
**Aircraft ground equipment — Basic
requirements —**

**Part 1:
General design requirements**

Matériel au sol pour aéronefs — Exigences de base —

Partie 1: Exigences générales de conception

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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.

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 6966-1 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 9, *Air cargo and ground equipment*.

This first edition of ISO 6966-1, together with ISO 6966-2, cancels and replaces ISO 6966:1993, which has been technically revised.

ISO 6966 consists of the following parts, under the general title *Aircraft ground equipment — Basic requirements*:

— *Part 1: General design requirements*

— *Part 2: Safety requirements*

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Introduction

This part of ISO 6966 specifies the general requirements to be taken into account by manufacturers for the design of aircraft ground support equipment. It identifies the various concerns to be taken into consideration to ensure ground equipment presents the appropriate general design characteristics.

Throughout this part of ISO 6966, 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 ground support equipment. Deviation from recommended criteria should only occur after careful consideration and thorough service evaluation have shown alternative methods to provide equivalent equipment.

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Aircraft ground equipment — Basic requirements —

Part 1: General design requirements

IMPORTANT — In most countries, standing government health and safety laws and regulations apply to machinery, implicitly or explicitly including aircraft ground support equipment. Nothing in this International Standard, however, shall be deemed or otherwise used to supersede any locally applicable law or regulation, unless a specific exemption has been obtained for this purpose from the appropriate authority.

1 Scope

This part of ISO 6966 specifies the minimum general design requirements applicable to aircraft ground support equipment, as defined in 3.1, in order to ensure

- a) definition of aircraft ground support equipment general requirements for designers;
- b) effective operation of aircraft ground support equipment.

The requirements of this part of ISO 6966 apply to any piece of aircraft ground support equipment, as defined in 3.1, used on airports.
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NOTE An informative list of the most commonly used pieces of ground equipment is provided in Annex B.

This part of ISO 6966 does not provide all the design requirements applicable for aircraft ground support equipment. Other requirements apply, and can be found in separate standards:

- ISO 6966-2 specifies the safety-related requirements applicable to all aircraft ground support equipment;
- 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 (ULDs);

NOTE In addition, guidelines for efficiency of conveying surfaces of ground support equipment used to handle air cargo ULDs are provided in Annex A.

- specific standards, listed in the Bibliography, define the functional and performance requirements for certain types of aircraft ground support equipment.

This part of ISO 6966 does not apply to unmodified general-use transportation vehicles such as automobiles, vans, buses and flat-bed trucks when used on airports.

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 2328, *Fork-lift trucks — Hook-on type fork arms and fork arm carriages — Mounting dimensions*

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

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

3 Terms and definitions

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

3.1 aircraft ground support equipment GSE

ground equipment
ramp equipment

any piece of mobile equipment, whether or not powered or self-propelled, purpose designed, built and used for ground handling, servicing or field maintenance of civil transport aircraft on the ramp area of an airport

NOTE A non-comprehensive informative list of the most commonly used pieces of ground equipment is provided in Annex B.

3.2 booted foot

foot of an operator, appropriately sheathed for protection from occupational hazards and weather conditions

3.3 dead man type control

control design such that continuous deliberate pressure on the control is necessary for activation, and such that release of that pressure will cause control deactivation

3.4 elevated working surface

any working platform or area, located 1,2 m (4 ft) or more higher than the ground or a lower working surface, on or in which an employee may be located in the performance of his/her working duties

3.5 functional

capable of effectively servicing the purpose for which it was designed

3.6 gloved hand

hand of an operator, appropriately sheathed for dexterity and protection from occupational hazards and weather conditions

3.7 guardrail

barrier erected along the exposed edges of an elevated work surface to prevent the fall of persons

3.8 handrail

member supported alongside a stairway to provide persons with a handhold

3.9**highway usage**

operation of equipment on a public street or road such that national motor vehicle licensing of the vehicle is required

3.10**hydrostatic drive**

vehicle transmission where hydraulic fluid, pumped by a hydraulic pump powered by an engine or electric motor, is directly fed to a hydraulic motor on the driven axle or wheels, then directly returns to the pump instead of going through a reservoir

3.11**ramp area**

apron GB

zone of an airport where aircraft manoeuvre and park for ground handling purposes

3.12**ramp**

apron GB

tarmac US

surface of the ground in the ramp area

3.13**riser**

vertical distance from the top of one tread to the top of the next higher tread in a stair or steps

3.14**rung**

ladder cross-member for use as a horizontal foothold and handhold

3.15**slope**

(ramp) local angle of the ramp surface with the horizontal plane, expressed in degrees or slope percentage

3.16**stability**

ability to remain in the same position and attitude

3.17**step**

horizontal flat surface of a stair, ladder, or single foothold between two levels, capable of accepting a work load

3.18**step width**

distance between the handrails of a stair or ladder, inside to inside

3.19**toe board**

vertical barrier erected along exposed edges of elevated work surfaces to prevent materials from falling

3.20**tread depth**

horizontal distance on a step, measured from the front tread edge to the riser or rear edge of the tread

3.21**unit**

any single piece of equipment; or a coupled equipment set

3.22**vehicle**

any piece of mobile aircraft ground equipment which is self-propelled and capable of carrying the operator

4 Materials

- 4.1 Materials shall be selected from those which experience and/or tests have demonstrated to be suitable and dependable for use on aircraft ground handling equipment.
- 4.2 Materials used shall be corrosion-resistant and protected by plating or other surface treatment, e.g. to resist the action of de-icing and hydraulic fluids.
- 4.3 Whenever possible, standard commercially available components shall be used.
- 4.4 The use of materials, design and manufacturing processes shall conform with the applicable national codes of practice.

5 Workmanship

- 5.1 Workmanship and methods of fabrication shall be of a high standard.
- 5.2 Consideration should be given to using an appropriate manufacturing quality system for this purpose.

6 Characteristics

6.1 General

6.1.1 Considerable importance is attached to having equipment into which the essential safety aspects have been incorporated as part of the basic design. It is particularly necessary when designing aircraft handling equipment to take into account the adverse conditions which frequently prevail in ramp areas, e.g. congested vehicle movement, exposure to weather, jet blast, night operation, noise from aircraft and other vehicles, and difficult communications.

6.1.2 All equipment shall meet the applicable safety requirements of ISO 6966-2.

NOTE For intended operation in Europe, additional EU Machinery Directive requirements also apply. They can be met by complying with the requirements of the following European standards.

EN 1915-1, *Aircraft ground support equipment — General requirements — Part 1: Basic safety requirements*

EN 1915-2, *Aircraft ground support equipment — General requirements — Part 2: Stability and strength requirements, calculations and test methods*

EN 1915-3, *Aircraft ground support equipment — General requirements — Part 3: Vibration measurement methods and reduction*

EN 1915-4, *Aircraft ground support equipment — General requirements — Part 4: Noise measurement methods and reduction*

6.2 Mobility

6.2.1 Any vehicle shall be manoeuvrable on ice and snow, and the driving wheels should have sufficient clearance to permit installation and use of tyre chains.

6.2.2 The equipment shall be capable of operating or moving in the following conditions:

- a) for operation and stability purposes, a ramp slope up to 1,5° (2,5 %);
- b) for mobility purposes, a roadway slope up to 3° (5 %).

NOTE Roadway slope applicable to ramp tractors, carts and dollies can increase up to 5° (8,7 %) for access to underground baggage sorting areas at some airport terminals, to be specified by the purchaser.

6.2.3 Means shall be provided to tow a stalled vehicle clear of an aircraft.

6.2.4 Hydraulic valves and electrical circuits shall be provided with a bypass system for manual emergency operation in case of failure.

6.2.5 Vehicle speeds shall not exceed the values in Table 1 according to tyre types and suspension fitted.

Table 1 — Transport speeds

Suspension type	Tyre type							
	Solid metal		Solid rubber		Zero pressure ^a		Pneumatic	
	km·h ⁻¹	mile·h ⁻¹	km·h ⁻¹	mile·h ⁻¹	km·h ⁻¹	mile·h ⁻¹	km·h ⁻¹	mile·h ⁻¹
Unsprung	8	5	16	10	24	15	32	20
Sprung	—	—	24	15	32	20	Road speed if required	

^a Cushion-type solid rubber tyres of pneumatic configuration.

6.2.6 The fuel tank(s) (gasoline, diesel or liquid propane gas) capacity shall be sufficient for at least eight hours continuous operation. Operating time requirements for electrically driven units are to be determined by the purchaser.

6.3 Structure

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6.3.1 All threaded fasteners shall be prevented from becoming loose and/or lost from the unit.

6.3.2 Parts requiring removal for replacement, service, or maintenance shall be fastened with removable fasteners or latching devices. standards.iteh.ai/catalog/standards/sist/5c005e5a-b3a5-4de1-b705-b5f1c1fc63a6/iso-6966-1-2005

6.3.3 The minimum ground clearance of the fully laden equipment shall be as follows:

- a) 127 mm (5 in) at any point of the equipment's undersurface, when it sits on a flat and horizontal ground;
- b) in addition, the equipment shall be able to transverse two surfaces intersecting at a minimum angle of 3° (5 %) as per 6.2.2, either in bridging or in cresting, while retaining positive clearance at any point.

Where this is not achievable for a given type of equipment, steps shall be taken to maximize ground clearance so that it is as close as possible to objectives a) and b) above.

6.3.4 Water traps and gullies permitting dirt to collect shall be avoided. Where this is not practical, adequate drainage shall be provided.

6.3.5 Vibration shall be kept to a minimum and shall have no adverse effect on the unit or the operator.

6.4 Miscellaneous equipment

6.4.1 General

Miscellaneous equipment, when installed, shall comply with the indicated standards.

6.4.2 Towing interface

6.4.2.1 The tow bar shall be attached in as horizontal a position as possible during towing.