
**Aircraft ground support equipment —
Tow bars**

Équipement au sol pour aéronefs — Barres de tractage

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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 on 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 the following URL: 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 9667:2016), which has been technically revised.

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

- a complete revision of all clauses has been made to harmonize with SAE ARP1915;
- figures have been updated and minor editorial modifications have been made; and
- [Clauses 9, 10](#) and [11](#) have been added.

Introduction

This document specifies the functional requirements defined by the manufacturers for the design of aircraft tow bars.

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, economical and usable aircraft tow bars. 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.

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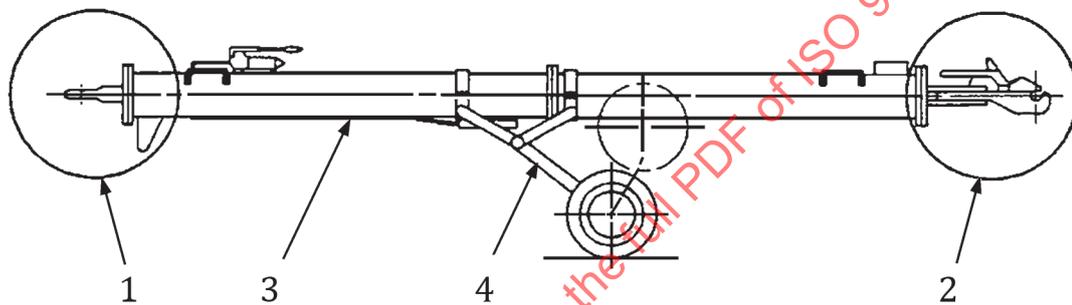
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Aircraft ground support equipment — Tow bars

1 Scope

This document specifies dimensional and physical requirements of tow bar connections to tractor and aircraft (see [Figure 1](#)). It is applicable to any new type of commercial transport category aircraft tow bar designed or built after publication of this document.

The purpose of this document is to standardize tow bar attachments to airplane and tractor according to the mass category of the towed aircraft, so that one tow bar head with different shear levels can be used for all aircraft that are within the same mass category and are manufactured in compliance with ISO 8267.



Key

- 1 tractor connection
- 2 aircraft connection
- 3 tow bar body
- 4 tow bar undercarriage

Figure 1 — Tow bar

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 8267-1, *Aircraft — Tow bar attachment fittings interface requirements — Part 1: Main line aircraft*

ISO 8267-2, *Aircraft — Tow bar attachment fittings interface requirements — Part 2: Regional aircraft*

3 Terms and definitions

No terms and definitions are listed in this document.

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

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Aircraft mass categories

The aircraft mass categories shall be in accordance with ISO 8267.

A given tow bar type may be used on several aircraft types within the same ISO 8267-1 or ISO 8267-2, as appropriate, weight category, provided:

- their nose landing gear towing interface meets the ISO 8267 series requirements for that category; and
- the protective provisions chosen are the lowest applicable for any aircraft.

5 Tow bar general requirements

5.1 As a safety feature the tow bar (body or head holding section or retaining feature) shall be designed to sustain at least 150 % of the protective device(s) functioning point.

5.2 The tow bar, when unladen, shall be both towable and stable at speeds up to 25 km/h (15 mph). The maximum towing speed shall be suitably placarded.

5.3 Handles for manual lifting and coupling shall be provided at both ends of the tow bar either on both sides or on top. They shall be designed and located to reduce the danger of crushing at connection points.

6 Aircraft connection

6.1 Dimension of tow bar connection to aircraft

The standard configuration of the tow bar connection to the aircraft shall be compatible with the horizontal pin of the aircraft tow bar attachment fitting as specified in ISO 8267.

NOTE Several common aircraft types designed prior to publication of ISO 8267 still use non-standard nose gear tow bar attachment fittings. Refer to the aircraft type manufacturer's documentation for interface requirements.

6.2 Aircraft interface requirements

The design of the tow bar aircraft connection device that clamps to the horizontal cylindrical pin of the aircraft:

- shall grip the pin uniformly over 96 % to 98 % of its length;
- shall be designed to eliminate inadvertent disengagement of the tow bar during towing or pushing operations;
- shall be designed to provide adequate clearance during engagement and disengagement of the tow bar from the aircraft connection (allowable space envelope for clearance is specified in ISO 8267); and
- should be adjustable to provide pressure on the pin when locked.

NOTE Several common aircraft types designed prior to publication of ISO 8267 still use non-standard nose gear tow bar attachment fittings. Refer to the aircraft type manufacturer's Facility and Equipment Planning document for interface requirements.

6.3 Aircraft protective provisions

6.3.1 General requirements

The tow bar should be so constructed to prevent any item from becoming a Foreign Object Damage (FOD) hazard, e.g. broken parts of the shear pin and any bushes always remain captive to prevent aircraft engine ingress.

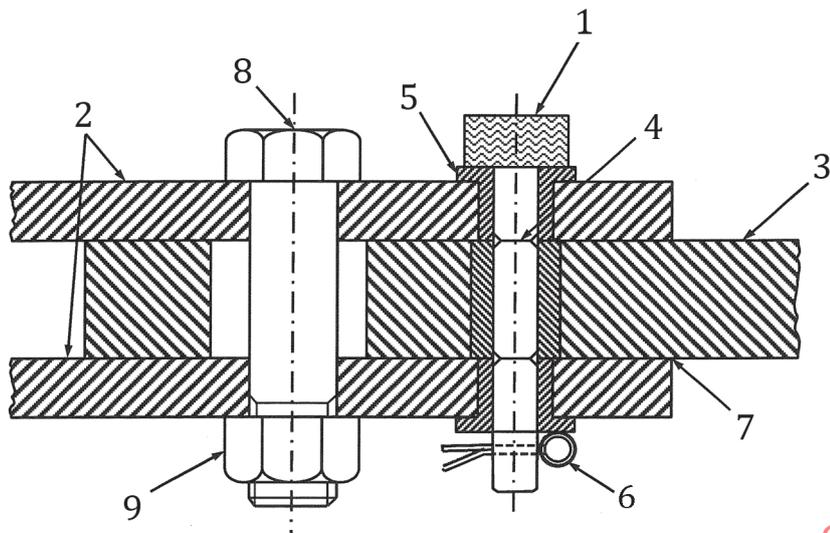
The tow bar shall incorporate a device or devices, such as for example shear pins (typically two, respectively for push/pull and torsion protection), to protect the aircraft from damage due to towing which shall:

- relieve fore/aft and torsional towing forces applied to the aircraft nose gear through the tow bar which exceed the maximum force recommendations of the aircraft manufacturer by means of a shock absorbing device that is designed to function at values below tow bar design values;
- have an energy-absorbing device in order to limit loads induced in the landing gear that shall be designed to function at values beyond tow bar design values;
- simultaneously alert the tow tractor operator, audibly, visually, or both, that a device has been actuated;
- be replaceable or repairable with a minimum of effort; and
- transfer overload to a retaining feature preventing separation and therefore loss of control of the aircraft from the towing vehicle. The retaining feature shall allow free rotation on $\pm 90^\circ$ about aircraft centreline at the retaining fastener. The retaining feature should be designed so that the towing forces do not exceed the aircraft type manufacturer's maximum force recommendations. See [Figure 2](#) example.

6.3.2 Shear pins

If shear pins are used as a protective device, they shall:

- have a non-standard diameter to discourage hazardous replacement and encourage exclusive use of manufacturer's original parts;
- shear at or below the nominal force specified by the aircraft manufacturer(s);
- have a functioning point within a relative tolerance of (+0/-10 %);
- have a specific predetermined shear plane, with hardened bushings (see [Figure 2](#)).



Key

- 1 shear pin
- 2 head retention plates
- 3 head
- 4 preset shear plane
- 5 hardened steel bushings
- 6 retaining clip
- 7 sliding fit
- 8 head retention bolt
- 9 self-locking nut

NOTE Do not clamp up assembly.

Figure 2 — Typical shear pin/bushing configuration

7 Tractor connection

The attachment on the tow bar for connection to the tractor

- shall be as shown in [Figure 3](#) for all mass categories as specified in [Clause 3](#).
- shall contain a rotating tow bar eye.

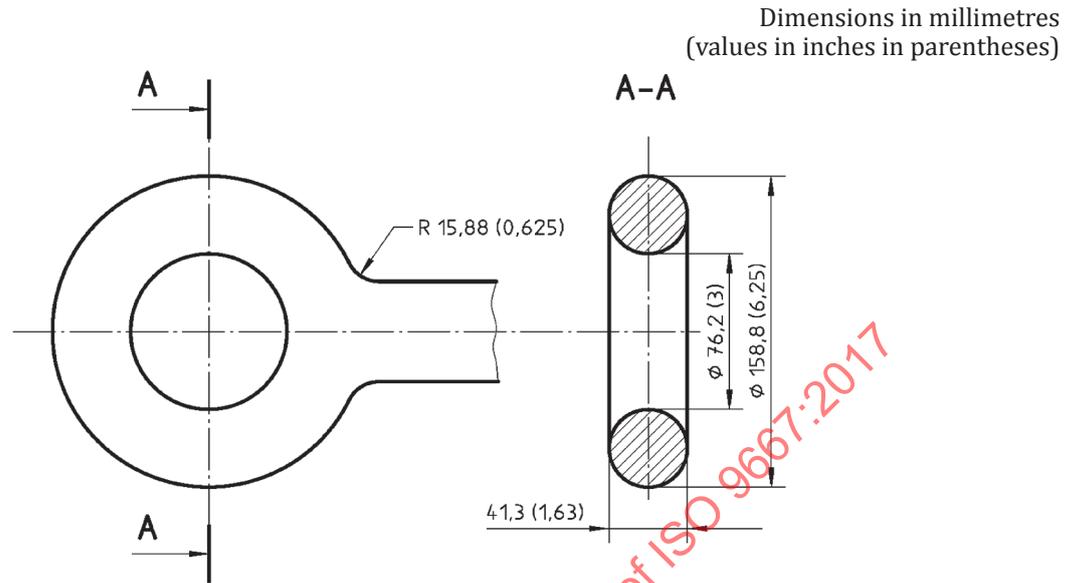


Figure 3 — Dimensions of tow bar eye (tractor connection)

It is recommended to have a cylindrical pin connection with minimum free play within the tow bar eye. Pintle or hook style hitch-tow interface shall be avoided. This is to limit load spikes attributed to the hitch-gap free play hammer effect and is aimed at reducing the nose landing gear and airframe fatigue damage and possible overloading.

8 Tow bar undercarriage

The tow bar shall be equipped with a wheeled undercarriage to support it while being moved unladen and to serve as height adjustment device while attaching the end connections.

The undercarriage shall be extendable by use of a mechanical device, or a hand pump and hydraulic cylinder. It shall retract mechanically or by hydraulic pressure release.

Height adjustment shall cover the range necessary for connecting to and towing all aircraft types the tow bar is intended for, with the wheels clearing ground by a minimum of 50 mm (2 in) during towing.

Longitudinal adjustment of the undercarriage shall allow centre of gravity adjustments in the event of, e.g. changing the tow bar head or installing a Ground Power Unit cable.

- Where design is such that the tow bar is attached below the aircraft towing spool (see [Figure 4](#)), the tow bar centre of gravity shall ensure it is heavier at the tractor end by no more than 12 kg (25 lb).

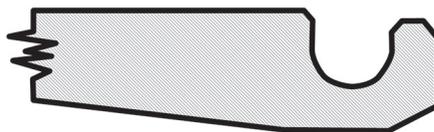


Figure 4 — Attachment below aircraft spool

- Where design is such that the tow bar is attached above the aircraft towing spool (see [Figure 5](#)), the tow bar centre of gravity shall ensure it is heavier at the aircraft end by no more than 12 kg (25 lb).

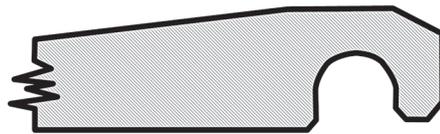


Figure 5 — Attachment above aircraft spool

9 Markings

9.1 The tow bar shall be clearly and indelibly marked to identify the allowable type(s) of aircraft and maximum towing force.

9.2 The vendor shall rivet a metal nameplate to the tow bar, specifying:

- vendor name and trademark
- type designation or model
- serial number
- date of manufacture
- special characteristics

9.3 The tow bar shall be either white, yellow or of any other high visibility colour to enhance its visibility in adverse conditions. Where this is not possible, it shall be fitted with adhesive light reflecting stripes visible for 360° around the tow bar.

10 Options

The following features may be incorporated on special requests.

- a tow bar head designed to separate from the tow bar after protective device(s) or shear pin activation failure. After separation, the head should not contact the ground when hanging from the attachment spool of the aircraft;
- a flyaway version of the tow bar, (separates into two lengths for air shipment);
- protective system warning device;
- provisions for ground power/intercom cable(s) and attachment fittings. These shall be located such that cables, if fitted, are not subject to damage;
- storage for the sockets/plugs of the cable(s);
- both tube ends holding the lunette eye and the tow head may be designed with detachable flanges (non-welded construction);
- the tow bar tube may float on its transverse axis to ease the hook-on operation of the head into the aircraft's nose landing gear attachment fitting;
- retention lanyard to retain broken portions of the shear pin(s).