BRITISH STANDARD

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12312-8:2005
+A1:2009

# Aircraft ground support equipment — Specific requirements —

## Part 8: Maintenance stairs and platforms

ICS 49.100



BSI
British Standards

# National foreword

This British Standard is the UK implementation of EN 12312-8:2005+A1:2009. It supersedes BS EN 12312-8:2005, which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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# EN 12312-8:2005+A1

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English Version

# Aircraft ground support equipment - Specific requirements - Part 8: Maintenance stairs and platforms

Matériel au sol pour aéronefs Exigences particulières Partie 8: Escabeaux et plate formes de maintenance

Luftfahrt Bodengeräte Besondere Anforderungen Teil 8: Wartungstreppen und bühnen

This European Standard was approved by CEN on 25 March 2005 and includes Amendment 1 approved by CEN on 1 March 2009.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up to date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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# Contents

# Foreword

This document (EN 12312-8:2005+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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.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 12312-8:2005.

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

This European Standard includes a Bibliography.

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# Introduction

This European Standard specifies health and safety requirements, as well as some functional and performance requirements for maintenance stairs and platforms including a built-in source of power (see Clause 1, Scope) intended for maintenance purposes on 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 maintenance stairs and platforms. Deviations from the recommended criteria should occur only after careful consideration, extensive testing, risk assessment and thorough service evaluation have shown alternative methods or conditions to be satisfactory.

This European Standard 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 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 European Standard specifies the technical requirements to minimise the hazards listed in Clause 4 which can arise during the commissioning, operation and maintenance of maintenance stairs and platforms 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 maintenance and handling agencies.

This European Standard applies to:

— self-propelled maintenance stairs and platforms;

— towable maintenance stairs and platforms equipped with powered means, e.g. for height adjustment, stabilizers,

designed for aircraft maintenance purposes including access to the aircraft (Examples see Annex A).

NOTE 1 Powered should be also understood as manual effort stored in springs or hydraulic accumulators, etc., the dangerous action of which can be produced or can continue after the manual effort has ceased or directly applied manual effort for lifting or lowering loads.

NOTE 2 Those clauses of this European Standard that can apply may also be used as a guideline for the design of towable maintenance stairs and platforms without powered means.

This European Standard does not apply to:

— maintenance docks either fixed to the ground or moveable only for docking procedure.

This European Standard does not establish requirements for noise and vibration.

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

This European Standard does not deal with hazards in respect to a standard automotive chassis and from other vehicles on the apron.

This Part of EN 12312 is not applicable to maintenance stairs and platforms which are manufactured before the date of publication of this standard 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 1175-1, *Safety of industrial trucks — Electrical requirements — Part 1: General requirements for battery powered trucks*

EN 1386, *Aluminium and aluminium alloys — Tread plate – Specifications*

EN 1837, *Safety of machinery — Integral lighting of machines*

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*

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 European Standard, the terms and definitions given in EN ISO 12100:2003 and EN 1915-1:2001 and the following apply.

**3.1**
**maintenance stair**
stair designed for:

— entering and leaving the aircraft for maintenance purposes;

— reaching and/or access to elevated parts of the aircraft;

— carrying out maintenance work on aircraft

**3.2**
**maintenance platform**
elevating work platform designed for:

— reaching and/or access to elevated parts of the aircraft;

— carrying out maintenance work on aircraft

**3.3**
**maintenance dock**
installed assembly, either fixed to the ground or moveable only for the docking procedure, designed for:

— reaching elevated parts of the aircraft;

— carrying out maintenance work on defined aircraft types

**3.4**
**stair flight**
series of steps between ground level and platform or between two platforms

**3.5**
**riser height (R)**
distance between the surface of the tread of one step and the surface of a step above or below when measured perpendicularly between the tread surfaces

**3.6**
**tread depth (T)**
distance from one step nosing to the adjacent step nosing when measured parallel to the tread surface

**3.7**
**step width**
maximum usable width measured along the nose of the step

**3.8**
**handrail height**
distance to the top surface of the handrail as measured at the nose of the step or platform and perpendicular to the tread surface

**3.9**
**incline**
angle of stair flight to a horizontal plane, measured across the noses of the steps

**3.10**
**inclination**
angle of platform and steps to a horizontal plane, measured at a right angle to the noses of the steps

## 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 maintenance stairs and platforms and which require action to eliminate or reduce risks.

## 5 Safety requirements and/or measures

### 5.1 General requirements

**5.1.1** ⟦A1⟩ Maintenance stairs and platforms 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 European Standard.

**5.1.2** Strength calculations shall be carried out in accordance with EN 1915-2.

**5.1.3** Stability calculations shall be carried out according to EN 1915-2.

For maintenance stairs and platforms intended only for indoor use, the stability calculation may be carried out without regard to wind and snow loads.

NOTE For special purposes the wind speed used for stability calculation may be different from 20,58 m/s (40 knots; see Clause 0 of EN 1915-1:2001-negotiations)

**5.1.4** Self-propelled maintenance stairs and platforms shall be equipped with driver accommodation.

NOTE This clause is not valid for pedestrian controlled self-propelled maintenance stairs and platforms.

**5.1.5** Parking brakes or equivalent devices of maintenance stairs and platforms shall be dimensioned so as to take into account the forces induced during work under intended use conditions in accordance with EN 1915-1:2001, 5.7.2, requirement to hold on a slope of at least 7 %.

**5.1.6** Deviating from the requirements of EN 1915-1 lights and reflectors for traffic purposes according to 5.10 of EN 1915-1:2001 are not required on equipment intended only for indoor use.

**5.1.7** Where working lights are provided they shall conform to EN 1837. The minimum electrical power of lamps shall be 25 W.

**5.1.8** Where maintenance platforms are intended to be moved with persons on the platform, adequate safety means, e.g. seats with safety belts and/or fixing points for safety harnesses shall be provided.

**5.1.9** Maintenance stairs shall be equipped with a work platform (see also 5.3).

**5.1.10** Maintenance platforms shall be equipped with means for safe access to and from the platform in lowered position.

**5.1.11** In all intended working positions step and platform inclination shall not exceed ± 3° (5 %) when the maintenance stair or platform rests on a horizontal plane.

**5.1.12** The material for the surface of steps and platforms shall provide the possibility of easy elimination of water and snow, e.g. by using tread plates conforming to EN 1386.

**5.1.13** The lowest point of the structure of maintenance stairs and platforms fully stowed for movement shall not be less than 150 mm above horizontal ground. In addition the ground clearance of maintenance stairs and platforms shall allow without interference the transversing of two surfaces intersecting at an angle of ± 3° (5 %) either in bridging or cresting.

**5.1.14** The electrical system of battery powered maintenance stairs and platforms shall conform to EN 1175-1.

**5.1.15** All sharp edges or corners resulting from the manufacturing process shall be chamfered or rounded with a minimum radius of 1 mm.

## 5.2 Stair flight

**5.2.1** All steps of a stair flight shall be designed with the same riser height and the same tread depth.

**5.2.2** Riser height and tread depth dimensions shall meet the following geometric criteria:

**Riser height (R) + Tread depth (T) = 460 mm ± 10 mm**

The riser height (R) shall be between 140 mm and 250 mm, the tread depth (T) shall be between 210 mm and 320 mm. Meeting these criteria allows a range of incline from 24° to 50°.

NOTE The ideal angle for the stair flight incline is between 30° and 35°.

**5.2.3** The minimum step width of a stair flight shall be 0,75 m.

**5.2.4** The distance from the ground to the tread surface of the bottom step shall not exceed 250 mm when the maintenance stair is positioned on a horizontal surface.

**5.2.5** Where the number of risers of a stair flight exceeds 22, an intermediate platform shall be provided (see also 5.3.2).

## 5.3 Platforms

**5.3.1** The work platform of a maintenance stair shall have a minimum usable length of 1,0 m. The minimum width dimension shall be the width of the stair flight (see also 5.2.3).

**5.3.2** Intermediate platforms on maintenance stairs shall have a minimum length of three treads.

**5.3.3** Parts of platforms adjacent to the aircraft shall be covered with protective padding.

**5.3.4** Parts of platforms adjacent to the aircraft shall be of such design as to minimize the gap to the aircraft when used as intended by the manufacturer, i.e. within 100 mm along the length of the interface.

**5.3.5** Where maintenance platforms are intended to move persons vertically the manufacturer shall carry out a risk assessment for establishing the possible need for additional safety devices (complementary to those required in this European Standard and in EN 1915-1 and EN 1915-2), in particular for warning the operator and prevent dangerous movements of the load in the event of overloading or exceeding the moments conducive to overturning.

NOTE Guidance can be found among others in EN 280.

## 5.4 Guard rails

**5.4.1** Maintenance stairs shall be provided with guard rails on both sides of the stair flight, the intermediate platform and the work platform. In addition, the work platform shall be provided with guard rails at the leading edge.

**5.4.2** The platform of maintenance platforms shall be provided with guard rails on all sides.

**5.4.3** The guard rails minimum height shall be as follows:

— stair flight (measured at nose of steps) 0,9 m;

— platforms 1,0 m.

**5.4.4** Where moveable, the design of guard rails shall ensure that standing areas and walkways are not obstructed during use of the equipment.

## 5.5 Lifting devices

**5.5.1** Telescopic height adjustment of a stair flight shall be performed by increments of one full step. Adjustment to intermediate heights shall be provided by either controllable platform or stair flight inclination.

**5.5.2** A releasable positive-fit safeguard shall be incorporated to ensure that the adjusted elevation is maintained when the work platform is subjected to maximum payload. Reliance on the extending stair height adjustment as a safety device against unintentional lowering shall not be considered acceptable.

**5.5.3** Stabilizers in the retracted position shall not protrude from the maintenance stair's or platform's overall width.

NOTE Preferably the stabilizers in operating position should also not protrude either from the overall width.

## 5.6 Controls, monitoring devices and displays

**5.6.1** Where the position of powered stabilizers cannot be monitored by the operator, confirmation by visible indication shall be provided next to each control, that the stabilizers are both fully retracted and in the extended position.

**5.6.2** Emergency stops stopping all movements shall be provided at each control paneland at ground level. [A1] They shall meet the requirements in EN ISO 13850:2008 category 0 or category 1 (see 4.1.4 of EN ISO 13850:2008). [A1]

The emergency stop shall not activate the travelling brakes of self-propelled maintenance stairs and platforms.

**5.6.3** Self-propelled maintenance platforms powered by an internal combustion engine shall be equipped with controls on the platform to start and stop the engine.

**5.6.4** Controls for raising and lowering of maintenance platforms shall be provided on the platform. These controls shall override any other devices controlling the same movements, with the exception of emergency stops.

## 5.7 Auxiliary means for powered maintenance stairs and platforms

**5.7.1** Powered maintenance stairs and platforms shall be fitted with auxiliary means

— to lower the platform and/or the stair flight;

— to retract the stabilizers,

allowing the maintenance stair or platform to be towed away in the event of primary power loss.

**5.7.2** The auxiliary means shall be independent from the primary, e.g. hand pump, or with a power source independent from the primary one. Its controls shall be located at ground level and protected against unintentional operation.

# 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:

— "Aircraft Maintenance Platform", where applicable[1)];

— "for indoor use only", if the equipment is designed only for indoor use;

— allowable wind speed, if not "for indoor use only".

## 6.3 Warnings

The following warnings shall be affixed permanently at prominent positions adjacent to the hazard:

— Keep clear of moving parts;

— Keep clear of stabilizers;

— Keep clear of unpropped platform.

## 6.4 Instructions

Operating and maintenance instructions shall be supplied with each maintenance stair or platform. 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 the design of the maintenance stair or platform, information about:

— measures to be taken in case of emergency situations or breakdown;

— routine checks to be carried out by the operator;

— minimum training programme for the operator;

— jacking points and transport means;

— types of hoses to be used in hydraulic systems;

— use of safety harnesses;

1) This is in order to denote differences in specification and possible differences in intended conditions of use with similar mobile elevating work platforms for general use.

— safety requirements for the maintenance of the equipment itself resulting from the specific design;

— maximum travelling speed of towable maintenance stairs and platforms.

## 7 Verification of requirements

The verification of requirements shall be carried out 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 requirements shall be verified by functional tests, and measurement (as appropriate):

— parking brakes (see 5.1.5);

— lights (see 5.1.6 and 5.1.7);

— electrical system (see 5.1.14);

— lifting devices (see 5.5);

— controls, monitoring devices and displays (see 5.6);

— auxiliary means (see 5.7);

— service brakes, steering devices, warning devices, lifting system and speeds (see EN 1915-1).

# Annex A
(informative)

## Examples of typical maintenance stairs and platforms

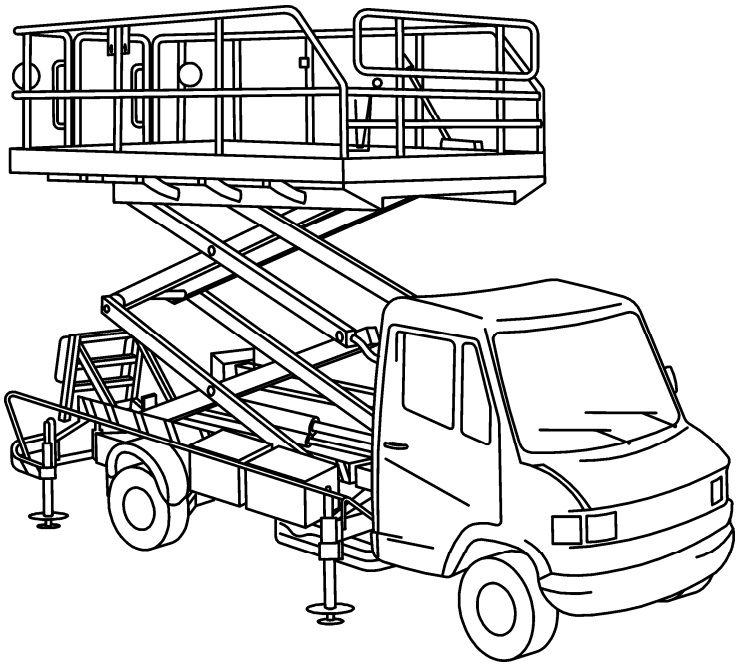

**Figure A.1 — Elevating maintenance platform mounted on a standard automotive chassis**

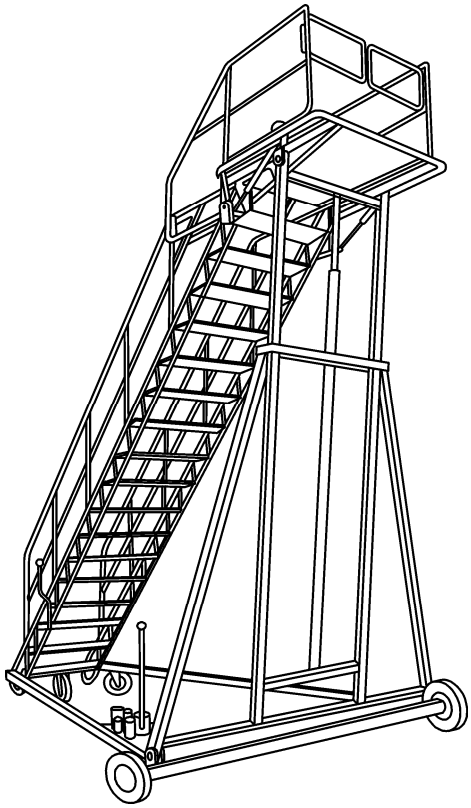

**Figure A.2 — Towable maintenance stairs**

# 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 | Hazard | Risk area | Hazardous situation | Reference in this European Standard |
|---|---|---|---|---|
| 1.1<br>1.2<br>1.5 | Crushing<br>Shearing<br>Trapping | Equipment body | Crushing or shearing between equipment and aircraft or other ground support equipment during positioning | 5.1.4, 5.1.5 |
| | | Lifting device | Crushing, trapping or shearing between parts of the lifting device | 5.5.2, 6.3 |
| | | Stabilizers | Crushing, trapping or shearing by movement of the stabilizers | 6.3 |
| | | Stair flight<br>Platform | Crushing, trapping or shearing between parts of moveable guard rails | 5.4.4 |
| 1.1<br>1.5<br>1.6 | Crushing<br>Trapping<br>Impact | Equipment body | Hitting, crushing or trapping by tilting equipment due to lack of stability or strength | 5.1.2, 5.1.3, 6.3 |
| 1.6 | Impact | Stair flight<br>Platform | Hitting due to inadequate width of stair flights or platforms | 5.2.3, 5.3.1 |
| | | Equipment body | Hitting due to missing ground clearance | 5.1.13 |
| | | Platform | Hitting due to missing safety devices | 5.1.8 |
| | | Stabilizer | Hitting due to protruding stabilizers | 5.5.3 |
| 1.7<br>1.8 | Stabbing<br>Abrasion | Guard rails | Pinching or scratching due to inadequate design of components or at moveable parts of guard rails design | 5.1.15, 5.4.4 |

**Table B.1** (*concluded*)

| Number corresponding to EN 1050 | Hazard | Risk area | Hazardous situation | Reference in this European Standard |
|---|---|---|---|---|
| 1.9 | High pressure fluid injection | Hydraulic system | Hitting by high pressure hydraulic oil jet caused by inadequate pipes or hoses | 6.4 |
| 2.1<br>2.2 | Contact | Power source<br>Electrical connections<br>Batteries | Contact with live parts | 5.1.14 |
| 2.5 | Thermal radiation or other pheno-mena | | Shorts circuits on batteries or loose contacts | 5.1.14 |
| 19 | Falling<br>Tripping<br>Slipping | Stair flight<br>Platform<br>Guard rails | Falling, tripping or slipping due to inadequate stairs and steps, walking surfaces, guard rails | 5.1.8, 5.1.9, 5.1.10, 5.1.11, 5.1.12, 5.2.1, 5.2.2, 5.2.4, 5.2.5, 5.3.2, 5.3.4, 5.4, 5.5.1 |
| 21.5 | Insufficient visibility | Equipment body<br>Stabilizers | Tilting of equipment, crushing, shearing or hitting due to missing control of position of stabilizers | 5.6.1 |
| 21.6 | Inadequate lighting | Operating range | Inadequate lights | 5.1.7 |
| 22.1<br>22.2 | Inadequate location and design of manual controls | Controls | Various risks for persons during operation of equipment | 5.6.2, 5.6.3, 5.6.4, 5.7 |
| 26 | Insufficient instructions | Operating range | Absence of marking and data<br>Absence of safety related placards and pictographs<br>Missing of operating and maintenance instructions | 6.1, 6.2<br>6.2, 6.3<br>6.4 |

# 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 *(except 5.3.3)* 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.

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 (except 5.3.3) 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. A1

# Bibliography

This bibliography contains additional references for maintenance stairs and platforms from regulations, publications, standards or draft standards.

European Standards:

[1] EN 280:2001, *Mobile elevating work platforms - Design calculations - Stability criteria - Construction - Safety - Examinations and tests*[2)]

[A1] *deleted text* [A1]

[2] CEN Guide 414:2004, *Safety of machinery — Rules for the drafting and presentation of safety standards*

2) EN 280 does not apply to aircraft ground support equipment. However, in view of design similarity with mobile elevating work platforms for general use, manufactures may wish to consult it in parallel with the present European Standard.

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