INTERNATIONAL STANDARD

ISO 18639-6

First edition
2018-01

PPE ensembles for firefighters undertaking specific rescue activities —

Part 6: **Footwear**

Équipements de protection personnelle pour pompiers entreprenant des activités de sauvetage particulières —
Partie 6: Chaussures

Reference number
ISO 18639-6:2018(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 14, *Fire-fighters personal equipment*.

A list of all the parts in the ISO 18639 series can be found on the ISO website.

Introduction

ISO 18639 is a series of standards for Personal Protective Equipment (PPE) for firefighters when engaged in specific rescue activities. It is not possible to provide a standard for PPE to cover all of the diverse range of rescue scenarios that firefighters are likely to encounter so it is important that risk assessments are undertaken to determine if the PPE covered by ISO 18639 is suitable for its intended use and the expected exposure to hazards. For complete protection against exposures, the risk assessment should include protection of the whole body including the torso, arms and legs, head, face, hands and feet.

For certain rescue activities, safety ropes and harnesses can be required. For certain rescue situations, special PPE for use in and on water can be required. In some cases, appropriate respiratory protection can also be identified as being necessary.

The performance requirements in this document take account of accidental exposure to heat and flame, but do not cover PPE for firefighting. While this document takes account of accidental exposure to some common chemicals, it is not intended that PPE to this document should be considered as providing chemical protection as a primary function. It does not cover PPE to protect against biological, electrical or radiation hazards. The risk assessment determines whether PPE complying to this document or the requirements of any other relevant standard is more suitable.

Firefighters should be trained in the use, care and maintenance of the PPE covered by this document, including an understanding of its limitations.

PPE ensembles for firefighters undertaking specific rescue activities —

Part 6: Footwear

1 Scope

This document provides the principles that govern the development of incident type and/or hazard specific test methods and minimum performance requirements for safety footwear for firefighters while engaged in specific rescue activities.

Footwear related to specific rescue activities, e.g. Road Traffic Crash, (RTC) and Urban Search and Rescue, (USAR) is documented in individual subclauses of this document.

NOTE For further guidance refer ISO 18639-1.

The purpose of this document is to ensure minimum performance requirements for incident type and/or hazard specific safety footwear are designated.

This document covers general footwear design, the minimum performance level of the materials used and the methods of test for determining this performance level.

It does not cover special footwear for use in other high risk situations such as structural firefighting.

This document does not cover protection for the head, torso, arms, hands and legs or protection of the feet against other hazards, e.g. chemical, biological, radiation and electrical hazards, except for limited, accidental exposure to fire ground chemicals and contaminated blood or body fluids.

Selection of the appropriate system of Personal Protective Equipment, (PPE), including footwear, is dependent on carrying out an effective risk assessment which identifies the hazard to be faced, evaluates the likelihood of those hazards and provides the means of reducing or eliminating these hazards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 18639-1, *PPE for firefighters undertaking specific rescue activities — Part 1: General*

ISO 13994, *Clothing for protection against liquid chemicals — Determination of the resistance of protective clothing materials to penetration by liquids under pressure*

ISO 15025, *Protective clothing — Protection against flame — Method of test for limited flame spread*

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

ISO 20345, *Personal protective equipment — Safety footwear*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18639-1 and ISO 20345 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Classification and designs

Footwear shall be classified in accordance with Table 1 and Figure 1.

Table 1 — Classification of footwear

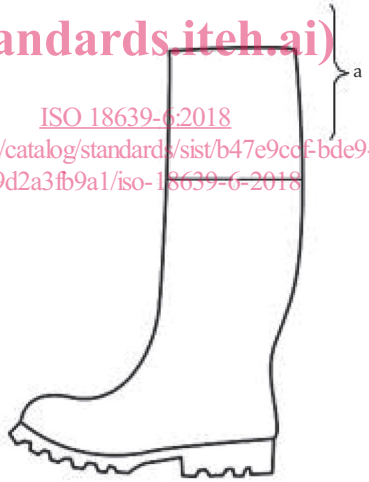
Classification	Description
Class I	Footwear made from leather and other materials, excluding all-rubber or all-polymeric footwear
Class II	All-rubber (i.e. entirely vulcanized) or all-polymeric (i.e. entirely moulded) footwear

a) Low shoe — Not allowed

b) Ankle boot

c) Half-knee boot

d) Knee-height boot



e) Thigh boot

a Variable extension which can be adapted to the wearer, see Note 1 for more information.

NOTE 1 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.

NOTE 2 Class II footwear can be equipped with another material which extends the upper (see ISO 20345:2011, Annex A).

Figure 1 — Designs of footwear

5 Sampling and conditioning

Where not directly specified in a clause of this document, the sampling and conditioning of samples shall satisfy the requirements of 5.1 and 5.2.

5.1 Sampling

The minimum number of samples shall be those specified ISO 20344:2011, Table 1.

Wherever possible, test pieces shall be taken from the whole footwear unless otherwise stated in this document or ISO 20344.

If it is not possible to obtain a large enough test piece from the footwear, then a sample of the material from which the component has been manufactured may be used instead and this shall be noted in the test report.

Where samples are required from each of three sizes, these shall comprise the largest, smallest and a middle size of the footwear under test.

5.2 Conditioning

All test pieces shall be conditioned in a standard atmosphere of (23 ± 2) °C and (50 ± 5) % relative humidity for a minimum of 48 h before testing, unless otherwise stated in the test method.

The maximum time which shall elapse between removal from the conditioning atmosphere and the start of testing shall be less than 10 min, unless otherwise stated in the test method.

Each test piece shall individually satisfy the specific requirement, unless otherwise stated in the test method.

NOTE The uncertainty of measurement for each test method described in the present document can be assessed. One of the two following approaches needs to be used:

— a statistical method, e.g. that given in ISO 5725-2[1];

— a mathematical method, e.g. that given in ENV 13005[3].

6 Performance requirements

6.1 General

Footwear shall meet the requirements of 6.2 appropriate to the rescue activity classification for the footwear.

6.2 Summary of requirements and classification of specific rescue activities

RTC or USAR footwear shall conform to the respective mandatory requirements (indicated by X and O) given in Table 2 below. Where additional performance features are claimed (indicated by *), the footwear shall conform to the requirements in 6.3 to 6.7.

Table 2 — Summary of requirements

Classification of specific rescue activity				RTC		USAR		
Requirement		This document	Subclause of ISO 20345:2011	Class		Class		Marking
				I	II	I	II	
Design	Height of upper (B, C, D, E)		5.2.2	X	X	X	X	
	Seat region		5.2.3	X	X	X	X	
Whole footwear	Sole performance:		5.3.1					
	— Construction		5.3.1.1	X	N/A	X	N/A	
	— Upper/outsole bond strength		5.3.1.2	X	N/A	X	N/A	
	Toe protection:		5.3.2					
	— General		5.3.2.1	X	X	X	X	
	— Internal length of toecaps		5.3.2.2	X	X	X	X	
	— Impact resistance		5.3.2.3	X	X	X	X	
	— Compression resistance		5.3.2.4	X	X	X	X	
	— Behaviour of toecaps		5.3.2.5	X	X	X	X	
	Leakproofness		5.3.3	N/A	X	N/A	X	
	Water resistance	6.5.1		X	N/A	X	N/A	WR
	Specific ergonomic features		5.3.4	X	X	X	X	
	Slip resistance (for more details, see Annex D):		5.3.5					
	— Slip resistance on ceramic tile floor with NaLS and on steel floor with glycerine (SRC)		5.3.5.4	X	X	X	X	
Whole footwear	Electrical properties	6.5.2		X	X	X	X	
	— Electrically insulating footwear ▲	6.5.2.1						EN 50321:1999, 5.3
	— Antistatic footwear ▲	6.5.2.2						
	Cut resistance		6.2.8	X	X	X	X	CR
	Penetration resistance		6.2.1	X	X	X	X	P
	Flame resistance	6.3.2		X	X	*	*	FR
	Cut resistance by a hand-held chainsaw	6.4.1		*	*	*	*	ISO 17249:2013, Figure 1
	Metatarsal protection	6.4.2		*	*	*	*	M
	Ankle protection	6.4.3		*	*	X	X	AN
Upper	General		5.4.1	X	N/A	X	N/A	
	Thickness		5.4.2	N/A	X	N/A	X	
	Tear strength		5.4.3	X	N/A	X	N/A	
	Tensile properties		5.4.4	X	X	X	X	
	Flexing resistance		5.4.5	N/A	X	N/A	X	
	Water vapour permeability and coefficient		5.4.6	X	N/A	X	N/A	
	pH value		5.4.7	X	N/A	X	N/A	
	Hydrolysis		5.4.8	N/A	X	N/A	X	
	Chromium VI content		5.4.9	X	N/A	X	N/A	
	Liquid penetration resistance	6.7.1		*	*	*	*	LPR