BS EN 13634:2015

BSI Standards Publication

Protective footwear for motorcycle riders — Requirements and test methods

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National foreword

This British Standard is the UK implementation of EN 13634:2015. It supersedes BS EN 13634:2010 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/1, Safety, protective and occupational footwear.

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

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Chaussures de protection pour motocyclistes - Exigences et méthodes d'essai

Schutzschuhe für Motorradfahrer - Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 10 October 2015.

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European foreword

This document (EN 13634:2015) has been prepared by Technical Committee CEN/TC 161 “Foot and leg protectors”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by June 2016, and conflicting national standards shall be withdrawn at the latest by June 2016.

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 13634:2010.

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).

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

The following significant technical changes have been introduced in comparison with the former edition EN 13634:2010:

a) The requirement concerning forward facing seams has been removed;

b) Clarification on the classification of the height of the upper (Table 2, Table 3 and Figure 2). A reduction in minimum upper height has been introduced for footwear having level 1 performance in upper abrasion resistance (4.4.4) and upper impact cut resistance (4.4.5);

c) The water absorption and desorption requirements for insoles and insocks have been made optional (Table 7) and a new marking is created WAD;

d) If applicable, the ankle areas shall be tested on the internal and external side of the footwear (5.1);

e) Any removable component shall be tested during the test of transverse rigidity (6.1.3);

f) Clarification on test method (6.1.5).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Motorcyclists' footwear is intended to give a degree of mechanical protection to the foot, optionally the ankle and/or part of the shin in accidents without significantly reducing the ability of the rider to control the motorcycle and operate the foot controls. The particular hazards in motorcycle accidents are abrasion with the road surface plus impacts with the motorcycle, conflicting vehicles, road furniture and road surfaces. Road surface injuries are worse when the foot is trapped under the motorcycle during sliding impacts. The standard sets out a number of basic requirements considered essential for this type of footwear including a number of ergonomic requirements.

For a number of tests, this European Standard includes two performance levels in terms of the protection afforded. The degree of risk or hazard that a motorcyclist will face is closely linked to the type of riding and the nature of the accident. Within EN 13634:2015 'Level 1' performance is deemed as the minimum level required so that the footwear provides useful protection in an accident, and offers footwear with an optimum comfort level to suit all riding types. Where riders feel that their riding style or sport exposes them to an increased accident risk 'Level 2' has been provided, which offers increased performance. However it is likely that this higher performance level has an increased penalty for the weight and comfort so may not be acceptable to all riders.

1 Scope

This European Standard applies to protective footwear for motorcycle riders for use while riding motorcycles for on or off road activities. It specifies the requirements for protection, ergonomic characteristics, innocuousness, mechanical properties, marking and information for users. It also specifies the appropriate test methods.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1621-1, *Motorcyclists' protective clothing against mechanical impact — Part 1: Motorcyclists' limb joint impact protectors — Requirements and test methods*

EN 13595-2:2002, *Protective clothing for professional motorcycle riders — Jackets, trousers and one-piece or divided suits — Part 2: Test method for determination of impact abrasion resistance*

EN 13595-4:2002, *Protective clothing for professional motorcycle riders — Jackets, trousers and one-piece or divided suits — Part 4: Test method for determination of impact cut resistance*

EN ISO 4045, *Leather — Chemical tests — Determination of pH (ISO 4045)*

EN ISO 11642, *Leather — Tests for colour fastness — Colour fastness to water (ISO 11642)*

EN ISO 17075:2007, *Leather — Chemical tests — Determination of chromium(VI) content (ISO 17075:2007)*

EN ISO 20344:2011, *Personal protective equipment — Test methods for footwear (ISO 20344:2011)*

EN ISO 20345:2011, *Personal protective equipment — Safety footwear (ISO 20345:2011)*

ISO 4649:2010, *Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device*

ISO 5423:1992, *Moulded plastics footwear — Lined or unlined polyurethane boots for general industrial use — Specification*

ISO 7000, *Graphical symbols for use on equipment — Registered symbols*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
zone of specific protection
area of footwear that is intended to provide additional specific protection, and is subject to specific testing

3.2
optional requirement
additional requirement(s) claimed by the footwear manufacturer and associated with a specific marking

4 Basic requirements for motorcycle footwear

4.1 General

The minimum number of samples to be tested in order to check compliance with the requirements specified in this standard is detailed in Table 1. Unless otherwise specified, all samples shall be conditioned and tested in an environment of (23 ± 2) °C and (50 ± 5) % rh (relative humidity).

The uncertainty of measurement of each test method specified in this standard should be assessed (see Annex B).

Table 1 — Minimum number of samples and test specimens and their origin

Property	Clause	Samples	Take test specimens only from footwear
Height of the upper	4.2.1	One pair in each of 3 sizes	YES
Upper/outsole bond strength	4.3	One shoe in each of 3 sizes	YES
pH value	4.4.1	One sample only of each leather	NO
Chromium VI content	4.4.2	One sample only of each leather	NO
Dye fastness	4.4.3	One sample only of each material	NO
Upper impact abrasion resistance	4.4.4	One sample from each combination of material	NO
Upper Impact cut resistance	4.4.5	One sample from each combination of material	NO
Lining Tear strength	4.5.2	One sample only of each material	NO
Lining Abrasion resistance	4.5.3	One sample only of each material	NO
Lining pH value	4.5.4	One sample only of each leather	NO
Lining Chromium VI content	4.5.5	One sample only of each leather	NO
Outsole thickness and cleat height	4.6.1	One shoe in each of 3 sizes	YES
Outsole abrasion resistance	4.6.2	One shoe in each of 3 sizes	YES
Outsole hydrolysis	4.6.3	One shoe in each of 3 sizes	YES
Outsole interlayer bond strength	4.6.4	One shoe in each of 3 sizes	YES
Ergonomics	4.7	One pair in each of 3 sizes	YES
Transverse rigidity of the whole footwear	4.8	One pair in each of 3 sizes	YES
Impact energy protection ankle / shin	5.1	One pair in each of 3 sizes	YES
Water resistance	5.2	3 pair of shoes (minimum of 2 different sizes)	YES
Resistance to fuel oil of the outsole	5.3	One shoe in each of 3 sizes	YES
Slip resistance of outsoles	5.4	One shoe in each of 3 sizes	YES
Permeable uppers	5.5	One sample only of each material	YES
Insole and Insocks	5.6	One sample only	NO
NOTE 3 Sizes = 1 pair in the smallest size + 1 pair in the largest size + 1 pair from the middle of the size range.			

4.2 Design

4.2.1 Height of upper

The height of the upper for level 1 and 2 performance footwear are given in Table 2 and Table 3.

Table 2 — Minimum height of upper

Footwear size		**H2 (Figure 1) in mm**	**H1 (Figure 1) in mm**
Paris Point	**UK**		
36 and below	Up to 3½	103	64
37 and 38	4 to 5	105	66
39 and 40	5½ to 6½	109	68
41 and 42	7 to 8	113	70
43 and 44	8½ to 10	117	72
45 and above	10½ and above	121	73

Table 3 — Minimum height of high upper

Footwear size		**H2 (Figure 1) in mm**
Paris Point	**UK**	
36 and below	Up to 3½	162
37 and 38	4 to 5	165
39 and 40	5½ to 6½	172
41 and 42	7 to 8	178
43 and 44	8½ to 10	185
45 and above	10½ and above	192

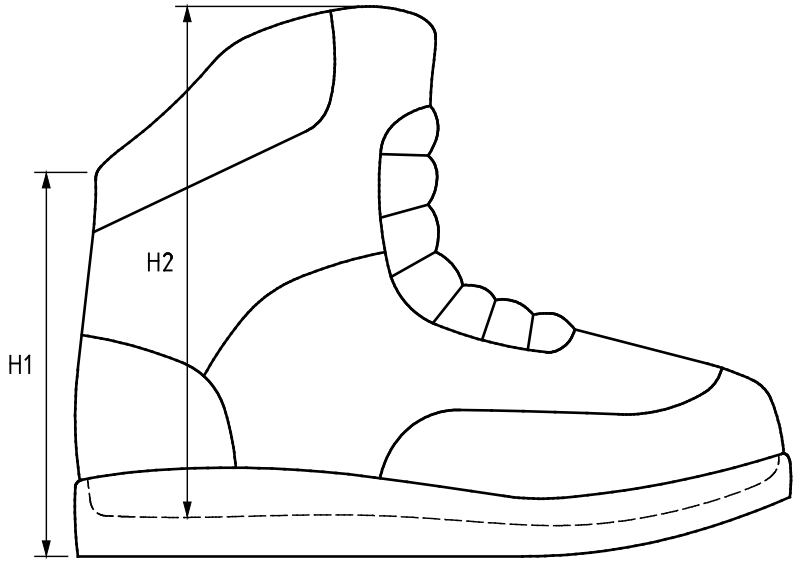


Figure 1 — Footwear minimum upper height definition of H1 and H2

4.2.2 Whole upper

Upper material shall meet the requirements of 4.4.

4.3 Whole footwear

When footwear is tested in accordance with the method specified in EN ISO 20344:2011, 5.2, the bond strength shall be not less than 4,0 N/mm unless there is tearing of the sole material in which case the bond strength shall be not less than 3,0 N/mm.

4.4 Uppers

4.4.1 pH value

When leathers are tested in accordance with EN ISO 4045, the pH value shall be not less than 3,2 and, if the pH is less than 4, the difference figure shall be less than 0,7. All individual leathers shall be assessed.

4.4.2 Chromium VI content

The quantity of Chromium VI in footwear containing leather shall not exceed 3,0 mg/kg when determined according to the test method specified in EN ISO 17075:2007.

If the footwear includes different types of leather, whether in contact with the skin or not, each leather type shall be tested separately and comply with the above requirement. One sample shall be taken from different items of footwear for each leather type.

4.4.3 Colour fastness

Footwear shall not be manufactured from material containing dyes which will readily migrate when it becomes wet with water. When any inner surfaces of the upper that will be adjacent to the wearers foot or hose (unnecessary if not coloured or if the footwear has a lining, in this case apply 4.5.6) are tested in accordance with EN ISO 11642, the change in colour of any component of the multifibre fabric shall be not worse than Grey Scale rating 3.

4.4.4 Abrasion resistance

When the full thickness of the upper (i.e. upper + lining) is tested in accordance with the procedure in EN 13595-2:2002 (3 test pieces from each combination of material), the abrasion resistance shall be classified as in Table 4. All material type combinations shall be tested and the upper classified on the lowest result (see Table 4):

Table 4 — Requirements for upper resistance to abrasion

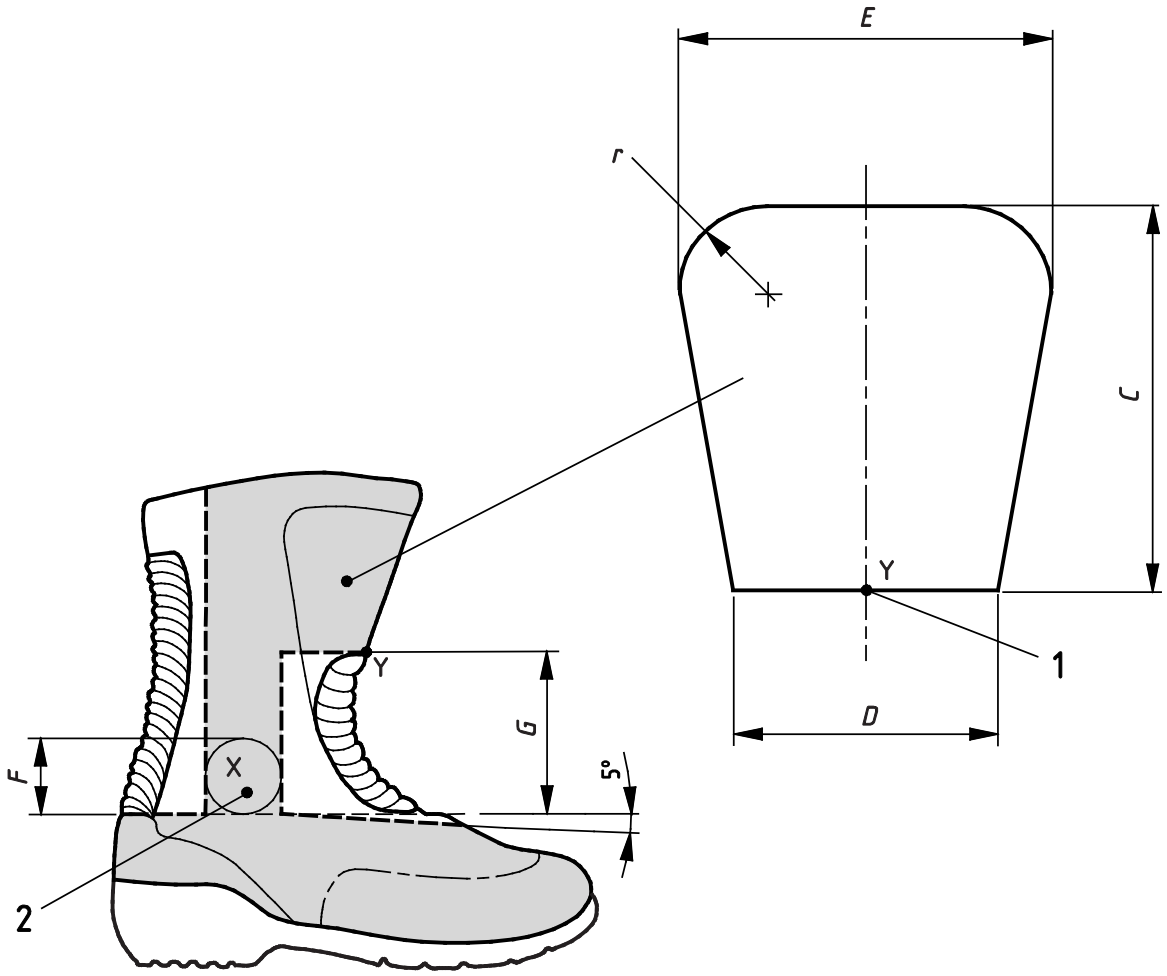
	Minimum abrasion resistance (in second)	
Areas (see Figure 2 and Table 6)	**Level 1**	**Level 2**
A	1,5 s	2,5 s
B	5 s	12 s
Height of the upper	At least the value given in Table 2	At least the value given in Table 3

Table 5 — Dimensions for Impact Zones and Material Areas shown in Figure 2 (Dimensions in millimetres)

Size (Paris Points)	**Size (English)**	C	D	E	r	F	G
		min.	min.	min.	max.	min.	max.
38 and below	5 and below	70	45	80	17	40	120
39 to 42	5,5 to 8	75	50	90	19	50	125
43 and above	8,5 and above	80	55	95	21	55	130

In order to accommodate different ergonomic requirements for different riding disciplines small deviations of Area A (see Table 5 and Figure 2) material are permitted in Area B (see Table 5 and Figure 2) provided the total infiltration is not greater than 8 cm^2 per boot.

The lower tangent of zone 2 is used to define the lower limits for measurements F and G. Zone 2 is located by centering point X over the natural centre of the ankle as felt through the footwear worn by an appropriate subject.



Key

1	= zone 1 shin region
2	= zone 2 ankle region
r	radius curvature
keys for C D E F G	see Table 5
	= Area A
	= Area B

Figure 2 — Impact zones and material areas (see Table 5)

4.4.5 Impact cut resistance

When the full thickness of the upper (i.e. upper + lining) is tested in accordance with the procedure in EN 13595-4:2002, with 3 test pieces from each combination of material, the impact cut resistance of the upper shall be classified as below. All material type combinations shall be tested and the upper classified on the lowest result (see Table 6):

Table 6 — Requirements for upper resistance to impact cut

Areas (see Figure 2 and Table 5)	Level 1	Level 2
A	Impact speed 2,0 m/s, maximum knife penetration 25 mm	Impact speed 2,0 m/s, maximum knife penetration 25 mm
B	Impact speed 2,8 m/s, maximum knife penetration 25 mm	Impact speed 2,8 m/s, maximum knife penetration 15 mm
Height of the upper	At least the value given in Table 2	At least the value given in Table 3

4.5 Linings

4.5.1 General

When present, all lining materials shall conform to the following requirements.

4.5.2 Tear strength

The tear strength of the lining shall be in accordance with EN ISO 20345:2011, 5.5.1.

4.5.3 Abrasion resistance

When tested in accordance with EN ISO 20344:2011, 6.12, the wearing surface of the lining shall not develop any holes before the following number of cycles has been performed:

— dry: 25 600 cycles;

— wet: 12 800 cycles.

4.5.4 pH value

When leather linings are tested in accordance with EN ISO 4045 the pH value shall be not less 3,2 and, if the pH is less than 4, the difference figure shall be less than 0,7. All individual leathers shall be assessed.

4.5.5 Chromium VI content

The quantity of Chromium VI in footwear containing leather shall not exceed 3,0 mg/kg when determined according to the test method specified in EN ISO 17075:2007.

If the footwear includes different types of leather, whether in contact with the skin or not, each leather type shall be tested separately and comply with the above requirement. One sample shall be taken from different items of footwear for each leather type.

4.5.6 Colour fastness

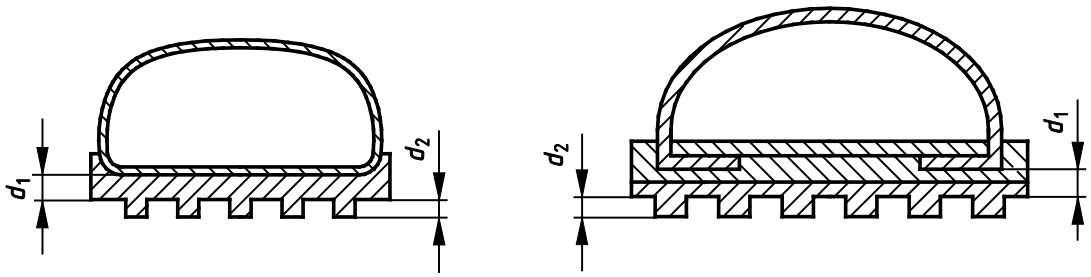
Footwear shall not be manufactured from material containing dyes which will readily migrate when it becomes wet with water. When any inner surfaces of the lining that will be adjacent to the wearers foot or hose (unnecessary if not coloured) are tested in accordance with EN ISO 11642, the change in colour of any component of the multifibre fabric shall be not worse than Grey Scale rating 3.

4.6 Outsoles

4.6.1 Thickness and cleat height

When measured in accordance with EN ISO 20344:2011, 8.1.2 excluding any cavities, the thickness of outsoles shall be not less than 4 mm (d_1), see Figure 3. When cleated outsoles are used, the cleat height

shall be not less than 2,5 mm (d_2), see Figure 3, and the shaded area as shown in Figure 4 shall have cleats which are open to the side.

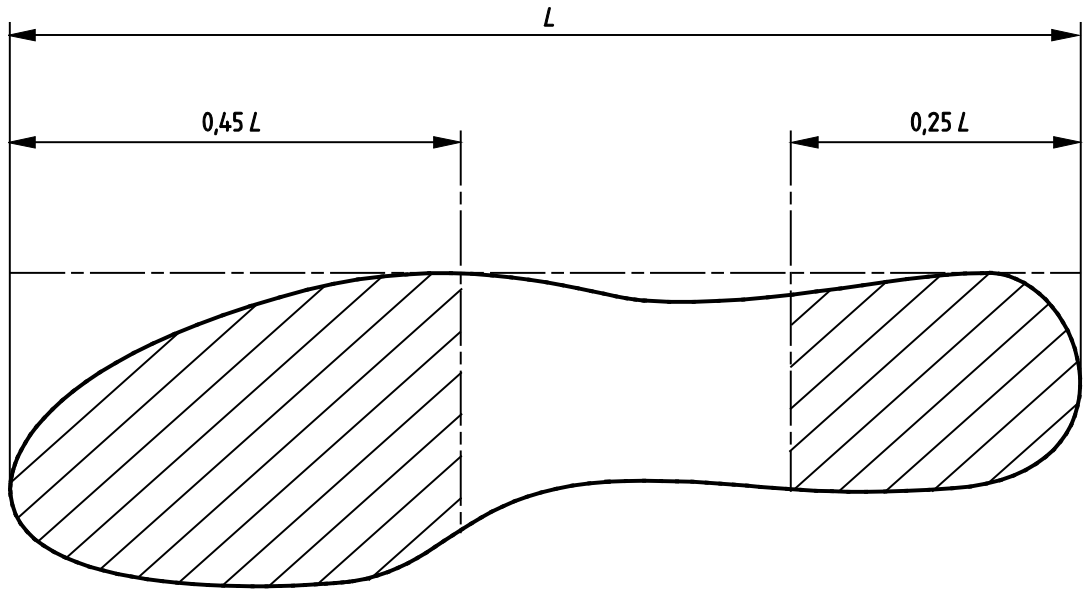


Key

d_1 minimum thickness

d_2 minimum cleat height

Figure 3 — Thickness of outsole



Key

L total length of the outsole

Figure 4 — Cleated area

4.6.2 Abrasion resistance

When outsoles are tested in accordance with Method A of ISO 4649:2010 (with a vertical force of 10 N over an abrasion distance of 40 m), the relative volume loss shall be not greater than 250 mm^3 for materials with a density of 0,9 g/ml or less and not greater than 150 mm^3 for materials with a density higher than 0,9 g/ml. Test pieces may be taken from anywhere on the sole.

4.6.3 Hydrolysis

When polyurethane outsoles are tested in accordance with the method specified in ISO 5423:1992, Annex C, after being prepared and conditioned as described in Annex E of that standard, the cut growth

shall be not greater than 6 mm before 150 000 flex cycles. The thickness of the test piece shall be (3,0 ± 0,2) mm and conditioning at ambient temperature shall be carried out at (23 ± 2) ºC.

4.6.4 Interlayer bond strength

When tested in accordance with EN ISO 20344:2011, 5.2, the bond strength between the outer or cleated layer and the adjacent layer shall be not less than 4,0 N/mm unless there is tearing of any part of the sole, in which case the bond strength shall be not less than 3,0 N/mm.

4.7 Ergonomics

When tested in accordance with the method specified in Annex A, the assessor shall be able to carry out all the defined movements without any significant problem being encountered. None of the questions in Annex A shall receive a negative response and the footwear will remain secure on the foot whilst undertaking the defined movements.

4.8 Transverse rigidity of the whole footwear

When tested according to the method given in 6.1, all footwear samples shall meet and be classified as:

a) level 1: Peak value of load not less than 1,0 kN;

b) level 2: Peak value of load not less than 1,5 kN.

4.9 Insole construction

Either an insole or insock shall be present in such a way that it cannot be removed without damaging the footwear, see acceptable options as detailed in Table 7.

4.10 Insole and insock

4.10.1 General

Insoles and insocks shall comply with Table 7.

4.10.2 Abrasion resistance

4.10.2.1 Insoles

When insoles are tested in accordance with EN ISO 20344:2011, 7.3, the abrasion damage shall be not worse than that exhibited by the reference test piece from the same family of materials after 400 cycles (see EN ISO 20344:2011, 7.3.6). This requirement also applies to any coverings over non-absorbent insoles.

Table 7 — Requirements for insoles and/or insocks

Options			Component to be assessed	Requirements to fulfil					
				Thickness EN ISO 20345:2011, 5.7.1	**pH** [a] EN ISO 20345:2011, 5.7.2	**Water absorption desorption** EN ISO 20345:2011, 5.7.3	**Abrasion** EN ISO 20345:2011, 5.7.4.1	**Chromium VI** [a] EN ISO 20345:2011, 5.7.5	**Abrasion** EN ISO 20345:2011, 5.7.4.2
1	No insole or if present not fulfilling the requirements	Non-removable insock	Insock	X	X	O		X	X
2	Insole present	No insock	Insole	X	X	O	X	X	
		Seat sock present							
3		Full insock, non-removable	Insock and Insole together	X		O			
			Insock		X			X	X
4		Full insock, removable and water permeable [b]	Insole	X	X	O	X	X	
			Insock		X			X	X
5		Full insock, removable not water permeable [b]	Insole	X	X	O	X	X	
			Insock		X	O		X	X

X means that the requirement shall be met.

O optional requirement see 5.6.

[a] Those requirements are only for leather.

[b] A water permeable insock is one that, when tested in accordance with EN ISO 20344:2011, 7.2, lets water through in.60 s or less.

4.10.2.2 Insocks

When insocks are tested in accordance with EN ISO 20344:2011, 6.12, the wearing surface shall not develop any holes before the following number of cycles has been performed.

— Dry: 25 600 cycles;

— Wet: 12 800 cycles.

4.10.3 pH value

When leather insoles are tested in accordance with EN ISO 4045, the pH value shall be not less than 3,2 and if the pH is less than 4, the difference figure shall be less than 0,7.

4.10.4 Chromium VI content

The quantity of Chromium VI in footwear containing leather shall not exceed 3,0 mg/kg when determined according to the test method described in EN ISO 17075:2007.

If the footwear includes different types of leather, whether in contact with the skin or not, each leather type shall be tested separately and comply with the above requirement. At least two samples shall be taken from different items of footwear for each leather type.

5 Optional requirements

5.1 Impact protection to the ankle and/or part of the shin

Footwear claiming to offer impact protection to the shin or ankle shall have a transmitted force of less than 5 kN when tested in accordance with the method given in 6.2. Footwear complying with the requirement for impact protection to the ankle shall be marked with the code “IPA” and footwear complying with the requirement for impact protection to the shin shall be marked with the code “IPS”, see Clause 9.

The ankle areas shall be protected on the internal and external side of the footwear.

5.2 Resistance to water penetration

Footwear claiming to be resistant to water penetration shall meet the requirements of EN ISO 20345:2011, 6.2.5. Footwear complying with this requirement shall be marked with the code “WR”, see Clause 9.

5.3 Resistance to fuel oil of outsole

Footwear with outsoles claiming to be resistant to fuel oil shall meet the requirements of EN ISO 20345:2011, 6.4.2. Footwear complying with this requirement shall be marked with the code “FO”, see Clause 9.

5.4 Slip resistance of outsole

Footwear with outsoles claiming to be slip resistant shall meet the requirements for slip resistance as detailed in Table 2 of EN ISO 20345:2011. Footwear complying with this requirement shall be marked with one of the three codes “SRA”, “SRB” or “SRC” as detailed in Table 2 of EN ISO 20345:2011, see Clause 9.

5.5 Permeable uppers

Footwear with uppers claiming to be permeable to water vapour shall meet the requirements of EN ISO 20345:2011, 5.4.6 and 5.5.3. Footwear complying with this requirement shall be marked with the code "B" (breathability), see Clause 9.

5.6 Insole/Insocks, Water absorption and desorption

When tested in accordance with EN ISO 20344:2011, 7.2, the water absorption of the layer of material adjacent to the foot shall be not less than 70 mg/cm^2 and the water desorption shall be not less than 80 % of the water absorbed. Footwear fitted with non-absorbent insoles, e.g. solid plastic type materials, are acceptable if covered provided that the covering meets the requirements for water absorption and desorption.

Footwear complying with this requirement shall be marked with the code "WAD" (water absorption desorption), see Clause 9.

6 Test methods

6.1 Determination of the transverse rigidity of the footwear

6.1.1 Principle

The load required to compress a boot in the transverse direction in the joint region is measured in a compression testing machine apparatus.

6.1.2 Apparatus

Compression testing machine capable of applying a force at least 5 kN to a tolerance of 2 % between platens of a minimum size of 45 mm by 95 mm which move at a speed of 30 mm/min ± 2 mm/min. Provisions via a chart recorded or electronic display shall be included for continuously monitoring the load.

6.1.3 Test piece

The test samples shall comprise 1 pair of footwear in each of three sizes – one from the lower end of the size range, one from the upper end of the size range and one from the middle of the size range.

If there is any removable component (for example, rigid slider or abrasion pad) they shall be left in place during the test.

6.1.4 Preparation of the test piece

Store the footwear at 23 ºC ± 2 ºC and 50 % rh ± 5 % rh for at least 24 h before testing. If the compression test cannot be carried out in this atmosphere, it shall be completed within 10 min of removing from the conditioning environment.

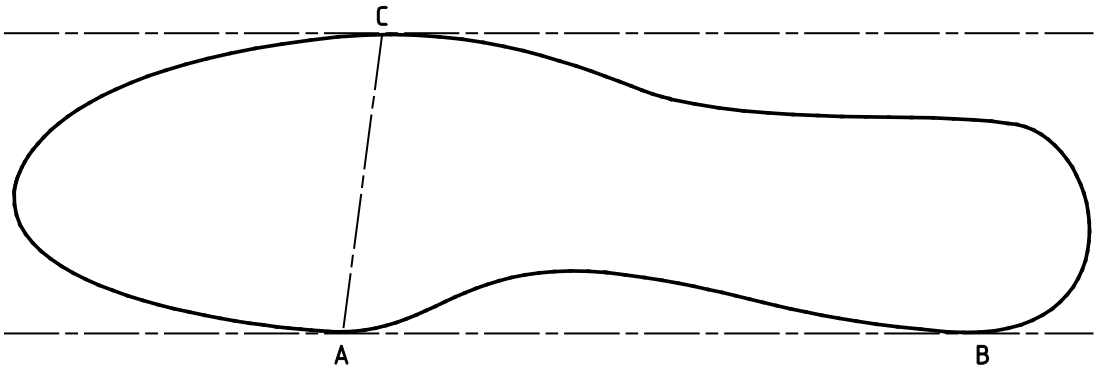
6.1.5 Test procedure

The footwear outsole shall be perpendicular to the platens during the test.

Place one item of footwear between platens fitted to the compression testing machine (6.1.2) such that points A B and C shown in Figure 5 touch the platens near to their centre and move one or both platens such that they move together at a speed of 30 mm/min ± 2 mm/min until the load reaches a constant value, begins to reduce or the sole has been compressed by 20 mm. The distance travelled by the moveable platen can be used to determine when a compression of 20 mm has occurred.

NOTE A material (for instance chamois leather) can be used to prevent any slippage during the test between the plates and the footwear.

Record the force during the compression; the result is the peak value of the load to the nearest 0,1 kN.



Key

A B C contact points between the footwear and platens

Figure 5 — Position of test specimen

6.2 Impact energy protection of ankle and shin

6.2.1 Principle

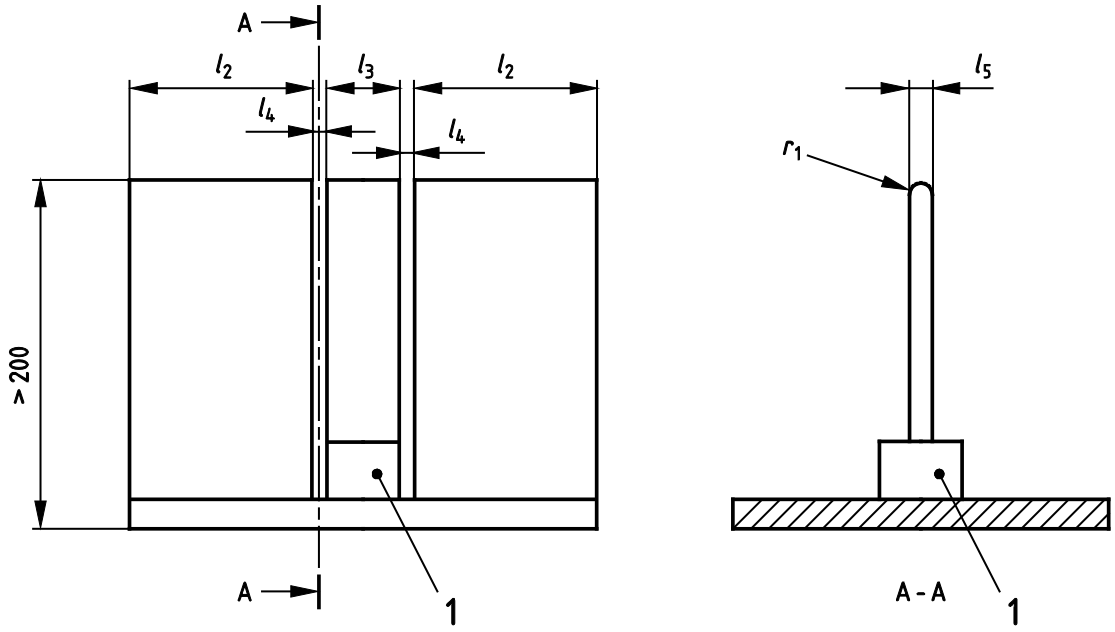
The minimum zones of protection are marked on the footwear using the templates as shown in Figure 2 and Table 5. The performance of the materials in the zones of protection is determined by impact testing. A modified apparatus of the type specified in EN 1621-1 shall be used. The sample is placed on a shaped anvil mounted on a load cell. A falling mass strikes the sample and the force registered by the load cell is recorded.

6.2.2 Apparatus

An apparatus as specified in EN 1621-1 shall be used with the following modification. For the ankle testing the anvil shall be constructed of steel with a hemispherical top surface with a radius of curvature of 25 mm ± 0,5 mm, and a height of at least 100 mm above the load cell. For testing the shin zone of protection the anvil shall consist of three vertical steel plates 25 mm ± 0,5 mm thick, attached to a flat base which is securely bolted or clamped to a concrete or similar massive base of at least 1 000 kg. The top edge of the plate shall be a half round section with a 12,5 mm ± 0,5 mm radius. The centre section of the plate 50 mm ± 1 mm wide shall be mounted vertically on the piezoelectric load cell or equivalent force transducer. The force transducer shall be bolted onto a flat base which shall be connected to a rigid mass of at least 1 000 kg. The section of the plate on the load cell shall be set between and in line with, sections of the plate mounted on the base that are at least 150 mm in length. There shall be a clearance of 1 mm ± 0,5 mm at each end of the free section. The half round top edge of the free section of the plate and the fixed end parts shall be at the same level ± 1 mm. The plate shall have a height of at least 200 mm. Figure 6 illustrates the principle of the design of the apparatus.

The anvil shall be positioned so that the long face of striker is at 90º ± 2º to the long axis of the anvil, and so that the centre of the striker would hit the centre of the anvil ± 2 mm. The anvil shall be provided with a clamping system for securing test specimens. A system of elastic straps, exerting a force of 5 N to 10 N has been found suitable.

Dimensions in millimetres



Key

1 load cell or force transducer

r_1 (12,5 ± 0,5) mm

l_2 > 150 mm

l_3 (50 ± 1) mm

l_4 (1 ± 0,5) mm

l_5 (25 ± 0,5) mm

Figure 6 — Principle of the design of the shin anvil

6.2.3 Test piece

The test samples shall comprise of 1 pair of footwear in each of three sizes — one from the lower end of the size range, one from the upper end of the size range and one from the middle of the size range.

6.2.4 Zones of protection

Figure 2 shows diagrammatically the zones of protection and gives the coding for the major dimensions associated with them which can be found in Table 5.

The footwear shall be put on by an appropriate subject with feet of suitable size for the test footwear and wearing motorcyclist's protective trousers correctly fastened with the subject standing upright. The centre point of the ankle shall be marked – this is denoted as Point X on Figure 2. The midline of the front of the shin shall be marked on the footwear. The point where this line intersects the bottom of the shin protection is denoted as Point Y on Figure 2.

The centre of the circular template for the ankle (zone 2) shall be positioned coincident with Point X and this shall be marked on the footwear. The template for the shin (zone 3) shall be positioned as in Figure 2 with the centreline coincident with the midline of the footwear and Point Y marking the lower edge of the shin protection. This template shall also be marked on the footwear and a check shall also be made that point Y is located within the tolerance permitted by dimension G.

6.2.5 Procedure

Test specimens shall be prepared by cutting away the sole of the footwear and opening the footwear by cutting up the posterior midline. The closures of the footwear on the front or side aspect shall be set as they were for marking the vertical and line on the front of the shin. Impact tests on the zones of protection on the anterior of the ankle and the shin are carried out on these samples.

Impacts shall be made at the appropriate energy level, see Table 8, on the shin zone of protection on each pair from three sizes of footwear so that each pair of footwear is subject to 2 impacts (i.e. 6 impacts in total across the three sizes). The centres of impact shall be not less than 30 mm apart or less than 10 mm from the edge of the zone of protection marked on the specimen. Impacts should be made at different points within the zone of protection including any perceived areas of weakness so that the mean value is representative of overall performance. The peak transmitted force value for each impact shall be recorded and the mean value of the five peak transmitted force values for each of the three sizes shall be calculated.

Table 8 — Transmitted force

	Impact energy J	Transmitted force kN
Ankle	10	5
Shin	10	5

After testing on the shin is complete, the footwear shall be opened down the centre front line to prepare samples for testing the zones of protection on the side of the ankle. These impacts shall be made using the hemispherical anvil. The centres of impact shall be not less than 20 mm apart or less than 10 mm from the edge of the zone of protection marked on the specimen. 4 impacts shall be carried out on each pair from three sizes of footwear (i.e. 12 impacts in total across the three sizes). Impacts should be made at different points within the zone of protection including any perceived areas of weakness so that the mean value is representative of overall performance. The peak transmitted force for each impact shall be recorded and the mean value of the 4 peak transmitted force values for each of the three sizes shall be calculated.

7 Marking

Each item of motorcycle footwear shall be clearly and permanently marked, for example by embossing or branding, with the following:

a) size;

b) manufacturer’s identification mark;

c) manufacturer’s type designation;

d) year of manufacture and at least the quarter;

e) number and year of this European Standard, i.e. EN 13634:2015;

f) pictogram in Clause 9 including the performance levels achieved in the testing;

g) where optional properties are provided, e.g. impact protection, water resistance and oil resistance, they shall be noted by reference to the marking codes as given in Clause 5 and Figure 7.

NOTE To aid clarity, it is advised that the markings for e) to g) be adjacent to one another.

8 Wearer information and instructions for use

Footwear for motorcycling shall be supplied with information and instructions for use. Instructions shall be precise, comprehensible and in the official language(s) of the country of destination. They shall contain at least the following information:

a) the information required in Clause 7;

b) the full address of the manufacturer or his authorised representative;

c) a statement of the intended use of the footwear;

d) an explanation of the protection provided under this European Standard and details of the extent of protective material and zones of specific impact protection provided;

e) advice about wearing other PPE to obtain the protection desired, for example, shin protection can be provided by impact protectors fitted into trousers;

f) a warning about the limits of protection provided by the footwear;

g) a warning about any environmental conditions or misuse that would seriously reduce the protection provided;

h) instructions on how to clean and care for the footwear;

i) instructions on how to examine the footwear for signs of wear and degradation;

j) the suggested lifetime of the footwear; instructions on actions to be taken when wear or damage is apparent to identify footwear which are no longer suitable to use;

k) the significance of any markings on the footwear such as the pictograms and any special marking codes — see Figure 7;

l) an explanation of the performance levels detailed in EN 13634:2015 This should consist of either the wording given below or a similar suitable alternative “European Standard EN 13634:2015 includes two performance levels in terms of the protection afforded. The degree of risk or hazard that a motorcyclist will face is closely linked to the type of riding and the nature of the accident. Within standard EN 13634:2015 ‘Level 1’ performance is deemed as the minimum level required in order for the footwear to provide useful protection in an accident, and offers footwear with an optimum comfort level to suit all riding types. Where riders feel that their riding style or sport exposes them to an increased accident risk ‘Level 2’ has been provided which offers increased performance – however it is likely that this additional level of protection has an increased penalty for the weight and comfort, so may not be acceptable to all riders”.

9 Pictogram

Footwear fulfilling requirements of this European Standard shall be marked with the pictogram, including the protection level, shown in Figure 7. The pictogram shall be clearly and permanently marked on the footwear for example by embossing or branding. The width of the pictogram shall be at least 25 mm.

EN 13634:2015

Level X X X

Key

First X	- Performance level achieved in the abrasion resistance testing (4.4.4)
Second X	- Performance level achieved in the impact cut resistance testing (4.4.5)
Third X	- Performance level achieved in the transverse rigidity of whole footwear testing (4.8)
Marking codes	for optional requirements to be met and claimed are as below and should follow the third "X":
IPA	– Footwear meeting the requirements for ankle impact protection (5.1)
IPS	– Footwear meeting the requirements for shin impact protection (5.1)
WR	- Footwear meeting the requirements for resistance to water penetration (5.2)
FO	- Footwear outsoles meeting the requirements for resistance to fuel oil (5.3)
SRA, SRB or SRC	- Footwear outsoles meeting the requirements for slip resistance (5.4)
WAD	- Footwear meeting the requirements for water absorption desorption of the insole/insock (5.6)
B	- Footwear meeting the requirements for uppers permeable to water vapour (5.5)

Figure 7 — Pictogram: Protective equipment for motorcycle riders ISO 7000-2618

Annex A
(normative)

Ergonomic and size testing

A.1 Principle

The sizes of footwear are verified by examining the fit of footwear on 3 subjects with the appropriate foot sizes. The ergonomic properties of the footwear are evaluated by an assessor performing a number of tasks and answering a number of questions.

A.2 Assessors

The size of the test footwear shall fit the foot size of the assessor. For footwear size verification and any of the off bike evaluations the assessor does not need to have experience of riding a motorcycle. For on bike verification (A.4 Questions 6-8) the assessor shall have experience of riding a motorcycle.

A.3 Procedure for footwear size verification

Unless otherwise specified in the "Wearer information and instructions for Use" the assessor shall wear at least one typical item of medium weight clothing with full length trousers. The footwear will be worn either inside or outside the trousers as appropriate for the footwear design and of a size appropriate to the assessor.

If the footwear is found to be too large or too small in a relatively minor way, two further subjects shall wear it, and its fit shall be assessed. The footwear size marking is acceptable if it satisfactorily fits both the additional subjects.

A.4 Procedure for ergonomic evaluation

Pre-donning assessment

1.	Is the inside surface of the footwear free from rough, sharp or hard areas that may cause excessive irritation or injury to the wearer?	YES	NO
2.	Is the footwear free of any features that could be considered to make wearing the footwear hazardous?	YES	NO

Donning

3.	Is it possible to put the footwear on and operate the fasteners/adjusters with sufficient ease?	YES	NO
4.	When fitted is the footwear correctly positioned on the wearer? For instance, do any areas of special protective properties align with the relevant part(s) of the body?	YES	NO

Off-bike activities

5.	Can the following be carried out without difficulty?		
	1) Walk using a normal gait for 5 min at 4 Km/h	YES	NO
	2) Climb and descend (17 ± 3) stairs for 1 min.	YES	NO
	3) Bending over	YES	NO
	4) Crouching and picking up a small object from the floor	YES	NO

Riding actions

6.	Is it possible to perform the following easily and without difficulty?		
	1) Mount the motorcycle and adopt the riding position?	YES	NO
	2) Put feet on the pegs and on the ground?	YES	NO
	3) Feel and operate all the brake and gear changes?	YES	NO
7	Is the footwear free from excessive tightness around the feet, ankles and lower leg?	YES	NO
8	Is the footwear free from features that would make riding hazardous?	YES	NO

The footwear is judged as passing the requirements provided the assessor does not identify a significant problem. The assessment under A.4 questions 6 to 8 shall be carried out using an appropriate motorcycle or replica motorcycle.

NOTE It might be necessary to have a period of "wearing in" before the assessment to overcome any initial fit problem.

Annex B
(informative)

Uncertainty of measurement and interpretation of results

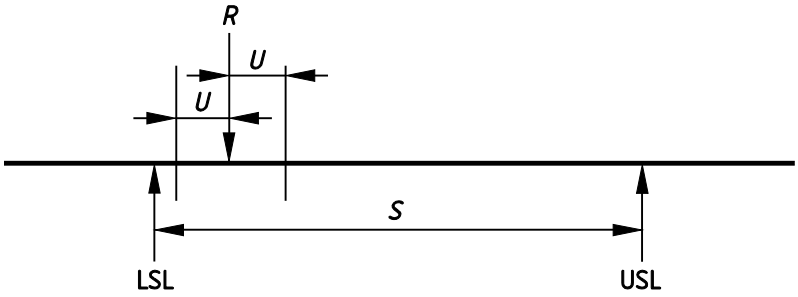
B.1 Uncertainty of measurement

For each of the measurements performed in accordance with this standard, a corresponding estimate of the uncertainty of measurement *U* should be calculated. This estimate of uncertainty should be applied in accordance with B.2 and stated when reporting test results, in order to enable the user of the test report to assess the reliability of the data.

B.2 Interpretation of results

The following protocol with regard to uncertainty of measurement should be applied to test results:

If the test data plus/minus the uncertainty of measurement ***U*** falls between the upper and lower limiting values specified in the appropriate product performance guidelines, then the result should be deemed to be a straightforward pass (see Figure B.1).

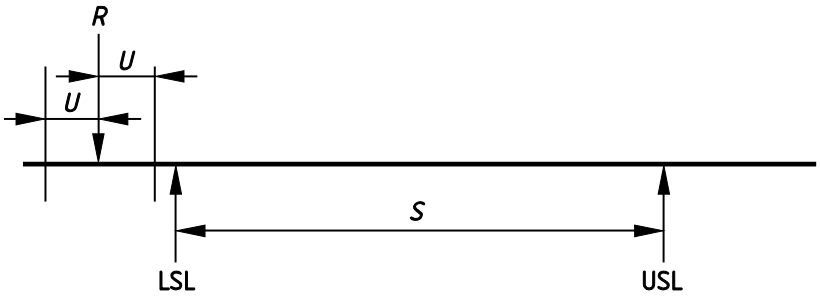


Key

R	result of a measurement
S	specified performance guidelines
LSL	Lower Specified Limit
USL	Upper Specified Limit
U	Uncertainty of measurement

Figure B.1 — Result pass

If the test data plus/minus the uncertainty of measurement *U* falls outside of the upper or lower limiting values specified in the appropriate product performance guidelines, then the result should be deemed to be a straightforward fail (see Figure B.2).

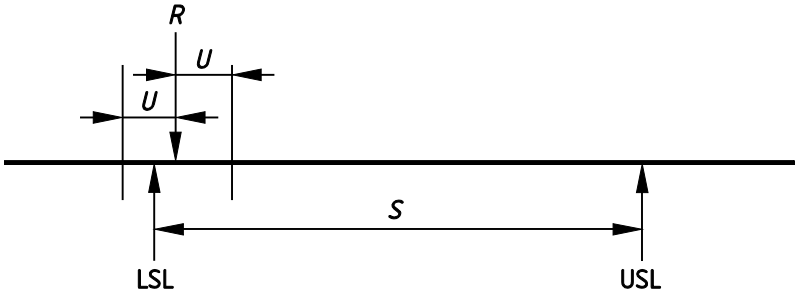


Key

R	result of a measurement
S	specified performance guidelines
LSL	Lower Specified Limit
USL	Upper Specified Limit
U	uncertainty of measurement

Figure B.2 — Result fail

If the test data falls within the specified limits for the appropriate product performance guidelines but the uncertainty of measurement *U* falls outside of the upper or lower limiting values, then the result should be deemed a fail (see Figure B.3).



Key

R	result of a measurement
S	specified performance guidelines
LSL	Lower Specified Limit
USL	Upper Specified Limit
U	uncertainty of measurement

Figure B.3 — Result fail

B.3 Calculation of uncertainty of measurement

The uncertainty of measurement should be calculated. The two following approaches can be used:

— statistical method, for example that given in ISO 5725-2;

— mathematical method, for example that given in JCGM 100:2008.

Annex ZA
(informative)

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

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 Personal Protective Equipment.

Once this standard is cited in the Official Journal of the European Union 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 Personal Protective Equipment

EU Directive 89/686/EEC, Annex II		**Clauses of this European Standard**
1.1.1	Ergonomics	4.8 and Annex A
1.1.2.1	Highest levels of protection possible	4.8 and Annex A
1.2.1	Absence of risks and other 'inherent' nuisance factors	Annex A
1.2.1.1	Suitable constituent materials	4.4.1, 4.4.2, 4.4.3, 4.5.4, 4.5.5, 4.5.6. 4.10
1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user	4.8 and Annex A
1.2.1.3	Maximum permissible user impediment	Annex A
1.3.1	Comfort and efficiency	4.8 and Annex A
1.3.2	Lightness and design strength	4.5.2; 4.5.3; 4.6.3 5.2 and 5.3
1.4	Information supplied by the manufacturer	Clause 8
2.2	PPE 'enclosing' the parts of the body to be protected	5.5
2.4	PPE subject to ageing	Clause 8, 4.6.3
2.12	PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	Clause 7 and Clause 9
3.1.2.1	Prevention of falls due to slipping	5.4
3.1.1	Protection against mechanical impact	4.4.4, 4.4.5 and 5.1
3.2	Protection against (static) compression of the body	4.8
3.3	Protection against physical injury (abrasion, perforation, cuts, bites)	4.4.4, 4.4.5

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

Bibliography

[1] JCGM 100:2008, *Evaluation of measurement data Guide to the expression of uncertainty in measurement* (website www.bipm.org)

[2] ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

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