BRITISH STANDARD

BS EN
358:2000

Personal protective equipment for work positioning and prevention of falls from a height — Belts for work positioning and restraint and work positioning lanyards

The European Standard EN 358:1999 has the status of a British Standard

ICS 13.340.99

National foreword

This British Standard is the official English language version of EN 358:1999. It supersedes BS EN 358:1993 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/5, Industrial safety belts and harnesses, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 11 and a back cover.

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English version

Personal protective equipment for work positioning and prevention of falls from a height - Belts for work positioning and restraint and work positioning lanyards

Equipement de protection individuelle de maintien au travail et de prévention contre des chutes de hauteur - Ceintures de maintien au travail et de retenue et longes de maintien au travail

Persönliche Schutzausrüstung für Haltefunktionen und zur Verhinderung von Abstürzen - Haltegurte und Verbindungsmittel für Haltegurte

This European Standard was approved by CEN on 27 October 1999.

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 Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 358:1999 E

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 160, Protection against falls from height including working belts, the Secretariat of which is held by DIN.

This European Standard supersedes EN 358:1992.

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 June 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.

This European Standard 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).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

When work undertaken at a height is of short duration, or for technical reasons the provision of a working platform, suitable barriers and other similar safeguards is impracticable, then the prevention from falling from a height whilst performing correctly the related work activity can be achieved by the use of personal protective equipment. Equipment when manufactured according to this standard is designed to either secure the user safely in position at the point of work (work positioning), or prevent the user from reaching a position where a fall can occur (restraint). It is essential to note that such personal equipment by design does not meet the requirements necessary for the purposes of fall arrest: it may be necessary to supplement it with collective or personal means of protection against falls from a height, and its safe use, in practice, relies upon the effective training and instruction of the user.

1 Scope

This European standard applies to belts and lanyards intended for the purpose of work positioning or restraint. It specifies the requirements, testing, marking and information supplied by the manufacturer.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies .

EN 137:1993
Respiratory protective devices; self-contained open-circuit compressed air breathing apparatus; requirements, testing, marking

EN 354
Personal protective equipment against falls from a height - Lanyards

EN 361
Personal protective equipment against falls from a height - Full body harnesses

EN 362
Personal protective equipment against falls from a height - Connectors

EN 363
Personal protective equipment against falls from a height - Fall arrest systems

EN 364:1992
Personal protective equipment against falls from a height - Test methods

EN 365
Personal protective equipment against falls from a height - General requirements for instructions for use and marking

EN 892
Mountaineering equipment - Dynamic mountaineering ropes - Safety requirements and test methods

EN 12277:1998
Mountaineering equipment - Harnesses - Safety requirements and test methods

ISO 9227
Corrosion tests in artificial atmospheres - Salt spray test.

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 attachment element

a load bearing element provided for the connection of other components

3.2 component

a part of a system at a point of sale by the manufacturer, supplied with packaging, marking and information supplied by the manufacturer. Body supports (including waist belts) and lanyards are examples of components of systems (see EN 363)

3.3 element

a part of a component or a sub-system. Ropes, webbing, attachment elements, fittings and anchorage lines are examples of elements

3.4 restraint

a technique whereby a person is prevented by means of personal protective equipment from reaching zones where the risk of a fall from a height exists

3.5 waist belt

a body support that encircles the body at the waist

3.6 work positioning

a technique that enables a person to work supported by personal protective equipment in tension in such a way that a fall is prevented.

3.7 work positioning lanyard

a component used to connect a waist belt to an anchor point, or to a structure by encircling it, as a means of support

4 Requirements

4.1 Design and construction

4.1.1 Waist belt

4.1.1.1 A waist belt shall be designed to enable the wearer to perform his work without undue discomfort and remain secure against the hazard of a fall from a height. Essential fastening and adjustment elements shall remain accessible to the wearer and shall operate effectively when manipulated by hand.

4.1.1.2 A waist belt shall be not less than 43 mm wide and shall be capable of adjustment to fit the wearer. The waist belt shall have at least one attachment element intended for the connection of load bearing components. The waist belt shall meet the performance requirements specified in 4.2.

4.1.1.3 The fastening and adjustment elements of a waist belt shall be designed and constructed so that when correctly fastened, involuntary release or opening of the element cannot occur. When fastening or adjustment elements can be secured in more than one manner, then the waist belt shall comply with the performance requirements of this standard when the elements are secured in each available manner.

4.1.1.4 It shall be possible to carry out a visual inspection of the waist belt and all its attachments even when the belt is incorporated into a garment or if it is a component in a full body harness.

4.1.1.5 A waist belt not fitted with a back support and intended for work positioning purposes shall be not less than 80 mm wide.

4.1.1.6 A back support when fitted to a waist belt shall be designed to give physical support to the wearer without inhibiting either arm or leg movements. The minimum length of the back support shall be 50 mm longer than half the circumference of the belt when adjusted to the maximum radial length (waist size) specified by the manufacturer. The minimum width of the back support shall be 100 mm for a length of 200 mm centred on the spine of the wearer and shall be a minimum of 60 mm elsewhere.

4.1.1.7 When a waist belt is equipped with shoulder or leg straps they shall not impair use of the waist belt in any way. No attachment element shall be connected to a shoulder or leg strap.

4.1.1.8 When a waist belt is incorporated into other equipment, e.g. a full body harness (see EN 361), then the waist belt shall meet the performance requirements specified in 4.2.

4.1.2 Work positioning lanyard

4.1.2.1 A work positioning lanyard of fixed length shall meet the requirements of EN 354. It shall be intended for a specific purpose which shall be detailed by the manufacturer. The length of such a work positioning lanyard shall be the minimum length to achieve its specified purpose.

4.1.2.2 A work positioning lanyard equipped with a length adjustment element shall be capable of adjustment to the minimum length which enables freedom to work and prevents the wearer from falling when the lanyard is incorporated into a specified work positioning system.

4.1.2.3 Every work positioning lanyard shall be so constructed that involuntary release of the lanyard when connected to a waist belt is prevented. The material of the work positioning lanyard shall be terminated in such a way that a length adjuster when fitted cannot be released from the lanyard involuntarily. When a work positioning lanyard can be assembled in more than one manner then the lanyard shall meet the performance requirements when tested with each method of assembly.

4.1.2.4 A work positioning lanyard equipped with a length adjustment element shall be either:

a) permanently attached to the waist belt at one end and have a connector compatible with an attachment element fitted to the waist belt at the other end;

b) detachable, in which case there shall be a connector at each end compatible with the attachment element(s) of the waist belt; or,

c) detachable (and independent), whereby at least one end of the work positioning lanyard shall be capable of attachment to a suitable anchor point; and the length adjustment element shall be capable of connection to the waist belt attachment element either directly or via a detachable lanyard of maximum length 0,5 m.

4.1.2.5 The work positioning lanyards described in 4.1.2.4 a) and b) shall have a maximum length of 2 m. The work positioning lanyard described in 4.1.2.4 c) shall be assigned a length of 2 m for the purpose of testing but shall not have a specified maximum length unless a limit is specified by the manufacturer.

4.1.2.6 It shall be possible to carry out a visual inspection of all the elements incorporated into the work positioning lanyard.

4.1.2.7 A work positioning lanyard shall meet the performance requirements of 4.2 when tested with a waist belt of a type with which it is intended to be used.

4.1.3 Materials

4.1.3.1 Webbing and yarns shall be made from virgin filament or multifilament synthetic fibres suitable for the use intended. The breaking tenacity of the synthetic fibre shall be known to be at least 0,6 N/tex.

4.1.3.2 Threads used for sewing shall be physically compatible with the webbing and of a quality comparable with that of the webbing. They shall be of a contrasting colour or shade in order to facilitate visual inspection.

4.1.3.3 When a work positioning lanyard is intended for a special application then the material appropriate for that specification (e. g. chain or wire rope) shall be specified by the manufacturer.

4.1.3.4 The material used in the manufacture of a work positioning lanyard shall be known to have a minimum breaking force of 22 kN.

4.1.4 Connectors

Connectors shall comply with EN 362.

4.1.5 Thermal resilience

Equipment which is claimed to be suitable for use in high temperature environments (e.g. fire-fighting exposure) shall be tested in accordance with 6.3.1.4 of EN 137:1993 and shall not continue to burn for more than 5 s after removal from the test flame.

4.2 Performance

4.2.1 Static strength

4.2.1.1 A waist belt shall be subjected to the static strength test described in 5.2.1 and shall withstand a force of 15 kN for 3 min without releasing the cylinder.

4.2.1.2 A waist belt with an integral work positioning lanyard shall be subjected to the static strength test described in 5.2.2 and shall withstand a force of 15 kN for 3 min without releasing the cylinder.

4.2.1.3 A work positioning lanyard with an adjustable element shall be subjected to the static strength test described in 5.2.3 and shall withstand a force of 15 kN for 3 min without fracture.

4.2.2 Dynamic strength

A waist belt and a work positioning lanyard shall be tested in combination as described in 5.3 and shall not allow the dummy to be released.

4.2.3 Corrosion resistance

When tested in accordance with 5.4 each metal part of a waist belt and of a work positioning lanyard shall show no evidence of corrosion which could affect its function.

5 Testing

5.1 Test apparatus

5.1.1 Apparatus for the testing of waist belts and work positioning lanyards shall meet the requirements of 4.1 to 4.7 of EN 364:1992; and, in respect of an alternative dummy (with waist) the model shown in Figure 2 of EN 12277:1998 given a mass of 100 kg shall be acceptable.

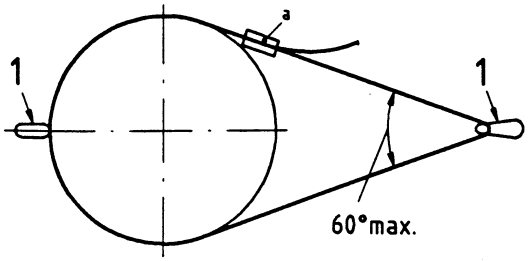
5.1.2 The diameter of the test cylinder specified in 4.3 of EN 364:1992 may be reduced to a minimum of 250 mm to avoid contact between the waist belt buckle and the cylinder.

5.2 Static strength test methods

5.2.1 Waist belt

5.2.1.1 Install the waist belt and test cylinder in the test apparatus as shown in figure 1. Apply the specified test force between the test cylinder and a waist belt attachment element. Maintain the force for 3 min and observe whether the waist belt releases the cylinder.

5.2.1.2 When waist belt attachment elements differ in design, or manner of connection to the belt, then the test shall be repeated for each different type of attachment. A new waist belt shall be used for each test.



1 Attachment element

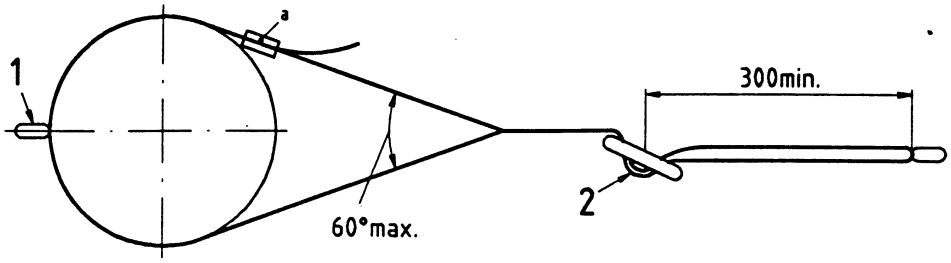
[a)] The buckle shall not contact the cylinder

Figure 1: Static strength test for a waist belt

5.2.2 Waist belt with integral work positioning lanyard

Install the waist belt with integral work positioning lanyard and test cylinder in the test apparatus as shown in figure 2. Ensure that the length adjustment element is a minimum of 300 mm from the free end of the lanyard and mark its position. Apply a force of 5 kN for a period of 3 min between the test cylinder and the connector at the free end of the work positioning lanyard. Record any movement (slippage) of the lanyard material through the adjustment element. Any movement of the material (slippage) through the adjustment element shall not exceed 50 mm. Release the load and immediately move the adjustment element of the work positioning lanyard to the end stop of the lanyard. Apply the specified test force (15 kN) between the test cylinder and the connector at the free end of the work positioning lanyard. Maintain the force for 3 min and observe whether the waist belt or the work positioning lanyard releases the cylinder.

Dimensions in millimetres



1 Attachment element
2 Length adjustment element

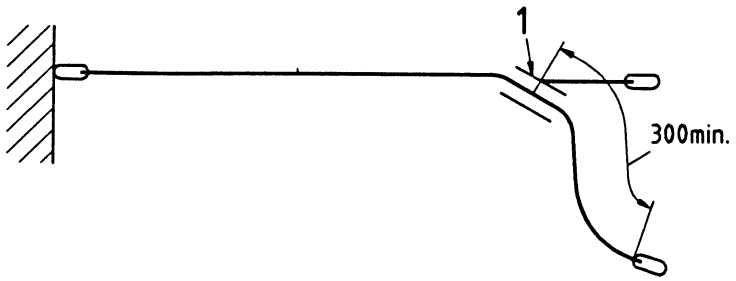
a) The buckle shall not contact the cylinder

Figure 2: Static strength test for a waist belt with integral work positioning lanyard

5.2.3 Detachable work positioning lanyard with a length adjustment element

Assemble the work positioning lanyard as shown in figure 3. Ensure that the length adjustment element is a minimum of 300 mm from the free end of the lanyard and mark its position. Apply a force of 5 kN for a period of 3 min between the connector at the anchor point and the length adjustment element. Record any movement (slippage) of the lanyard material through the adjustment element. Any movement (slippage) of the material through the adjustment element shall not exceed 50 mm. Release the load and immediately move the adjustment element of the work positioning lanyard to the end stop of the lanyard. Apply the specified test force (15 kN) between the connector at the anchor point and the length adjustment element. Maintain the force for 3 min and observe whether the work positioning lanyard fractures.

Dimensions in millimetres



1 Length adjustment element

Figure 3: Static strength test for a detachable work positioning lanyard

5.3 Dynamic strength

5.3.1 General

5.3.1.1 When a waist belt without an accompanying work positioning lanyard is required to be tested then a mountaineering rope of 11 mm diameter meeting the requirement of EN 892 'single rope' category shall be used for the purpose of the test. When a waist belt with an integral work positioning lanyard is required to be tested and the lanyard length is less than 1 m then a lanyard of length 1 m shall be provided for the purpose of the test.

5.3.1.2 When waist belt attachment elements differ in design, or manner of connection to the belt, then the test shall be repeated for each different type of attachment. A new waist belt and work positioning lanyard shall be used for each test.

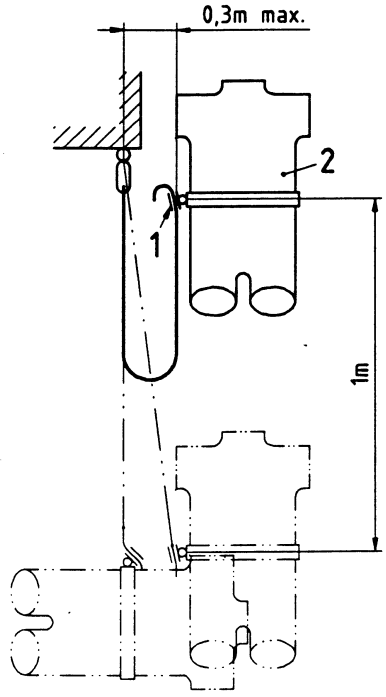
5.3.1.3 When a work positioning lanyard without an accompanying waist belt is required to be tested then either a waist belt meeting the requirements of this standard fitted to a torso dummy, or a rigid mass of 100 kg, shall be used for the purpose of the test.

5.3.2 Test method

5.3.2.1 Fit the waist belt to the selected torso dummy. Attach the work positioning lanyard or mountaineering rope to an attachment element of the waist belt. Adjust the length of the work positioning lanyard, or mountaineering rope, to (1 ± 0,05) m. Secure the connector at the free end of the work positioning lanyard to a structural anchor point as shown in figure 4.

5.3.2.2 Suspend the dummy by its upper attachment point and raise it so that the waist belt attachment element is level with the structural anchor point and as close possible to it (without risk of contact during the fall). Hold the torso dummy with the quick release device.

5.3.2.3 Release the torso dummy without initial velocity to free fall feet first about 1 m before the work positioning lanyard takes up the tension. Observe whether the torso dummy is released by the waist belt.



1 Length adjustment element
2 Torso dummy

Figure 4: Dynamic strength test for waist belt and work positioning lanyard

5.4 Corrosion resistance

5.4.1 Expose the specimen to the neutral salt spray test for a period of 24 h and then dry it for 1 h. The neutral salt spray test procedure shall be in accordance with ISO 9227.

5.4.2 When the specimen is examined white scaling or tarnishing is acceptable if the function of the element or component is not impaired. When it is necessary to gain visual access to internal components dismantle the device and examine as described.

6 Information supplied by the manufacturer, marking and packaging

6.1 Information supplied by the manufacturer

The information supplied by the manufacturer shall confom to the relevant requirements of EN 365 when applicable, and shall in addition contain the following information and advice:

a) size details and instructions on how to obtain the optimum fit;

b) the correct way to put on the belt;

c) the essential need to regularly check fastening and/or adjustment elements during use;

d) identification of attachment elements, the correct method of connecting to them, and a clear and unambiguous statement which states the purpose of each attachment element;

e) a statement of the purpose and limitations of the product;

f) a warning that the equipment is not suitable for fall arrest purposes and that it may be necessary to supplement arrangements for work positioning or restraint with collective means (e.g. safety nets) or personal means (e.g. fall arrest systems in accordance with EN 363) of protection against falls from a height;

g) an instruction to position and/or adjust the work positioning lanyard in such a way that the anchorage point is maintained at or above waist level; the lanyard is kept taut; and free movement is restricted to a maximum of 0,6 m;

h) that use of the equipment is intended to be restricted to properly trained and competent personnel, or subject to a level of competent supervision;

i) that before use of the equipment consideration should be given as to how any necessary rescue could be safely achieved;

j) on any limitations applicable to the materials of the product or hazards which may affect the performance of the materials, e.g. temperature, chemical agents, sharp edges, abrasion, cuts, ultraviolet radiation, etc;

k) on cleaning and disinfecting the product;

l) on the expected lifespan of the equipment or how this may be determined;

m) how to protect the equipment during transportation;

n) the interpretation of any markings;

o) the need for regular checks on the waist belt and associated lanyard(s) for signs of wear or damage before use.

6.2 Marking

The marking of waist belts and work positioning lanyards shall comply with EN 365 and shall in addition include the manufacturer's model designation or reference and the number of this European Standard, i.e EN 358.

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6.3 Packaging

Each waist belt and work positioning lanyard shall when supplied be wrapped in suitable moisture proof packaging.

Annex ZA (informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard 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 89/686/EEC.

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

The following clauses of this European Standard are likely to support requirements of Directive 89/686/EEC, Annex II:

EU-Directive 89/686/EEC, Annex II		Clauses of this European Standard
1.1	Design principles	
1.1.1	Ergonomics	4.1.1.1, 4.1.2.1
1.2	Innocuousness of PPE	
1.2.1.3	Maximum permissible user impediment	4.1.1.1, 4.1.2.2
1.3	Comfort and efficiency	
1.3.1	Adaptation to user morphology	4.1.1.1 to 4.1.1.3
1.3.2	Lightness and design strength	4.1.1.1, 4.1.3, 4.1.5, 4.2
1.3.3	Compatibility of different classes or types of PPE for simultaneous use	4.1, 6.1 f)
1.4	Information supplied by the manufacturer	6.1
2.1	PPE incorporating adjustment systems	4.1.1.1 to 4.1.1.3, 4.1.2.2 to 4.1.2.4
2.4	PPE subject to ageing	6.1 j), 6.1 k), 6.1 l)
2.9	PPE incorporating components which can be adjusted or removed by the user	4.1.1.1 to 4.1.1.3, 4.1.2.2 to 4.1.2.4
2.10	PPE for connection to another, external complementary device	4.1.2.4, 6.1 f), 6.1 g)
2.12	PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	6.1 n), 6.2
3.1.2.2	Prevention of falls from a height	0, 6.1 f), 6.1 g), 6.1 j)

Compliance with the clauses of this European Standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

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