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Aircraft ground equipment — Main deck loader — Functional requirements

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Exigences fonctionnelles*



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Foreword

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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 6967 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 6967:1994), which has been technically revised.

Introduction

This International Standard specifies the functional requirements to be taken into account by manufacturers for the design of aircraft main deck cargo container and pallet loaders.

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 usable aircraft main deck loaders. 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.

Aircraft ground equipment — Main deck loader — Functional requirements

1 Scope

This International Standard specifies the functional requirements for a self-propelled loader capable of raising air cargo unit load devices (ULDs) with base dimensions and maximum mass as given in Table 1.

Table 1 — Base dimensions and maximum mass

ISO 8097:2001 base size code	Length mm (in)	Width mm (in)	Maximum gross mass kg (lb)
A	3 175 (125)	2 235 (88)	6 804 (15 000)
M	3 175 (125)	2 438 (96)	6 804 (15 000)
R	4 978 (196)	2 438 (96)	11 340 (25 000)
G	6 058 (238,5)	2 438 (96)	13 600 (30 000)

This International Standard does not provide all the design requirements applicable for aircraft main deck loaders. Other requirements can be found in separate International Standards:

- ISO 4116 specifies the additional requirements applicable for conveying surfaces of those pieces of aircraft ground support equipment intended for handling and loading of baggage and cargo unit load devices;
- ISO 6966-1 and ISO 6966-2 specify, respectively, the general and safety-related requirements applicable to all aircraft ground support equipment.

The requirements of this International Standard were determined based on generally recognized assumptions with regard to

- a) the normally intended use of aircraft ground support equipment, when used on the ramp of international civil airports in order to handle, service or maintain civil transport aircraft;
- b) the environmental (surface, slope, weather, lighting, operating rules, staff qualification, etc.) conditions prevailing on the ramp area of the majority of international civil airports.

It is assumed the manufacturers of aircraft main deck loaders define in the relevant documentation the specifically intended conditions of use and environment for each item of equipment, and the purchasers systematically review their own specific conditions of use and environment in order to determine whether those stated are adequate, or negotiate with the manufacturer appropriate modifications to ensure they are.

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 6966-1, *Aircraft ground equipment — Basic requirements — Part 1: General design requirements*

ISO 6966-2, *Aircraft ground equipment — Basic requirements — Part 2: Safety requirements*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

ISO 8097:2001, *Aircraft — Minimum airworthiness requirements and test conditions for certified air cargo unit load devices*

ISO 11995:1996, *Aircraft — Stability requirements for loading and servicing equipment*

3 Requirements

3.1 General

3.1.1 On an adequate chassis, the loader shall provide two platforms:

- a) a front platform capable of operating between 2 100 mm (83 in) and 5 600 mm (221 in), which is positioned at the applicable aircraft door and remains at this position during the loading/unloading operation;
- b) a main platform for up and down movement between 508 mm (20 in) and 5 600 mm (221 in).

3.1.2 The overall dimensions of the loader shall be kept to a minimum.

3.1.3 The overall height of the entire loader should not exceed 3 600 mm (142 in) when being driven.

3.1.4 The loader shall support simultaneously, at their maximum gross mass, two 2 438 mm × 3 175 mm (96 in × 125 in) ULDs on the main platform and one 2 438 mm × 3 175 mm (96 in × 125 in) ULD on the front platform.

3.1.5 When negotiating two ramps that intersect at 3° (5 %), the loader shall have adequate underneath clearance from any portion of the equipment to the ground.

3.1.6 The length of the front platform shall be adequate to accept one 2 438 mm × 3 175 mm (96 in × 125 in) ULD lengthwise.

3.1.7 The length of the main platform shall be adequate to accept two 2 438 mm × 3 175 mm (96 in × 125 in) ULDs lengthwise on the platform.

3.1.8 The width of both platforms shall be adequate to accept a ULD with its 3 175 mm (125 in) dimension across the platforms.

3.1.9 The surface of both platforms shall allow for longitudinal and lateral movement of ULDs.

3.1.10 The front platform shall be adjustable to changes in aircraft attitude with an accuracy of

- a) $\pm 2,0^\circ$ in pitch and roll;
- b) 6,4 mm (0,25 in) in height.

3.1.11 The front platform shall be designed not to interfere with the opening and closing of the aircraft door. All component parts that may come into contact with the aircraft should be covered with a protective material, e.g. rubber 'D' section (see [7] in the Bibliography).

3.1.12 Safety guard-rails shall be fitted to both sides of the front platform and have a minimum height of 1 100 mm (43 in). These rails shall be adjustable to close the gap between the loader and the aircraft.

3.1.13 The front platform shall be accessible from the ground at all times.

3.1.14 Platform safety supports for maintenance purposes shall be provided.

3.1.15 The loader's design shall meet all applicable requirements of ISO 6966-1 and ISO 6966-2.

3.2 Guide rails and stops

3.2.1 Longitudinal (retractable) guide rails shall be provided on the main platform and adjustable on the front platform to the following ULD widths and as indicated in a) and b):

- 2 438 mm (96 in) + 25 mm to 50 mm (1 in to 2 in) clearance;
- 3 175 mm (125 in) + 25 mm to 50 mm (1 in to 2 in) clearance.

- a) Front platform: guide rails along the whole length of both sides of the platform to accurately guide ULDs into the aircraft. They shall be adjustable laterally to align with the appropriate in-aircraft guides.
- b) Main platform: guide rails 3 175 mm (125 in) + 25 mm to 50 mm (1 in to 2 in) clearance apart along the full length of both sides of the platform. The guide rails shall consist of two sections positioned adjacent to the powered sections of the platform and shall be able to operate independently. All sections shall automatically extend when the main platform starts moving upward and remain in this position. When the main platform is being lowered and reaches the height of 1 520 mm (60 in) from the ground, it should be possible for the operator to control the retraction of the guide rails.

For a unit with ULD rotation capability (see 4.3), the guide rails shall be able to be operated independently and/or simultaneously, and shall automatically arise when the main platform starts moving upward and remain in this position.

3.2.2 Automatic ULD stops shall be provided as follows.

- a) Front platform:

At the end adjacent to the main platform. These stops shall arise at the moment the main platform starts moving down and shall fully retract when the upcoming main platform is level with the front platform. These stops shall remain raised at any position other than level with the main platform.

- b) Main platform:

- 1) At the forward and aft ends.
- 2) Side guide rails that function as stops and guide rails.

3.2.3 The stops adjacent to the front platform shall automatically retract as the main platform lines up with the front platform. These stops shall start rising the moment the main platform starts moving down and remain raised at any position other than level with the front platform.

3.2.4 The rear stops and side guide rails shall automatically arise when the platform is raised above 559 mm (22 in) from the ground, and remain raised while the main platform is not aligned with the front platform.

3.2.5 The operating mode of the rear stops and side guide rails shall be selected by the operator.

3.2.6 If the operator selected the 'end loading' mode and the main platform reaches the height of 1 520 mm (60 in) from the ground when being lowered, it should be possible for the operator to control the retraction of the rear stops by continuous intentional action. When the platform descends below 559 mm (22 in) from the ground, the rear stops shall automatically retract but the side guide rails shall remain in the raised position.

3.2.7 If the operator selected the 'side loading' mode and the main platform reaches the height of 1 520 mm (60 in) from the ground when being lowered, it should be possible for the operator to control the retraction of the side guide rails by continuous intentional action. When the platform descends below 559 mm (22 in) from the ground, the selected side guide rails shall automatically retract but the rear stops shall remain in the raised position.

3.2.8 All fixed or removable guide rails and retractable stops shall have a minimum height of 100 mm (4 in). Retractable guide rails shall have a height of not less than 50 mm (2 in).

3.3 Conveyor surface

3.3.1 The loader shall be designed for powered end and side loading of ULDs.

On the front platform, the longitudinal and lateral movement shall be effected by means of a powered system.

On the main platform, the longitudinal and lateral movement shall be effected by means of a powered system. The main platform powered system shall be divided into two sections, each of which will accept one 3 175 mm × 2 438 mm (125 in × 96 in) ULD longitudinally. It shall be possible to control these sections individually or simultaneously.

3.3.2 The powered system shall be able to drive ULDs at a speed of approximately 0,3 m/s (60 ft/min).

3.3.3 It shall not be possible to transfer loaded ULDs from either platform when the stops are not properly operated.

3.3.4 The platform's conveying surfaces shall meet all applicable requirements of ISO 4116.

3.4 Platform operation and loading

3.4.1 It shall be possible to adjust the position of the ULD in a lateral direction on the front platform.

3.4.2 Platform elevating systems shall be able to hold both platforms at maximum height with full specified continuous lift capacity with no noticeable height decrease for 30 min, with and without the engine running.

3.4.3 Both the front and main platform elevating mechanisms shall incorporate safety features to prevent sudden collapse in the event of system failure.

3.4.4 The operator shall be able to

- a) open and close the aircraft door from the front platform;
- b) simultaneously operate the loader and in-aircraft systems.

3.4.5 The time taken for the main platform to reach maximum height from the lowered position and vice versa, i.e. one complete cycle, shall be less than 60 s.

3.4.6 It shall not be possible to alter the height of either platform while ULDs are bridging the platform.

3.5 Mobility and stability

3.5.1 The loader shall be capable of being driven at speeds up to 10 km/h (6 mile/h) for at least 3 km (2 mile). The loader does not require the capability of being driven when loaded.

3.5.2 Power steering shall be provided.

3.5.3 The unloaded loader shall be capable of starting from rest up a 3° (5 %) incline under its own power.

3.5.4 The swept radius should be kept to a minimum to allow the loader to be easily positioned at the aircraft and to be driven on airport service roads.

3.5.5 For final safe positioning at the aircraft door, a slow, positive, non-jerking speed is required.

3.5.6 Power-operated adjustable stabilizers shall be installed in order to provide the stability required for loading/unloading operations and to unload the wheel axles.

3.5.7 The unit shall meet the stability objectives of ISO 11995:1996, Clause 4.

3.5.8 It shall not be possible

- a) to activate the transfer system and to raise the main platform from the full down position if the stabilizers are not extended,
- b) to drive the loader when the stabilizers are extended,
- c) for stabilizers to collapse in the case of system failure.

3.6 Controls

3.6.1 All controls necessary to move and position the loader shall be located-at the driver's position.

3.6.2 All controls necessary to allow control of both platforms and the complete loading/unloading process shall be located at the operator's position. For simultaneous operation of the aircraft and loader controls, the operator's position should be located on the right-hand front side.

3.6.3 Ample lighting is required to illuminate the platforms and close surroundings for night operations.

3.6.4 Normal system warning and indicator lights shall be provided.

3.6.5 All controls shall be identified, preferably by pictograms in accordance with ISO 7000. The layout of the controls on the control panels should be in accordance with IATA AHM 915 Section 2 (see [19] in the Bibliography).

NOTE Graphical symbols for use on aircraft ground equipment will form the subject of a future International Standard (ISO 11532).

3.7 Emergency

3.7.1 The loader shall be capable of being towed away from an aircraft without its own power. When required, it shall be capable of being steered under these conditions.

3.7.2 Emergency recovery facilities, e.g. platform lowering, brake release and raising of stabilizers, shall be provided.

3.7.3 Emergency stop controls shall be installed. They shall be accessible both from the driver's and/or operator's position, and from ground level.

4 Options

- 4.1** An automatic audible device and/or flashing personnel warning light for movement of the main platform.
- 4.2** Fixed heavy guards which protect the main platform and remain at ground level when the main platform is lifting.
- 4.3** A ULD turning system on the main platform.
- 4.4** Main platform height adjusting systems for easier loading and unloading of ULDs by controlling the stabilizers of the main platform. The height range may be 495 mm to 533 mm (19,5 in to 21 in) or more.
- 4.5** An additional control panel or remote control at the rear end of the main platform.
- 4.6** An additional stop between the two sections on the main platform, individually controlled by the operator.
- 4.7** Front platform automatic adjustment capability to compensate for changes in aircraft height or attitude. This may be accomplished by a sensing device or physical contact with the aircraft.
- 4.8** Front platform extending up to upper deck height of 8 380 mm (330 in) with maximum load, while meeting the stability objectives of ISO 11995. A ULD stop shall be provided at the front end of the platform.
- 4.9** An enclosed driver/operator cabin.
- 4.10** Lift capacity of 18 140 kg (40 000 lb).
- 4.11** Lift capacity of 27 200 kg (60 000 lb).

Bibliography

- [1] NAS 3610, *Cargo Unit Load Devices — Specification for* ¹⁾
- [2] SAE AS 1130, *Air and Air/Surface (Platform) Cargo Pallets* ²⁾
- [3] SAE ARP 1328, *Aircraft Ground Support Equipment — Wind Stability Determination* ²⁾
- [4] SAE ARP 1334, *Ground Equipment Requirements for Compatibility with Aircraft Unit Load Devices* ²⁾
- [5] SAE AIR 1375, *Minimum Safety Requirements for Special Purpose Airline Ground Support Equipment* ²⁾
- [6] SAE AS 1491, *Interline Air Cargo Pallets* ²⁾
- [7] SAE AIR 1558, *Interface Protective Devices — Ground Equipment to Aircraft* ²⁾
- [8] SAE ARP 1673, *Aircraft Cargo Door Opening/Sill Details for Ground Support Equipment* ²⁾
- [9] SAE ARP 1838, *Pictograms for Ground Support Equipment* ²⁾
- [10] SAE ARP 4776, *Pallet/Container Loader Auto-Levelling Systems* ²⁾
- [11] SAE AS 36100, *Air Cargo Unit Load Devices — Performance Requirements and Test Parameters* ²⁾
- [12] IATA ULD Technical Manual 40/1, *IATA Identification Code for Unit Load Devices* ³⁾
- [13] IATA Airport Handling Manual (AHM) 904, *Aircraft Doors, Servicing Points and Systems Requirements* ³⁾
- [14] IATA Airport Handling Manual (AHM) 909, *Summary of Unit Load Device Capacity and Dimensions* ³⁾
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- [18] IATA Airport Handling Manual (AHM) 915, Section 1, *Pictograms for Ground Equipment Controls* ³⁾
- [19] IATA Airport Handling Manual (AHM) 915, Section 2, *Ground Equipment Control Panel Standard Layouts* ³⁾
- [20] IATA Airport Handling Manual (AHM) 932, *Main Deck Container/Pallet Loader Functional Specification* ³⁾

1) The NAS 3610 Specification is available from Aerospace Industries Association, 1250 Eye Street NW, Washington, DC, 20005, USA.

2) SAE publications are available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA.

3) IATA publications are available from International Air Transport Association, 800 Place Victoria, P.O. Box 113, Montréal — H4Z 1M1, Québec, Canada.

