
**Air cargo — Cargo stopper devices —
Design and testing**

Fret aérien — Dispositifs stop charge — Conception et essais



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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).

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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*.

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.

Introduction

This document specifies the design, performance and testing requirements for “cargo stopper” devices intended to be used in conjunction with restraint straps for cargo restraint on board civil transport aircraft.

The civil aviation requirements referred to in this document are those relating to operation of transport aircraft. They constitute the set of operation requirements internationally agreed in application of International Civil Aviation Organization (ICAO) Annex 6, *Operation of aircraft*, to the Convention on International Civil Aviation.

Throughout this document, 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 restraint arrangements on board aircraft. Deviation from recommended criteria should only occur after careful consideration and thorough service evaluation have shown alternate methods to provide an equivalent level of safety.

Dimensions are expressed in millimetres, and forces in newtons. Equivalent inch-pound system units are given between brackets for information.

Air cargo — Cargo stopper devices — Design and testing

1 Scope

This document specifies the design, performance and testing requirements for “Cargo Stopper” air cargo restraint accessories with a 22 250 N (5 000 lbf) rated load capacity, to be used in conjunction with air cargo restraint straps meeting ISO 16049-1 (TSO/ETSO – C172), or air cargo restraint slings meeting ISO 20291-1, with the same rated load.

Cargo stopper devices designed to this document are intended to be used in either of the following typical instances:

- a) to ensure restraint/tie-down of a piece of cargo that does not lend itself to either direct hooking of tie-down straps or passing a strap around without risk of slippage; a common example is long shaped cargo items with a narrow cross-section, whether or not overhanging from the pallet, individual or in bundles, e.g. pipes or beams; see ISO 16049-2:2020, 7.4;
- b) to restrain cargo smaller than the pallet net’s mesh, or identified as “piercing” cargo, presenting a hazard to the aircraft in the event of it being released during flight;
- c) when a crate containing cargo, even though its cross-section is large enough to be directly tied-down with the pallet net or restraint straps, contains or can contain a heavy item, e.g. a piece of machinery, shaft, or similar, with a cross-section lower than the pallet net’s mesh size;

NOTE Such “hidden” items have been known to break free from insufficiently strong crates when subjected to in-flight accelerations, then pass due to their small size through the net mesh restraining the crate and be released into the cargo compartment.

- d) to assist in tying-down odd-shaped cargo pieces where it is difficult or not allowed to directly attach tie-down straps or pass them around the load in an effective manner.

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 10254, *Air cargo and ground equipment — Vocabulary*

ISO 12236, *Geosynthetics — Static puncture test (CBR test)*

ISO 16049-1, *Air cargo equipment — Restraint straps — Part 1: Design criteria and testing methods*

ISO 16049-2, *Air cargo equipment — Restraint straps — Part 2: Utilization guidelines and lashing calculations*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10254 and the following apply.