design requires a “blowout” device to achieve the required vent area, the blowout device shall remain attached to the container after activation.

4.7.1.3 This vent area shall be adequately protected from cargo load shift to ensure that the minimum area is maintained during emergency operations. Refer to ISO 11242 for the pressure equalization requirements.

4.7.2 Bridging and cresting

The container loaded to its maximum gross mass shall be capable of traversing from one item of handling equipment to another when there exists a height difference up to 150 mm (6 in) at the junction. At the point where the container balances on the end of the higher surface, the entire load is supported by one row of rollers in accordance with ISO 4116. Upon completion of the test, the container shall show neither permanent deformation nor abnormality that will render it unsuitable for use, and those dimensional requirements affecting handling and interchange shall be met.

4.7.3 Impact test

4.7.3.1 The container loaded to its maximum gross mass with the minimum centre-of-gravity (CG) height of 635 mm (25 in) for low-height containers (i.e. DKH and DKG), 864 mm (34 in) for other container sizes, longitudinal eccentricity within 10 % of its base length, and lateral eccentricity within 10 % of the base width, shall be impacted at the base of the unit at a rate of 0,3 m/s (1 ft/s) against a vertical rigid solid bar 51 mm (2 in) high, on each side of the base of the unit to be tested.

4.7.3.2 The impact test shall consist of at least 50 test impacts on each side of the container base in accordance with 4.7.3.1. 25 % of these impacts shall be initiated with the container at 15° offset to the leading edge in the direction of travel, and an additional 25 % of these would be on the other corner.

4.7.3.3 On completion of these tests, the container shall not discharge its contents, and the permanent set of the container contour shall not exceed 19 mm (0,75 in) at the top of the container, decreasing linearly to 3 mm (0,12 in) at the base level.

4.7.4 Rain test

The container shall be designed to prevent the ingress of water such as might be experienced in heavy driving rain. It shall be demonstrated that in these conditions cargo will be undamaged by water ingress.

4.8 Additional design options

The following may be added as design options required by a particular customer:

a) knock-down capability;

b) component and sub-assembly interchangeability;

c) internal shelf capability.

5 Marking

5.1 All containers covered by this International Standard shall be marked with the following information:

a) name and address of the manufacturer;

b) actual tare of the container to the nearest kilogram and pound;

c) maximum gross mass in kilograms and pounds;

d) serial number or date of manufacture or both.

The lettering size shall be large enough to ensure good readability and shall not be less than 25 mm (1 in) high for the maximum gross mass and tare.

5.2 The following additional markings should also be included. The manufacturer's part number and date of manufacture lettering sizes should be large enough to ensure good readability. The ID code shall be not less than 100 mm (4 in) high and shall be located at the top of the outboard and inboard panels at a height of not less than 1 150 mm (45 in). For a low-height container, i.e. DKH or DKG, this minimum height may be reduced to 890 mm (35 in) on both sides of the container.

a) ID code [3] _____

b) Manufacturing part number _____

c) Date of manufacture _____

NOTE The ID code is an international unit designation and marking system consisting of

— 3-digit (alpha) type and size code;

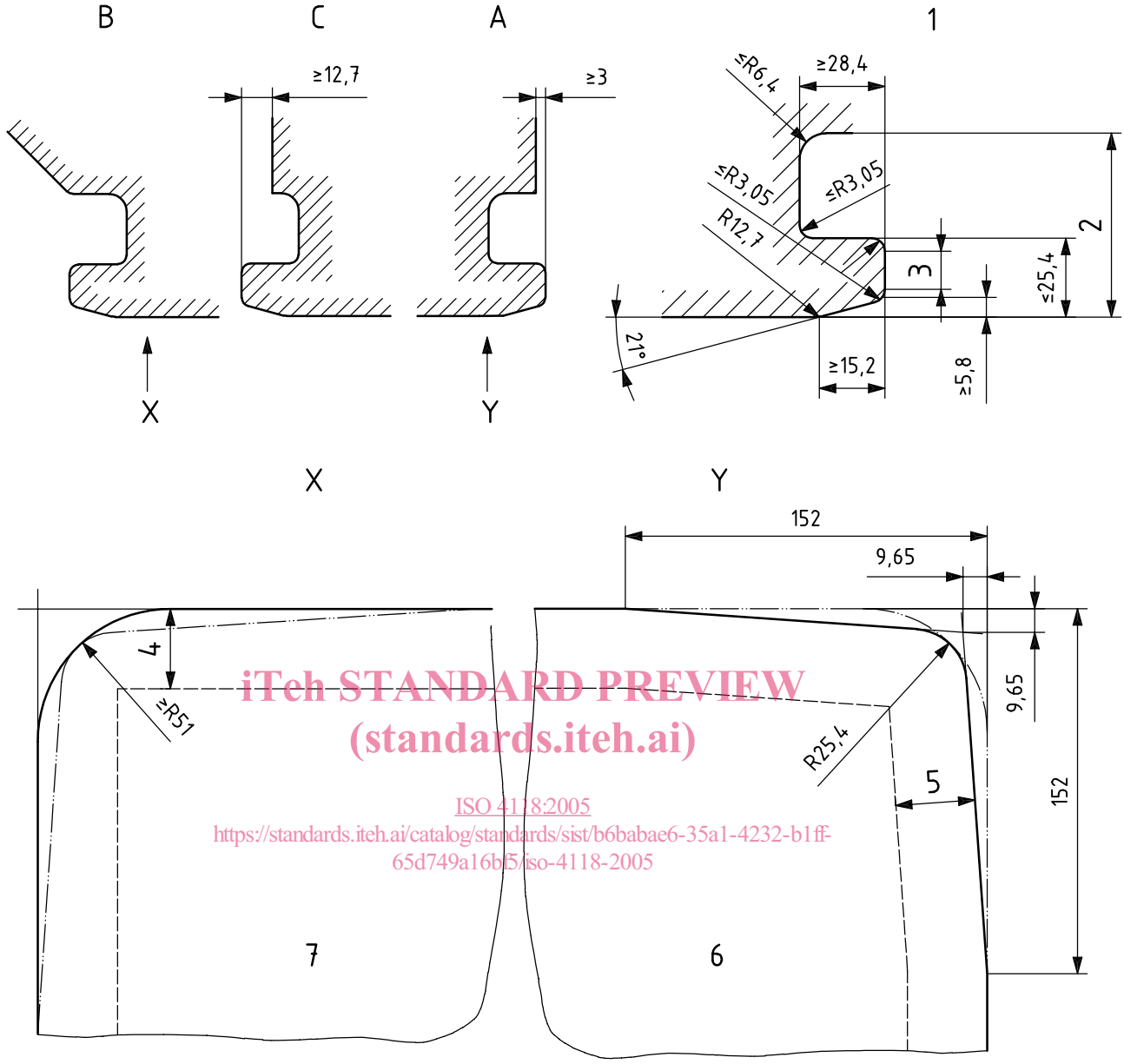
— 4- or 5-digit (numeric) individual serial number;

— 2-digit (alpha) owner code (airline or non-airline).

For more details on the above markings, see [4] in the Bibliography.

3) ID codes are assigned by the following organization:

ULD Registrar, International Air Transport Association (IATA), 800 Place Victoria, P.O. Box 113, Montréal, Québec, Canada H4Z 1M1.



Key

A Inboard edge (detail)
B Outboard edge (detail)
C Forward and aft edges (detail)

1 Base details typical for all edges
2 88,9 min.; 108 for A, L and M size bases (see Table 2)
3 Flat,10,2 min.
4 Recess parallel to outer edge of base except at corner radius
5 28,4 min. recess parallel to outer edge of base which must be kept clear around complete periphery of base
6 Showing tapered corner with radiused corner option shown chain dotted
7 Showing radiused corner with tapered corner option shown chain dotted

Figure 1 — Container base dimensional requirements

(Dimensions in millimetres)