TECHNICAL REPORT

ISO/TR 18690

Second edition
2012-12-15

Guidance for the selection, use and maintenance of safety and occupational footwear and other personal protective equipment offering foot and leg protection

Lignes directrices pour la sélection, l'utilisation et l'entretien des chaussures de protection et de loisirs ainsi que tout autre équipement de protection personnelle des pieds et des jambes

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Foreword

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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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ('state of the art', for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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.

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ISO/TR 18690 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 161, *Foot and leg protectors*, in collaboration with ISO 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).

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This second edition cancels and replaces the first edition (ISO/TR 18690:2006), which has been technically revised.

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Guidance for the selection, use and maintenance of safety and occupational footwear and other personal protective equipment offering foot and leg protection

1 Scope

This Technical Report provides guidance for the selection, use and maintenance of personal protective equipment and safety and occupational footwear. It is intended for footwear manufacturers and suppliers, employers and self-employed people, safety engineers and other users. This Technical Report also provides guidance for preparing national guidance in this area.

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 20345, *Personal protective equipment — Safety footwear*

ISO 20347, *Personal protective equipment — Occupational footwear*

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3 Terms and definitions

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For the purposes of this document, the terms and definitions given in ISO 20345 and ISO 20347 apply.

4 Design, construction and classification

Construction of safety and occupational footwear is illustrated in Figure 1. Design and classification are defined in ISO 20345 and ISO 20347. Classification of footwear is presented in Table 1. Designs of footwear are illustrated in Figure 2. Protective elements should be incorporated in the footwear in such a way that they cannot be removed without damaging it.

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

NOTE ISO 20345:2011, Annex A, permits hybrid footwear comprising uppers with both an all rubber or polymeric foot section and a leg shaft area of leather or other materials.

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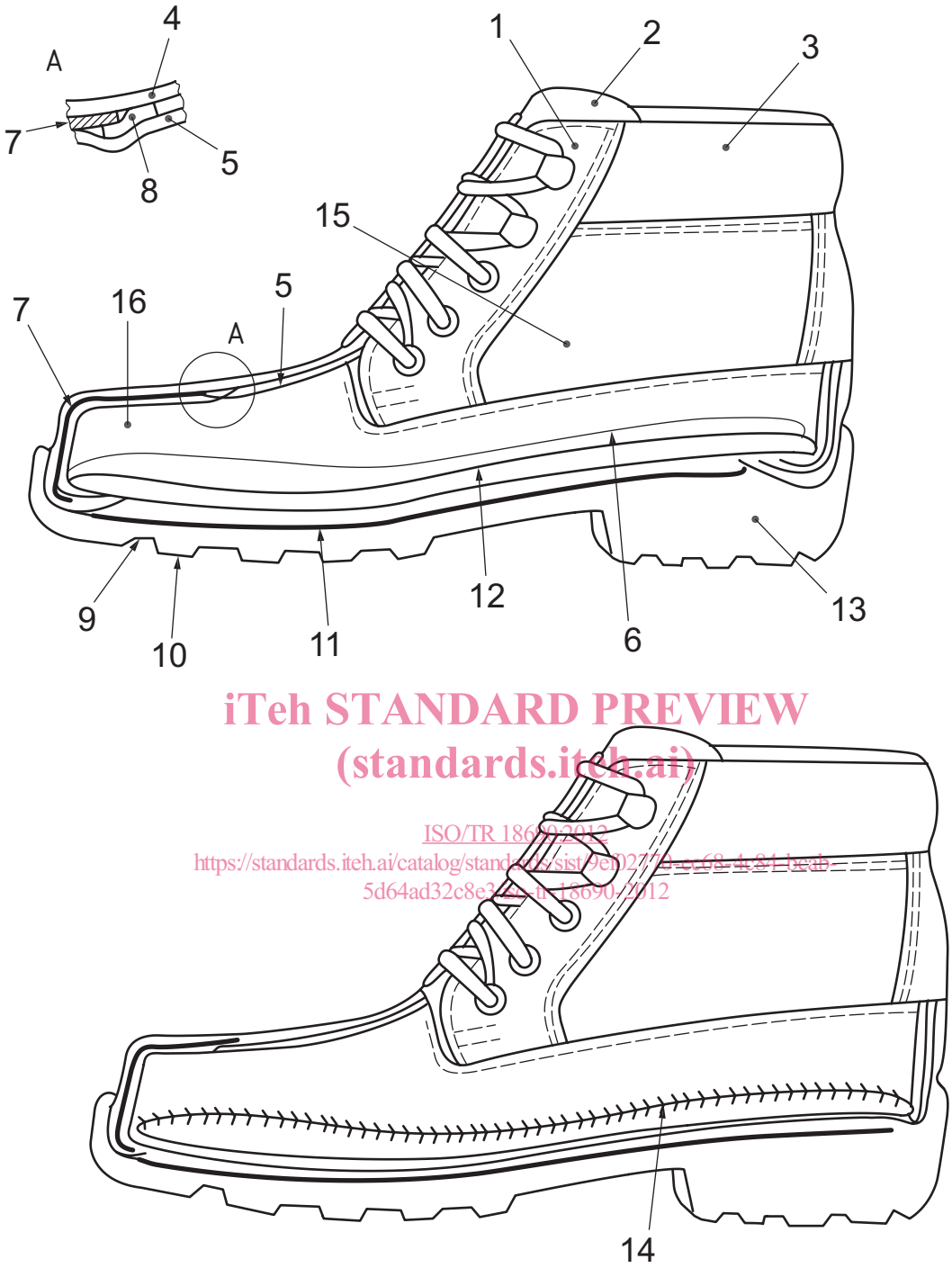

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Key

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

Figure 1 — Example of parts of Strobel construction

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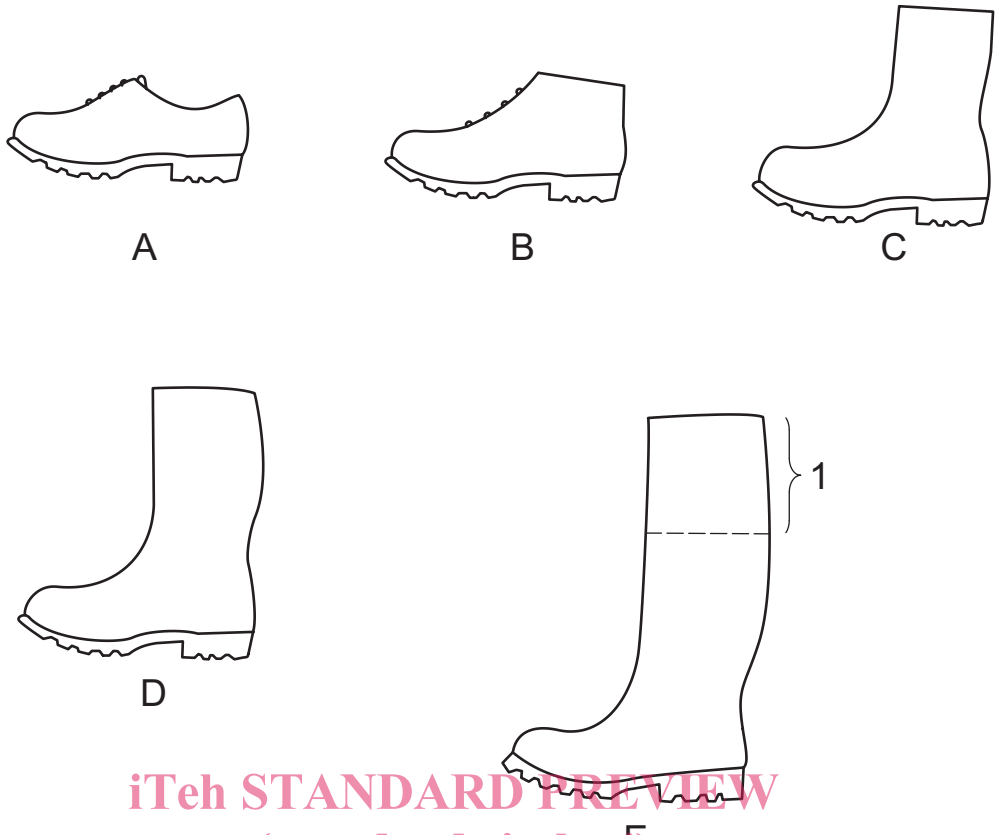

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Key

Type A	low shoe
Type B	ankle boot
Type C	half-knee boot
Type D	knee-height boot
Type E	thigh boot
1	variable extension which can be adapted to the wearer

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Figure 2 — Designs of footwear

5 Marking of categories

5.1 Personal protective equipment — Safety footwear

5.1.1 Basic requirements

Safety footwear is fitted with safety toecaps and complies with the basic requirements given in Table 2 of ISO 20345:2011. It can incorporate one or more additional protective features to protect the wearer from injuries that could arise through accidents in the working sectors for which the footwear is designed. Safety toecaps meet the requirements of impact resistance at an energy level of 200 J and the requirements of compression resistance at a compression load of 15 kN.

The marking symbol for basic requirements is SB.

5.1.2 Additional requirements

Additional protective features are presented in Table 2.

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Table 2 — Additional symbols for safety footwear

Requirement	Symbol in footwear
Penetration resistance	P
Electrical resistance	
Conductive footwear	C
Antistatic footwear	A
Electrically insulating footwear	See EN 50321
Resistance to inimical environments	
Insulation against heat	HI
Insulation against cold	CI
Energy absorption of seat region	E
Resistance to water (footwear of Classification I)	WR
Metatarsal protection	M
Ankle protection	AN
Water penetration and water absorption of upper (footwear of Classification I)	WRU
Cut resistance	CR
Cleated outsole	
Resistant to hot contact of outsole	HRO
Resistance to fuel oil of outsole	FO

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5.1.3 Marking of categories of safety footwear

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Tables 3 and 4 categorize safety footwear with the most widely used combinations of basic and additional requirements.

Table 3 — Class I: safety footwear made from leather and other materials

Category	Additional requirements
SB	
S1	Closed seat region Antistatic footwear Energy absorption of seat region Fuel oil resistance
S2	As S1 plus: Water penetration and water absorption
S3	As S2 plus: Penetration resistance Cleated outsole

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Table 4 — Class II: all-rubber or all-polymeric safety footwear

Category	Additional requirements
SB	
S4	Antistatic footwear Energy absorption of seat region fuel oil resistance
S5	As S4 plus: Penetration resistance Cleated outsole

5.2 Personal protective equipment — Occupational footwear

5.2.1 Basic requirements

Occupational footwear complies with the basic requirements given in Table 2 of ISO 20347:2012 and it should incorporate one or more protective features to protect the wearer from injuries that could arise through accidents in the working sectors for which the footwear is designed. The additional protective requirements are presented in Table 5. Occupational footwear should provide at least one of the whole footwear additional protective features: penetration resistance, electrical resistance, resistance to inimical environments or energy absorption of the seat region.

NOTE Occupational footwear is not fitted with safety or protective toecaps.

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5.2.2 Additional requirements

Additional protective features are presented in Table 5.

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Table 5 — Additional symbols for occupational footwear

Requirement	Symbol in footwear
Penetration resistance	P
Electrical resistance	
Conductive footwear	C
Antistatic footwear	A
Electrically insulating footwear	See EN 50321
Resistance to inimical environments	
Insulation against heat	HI
Insulation against cold	CI
Energy absorption of seat region	E
Resistance to water (footwear of Classification I)	WR
Ankle protection	AN
Water penetration and water absorption of upper (footwear of Classification I)	WRU
Cleated outsole	
Resistant to hot contact of outsole	HRO
Resistance to fuel oil of outsole	FO

5.2.3 Marking of categories of occupational footwear

Tables 6 and 7 categorize protective footwear with the most widely used combinations of basic and additional requirements.

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Table 6 — Class I: occupational footwear made from leather and other materials

Category	Additional requirements
OB	
O1	Closed seat region Antistatic footwear Energy absorption of seat region
O_2	As O1 plus: Water penetration and water absorption
O3	As O_2 plus: Penetration resistance Cleated outsole

Table 7 — Class II: all-rubber or all-polymeric occupational footwear

Category	Additional requirements
OB	
O4	Antistatic footwear Energy absorption of seat region
O5	As O4 plus: Penetration resistance Cleated outsole

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5.3 Other markings

All safety and occupational footwear should be marked with:

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a) size;

b) manufacturer's identification mark;

c) manufacturer's type designation;

d) year of manufacture and at least quarter;

e) number of the International Standard, e.g. ISO 20345:2011;

f) symbol(s) from Table 2 appropriate to the protection provided or, where applicable, the appropriate category.

The markings for e) and f) should be adjacent to one another.

6 Selection of PPE footwear

6.1 Risk assessment

6.1.1 General

Statistics show that slip is the most common hazard in most workplaces. Slip resistance should therefore be the first property to be considered when selecting footwear as PPE.

Employers and self-employed people should assess the risks from their work activities. Every effort should be made to reduce risks to a minimum before considering the use of PPE. If the risks cannot be eliminated by other methods, personal protective equipment should be used. It is important to select the correct type of PPE footwear in respect of the risk. The protection required in the work place determines the type of footwear to be chosen. The properties of PPE Footwear can be combined to provide protection against more than one hazard, for example footwear can have a toe cap and be slip resistant.

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Prior to the selection and use of PPE footwear or leg protector the employer should assess the working conditions, especially the type and extent of the hazards, duration of the hazard and personal requisites of the wearer.

6.1.2 Risk analysis

Generally, exposure to health and safety risks is always present in work activities. Therefore, the implementation of collective protection systems is required, and when the residual risk cannot be avoided and/or reduced, PPE has to be used.

Before selecting and using safety or occupational footwear, the employer should carefully evaluate the working conditions, including:

— risk type and nature;

— risk duration and frequency;

— individual features of the worker to be protected.

In this context, the human factor-related risk is of particular importance. The term encompasses all risk factors connected with the worker's psycho-physical state, incapacity, recklessness, lack of training and, in general, behaviour that is inappropriate in the work context. The absence of theoretical and practical training, as well as the inability to handle certain work situations, are the most frequent human factor-related causes of accidents. Human factor-related risks at work should be duly analysed so as to be subsequently eliminated and/or reduced.

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6.1.3 Types of risk

In his work activities, the worker is exposed to residual risks of various natures, which can be eliminated or reduced to an acceptable level. The elimination or reduction of such risks should be performed through the implementation of suitable safety footwear which should always be correctly used and maintained, according to the manufacturer's instructions, within qualitative limits that do not compromise the protective characteristics of the footwear and in accordance with its intended use, so as not to incur further risks derived from the footwear itself.

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Risks covered by the use of safety footwear:

— mechanical;

— electrical;

— thermal;

— chemical.

Risks resulting from the use of inappropriate or damaged safety footwear:

— discomfort, interference with work activities;

— accidents and health risks;

— insufficient protection, etc.

6.1.4 Exposure to risks

Risk assessment should be able to identify the presence, at any time throughout the work day, of serious health risks, that is risks that may incur death or permanent health damage and of which the worker may not be opportunely aware, as well as any other health and safety risks.

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