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Wildland firefighting personal protective equipment — Requirements and test methods —

Part 6: Footwear

Équipement de protection individuelle pour la lutte contre les feux d'espaces naturels — Exigences et méthodes d'essai —

Partie 6: Chaussures

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 94, *Personal safety — Personal protective equipment*, Subcommittee SC 14, *Firefighters' personal equipment.*

This first edition of ISO 16073-6, together with ISO 16073-1 to ISO 16073-8, cancels and replaces ISO 16073:2011.

The main changes are as follows:

— the content has been reviewed and separated into several parts;

— the respiratory protection has been deleted from the document.

A list of all parts in the ISO 16073 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Wildland firefighting involves work carried out mostly in summer temperatures and for many hours, during which the firefighter can develop high levels of metabolic heat. As a consequence, the personal protective equipment (PPE) is required to be light, flexible and commensurate with the risks to which the firefighter can be exposed in order to be effective without introducing excessive heat stress to the wearer.

It is important to train firefighters in the selection, use, care and maintenance of the PPE covered by this document, including an understanding of its limitations.

It is intended that a risk assessment be undertaken to determine if the PPE covered by this document is suitable for its intended use and the expected exposure.

This document provides minimum performance requirements for wildland firefighters' personal protective equipment footwear designed for use for extended periods during wildland firefighting.

Wildland firefighting personal protective equipment — Requirements and test methods —

Part 6: Footwear

1 Scope

This document covers the general design, minimum performance requirements and methods of test for wildland firefighting footwear. This document does not cover PPE for structural firefighting (see ISO 11999 series), for use against chemical, biological, radiological and nuclear hazards, ISO 18639 series PPE for firefighters undertaking specific rescue activities or for use where a reflective outer surface is required (see ISO 15538).

Activities in support of wildland firefighting, such as the cutting of trees and the use of a chainsaw can require additional protection to that provided in this document. Users are directed to those relevant standards for the requirements associated with such protection.

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 6942, *Protective clothing — Protection against heat and fire — Method of test: Evaluation of materials and material assemblies when exposed to a source of radiant heat*

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

ISO/TR 19591, *Personal protective equipment for firefighters — Standard terms and definitions*

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

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

EN 14119, *Safety of machinery. Interlocking devices associated with guards. Principles for design and selection*

EN 15090:2012, *Footwear for firefighters*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 19591 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/

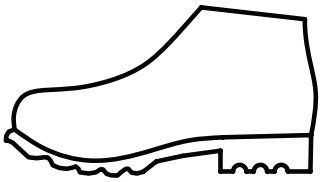
4 Footwear designs

Footwear for wildland firefighters shall be made from leather and other materials, excluding all-rubber or all-polymeric footwear.

Footwear shall be suitable for firefighting suppression action involving a fire in vegetative fuels such as a forest, crops, plantations, grass or farmland.

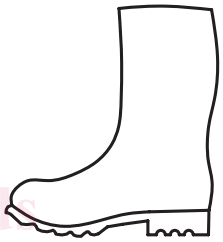
Footwear shall conform to designs of Figure 1 b), c) or d).

a) Low shoe - not allowed



b) Ankle boot

c) Half-knee boot



d) Knee-height boot

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 in ISO 20344:2011, Table 1, together with the minimum number of test pieces taken from each sample as given in 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.

Table 1 — Minimum number of samples and test specimens or test pieces

Property to be determined[a]	Referenced subclause	Number of samples	Number of test pieces from each sample	Test only on the final footwear
Radiant heat	6.3.2	1 pair	1 pair	Yes
Flame Resistance	6.3.3	1 pair	1 pair	Yes
Compression resistance of toepuff	EN 15090:2012, 6.4	1 pair from each of 3 sizes	1 pair	Yes
Zipper puller attachment strength	EN 15090:2012, 6.8.2	3 zippers		No
Zipper lateral strength	EN 15090:2012 6.8.3	3 zippers		No
Whole footwear	7.4	1 pair	1 pair	Yes
Thread	6.5 and 7.5	1 length (10 m)	1	No
Laces	6.4	3 pieces	1	No
Insulation against heat	6.3.1	1 pair	1	Yes

[a] Applies only to leather. ISO 20344:2011, Table 1 also applies.

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.

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

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

— a mathematical method, e.g. that given in ISO/IEC Guide 98-3.

6 General

6.1 Footwear conforming to the requirements specified in Table 2

Table 2 — Summary of requirements

		Requirements	Reference				Marking symbol
			ISO 20345:2011	EN 15090:2012	ISO 16073-6:2021		
General	Footwear construction	Types and Classifications		4 and 6.1		X	
		Height of upper	5.2.2			X	
		Specific ergonomic features	5.3.4			X	
		Water resistance			6.2	X	
		Flame resistance			6.3.3	X	
	Seat region	Design B Figure 3 ISO 20345	5.2.1			X	
		Design C and D Figure 3 ISO 20345	5.2.1			X	
Whole footwear	Sole performance	Construction	5.3.1.1			X	
		Upper/outsole bond strength	5.3.1.2			X	
		Insulation against heat			6.3.1	X	HI3
		Slip resistance – on ceramic tile floor with NaLS and on steel floor with glycerine	5.3.5.4		Annex D		SRC
		Energy absorption of seat region	6.2.4			X	E
		Flame resistance			6.3.3	X	
		Penetration resistance	6.2.1			O	P
	Toe protection	General	5.3.2.1			X	
		Internal length of toe caps	5.3.2.2			X	
		Impact resistance	5.3.2.3			X	
		Compression resistance	5.3.2.4			X	
		Corrosion resistance of metallic toe caps	5.3.2.5.1			X	
		Non-metallic toe caps	5.3.2.5.2			O	
		Compression resistance of toepuff		6.4		b	R
		Electrically insulating footwear[a]		6.6.2		X	I
		Antistatic footwear[a]		6.6.3		X	A
		Cold insulation of sole complex	6.2.3.2			b	CI
		Whole footwear heat resistance test			7.4	X	
		Zipper		6.8		O	
	Accessories	Metatarsal protection	6.2.6			b	M
		Ankle protection	6.2.7			b	AN
		Laces			6.4	O	
		Eyelet and stud post attachment			7.6	O	
		Threads			6.5 and 7.5	X	

X The requirement shall be met. In some cases the requirement relates only to particular material within the classification, e.g. pH value of leather components. This does not mean that other materials are precluded from use.

O If the component part exists, the requirement shall be met.

[a] It is obligatory that one of the two requirements shall be chosen.

[b] If the property is claimed, the requirement given in the appropriate clause shall be met.

N/A The requirement is not applicable.

The absence of X or O means that no requirement is made.

Table 2 *(continued)*

		Requirements	Reference				Marking symbol
			ISO 20345:2011	EN 15090:2012	ISO 16073-6:2021		
Upper		Tear strength	5.4.3			X	
		Tensile properties	5.4.4			X	
		Water vapour permeability and coefficient	5.4.6			X	
		pH value	5.4.7			X	
		Chromium VI content	5.4.9			X	
		Water penetration and water absorption	6.3			X	
		Radiant heat			6.3.2	X	
		Flame resistance			6.3.3	X	
		Cut resistance	6.2.8			X	CR
Lining	Vamp	Tear strength	5.5.1			X	
		Abrasion resistance	5.5.2			X	
		Water vapour permeability and coefficient	5.5.3			X	
		pH value	5.5.4			X	
		Chromium VI content	5.5.5			X	
	Quarter	Tear strength	5.5.1			O	
		Abrasion resistance	5.5.2			O	
		Water vapour permeability and coefficient	5.5.3			O	
		pH value	5.5.4			O	
		Chromium VI content	5.5.5			O	
Tongue		Tear strength	5.6.1			O	
		pH value	5.6.2			O	
		Chromium VI content	5.6.3			O	
Insole/ insocks					Table 3	X	
Outsole		Tear strength	5.8.2			X	
		Abrasion resistance	5.8.3			X	
		Flexing resistance	5.8.4			X	
		Hydrolysis	5.8.5			X	
		Interlayer bond strength	5.8.6			O	
		Resistance to fuel oil	6.4.2			X	FO
		Cleated area	5.8.1.2			X	
		Thickness	5.8.1.1			X	
		Cleat design		6.7.1		X	
		Cleat height		6.7.2		X	
		Cleat height in the waist area		6.7.3		X	
		Heel breast		6.7.4		X	
		Resistance to hot contact	6.4.1			X	HRO

X The requirement shall be met. In some cases the requirement relates only to particular material within the classification, e.g. pH value of leather components. This does not mean that other materials are precluded from use.

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