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Air cargo unit load devices — Performance requirements and test parameters

Unités de charge de fret aérien — Exigences de performances et paramètres d'essai

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Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **2**
3 Terms and definitions **2**
4 Classification **3**
4.1 Types 3
4.2 Sizes 3
4.3 Configurations 4
4.4 Forms 4
4.5 Classification identifier 4
5 Performance requirements **4**
5.1 Materials 4
5.2 Fabrication methods and workmanship 4
5.3 Protection 4
5.4 Construction 5
5.5 Marking 5
5.6 Inspection provisions 5
5.7 Fire protection 5
5.8 Rapid decompression 5
5.9 Dimensions and tolerances 5
5.10 Strength 6
5.10.1 Ultimate load criteria 6
5.10.2 Restraint criteria 6
5.10.3 Pallets and nets 6
5.10.4 Base performance 7
5.11 Environmental degradation 7
6 Tests **7**
6.1 Test requirements 7
6.2 Test parameters 7
6.3 Test methods 7
6.4 Test results 8
7 Additional information **8**
7.1 Intended use 8
7.2 Unit load device capacities 8
7.3 Container contours 8
7.4 Pallet configurations 8
8 Unit load device configurations **8**
8.1 General 8
8.2 ULD CONFIGURATION A7 10
8.3 ULD CONFIGURATION A8 11
8.4 ULD CONFIGURATION B7 12
8.5 ULD CONFIGURATION B8 13
8.6 ULD CONFIGURATION G1 14
8.7 ULD CONFIGURATION K4 15
8.8 ULD CONFIGURATION L5 16
8.9 ULD CONFIGURATION L6 18
8.10 ULD CONFIGURATION M4 20
8.11 ULD CONFIGURATION M5 21
8.12 ULD CONFIGURATION N1 22
8.13 ULD CONFIGURATION P1 23

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8.14 ULD CONFIGURATION Q1 24
8.15 ULD CONFIGURATION R1 25
8.16 ULD CONFIGURATION S1 27

9 Testing restraint conditions 28
9.1 General 28
9.2 RESTRAINT CONDITION (RC) A1 29
9.3 RESTRAINT CONDITION (RC) A2 30
9.4 RESTRAINT CONDITION (RC) G 32
9.5 RESTRAINT CONDITION (RC) K 33
9.6 RESTRAINT CONDITION (RC) L 35
9.7 RESTRAINT CONDITION (RC) N 37
9.8 RESTRAINT CONDITION (RC) P 39
9.9 RESTRAINT CONDITION (RC) Q 40
9.10 RESTRAINT CONDITION (RC) R 43

Bibliography 45

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Foreword

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

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

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.

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

This second edition cancels and replaces the first edition (ISO 21100:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

— 5.10.3.5, addition of pallets track test to ensure compatibility with straps restraint;

— 5.10.4.3, addition of stiffness requirements for containers base edges;

— Clause 8, ULD configurations A8, B8 and M5 use limited to lower deck containers;

— Clause 8, ULD configuration Q1 change to add pallet and net applicability;

— Clause 9, restraint conditions K, L, P and Q change as a result of testing experience.

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.

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Introduction

This document specifies the performance and testing requirements for approved (certified) cargo unit load devices (containers, pallets and nets) intended to be used for cargo restraint on board civil transport aircraft.

The civil aviation requirements referred to in this document are those concerning certification of transport aircraft and appliances to be installed aboard them, and constitute the set of design and operation requirements internationally agreed in application of International Civil Aviation Organization (ICAO) Annex 8, *Airworthiness of aircraft*, to the Convention on International Civil Aviation. This document provides one means of compliance for unit load devices.

Dimensions and tolerances are expressed in millimetres, with dimensions in inches shown between brackets. The nominal values of outer unit load device base dimensions are those expressed in inches. Forces are expressed in Newton, with forces in pound-force shown between brackets.

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Air cargo unit load devices — Performance requirements and test parameters

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1 Scope

This document specifies the minimum requirements for airworthiness approval of air cargo pallets, nets and containers, generally designated as air cargo unit load devices (ULD).

This document is intended to provide a uniform technical reference for air cargo unit load devices approval. As a prerequisite, it is presupposed that the applicable general civil aviation requirements and the aircraft manufacturer's approved Weight and Balance Manual are followed.

This document defines the minimum performance requirements and test parameters for air cargo unit load devices requiring approval of airworthiness for installation in an approved aircraft cargo compartment and restraint system that complies with the cargo restraint and occupant protection requirements of EASA CS-25 or 14 CFR Part 25, except for the 9,0 g forward ultimate inertia force of § 25.561(b) (3) (ii).

This document applies to airworthiness approved air cargo unit load devices intended for carriage on board civil transport category airplanes type certificated under EASA CS-25 or 14 CFR Part 25, or equivalent.

This document exclusively applies to unit load devices airworthiness approval and testing parameters. It does not apply to aircraft design or aircraft operating requirements, which are provided by the approved Weight and Balance Manual for each aircraft type.

Other aspects that do not directly pertain to air cargo unit load devices airworthiness approval and testing are not covered by this document and are defined in other International Standards (see Bibliography), e.g.:

— ULD design specifications,

— ULD in service damage limits,

— ULD restraint malfunction limitations,

— ULD test methods,

— ULD load distribution models,

— ULD maximum allowable contours,

— ULD CG (centre for gravity) location control means,

— ULD pressure equalization methods,

— ULD utilization guidelines.

Air cargo unit load devices qualified prior to publication of this document were approved in accordance with the requirements of ISO 8097:2001. This document is intended as a TSO approval reference for all new models of unit load devices in the sizes and types it covers, in replacement of ISO 8097. For air cargo unit load devices the size or type of which is not covered in this document, see the requirements of ISO 8097:2001, if their size or type is contained therein, or other equivalent criteria, if not.

NOTE 1 ISO 8097 is based on USA National Aerospace Standard NAS 3610 revision 10:1990, Specification for Cargo Unit Load Devices.

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NOTE 2 The requirements for cargo covers are not defined in this document, except insofar as net restraint is incorporated therein.

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 7166, *Aircraft — Rail and stud configuration for passenger equipment and cargo restraint*

ISO 9788, *Air cargo — Double stud tie-down fittings — Design and testing requirements*

ISO 10046, *Aircraft — Methodology of calculating cargo compartment volumes*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
base edge
outer perimeter of a *unit load device* (3.8), interfacing with the aircraft *restraint system* (3.7), ensuring the required performance with contribution of adjacent parts of the complete unit load device

3.2
container
<air cargo> rigid structure which interfaces directly with the aircraft cargo handling and *restraint system* (3.7) and alone performs all the functions of a *unit load device* (3.8)

3.3
cover
<cargo> layer made of flexible material, used to protect cargo on a *pallet* (3.6)

Note 1 to entry: It may or may not incorporate a pallet *net* (3.4) or be permanently attached to one. If a net is incorporated or permanently attached to the cover, the performance and testing requirements applicable to nets in this document are applicable to the net/cover assembly.

3.4
net
<air cargo pallet> webbing or rope net for restraining load onto an air cargo *pallet* (3.6)

3.5
numeric simulation
simulation of physical test condition and reaction of *unit load device* (3.8) employing numerical analysis, computational geometry and computer graphics to obtain proof support and design verification, validated by demonstration that parameters, algorithms and analytical methods used provide results of at least equivalent reliability to the outcome of a specified actual test

3.6
pallet
<air cargo> *unit load device* (3.8) consisting of a flat platform with a flat undersurface of standard dimensions, on which goods are assembled and secured by a *net* (3.4) before being loaded as a unit onto the aircraft, and which interfaces directly with the aircraft handling and *restraint system* (3.7)

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