BRITISH STANDARD

BS EN 12312-19:2005 +A1:2009

Aircraft ground support equipment — Specific requirements —

Part 19: Aircraft jacks, axle jacks and hydraulic tail stanchions

ICS 49.100

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 12312-19:2005+A1:2009. It supersedes BS EN 12312-19:2005, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ⟩A1 A1⟨.

The UK participation in its preparation was entrusted to Technical Committee ACE/57, Air cargo and ground support equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Luftfahrt-Bodengeräte - Besondere Anforderungen - Teil 19: Flugzeugheber, Radwechselheber und hydraulische Heckstützen

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Contents

Foreword

This document (EN 12312-19:2005+A1:2009) has been prepared by Technical Committee CEN/TC 274 "Aircraft ground support equipment" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2009-03-01.

This document supersedes EN 12312-19:2005.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟦A1⟩ ⟨A1⟧.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive(s).

⟦A1⟩ For relationship with EU Directives, see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟧

The Parts of EN 12312 — Aircraft ground support equipment — Specific requirements — are:

Part 1: Passenger stairs
Part 2: Catering vehicles
Part 3: Conveyor belt vehicles
Part 4: Passenger boarding bridges
Part 5: Aircraft fuelling equipment
Part 6: Deicers and deicing/antiicing equipment
Part 7: Aircraft movement equipment
Part 8: Maintenance stairs and platforms
Part 9: Container/Pallet loaders
Part 10: Container/Pallet transfer transporters
Part 11: Container/Pallet dollies and loose load trailers
Part 12: Potable water service equipment
Part 13: Lavatory service equipment
Part 14: Disabled/Incapacitated passenger boarding equipment
Part 15: Baggage and equipment tractors
Part 16: Air start equipment
Part 17: Air conditioning equipment
Part 18: Nitrogen or Oxygen units
Part 19: Aircraft jacks, axle jacks and hydraulic tail stanchions
Part 20: Ground power equipment

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Introduction

This document specifies health and safety requirements, as well as some functional and performance requirements for aircraft jacks, axle jacks and hydraulic tail stanchions intended to be used for servicing and handling of all aircraft types commonly in service in civil air transport.

The minimum essential criteria are considered to be of primary importance in providing safe, serviceable, economical, and practical aircraft jacks, axle jacks and tail stanchions. Deviations from the recommended criteria should occur only after careful consideration, extensive testing, risk assessment and in service evaluation have shown alternative methods or conditions to be satisfactory.

This document is a Type C standard as stated in ⟦A1⟩ EN ISO 12100 ⟨A1⟧.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this Type C standard are different from those which are stated in Type A or B standards, the provisions of this Type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this Type C standard.

1 Scope

This document specifies the technical requirements to minimise the hazards listed in Clause 4 which can arise during the commissioning, operation and maintenance of aircraft jacks, axle jacks and hydraulic tail stanchions when carried out in accordance with the specifications given by the manufacturer or his authorised representative. It also takes into account some performance requirements recognised as essential by authorities, aircraft and ground support equipment (GSE) manufacturers as well as airlines and handling agencies.

This document applies to:

— all types of aircraft jacks;

— axle jacks and hydraulic tail stanchions designed to be used at specific jacking points on the aircraft (examples see Annex A).

NOTE A tail stanchion type is intended to be used with one type of aircraft.

This document does not apply to aircraft recovery equipment.

This document does not establish requirements for noise and vibration.

Noise and vibration are dealt with respectively in EN 1915-4 and EN 1915-3.

This Part of EN 12312 is not applicable to aircraft jacks, axle jacks and hydraulic tail stanchions which are manufactured before the date of publication of this document by CEN.

[A1] This part of EN 12312 is intended to be used in conjunction with EN 1915-1, EN 1915-2, EN 1915-3 (for vehicles) and EN 1915-4. [A1]

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.

[A1] *deleted text* [A1]

EN 1050:1996, *Safety of machinery — Principles for risk assessment*

EN 1915-1:2001, *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*

[A1] EN 1915-3, *Aircraft ground support equipment — General requirements — Part 3: Vibration measurement methods and reduction* [A1]

[A1] EN 1915-4, *Aircraft ground support equipment — General requirements — Part 4: Noise measurement methods and reduction* [A1]

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003).

[A1] EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)* [A1]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2003 and EN 1915-1:2001 and the following apply.

3.1
aircraft jack
lifting device to support and/or raise an aircraft via its fuselage and wings

3.2
axle jack
lifting device used to support and/or raise an aircraft via its axles

3.3
hydraulic tail stanchion
device used to support an aircraft at its tail during loading and unloading operations

4 List of hazards

The list of risks and hazards (see Annex B) is based on EN 1050 and contains the hazards and hazardous situations, as far as they are dealt with in this document, identified by risk assessment as significant for aircraft jacks, axle jacks and hydraulic tail stanchions and which require action to eliminate or reduce risks.

5 Safety requirements and/or measures

5.1 General requirements

5.1.1 ⟦A1⟩ Aircraft jacks, axle jacks and hydraulic tail stanchions shall conform to the relevant requirements of EN 1915-1, EN 1915-2, EN 1915-3 and EN 1915-4 unless otherwise specified in this standard**.** ⟨A1⟧ They shall also conform to the specific requirements of this document.

5.1.2 Stability and strength calculations shall be carried out in accordance with EN 1915-2.

5.1.3 Where a pressure relief valve is used for overload protection, it shall not be positioned between the ram and its control device. The pressure relief valve shall be adjusted to the lowest possible value but not exceeding 125 % of the rated load.

5.1.4 On jacks it shall be possible for the operator to control the lowering speed or stop the lowering at any load up to the rated load, e.g. on manually operated jacks, by a finely controllable valve.

5.1.5 Maximum admissible forces for manual operation and translation of jacks and stanchions and the methods to measure it are given in Annex C.

5.2 Specific requirements for aircraft jacks and hydraulic tail stanchions

5.2.1 Aircraft jacks and hydraulic tail stanchions shall be designed to enable safe and easy steering, e.g. one steering wheel out of three.

5.2.2 Permanent access shall be provided on aircraft jacks and hydraulic tail stanchions to enable positioning and adjustment of the upper load support point. Where this is only a ladder, the maximum distance between the fourth tread counting from the top of the ladder and the maximum extended position of the support point shall not exceed 2,0 m.

5.2.3 On power operated aircraft jacks and tail stanchions, emergency stops shall be installed at each operator's panel. ⟦A1⟩ They shall meet the requirements in EN ISO 13850:2008, Category 0 or 1. ⟨A1⟧

5.2.4 Adjustable stabilisers may be considered as equivalent devices to fulfil the requirements in EN 1915-1:2001, 5.7.2.

5.2.5 The lifting system of aircraft jacks shall be equipped so that failure in the lifting device does not generate any hazardous movement of the lifting point/load.

5.2.6 Where more than one jack is intended to be used to lift an aircraft:

— failure of one drive shall induce stopping of all the jacks;

— monitoring of the movement shall be provided, in accordance with EN 1915-1:2001, 5.1;

— differences in height up to 100 mm shall be automatically corrected and differences in height of more than 100 mm shall lead to immediate stop of all jacks;

— manual lowering shall not be used.

The device to fulfil the requirements in EN 1915-1:2001, 5.20.3, shall be a pilot-operated check valve (see Clause 0 of EN 1915-1:2001 — negotiation).

5.2.7 The upper load support point of hydraulic tail stanchions, when connected to the aircraft jacking point by the headstock, shall follow any upward movement of the aircraft tail. The foot of the stanchion shall not be lifted from the supporting surface.

By receiving a load pressure defined by the aircraft manufacturer for the particular aircraft concerned, a safety valve shall open and allow the cylinder to retract for downward movements of the aircraft tail. A pressure gauge, visible from the ground, shall be installed to indicate the pressure in the hydraulic system.

5.2.8 On hydraulic tail stanchions, the vertical forces shall be transmitted to the supporting surface via the foot of the stanchion. The wheels shall not be used to transfer these forces.

5.2.9 Hydraulic tail stanchions shall allow all movement of the aircraft jacking point defined by the aircraft manufacturer for the particular aircraft concerned without deflection.

5.3 Specific requirements for axle jacks

5.3.1 Axle jacks shall be designed to enable easy and accurate positioning , e.g. two steering wheels out of four.

5.3.2 Devices for towing shall be of rigid construction. Handles and control means shall be calculated according to EN 1915-2 using the forces as given in Annex C.

5.3.3 Grab handles shall be provided for pushing and pulling.

5.3.4 Handles and control means shall be designed so that under intended use conditions they are not capable of causing injuries, e.g. pinching due to inadequate design of towbar or cutting due to sharp edges and corners.

6 Information for use

6.1 Marking

Permanent marking of data shall consist of metal plates fixed with rivets or welded to the structure.

6.2 Additional marking

In addition to the name-plate, the following shall be marked:

— rated load;

— type of aircraft, when restricted to certain types of aircraft;

— for hydraulic tail stanchions: comparison table for pressure/force, where the pressure gauge is not graduated in force;

— for aircraft jacks: “Not intended to be used in a group”, where applicable.

6.3 Instructions

Operating and maintenance instructions shall be supplied with each aircraft jack, axle jack or hydraulic tail stanchion. They shall generally meet the requirements in 6.2 of EN 1915-1:2001. In addition, the operating and maintenance instructions shall contain, depending on type and design of aircraft jack, axle jack or hydraulic tail stanchion, information about:

— safe handling and transport;

— loads and/or types of aircraft which the jack or stanchion is intended to be used for;

— possible limitation or range of application;

— use of aircraft jacks in a group;

— relationship between pressure and forces on stanchions;

— lashing points and transportation facilities;

— types of hose to be used in hydraulic systems;

— measures to be taken in case of exceeding the effort values given in Annex C, e.g. lowering the efforts required by additional persons, use of tractors;

— measures to be taken in case of emergency on breakdown;

— routine checks to be carried out by the operator;

— minimum training programme for the operator.

7 Verification of requirements

The verification of requirements shall be carried out generally in accordance with Clause 7 of EN 1915-1:2001. ▌A1⟩ See also details for verification in EN 1915-3 as relevant and EN 1915-4. ⟨A1▐

The following shall be verified by functional tests, and measurement (as appropriate):

— pressure relief valve (see 5.1.3);

— lowering control (see 5.1.4);

— efforts (see 5.1.5);

— steering (see 5.2.1 and 5.3.1);

— lifting or support systems (see 5.2.5, 5.2.6 and 5.2.7).

Annex A
(informative)

Typical examples of jacks and stanchions

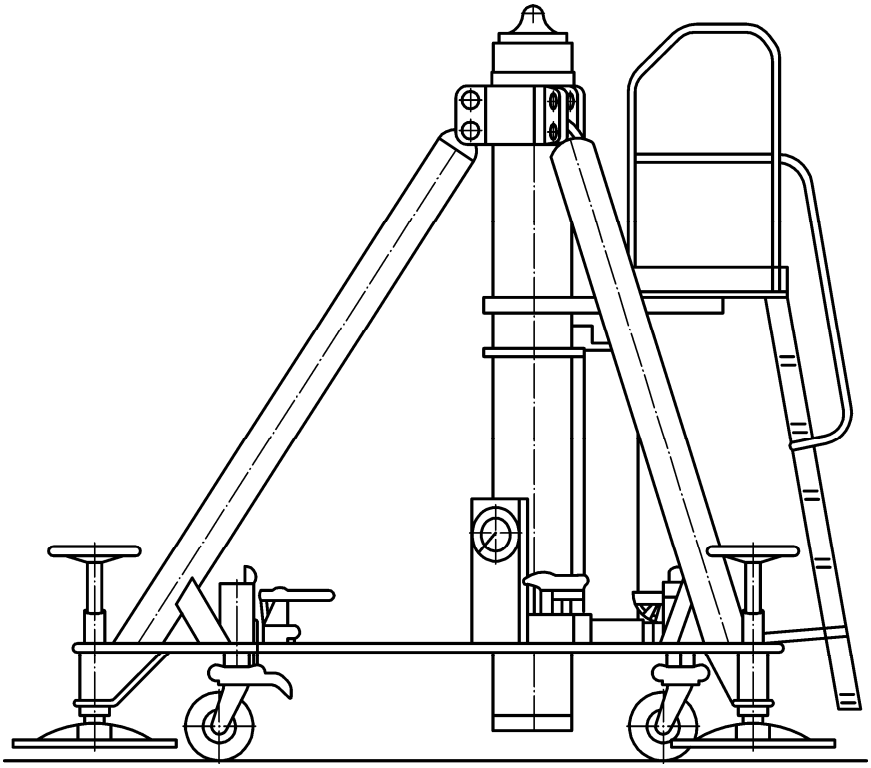

Figure A.1 — Aircraft jack

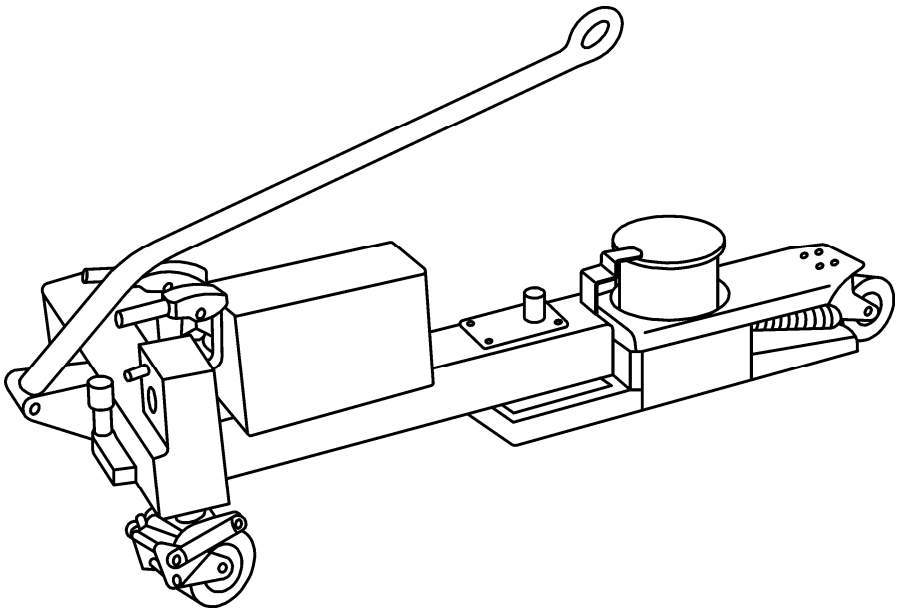

Figure A.2 — Axle jack

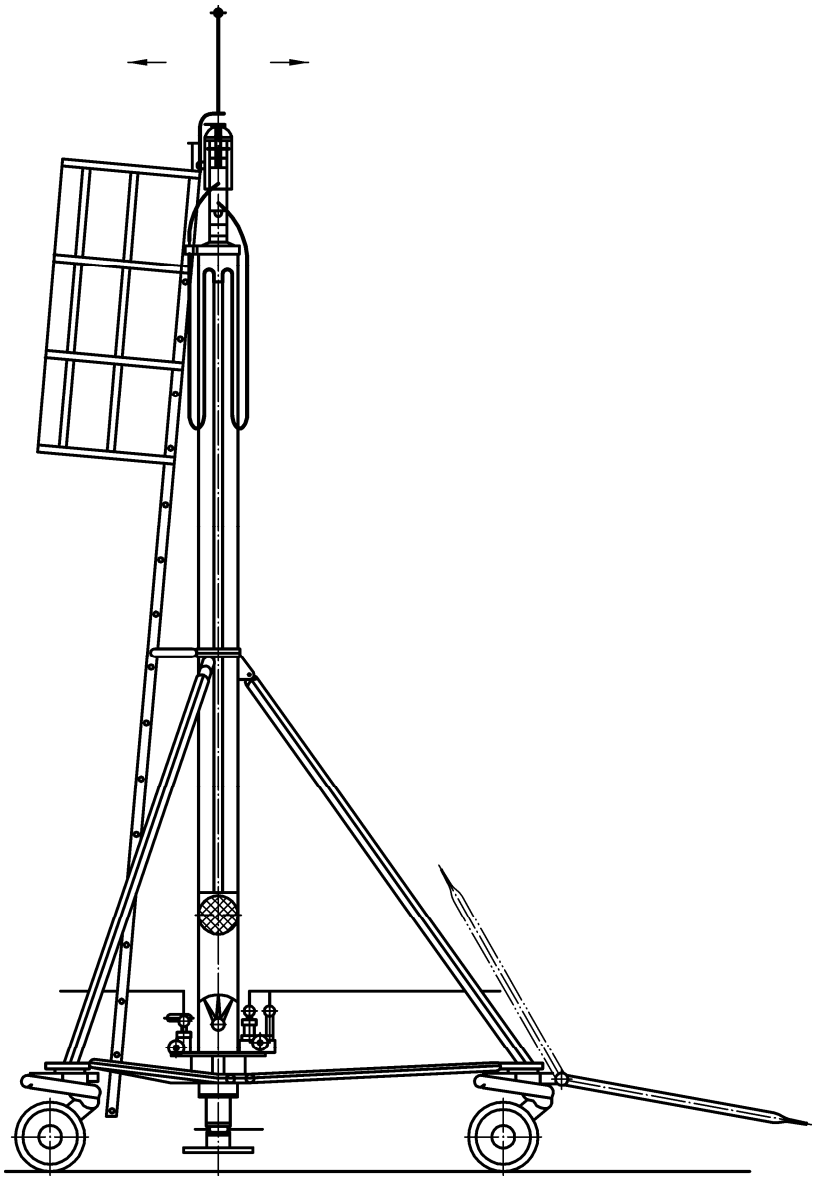

Figure A.3 — Hydraulic tail stanchion

Annex B
(normative)

List of hazards in addition to those of EN 1915-1

Table B.1 — List of hazards

Number corresponding to EN 1050:1996	Hazard	Risk area	Hazardous situation	Reference in this document
1.1	Crushing	Body of the unit Aircraft	Crushing underneath aircraft due to lack of stability or strength the jack or tail stanchion	5.1.2, 5.2.9
1.1 1.2	Crushing Shearing	Body of the unit Aircraft	Crushing or shearing during positioning due to inadequate steering Crushing or shearing due to inadequate lifting system	5.2.1, 5.3.1 5.1.3, 5.1.4, 5.2.5, 5.2.6
1.2 1.5 1.6	Shearing Trapping Impact	Body of the unit Aircraft	Shearing, trapping or hitting between aircraft or hydraulic tail stanchion due to unintentional movement	5.2.7, 5.2.8
1.6	Impact	Body of the unit Handles Control means	Hitting by jack or stanchion due to missing or inadequate parking brake or equivalent device Hitting or other injuries due to inadequate handles and control means	5.2.4 5.3.4
1.7 1.8	Stabbing Abrasion	Body of the unit	Cutting or scratching due to missing or inadequate handles or control means	5.3.4

Table B.1 *(continued)*

Number corresponding to EN 1050:1996	Hazard	Risk area	Hazardous situation	Reference in this document
1.9	High pressure fluid injection	Hydraulic system	Hitting by high pressure hydraulic oil jet caused by inadequate hoses	6.3
8.1	Unhealthy postures Excessive effort	Handles Control means	Injuries due to excessive efforts caused by inadequate handles and/or control means	5.1.5, 5.3.2, 5.3.3
14	Failure of the control circuit	Lifting system	Hazards due to unintended movements or loss of stability	5.2.5, 5.2.6, 5.2.7
21.1	Fall of persons during access to the work position	Access ladders	Falling to the ground due to missing or inadequate access on aircraft jacks and hydraulic tail stanchions	5.2.2
22.1 22.2	Inadequate location and/or design of manual controls	Controls	Various risks for persons during operation	5.2.3
26	Insufficient instructions	Information for use	Absence of data and markings Absence of safety related placards and pictographs Missing of operating and maintenance instructions	6.1 6.2 6.3

Annex C
(normative)

Manual forces and manual force measurement methods

C.1 Maximum allowed forces

The maximum manual forces required shall not exceed the following figures:

To start moving unloaded	300 N
To maintain the movement unloaded	200 N
To raise a load or set a stanchion, using the lever of a hand pump	400 N
To raise a load, using a foot pump	400 N

C.2 Conditions for test

The tests shall be carried out with a new jack or stanchion on a smooth, dry, level, trowelled finish concrete floor in good condition. The tests shall be carried out at an ambient temperature of between 15 °C and 28 °C. The measuring instrument used shall have a range of error of ± 3 %.

The forces required are measured in accordance with the methods described below. The tests in both the forward and reverse directions shall be carried out and the average result recorded.

C.3 Measurement of starting force and rolling force

With the unloaded jack or stanchion in starting position and stationary, the wheels are positioned in the direction that they naturally take when moving the jack or stanchion in the test direction.

The force shall be applied horizontally along the jack's or stanchion's axis, on the handle or bar in the test direction.

C.4 Starting force

The maximum value necessary to start the jack or stanchion moving shall be recorded.

C.5 Rolling force

The maximum value necessary to maintain the jack or stanchion at a stabilised speed of 0,5 m/s shall be recorded.

C.6 Average forces

The maximum starting force or the maximum rolling force is the average of the maximum values recorded in each direction of travel, forward and reverse, during two successive tests.

C.7 Hand or foot forces

Actuate the handle or foot pedal as many times as necessary to raise the fully loaded jack (unloaded stanchion) to its maximum height.

The maximum force value is measured perpendicularly to the handle or pedal during each pumping cycle.

The maximum force value is the average of the maximum values recorded at each handle or pedal cycle during one complete lifting.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC, amended by Directive 98/79/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive — Machinery Directive 98/37/EC, amended by Directive 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Annex ZB
(informative)

[A1] Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

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WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard. [A1]

Bibliography

This bibliography contains additional references for aircraft jacks, axle jacks and hydraulic tail stanchions from regulations, publications, standards or draft standards.

[1] EN 414:2000, *Safety of machinery — Rules for the drafting and presentation of safety standards*

[A1] *deleted text* [A1]

[2] ISO 43:1976, *Aircraft — Jacking pads*

[3] ISO 1464:1985, *Aerospace — Tripod jacks — Clearance dimensions*

[4] AHM 938, *Functional specification for a tail support stanchion for Boeing 747 freighter and combi aircraft*[1)]

[5] Aerospace Standard AS 4775, *Aircraft maintenance jacks – General requirements*[1)]

[1)] Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale PA 15096-0001, U.S.A.

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