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Second edition
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Personal protective equipment — Safety footwear

Équipement de protection individuelle — Chaussures de sécurité

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 20345 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 161, *Foot and leg protectors*, in collaboration with Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 3, *Foot protection*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 20345:2004), which has been technically revised. It also incorporates the Amendment ISO 20345:2004/Amd. 1:2007 and the Technical Corrigenda ISO 20345:2004/Cor.1:2005 and ISO 20345:2004/Cor.2:2006.

Personal protective equipment — Safety footwear

1 Scope

This International Standard specifies basic and additional (optional) requirements for safety footwear used for general purpose. It includes, for example, mechanical risks, slip resistance, thermal risks, ergonomic behaviour.

Special risks are covered by complementary job-related standards (e.g. footwear for firefighters, electrical insulating footwear, protection against chain saw injuries, protection against chemicals and molten metal splash, protection for motor cycle riders).

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.

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

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

EN 12568:2010, *Foot and leg protectors — Requirements and test methods for toecaps and penetration resistant inserts*

EN 50321, *Electrically insulating footwear for working on low voltage installations*

3 Terms and definitions

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

NOTE The component parts of footwear are illustrated in Figures 1 and 2.

3.1
safety footwear
footwear incorporating protective features to protect the wearer from injuries that could arise through accidents

NOTE Items of safety footwear are fitted with toecaps designed to give protection against impact when tested at an energy level of at least 200 J and against compression when tested at a compression load of at least 15 kN.

3.2
leather
hide or skin tanned to be imputrescible

3.2.1
leather split
flesh or middle part of a hide or skin, obtained by splitting a thick leather, which is tanned to be imputrescible

3.3
rubber
vulcanized elastomers

3.4
polymeric materials
large molecules composed of repeating structural units (monomers) typically connected by chemical bond

EXAMPLE Polyurethane (PU) or polyvinylchloride (PVC).

3.5
insole
non-removable component used to form the base of the shoe to which the upper is usually attached during lasting

3.6
insock
removable or non-removable footwear component used to cover part or all of the insole

NOTE "Non-removable" means that the insock cannot be removed without being damaged.

3.7
lining
material covering the inner surface of the upper

NOTE 1 The wearer's foot is in direct contact with the lining.

NOTE 2 Where an upper is split at the forepart to house the toecap, or if an external piece of material is stitched to the upper to form a pocket to house the toecap, the material under the toecap acts as a lining.

3.7.1
vamp lining
material covering the inner surface of the forepart of the upper

3.7.2
quarter lining
material covering the inner surface of the quarters of the upper

3.8
cleat
protruding part of the outer surface of the sole

3.9
rigid outsole
sole which cannot be bent through an angle of 45° under a load of 30 N

NOTE Testing is performed in accordance with ISO 20344:2011, 8.4.1.

3.10
cellular outsole
outsole which has a density of 0,9 g/ml or less with a cell structure that is visible under 10× magnification

3.11
penetration-resistant insert
footwear component placed in the sole complex in order to provide protection against penetration

3.12
safety toecap
built-in footwear component designed to protect the toes of the wearer from impacts of an energy level of at least 200 J and compression at a load of at least 15 kN

3.13
seat region
counter area
rear 10 % of the total length of the footwear (upper and sole)

3.14
conductive footwear
footwear, the resistance of which is in the range of 0 kΩ to 100 kΩ

NOTE Resistance is measured in accordance with ISO 20344:2011, 5.10.

3.15
antistatic footwear
footwear, the resistance of which is above 100 kΩ and less than or equal to 1 000 MΩ

NOTE Resistance is measured in accordance with ISO 20344:2011, 5.10.

3.16
electrically insulating footwear

footwear which protects the wearer against electrical shocks by preventing the passage of dangerous current through the body via the feet

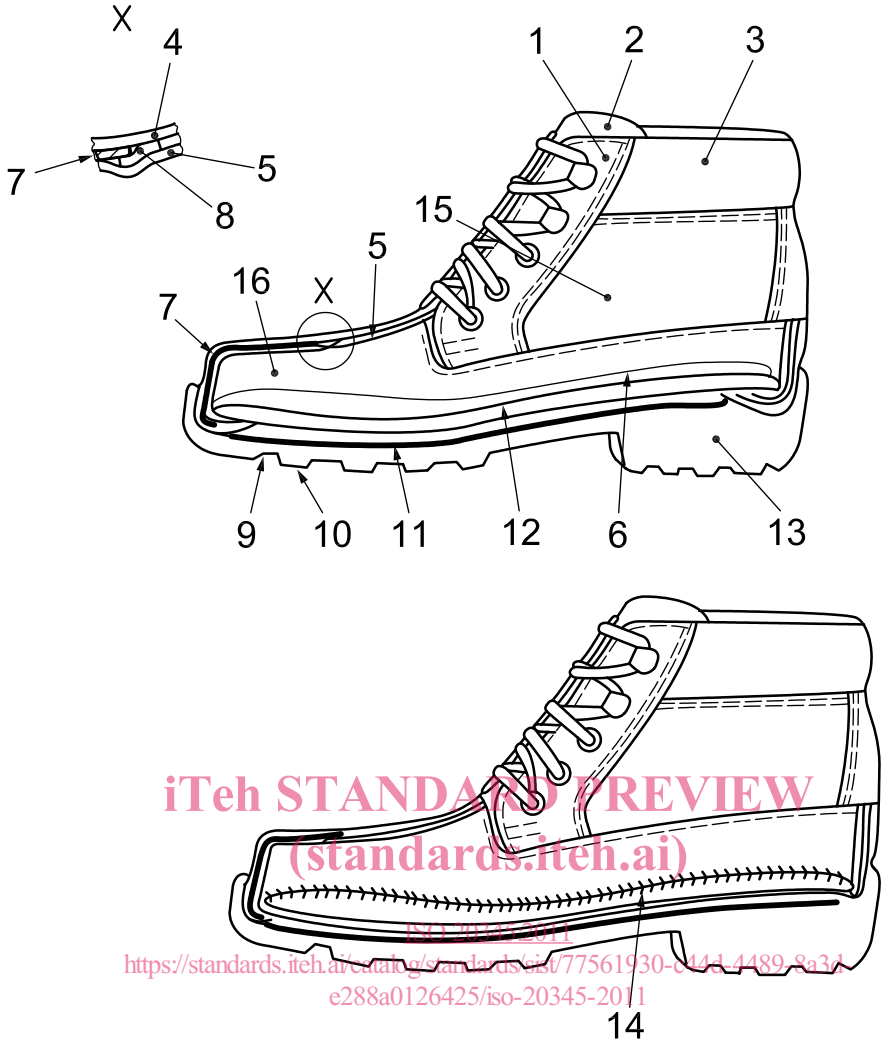
3.17
fuel oil
aliphatic hydrocarbon constituent of petroleum

3.18
specific job-related footwear
safety or occupational footwear relating to a specific profession

EXAMPLE Footwear for firefighters; footwear with resistance to chain saw cutting.

3.19
hybrid footwear
class II footwear incorporating another material which extends the upper

NOTE See Figure A.1.

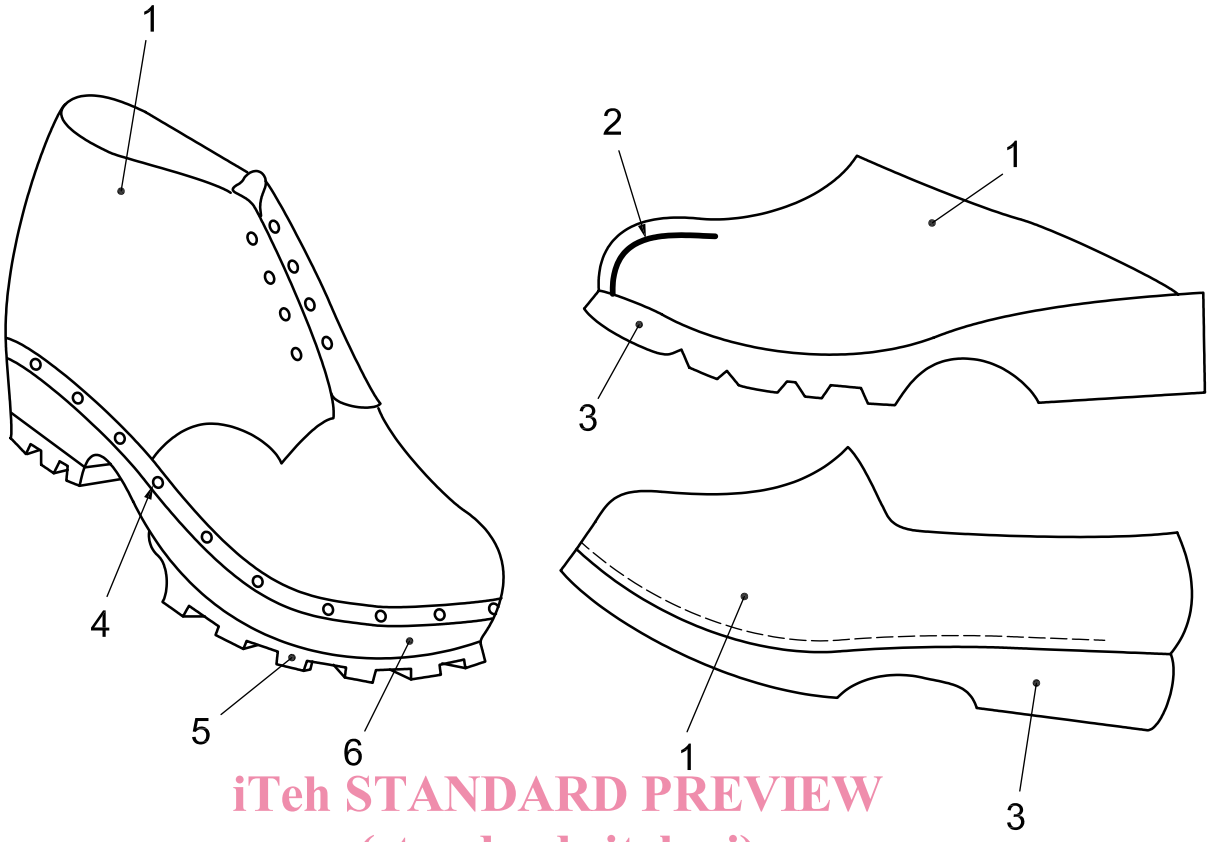


Key

1 facing
2 tongue
3 collar
4 upper
5 vamp lining
6 insock
7 toecap
8 edge covering, e.g. foam strip
9 outsole
10 cleat
11 penetration-resistant insert
12 insole
13 heel
14 Strobel stitching
15 quarter
16 vamp

a) Example of parts of footwear of Strobel construction

Figure 1 (*continued*)

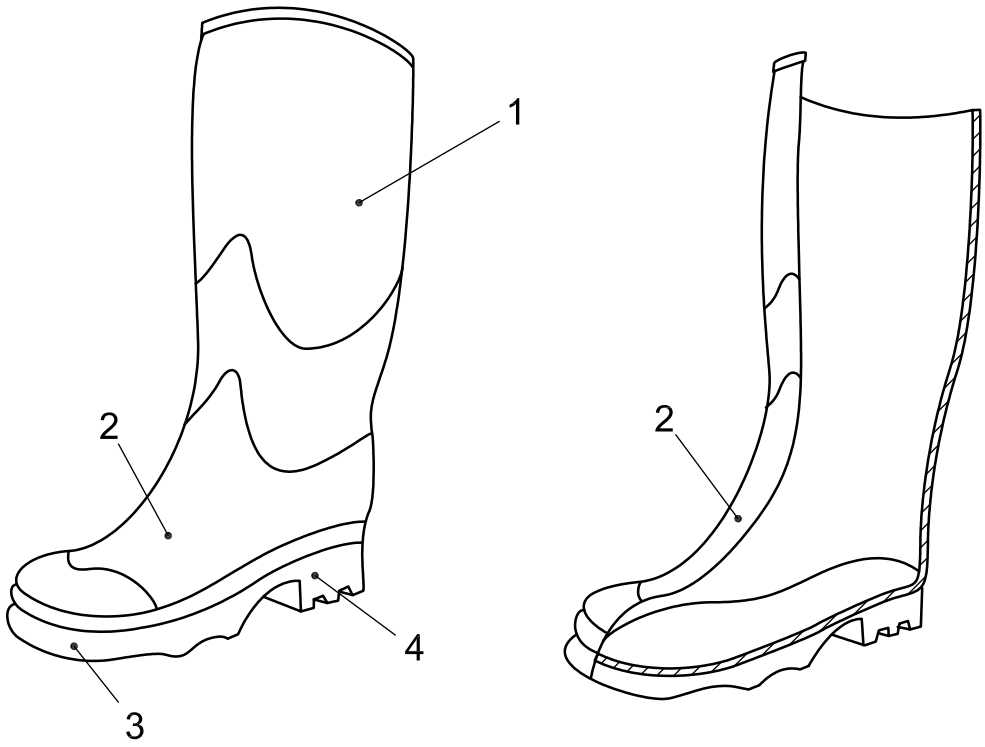


Key

1 upper
2 toecap
3 rigid sole
4 reinforcing welt with nails
5 outsole
6 wooden sole

b) Example of other footwear

Figure 1 — Types of footwear



Key

1 upper
2 vamp
3 outsole
4 heel

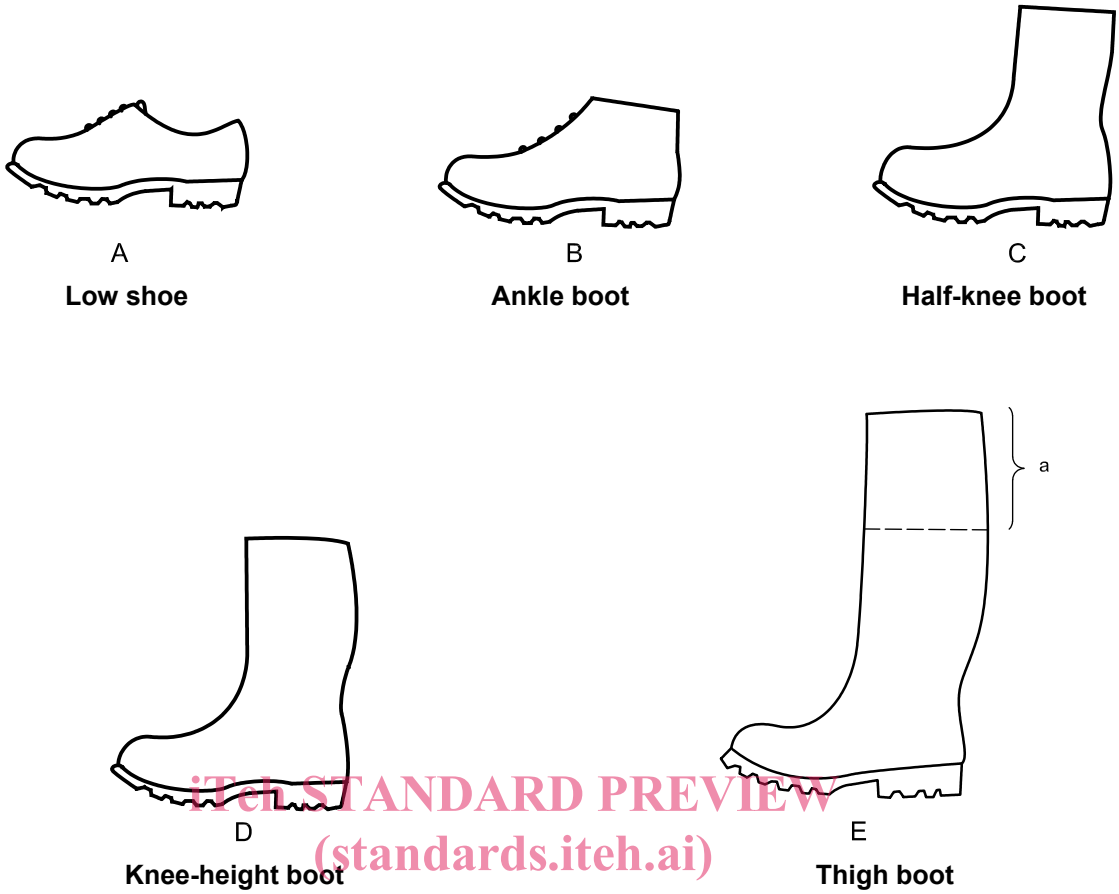
Figure 2 — Example of all-rubber (i.e. vulcanized) or all-polymeric (i.e. entirely moulded) footwear

4 Classification and designs

Footwear shall be classified in accordance with Table 1.

Table 1 — Classification of footwear

Classification	Description
Class I	Footwear made from leather and other materials, excluding all-rubber or all-polymeric footwear
Class II	All-rubber (i.e. entirely vulcanized) or all-polymeric (i.e. entirely moulded) footwear



[a] Variable extension which can be adapted to the wearer.

NOTE Design E can be a knee-height boot (design D) equipped with a thin impermeable material which extends the upper and which can be cut to adapt the boot to the wearer.

Figure 3 — Designs of footwear

Class II footwear can be equipped with another material which extends the upper. The requirements for this footwear are given in Annex A.

5 Basic requirements for safety footwear

5.1 General

Safety footwear shall conform to the basic requirements given in Table 2.

Table 2 — Basic requirements for safety footwear

Requirement		Subclause	Classification	
			I	II
Design	Height of upper	5.2.2	X	X
	Seat region (design B, C, D, E)	5.2.3	X	X
Whole footwear	Sole performance:	5.3.1		
	— Construction	5.3.1.1	X	
	— Upper/outsole bond strength	5.3.1.2	X	
	Toe protection:	5.3.2		
	— General	5.3.2.1	X	X
	— Internal length of toecaps	5.3.2.2	X	X
	— Impact resistance	5.3.2.3	X	X
	— Compression resistance	5.3.2.4	X	X
	— Behaviour of toecaps	5.3.2.5	X	X
	Leakproofness	5.3.3		X
	Specific ergonomic features	5.3.4	X	X
	Slip resistance:	5.3.5	X	X
	— Slip resistance on ceramic tile floor with NaLS[^a]	5.3.5.2		
	— Slip resistance on steel floor with glycerine[^b]	5.3.5.3		
	— Slip resistance on ceramic tile floor with NaLS and on steel floor with glycerine[^c]	5.3.5.4		
Upper	General	5.4.1	X	
	Thickness	5.4.2		X
	Tear strength	5.4.3	X	
	Tensile properties	5.4.4	X	X
	Flexing resistance	5.4.5		X
	Water vapour permeability and coefficient	5.4.6	X	
	pH value	5.4.7	X	
	Hydrolysis	5.4.8		X
	Chromium VI content	5.4.9	X	
Vamp lining	Tear strength	5.5.1	X	O
	Abrasion resistance	5.5.2	X	O
	Water vapour permeability and coefficient	5.5.3	X	
	pH value	5.5.4	X	O
	Chromium VI content	5.5.5	X	O