
**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



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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.

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.

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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 $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ 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

Table 2 (continued)

Classification of specific rescue activity				RTC		USAR		
Requirement		This document	Subclause of ISO 20345:2011	Class		Class		Marking
				I	II	I	II	
Vamp lining	Tear strength		5.5.1	X	0	X	0	
	Abrasion resistance		5.5.2	X	0	X	0	
	Water vapour permeability and coefficient		5.5.3	X	0	X	0	
	pH value		5.5.4	X	0	X	0	
	Chromium VI content		5.5.5	X	0	X	0	
Quarter lining	Tear strength		5.5.1	0	0	0	0	
	Abrasion resistance		5.5.2	0	0	0	0	
	Water vapour permeability and coefficient		5.5.3	0	0	0	0	
	pH value		5.5.4	0	0	0	0	
	Chromium VI content		5.5.5	0	0	0	0	
Insole/ Insock	Insulation against heat		Table 3	X	0	X	0	
Tongue	Tear strength		5.6.1	0	0	0	0	
	pH value		5.6.2	0	0	0	0	
	Chromium VI content		5.6.3	0	0	0	0	
Outsole	Design		5.8.1	X	X	X	X	
	Tear strength		5.8.2	X	X	X	X	
	Abrasion resistance		5.8.3	X	X	X	X	
	Flexing resistance		5.8.4	X	X	X	X	
	Hydrolysis		5.8.5	X	X	X	X	
	Interlayer bond strength		5.8.6	0	0	0	0	
	Resistance to hot contact		6.4.1	X	X	X	X	HRO
	Resistance to fuel oil		6.4.2	X	X	X	X	FO
	Insulation against heat	6.3.1		X	X	X	X	HI ₂
NOTE The applicability of a requirement is indicated in the table by the following: X means that a requirement shall be met. In some case the requirement relates only to particular materials e.g. pH of leather components. This does not mean that other materials are precluded. 0 means that if a component part exists, the requirement shall be met * means that if the property is claimed, the requirement given in the appropriate clause shall be met ▲ means that it is obligatory that one of the requirements are met								

6.3 Thermal requirements

6.3.1 Insulation against heat

When tested according to the procedure described in ISO 20344:2011, 5.12 the footwear shall meet the requirements for the temperature inside the footwear ([Table 3](#)) and the requirements for resistance to degradation ([Table 4](#)).

Table 3 — Requirement for temperature inside the footwear

Sandbath temperature (°C)	250
Inside temperature of the footwear (°C)	<42 after 10 min

Table 4 — Requirement for resistance to degradation

Sandbath temperature (°C)	250
Test duration	20 min
Assessment	After testing footwear shall conform to A.2.1

6.3.2 Flame resistance

6.3.2.1 Sampling and conditioning

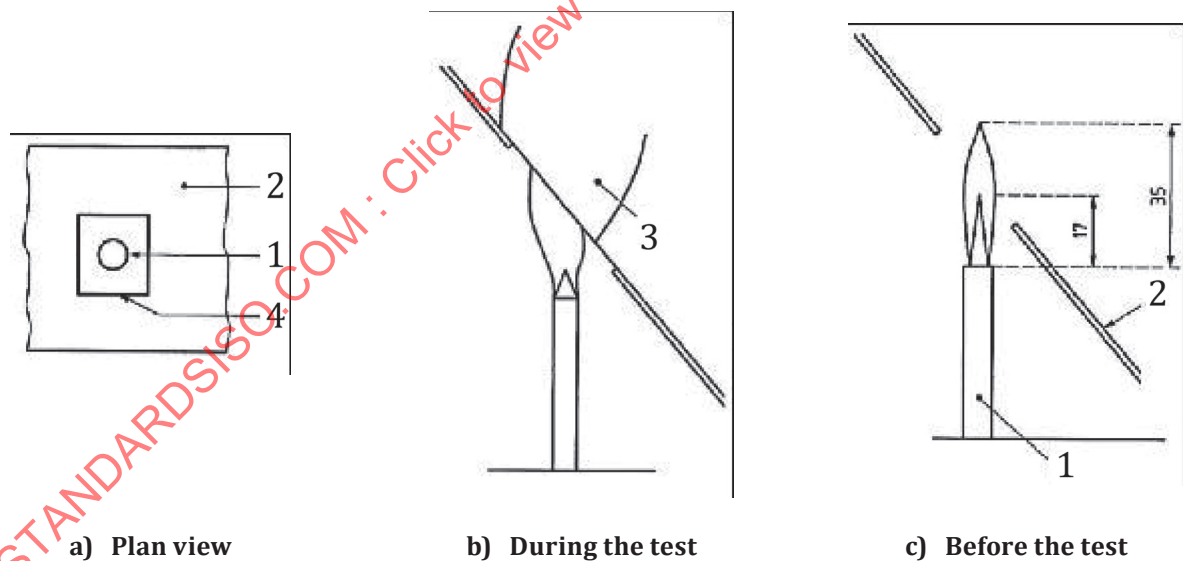
All different external materials, including external seams, labels and closing mechanisms, as provided, as a complete sample of footwear shall be tested in accordance with ISO 15025 as modified in below.

6.3.2.2 Procedure

6.3.2.2.1 Place the burner (see [Figure 2](#)) on a flat, horizontal surface with the burner and flame in a vertical position.

6.3.2.2.2 Clamp the part of the footwear to be tested so that the minimum distance from the top of the burner to the footwear surface is (17 ± 1) mm and the angle between the sample area to be tested and the horizontal plane is $(45 \pm 5)^\circ$ (see [Figure 2](#)). The sample carrier has a square flame application aperture size of $[(50 \times 50) \pm 1]$ mm.

NOTE A simple clamp commonly used for holding test tubes on a metal stand or a sample carrier can be used to hold the footwear.



Key

- 1 burner
- 2 sample carrier
- 3 footwear being tested
- 4 flame application aperture

Figure 2 — Equipment for flame resistance tests

6.3.2.2.3 Move the burner away from the sample and ignite the burner and preheat it for 2 min and adjust the flame height in accordance with ISO 15025.

6.3.2.2.4 Reposition the burner as in [6.3.2.2.2](#) and apply the flame for (10 ± 1) s to the designated area.

6.3.2.2.5 Remove the flame and measure any after-flame and/or after-glow as defined in ISO 15025.

6.3.2.2.6 Repeat procedures [6.3.2.2.2](#), [6.3.2.2.3](#) and [6.3.2.2.4](#) for at least one test piece of each different external material used in the construction of the footwear, external seams and closing mechanism.

When tested in accordance with the method described above, the footwear shall neither flame for more than 2 s (after-flame time) nor glow more than 2 s (after-glow time). After testing, the footwear shall conform to [A.2.2](#).

6.4 Mechanical protection requirements

6.4.1 Cut resistance by a hand-held chainsaw

When tested against the requirements of ISO 17249, the footwear shall meet the design requirements and provide level 1 protection or higher.

6.4.2 Metatarsal Protection

The footwear shall conform to all the requirements given in ISO 20345:2011, 6.2.6.

6.4.3 Ankle Protection

The footwear shall conform to all the requirements given in ISO 20345:2011, 6.2.7

6.5 Environmental protection requirements

6.5.1 Water resistance

When tested in accordance with ISO 20344:2011, 5.15.2, the total wetted area inside the footwear shall not be greater than 3 cm².

6.5.2 Electrical properties

The footwear shall comply with either [6.5.2.1](#) or [6.5.2.2](#).

6.5.2.1 Electrically insulating footwear

Electrically insulating footwear shall fulfill the requirements given in ISO 20345:2011, 6.2.2.3.

The test voltages shall be 5 kVrms for the proof test and shall be 10 kVrms for withstand test. (This relates to Class 0 electrical resistance).

6.5.2.2 Antistatic footwear

Antistatic footwear shall conform to all the requirements given in of ISO 20345:2011 6.2.2.2.

6.6 Visibility requirements

This subclause has no text.

6.7 Biological and chemical requirements

6.7.1 Liquid penetration resistance

When tested according to ISO 13994, procedure C1, footwear uppers, upper seams and vamp seams shall show no penetration of the following liquids for 1 h:

- 40 % sodium hydroxide (NaOH) at 20 °C;
- 36 % hydrochloric acid (HCl) at 20 °C;
- 30 % sulfuric acid (H₂SO₄) at 20 °C;
- 50 % toluene and 50 % iso-octane (V/V).

7 Marking

Each item of safety footwear shall be clearly and permanently marked, e.g. by embossing or branding, with the following:

- a) size;
- b) manufacturer's identification mark;
- c) manufacturer's unique model/design identification;
- d) year and month of manufacture;
- e) reference to this document, i.e. ISO 18639-6;
- f) reference to the specific rescue activity to which the footwear complies. This reference should be adjacent to;

i.e. ISO 18639-6 RTC or ISO 18639-6 USAR or ISO 18639-6 RTC USAR;
- g) marking symbols for any optional requirements that are met.

8 Information to be supplied

8.1 General

Safety footwear shall be supplied to the customer with information written at least in the official language(s) of the country of destination. All information shall be unambiguous and shall include the following.

- a) Name and full address of the manufacturer and/or his authorized representative;
- b) Name and full address of the authority certifying compliance with this document;
- c) Reference to this International Standard, i.e. ISO 18639-6;
- d) Explanation of any pictograms, markings and levels of performance;
- e) Basic explanation of the tests that have been applied to the footwear, if applicable;
- f) Instructions for use:
 - 1) tests to be carried out by the wearer before use, if required;
 - 2) fitting and how to put on and take off the footwear, if relevant;

- 3) application (basic information on possible uses and, where detailed information is given, the source);
 - 4) limitations of use (e.g. temperature range);
 - 5) instructions for storage and maintenance, with maximum periods between maintenance checks (if important, drying procedures to be defined);
 - 6) instructions for cleaning and/or decontamination;
 - 7) obsolescence deadline or period of obsolescence;
 - 8) if appropriate, warnings against problems likely to be encountered (modifications can invalidate the type approval, e.g. orthopaedic footwear);
 - 9) if helpful, additional illustrations, part numbers, etc.
- g) Reference to accessories and spare parts, if relevant;
- h) Type of packaging suitable for transport, if relevant.

8.2 Antistatic footwear

Each pair of antistatic footwear shall be supplied with a leaflet containing the following wording.

Antistatic footwear should be used if it is necessary to minimize electrostatic build-up by dissipating electrostatic charge, thus avoiding the risk of spark ignition of, for example flammable substances and eliminated.

ATTENTION — It should be noted, however, that antistatic footwear cannot guarantee an adequate protection against electric shock as it introduces only a resistance between foot and floor.

If the risk of electric shock has not been completely eliminated, additional measures to avoid this risk are essential. Such measures, as well as the additional tests mentioned below, should be a routine part of the accident prevention program at the workplace.

Experience has shown that, for antistatic purposes, the discharge path through a product should normally have an electrical resistance of less than 1 000 M Ω at any time throughout its useful life. A value of 100 k Ω is specified as the lowest limit of resistance of a product when new, in order to ensure some limited protection against dangerous electric shock or ignition in the event of any electrical apparatus becoming defective when operating at voltages of up to 250 V. However, under certain conditions, users should be aware that the footwear might give inadequate protection and additional provisions to protect the wearer should be taken at all times.

The electrical resistance of this type of footwear can be changed significantly by flexing, contamination or moisture. This footwear will not perform its intended function if worn in such conditions. It is therefore necessary to ensure that the product is capable of fulfilling its designed function of dissipating electrostatic charges and also of giving some protection during the whole of its life. The user is recommended to establish an in-house test for electrical resistance and test it at regular intervals.

Classification I footwear can absorb moisture if worn for prolonged periods and in moist and wet conditions can become conductive.

If the footwear is worn in conditions where the soling material becomes contaminated, wearers should always check the electrical properties of the footwear before entering a hazard area.

Where antistatic footwear is in use, the resistance of the flooring should be such that it does not invalidate the protection provided by the footwear.

In use, no insulating elements should be introduced between the inner sole of the footwear and the foot of the wearer. If any insert is put between the inner sole and the foot, the combination footwear/insert should be checked for its electrical properties.

8.3 Electrically insulating footwear

Footwear with insulating properties provides limited protection against the inadvertent contact with damaged electrical apparatus and therefore each pair shall be supplied with a leaflet containing the following wording.

- a) Electrically insulating footwear shall be worn if there is a danger of electric shock, for example from damaged live electrical apparatus;
- b) Electrically insulating footwear cannot guarantee 100 % protection from electric shock and additional measures to avoid this risk are essential. Such measures, as well as the additional tests mentioned below, should be part of a routine risk assessment program;
- c) The electrical resistance of footwear should meet the requirements of EN 50321:1999, 6.3 at any time throughout the life of the footwear;
- d) This level of protection can be affected during service by the footwear becoming damaged by nicks, cuts, abrasions or chemical contamination, regular inspections are necessary, worn and damaged footwear should not be used;
- e) If footwear is worn in conditions where the soling material becomes contaminated, for example by chemicals, caution should be taken when entering hazardous areas as this can well affect the electrical properties of the footwear;
- f) It is recommended that the users establish an appropriate means of having the electrical insulating properties of footwear inspected and tested while in service.

8.4 Insocks

If the footwear is supplied with a removable insock it should be made clear in the leaflet that testing was carried out with the insock in place. A warning shall be given that the footwear shall only be used with the insock in place and that the insock shall only be replaced by a comparable insock supplied by the original footwear manufacturer.

If the footwear is supplied without an insock it should be made clear in the leaflet that testing was carried out with no insock present. A warning shall be given that fitting an insock can affect the protective properties of the footwear.

8.5 Information regarding penetration resistant insert

Each pair of penetration resistant footwear shall be supplied with a leaflet containing the following wording: "The penetration resistance of this footwear has been measured in the laboratory using a truncated nail of diameter 4,5 mm and a force of 1 100 N (see [Annex A](#)). Higher forces or nails of smaller diameter will increase the risk of penetration occurring. In such circumstances alternative preventative measures should be considered. Two generic types of penetration resistant insert are currently available in PPE footwear. These are metal types and those from non-metal materials. Both types meet the minimum requirements for penetration resistance of the standard marked on this footwear but each has different additional advantages or disadvantages including the following:

- | | |
|------------|--|
| Metal: | Is less affected by the shape of the sharp object/hazard (ie diameter, geometry, sharpness) but due to shoemaking limitations does not cover the entire lower area of the shoe |
| Non-metal: | May be lighter, more flexible and provide greater coverage area when compared with metal but the penetration resistance may vary more depending on the shape of the sharp object / hazard (i.e. diameter, geometry, sharpness) |

For more information about the type of penetration resistant insert provided in your footwear please contact the manufacturer or supplier detailed on these instructions"

Annex A

(normative)

Assessment of the footwear by the laboratory during testing for resistance to heat and flame

A.1 General

The following list and the drawings in [Annex C](#) are provided to assess the resistance to heat and flame tested in accordance with 6.2.3. of footwear for firefighters undertaking specific rescue activities.

A.2 Criteria for the assessment of the state of footwear

A.2.1 Insulation against heat

Footwear for firefighters shall be failed when tested in accordance with 6.2.3.1 if any of the signs of deterioration identified below are found.

- the outsole shows cracks greater than 10 mm long and 3 mm deep ([Figure C.1 d](#));
- upper/outsole separation of more than 15 mm long and 5 mm wide (deep);
- pronounced deformation of the outsole still present when the footwear is at ambient temperature again.

To assess any pronounced deformations, the ergonomic requirements of ISO 20345:2011, 5.3.4 shall be satisfied.

A.2.2 Flame resistance

Footwear for firefighters shall be failed when tested in accordance with 6.2.3.2 if any of the following signs of deterioration identified below are found:

- beginning of pronounced and deep cracking affecting half of the upper material thickness ([Figure C.1 a](#));
- ignition and melting of the upper affecting to more than the half of upper thickness;
- the upper shows split seams (separation of components) ([Figure C.1 c](#));
- the outsole shows cracks more than 10 mm long and 3 mm deep ([Figure C.1 d](#));
- upper/outsole separation of more than 15 mm long and 5 mm wide (deep);
- the closing mechanism is no longer closed or cannot be opened easily.

Annex B (informative)

Assessment of the footwear by the wearer

B.1 General

The following list and drawings in [Annex C](#) are provided to assist in assessing the performance of firefighting footwear.

B.2 Criteria for the assessment of the state of footwear

Footwear for firefighters should be assessed at regular intervals by inspection and should be replaced when any of the signs of wear identified below are found. Some of these criteria can vary according to the type of footwear and materials used:

- Beginning of pronounced and deep cracking affecting half of the upper material thickness ([Figure C.1 a](#));
- Strong abrasion of the upper material, especially if the toecap is revealed ([Figure C.1 b](#));
- The upper shows areas with deformations, burns, fusions or bubbles, or split seams in the leg ([Figure C.1 c](#));
- The outsole shows cracks greater than 10 mm long and 3 mm deep ([Figure C.1 d](#)); upper/sole separation of more than 10 mm long and 5 mm wide (deep);
- Cleat height in the flexing area lower than 1,5 mm ([Figure C.1 e](#));
- Original insock (if any) showing pronounced deformation and crushing.
- It is convenient to check manually the inside of the footwear from time to time, aiming at detecting destruction of the lining or sharp borders of the toe protection which could cause wounds ([Figure C.1 f](#));
- The closing mechanism is in working order (zip, laces, eyelets, touch and close system);
- The obsolescence deadline should not be exceeded;
- The footwear durability depends on the level of use and remarks made above.

NOTE Replacement of footwear for firefighters in this context means also replacement of damaged parts, which are attached to the footwear, e.g. insocks, zippers, tongues, laces.

Annex C (informative)

The following drawing can be provided with the user information to assist in assessing the performance of firefighter footwear

Dimensions in millimetres

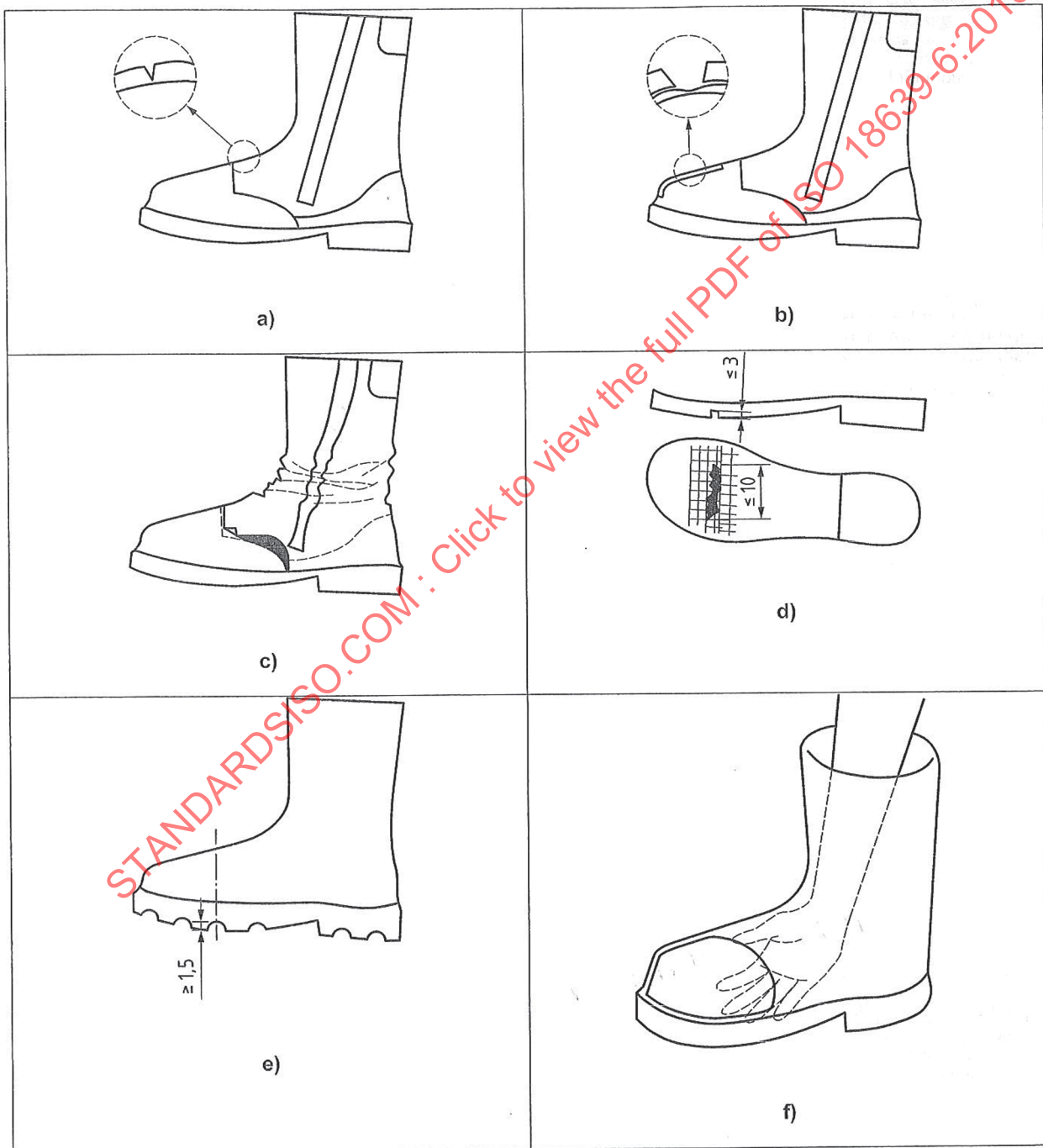


Figure C.1 — Criteria for the assessment of the state of footwear for firefighters