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Air cargo equipment — Restraint straps —

Part 2: Utilization requirements and recommendations and lashing calculations



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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).

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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*.

This third edition cancels and replaces the second edition (ISO 16049-2:2013), which has been technically revised. The main changes compared to the previous edition are as follows::

- new [4.14](#), [Figure 3](#) and [Table 1](#) regarding maximum number of tie-down locations on a pallet;
- deletion in [5.1](#), Basic methods, of [Figure 4](#) former first drawing without lateral restraint dedicated straps;
- specification in [6.2](#), Calculation principles, of centreline angle and floor angle;
- deletion in [6.3](#), Practical calculation, and Bibliography of references to IATA AHM 311 and AHM 450;
- new [6.4](#), Calculation sheet.

A list of all parts in the ISO 16049 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.

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Introduction

This document specifies utilization guidelines and the principles to be used in tie-down/lashing strength calculations for the use of air cargo restraint straps on board civil transport aircraft.

The civil aviation requirements referred to in the present 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 lashing arrangements. Deviation from recommended criteria should only occur after careful consideration and thorough service evaluation have shown the alternate methods ensure the same level of safety.

The requirements of this document are expressed in the applicable SI units, with approximate inch-pound units conversion between brackets for convenience in those countries using that system.