BRITISH STANDARD

BS EN 813:2008

Personal fall protection equipment — Sit harnesses

ICS 13.340.60

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 813:2008. It supersedes BS EN 813:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/5, Industrial safety belts and harnesses.

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

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Personal fall protection equipment - Sit harnesses

Equipement de protection individuelle pour la prévention contre les chutes de hauteur - Ceintures à cuissardes

Persönliche Absturzschutzausrüstung - Sitzgurte

This European Standard was approved by CEN on 4 July 2008.

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Contents

Page

Figures

Foreword

This document (EN 813:2008) has been prepared by Technical Committee CEN/TC 160 “Protection against falls from a height including working belts”, 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of an identical text or by endorsement, at the latest by February 2009, and conflicting national standards shall be withdrawn at the latest by February 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 813:1997.

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 89/686/EEC.

Annex B provides details of significant technical changes between this European Standard and the previous edition EN 813:1997.

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

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1 Scope

This European Standard specifies requirements, testing, marking and information to be supplied by the manufacturer for sit harnesses to be used in restraint, work positioning and rope access systems, where a low point of attachment is required. Sit harnesses are not suitable to be used for fall arrest purposes.

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.

EN 358, *Personal protective equipment for work positioning and prevention of falls from a height — Belts for work positioning and restraint and work positioning lanyards*

EN 363:2008, *Personal fall protection equipment — Personal fall protection 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, maintenance, periodic examination, repair, marking and packaging*

EN 892, *Mountaineering equipment — Dynamic mountaineering ropes — Safety requirements and test methods*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2006)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 363:2008, and the following apply.

3.1
element
part of a component

NOTE Webbing, attachment elements and fittings are examples of elements.

3.2
component
part of a system at a point of sale by the manufacturer, supplied with packaging, marking and instructions for use

NOTE A sit harness is an example of a component of a system.

3.3
fastening and adjustment element
device which enables the sit harness to be fastened and allows adjustment to be made to meet the fitting requirements of the wearer

NOTE A buckle is an example of a fastening and adjustment element.

3.4
attachment element
part or parts of the sit harness intended for the load bearing connection to other components

3.5
attachment point
specific connecting point on the sit harness for the load bearing connection to other components, consisting of one or more attachment elements

3.6
sit harness
arrangement of straps, fittings, buckles, back supports or other elements in the form of a waist belt with a ventral attachment point and connecting support encircling each leg suitably arranged so that a conscious person can be supported in a sitting position

NOTE 1 Sit harnesses may be fitted with shoulder straps.

NOTE 2 A sit harness may be incorporated into a garment or in a full body harness.

3.7
load bearing parts
parts of the sit harness intended to transmit forces

NOTE 1 Attachment elements, leg loops and waist belts are examples of load bearing parts.

NOTE 2 Accessory parts and clothing are examples of non-load bearing parts.

3.8
back support
part of the sit harness intended to give physical support to the lower back of the wearer

3.9
maximum rated load (for the sit harness)
maximum mass of a person or persons, including tools and equipment, to be used with the sit harness, as specified by the manufacturer

NOTE Maximum rated load is expressed in kilograms.

4 Requirements

4.1 Ergonomics

When tested in accordance with 5.3.1, the sit harness shall be shown to:

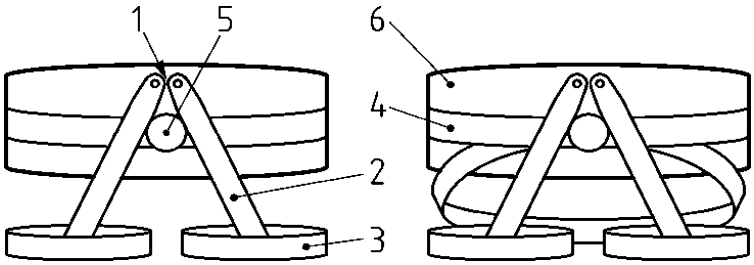
a) be capable of adjustment to enable correct positioning on the user;

b) be able to support the user in an upright sitting position while in suspension;

c) allow the person wearing the sit harness to undertake a specified range of movements without undue discomfort;

d) consist of metal fittings with no contact with the groin, the inside of the thighs, the armpits or the small of the back;

e) remain correctly adjusted.



Key

1 attachment point (consisting of two attachment elements)
2 straps connecting leg loops to waist belt
3 leg loop
4 waist belt
5 fastening and adjustment element
6 back support

Figure 1 — Examples of sit harnesses and elements

4.2 Design, materials and construction

4.2.1 Materials

4.2.1.1 When checked in accordance with 5.3.2.1, webbing and sewing threads shall be known to be made from virgin filament or multifilament synthetic fibres suitable for their intended use and the breaking tenacity of the synthetic fibres shall be known to be at least 0,6 N/tex.

NOTE Polyamide and polyester are typical examples of materials considered suitable for normal use. However, other materials can be more appropriate in certain circumstances.

4.2.1.2 When checked in accordance with 5.3.2.2, thread used for sewing shall be known to be physically compatible in its mechanical properties with the webbing and the shade of thread shall be such as to contrast with the shade of the webbing to facilitate visual inspection.

4.2.2 Attachment points

4.2.2.1 When checked in accordance with 5.3.2.3, the sit harness shall have at least one attachment point located at the front and to the centre.

4.2.2.2 When the sit harness has side or back attachment elements, it shall in addition to this European Standard conform to EN 358.

4.2.2.3 When checked in accordance with 5.3.2.7, shoulder straps fitted to the sit harness shall not contain attachment points.

4.2.3 Load bearing parts

4.2.3.1 When checked in accordance with 5.3.1.6, it shall be determined which parts of the sit harness are load bearing parts that exert pressure on the body.

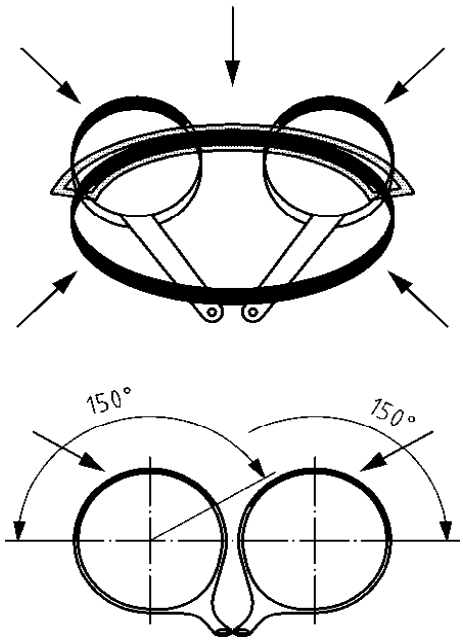


Figure 2 — Example of a sit harness design with typical load bearing parts exerting pressure to the body indicated (by arrows)

4.2.3.2 When checked in accordance with 5.3.2.5, the width of load bearing parts where they impact on the body shall be a minimum of 43 mm (see Figure 2). Load bearing parts in other areas (typically the inner thighs where they may cause discomfort) may be less than 43 mm wide.

NOTE Typically, 150° of the leg loops are load bearing parts that exert pressure to the legs.

4.2.4 Back support

4.2.4.1 A back support shall be fitted to the waist belt.

4.2.4.2 When checked in accordance with 5.3.2.6, the minimum length of the back support shall be 50 mm longer than half the circumference of the waist belt, when adjusted to the maximum circumferential 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.

4.2.5 Fastening and adjustment elements

4.2.5.1 When checked in accordance with 5.3.2.8, fastening and adjustment elements shall be so designed and constructed that, when correctly fastened, they can be released only by at least two different, deliberate, manual actions.

4.2.5.2 When checked in accordance with 5.3.2.9, metal and other parts shall be free from sharp edges and burrs that could cause injury.

4.2.5.3 When checked in accordance with 5.5, the slippage of fastening and adjustment elements shall be not more than 20 mm. If fastening and adjustment elements can be fastened or adjusted in more than one manner, each manner of fastening or adjustment shall be tested.

4.2.6 Accessibility

When checked in accordance with 5.3.2.4, the complete sit harness shall be capable of visual inspection, e.g. for signs of wear or chemical attack. This shall also apply when the sit harness is incorporated into a garment.

4.3 Dynamic strength

When tested in accordance with 5.4, at each front attachment point, with a torso dummy having a minimum mass of 100 kg or a mass equivalent to the maximum rated load, whichever is the greater mass, the sit harness shall withstand one drop test without releasing the torso dummy and no load bearing part of the sit harness shall break or rupture. No element of the sit harness shall become detached.

4.4 Static strength

When tested at each front attachment point in accordance with 5.5, with a force equivalent to 10 times the maximum rated load and not less than 15 kN applied for 3 min, no load bearing part shall break or rupture. No element of the sit harness shall become detached.

4.5 Corrosion resistance

After testing in accordance with 5.6, metal parts of the sit harness shall not show evidence of corrosion that would affect their function. White scaling or tarnishing is acceptable if the function is not impaired.

NOTE Conformity with this requirement does not imply suitability for use in a marine environment.

4.6 Marking and information

Marking shall be in accordance with Clause 6.

Information shall be supplied with the sit harness in accordance with Clause 7.

5 Test methods

5.1 Test samples

Four new sit harnesses shall be provided: two for the purposes of the tests specified in 5.3 and two for the purposes of the tests specified in 5.4 and 5.5. One sample provided from the test specified in 5.3 shall be used for the corrosion resistance test of 5.6.

5.2 Test subjects

The test subjects shall be two persons of different height, within the range 160 cm to 190 cm, and of different weight, within the range 60 kg to 110 kg. Each person shall be within the size range for the sit harness being examined and shall wear lightweight clothing. There shall be a size difference of at least 15 cm between the two persons and weight difference of at least 30 kg.

5.3 Examination of design

5.3.1 Ergonomics

5.3.1.1 The tests shall be carried out by each of the test persons for each front attachment point of the sit harness designated by the manufacturer.

5.3.1.2 The test subject shall don the sit harness in accordance with the information supplied by the manufacturer.

5.3.1.3 Suspend the test subject clear of the ground by means of a suitable lifting/lowering device connected to the attachment point.

The test subjects shall be directly supervised throughout the procedure.

NOTE The safety precautions outlined in A.2 should be taken into account.

5.3.1.4 The test shall be stopped immediately if the test subject experiences any unacceptable pain, discomfort or distress.

5.3.1.5 The duration of the suspension shall be a minimum of 3 min 45 s and a maximum of 4 min. Adjustment of the sit harness while the test subject is in suspension may be made at any time during the test. If the test subject has to step down on the floor for readjustment, the test shall start from the beginning after readjustment.

5.3.1.6 Identify which load bearing parts exert pressure on the body during suspension.

5.3.1.7 During the test, the test subject shall demonstrate while suspended that a sitting position can be maintained without discomfort. Additionally the test subject shall carry out the following movements to determine whether the sit harness allows adequate freedom of movement:

a) hold the left foot with the right hand, then release;

b) hold the right foot with the left hand, then release;

c) hold both hands together at full stretch above the head, then release;

d) hold both hands together behind the waist and then release.

5.3.1.8 During the test, the sit harness shall be examined to determine whether any metal fitting is in contact with the groin, the inside of the thighs, the armpits or the small of the back.

Each test subject shall note whether they experience:

1) any numbness (loss of feeling) or tingling ("pins and needles") in any part of the body;

2) any restriction of normal breathing.

5.3.1.9 After completion of the suspension test with the test subject standing on the ground, check that the sit harness is still correctly adjusted.

5.3.2 Materials and other aspects of design

5.3.2.1 Check the data provided by the manufacturer to examine the suitability of the materials used in the construction of the sit harness for their intended use and the breaking tenacity of the synthetic fibres used in the construction of the sit harness.

5.3.2.2 Check the data provided by the manufacturer and carry out a visual inspection of the sit harness to examine the compatibility and colour shades of the sewing thread and the webbing.

5.3.2.3 Carry out a visual check, locate and count the attachment points.

5.3.2.4 Check that a visual inspection of the complete sit harness is possible.

5.3.2.5 Measure the minimum width of the load bearing parts as identified in accordance with 5.3.1.6 to the nearest millimetre.

5.3.2.6 Check that each sit harness is fitted with a back support and measure the dimensions to the nearest millimetre.

5.3.2.7 Carry out a visual inspection of the shoulder straps, if relevant.

5.3.2.8 Check the manner of release of the fastening and adjustments elements.

5.3.2.9 Carry out a visual and tactile examination of all parts of the sit harness and note any sharp edges and burrs.

5.4 Dynamic strength

5.4.1 The test apparatus shall conform to 4.2, 4.4 and 4.6 of EN 364:1992. Where the maximum rated load is more than 100 kg, add additional rigid mass to the lower attachment element of the torso dummy to meet the maximum rated load with a tolerance of ± 1 kg.

5.4.2 The test lanyard shall be an unused sample of mountaineering rope, which shall conform to EN 892 for single rope, have a nominal diameter of 11 mm and be known to have an impact force of (9 ± 1,5) kN in the first impact force test of that standard.

Terminate the rope in loops produced by tying bowline knots (see Figure 3) and ensure that the length of the termination loop is a maximum of 200 mm.

Adjust the length so that, under a load of $(100\ ^{+1}_{0})$ kg, the length of the test lanyard including the termination loops to be formed at the two ends is $(1\ 000\ ^{+100}_{0})$ mm (see Figure 4).

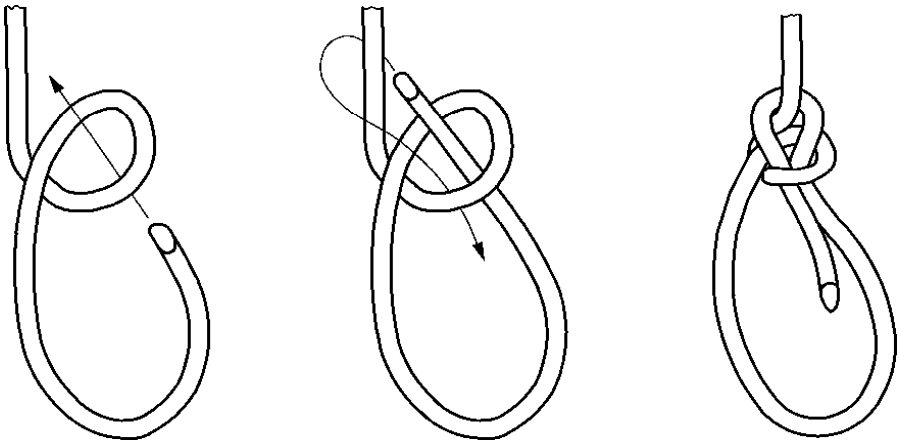
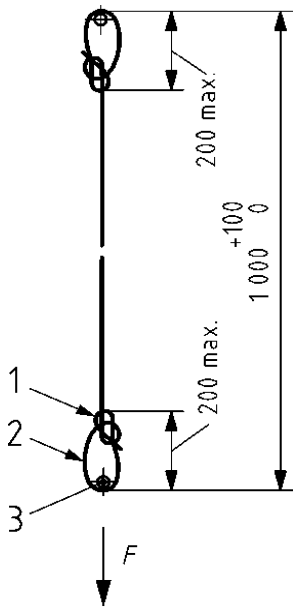


Figure 3 — Bowline knot

Dimensions in millimetres



Key

F mass of (100^{+1}_{0}) kg or equivalent force

1 bowline knot
2 termination loop
3 attachment point/eye

Figure 4 — Lanyard for dynamic strength test

5.4.3 Following the information supplied by the manufacturer, fit the sit harness to the torso dummy. Connect one end of the test lanyard to the attachment point of the sit harness and the other end to the rigid anchor point.

5.4.4 Suspend the torso dummy by the upper attachment point and raise it to ($1\ 000^{+50}_{0}$) mm above the fixed anchor point and at a maximum of 300 mm horizontally from the centre line (see Figure 5). Hold it with a quick release device.

Dimensions in millimetres

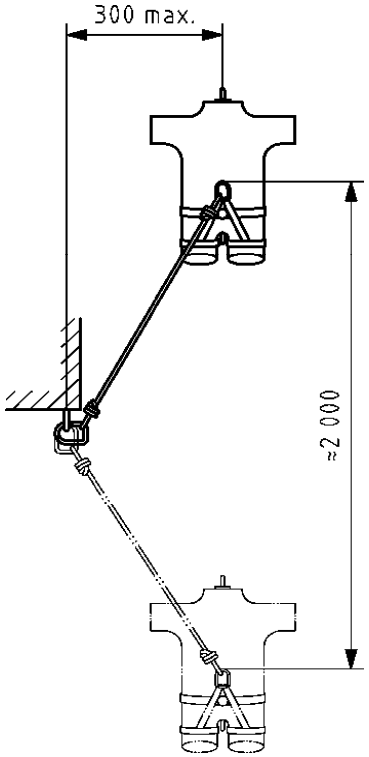


Figure 5 — Dynamic strength test

5.4.5 Release the torso dummy without initial velocity and allow it to fall freely. Check whether the torso dummy is held and whether any elements of the sit harness have become detached. Check the load bearing parts for breaking or rupture.

5.4.6 Repeat the test procedure specified in 5.4.3 to 5.4.5 for each additional front attachment point of the sit harness. A new test lanyard and a new sit harness may be used for each test if necessary.

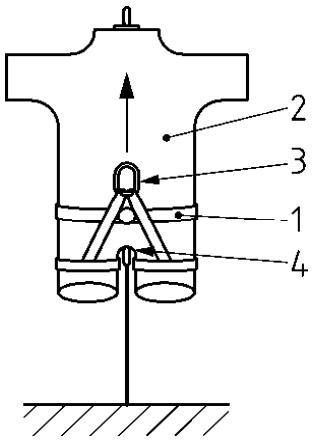
5.5 Static strength

5.5.1 The test apparatus shall conform to 4.1 and 4.2 of EN 364:1992.

5.5.2 Following the information supplied by the manufacturer, fit the sit harness to the torso dummy.

5.5.3 Install the torso dummy and sit harness in the test apparatus and while the equipment is suspended mark the adjustment strap of each fastening and adjustment element in such a way that any slippage can be measured.

5.5.4 Apply a force equivalent to 10 times the maximum rated load with a tolerance of $(^{+0,2}_{0})$ kN and not less than $(15\ ^{+0,2}_{0})$ kN, between the attachment point of the sit harness and the lower attachment point of the torso dummy (see Figure 6). Apply the force gradually over a period of (2 ± 0,25) min.



Key

1 sit harness
2 torso dummy
3 attachment point
4 lower ring of the torso dummy

Figure 6 — Static strength test

5.5.5 Maintain the force for a period of $(3\ ^{+0,25}_{0})$ min.

5.5.6 Check whether any elements of the sit harness have become detached. Check the load bearing parts for breaking or rupture.

5.5.7 Measure and record any slippage of the adjustment strap(s) through the fastening and adjustment elements.

5.5.8 Repeat the test for each manner of fastening or adjusting of the fastening and adjustment elements. A new sit harness may be used for each test if necessary.

5.5.9 Repeat the test(s) for each front attachment point. A new sit harness may be used for each test if necessary.

5.6 Corrosion resistance of metal components

5.6.1 Expose any metal parts of the sit harness to the neutral salt spray test in accordance with EN ISO 9227 for $(24\ ^{+0,5}_{0})$ h. Dry for $(60\ ^{+5}_{0})$ min at (20 ± 2) ºC. Then repeat the procedure, so that the metal parts are subjected in total to $(24\ ^{+0,5}_{0})$ h exposure and $(60\ ^{+5}_{0})$ min drying plus another $(24\ ^{+0,5}_{0})$ h exposure and $(60\ ^{+5}_{0})$ min drying.

5.6.2 Examine the specimens and check for signs of corrosion which would affect their function.

NOTE If the complete sit harness is subjected to the corrosion test, it can be necessary to dismantle the sit harness to gain visual access to some metal parts.

6 Marking

Marking of the sit harness shall conform to EN 365. In addition, the marking shall include the following:

a) the size;

b) the correct method of fastening or adjusting any sit harness fastening and adjustment elements (e.g. pictograms);

c) the maximum rated load of the sit harness in kilograms.

7 Information supplied by the manufacturer

The information supplied by the manufacturer shall conform to EN 365 and, in addition, shall contain at least advice or information as follows:

a) that the user should read and understand the information supplied by the manufacturer before using the sit harness;

b) the maximum rated load of the sit harness;

c) sizing details and how to obtain the optimum fit;

d) on the correct way to put on the sit harness;

e) on the need to check fastening and adjustment elements regularly;

f) on identification of the attachment points of the sit harness and how they are to be used;

g) that before use for the first time, the user should carry out a comfort and adjustability test in a safe place to ensure that the sit harness is the correct size, has sufficient adjustment and is of an acceptable comfort level for the intended use;

h) the materials from which the sit harness is made;

i) a warning to emphasize that a sit harness is not suitable for use for fall arrest purposes;

j) a warning about the cause and effects of suspension trauma and how to protect against it;

k) the importance of checking the sit harness regularly for any damage;

l) if the sit harness can be disassembled, how to assemble or reassemble the elements to prepare the sit harness ready for use;

m) the number of this European Standard and its date of publication, i.e. EN 813:2008.

8 Packaging

Packaging shall conform to the requirements for packaging in EN 365.

Annex A
(informative)

Safety precautions for the ergonomic test procedure of a sit harness

A.1 General

This annex describes the safety precautions recommended during the procedure for assessing the comfort and usability of a sit harness against the ergonomic requirements specified in 4.1.

A.2 Safety precautions

A.2.1 Part of the test procedure involves the test subject being suspended clear of the ground while wearing the sit harness. The suspension test should be carried out in a safe place under the immediate supervision of a person other than the test subject(s). The test subject should be suspended with only a small clearance between the test subject's feet and the ground, e.g. 100 mm. A means of support should be provided, e.g. a wooden box, of a height slightly greater than the clearance between the test subject's feet and the ground to provide immediate relief from the suspension, if necessary. Competent first aid assistance should be available on the site where the evaluation is taking place and at least one available first-aider should be familiar with the information issued by the manufacturer that may be relevant, particularly 'the cause and effects of suspension trauma and how to protect against it' .

A.2.2 Each test should have a maximum duration of 4 min, and the test subject should have a break of at least 5 min between tests.

NOTE It is recommended that while in suspension, the test subject should move their legs regularly to maintain circulation and, during the breaks, they should exercise their legs by, for example, walking about.

Annex B
(informative)

Significant technical changes between this document and the previous edition of this European Standard

This document includes the following significant technical changes compared to the previous edition EN 813:1997:

— terms and definitions have been modified, definitions for back support and maximum rated load have been added;

— tolerances on physical values have been specified;

— requirements on sit harnesses have been changed;

— requirements on back support, accessibility and corrosion have been added;

— test methods have been modified;

— the marking and the information to be supplied by the manufacturer have been changed;

— requirements on packaging have been added;

— an informative annex on safety precautions for the ergonomic test procedure has been added.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC

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 89/686/EEC.

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 clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 89/686/EEC

Clause(s)/sub-clause(s) of this EN	**Essential Requirements (ERs) of Directive 89/686/EEC, Annex II**	
4.1, 4.2.3, 4.2.4	1.1.1	Ergonomics
4.1, 4.2.5	1.2.1	Absence of risks and other inherent nuisance factors
4.2.5.2	1.2.1.2	Satisfactory surface conditions of all PPE parts in contact with the user
4.1	1.2.1.3	Maximum permissible user impediment
4.1	1.3.1	Adaptation of PPE to user morphology
4.3, 4.4	1.3.2	Lightness and design strength
7	1.4	Information supplied by the manufacturer
6	2.12	PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety
4.2.2	3.1.2.2	Prevention of falls from a height

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

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