INTERNATIONAL STANDARD

ISO 16073

First edition
2011-02-15

Wildland firefighting personal protective equipment — Requirements and test methods

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

Reference number
ISO 16073:2011(E)

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Published in Switzerland

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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 16073 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 14, *Fire-fighters' personal equipment*.

Introduction

This International Standard provides minimum performance requirements for wildland firefighters' personal protective equipment (PPE) designed for use for extended periods during wildland firefighting.

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 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 very important to train firefighters in the selection, use, care and maintenance of the PPE covered by this International Standard, including an understanding of its limitations.

Nothing in this International Standard is intended to restrict any jurisdiction, purchaser or manufacturer from exceeding these acceptable performance requirements.

A number of Member bodies have raised issues regarding harmonization of test methods for different items of PPE, e.g. radiant heat tests on footwear and apparel. This has been extensively discussed, but requires considerable testing and validation before it can be addressed in this International Standard. Technical Committee ISO/TC 94/SC 14 has agreed that this will be a priority for the next revision. Similarly, the issue of testing of complete assemblies of PPE has been only slightly addressed and will be further explored in the next revision.

It is intended that a risk assessment be undertaken to determine if the PPE covered by this International Standard is suitable for its intended use and the expected exposure. It is intended that the risk assessment be used to determine what types of PPE are necessary for head, face, hands, body and feet.

Wildland firefighting personal protective equipment — Requirements and test methods

1 Scope

This International Standard specifies the minimum performance requirements and methods of test for personal protective equipment (PPE) covering the torso, neck, arms, hands, legs, feet, head, eyes and hearing for wildland firefighting.

This International Standard covers the general design of the PPE, the minimum levels of performance for the materials employed and the methods of test used. This PPE is not intended to provide protection during fire entrapment.

This International Standard does not cover PPE for structural firefighting (see ISO 11613), for use against chemical, biological, radiological and nuclear hazards, 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 International Standard. Users are directed to those relevant standards for the requirements associated with such protection.

NOTE Performance requirements for respiratory protective devices (RPD) for wildland firefighting are not available at the time of publication. An International Standard for RPD is under development.

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 139, *Textiles — Standard atmospheres for conditioning and testing*

ISO 3071, *Textiles — Determination of pH of aqueous extract*

ISO 3146, *Plastics — Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods*

ISO 3175-1, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 1: Assessment of performance after cleaning and finishing*

ISO 4045, *Leather — Chemical tests — Determination of pH*

ISO 4674-1, *Rubber- or plastics-coated fabrics — Determination of tear resistance — Part 1: Constant rate of tear methods*

ISO 5077, *Textiles — Determination of dimensional change in washing and drying*

ISO 6330, *Textiles — Domestic washing and drying procedures for textile testing*

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 9151, *Protective clothing against heat and flame — Determination of heat transmission on exposure to flame*

ISO 11092, *Textiles — Physiological effects — Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded-hotplate test)*

ISO 12127-1, *Clothing for protection against heat and flame — Determination of contact heat transmission through protective clothing or constituent materials — Part 1: Test method using contact heat produced by heating cylinder*

ISO 12947-2, *Textiles — Determination of abrasion resistance of fabrics by the Martindale method — Part 2: Determination of specimen breakdown*

ISO 13506, *Protective clothing against heat and flame — Test method for complete garments — Prediction of burn injury using an instrumented manikin*

ISO 13688, *Protective clothing — General requirements*

ISO 13934-1, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method*

ISO 13935-2, *Textiles — Seam tensile properties of fabrics and made-up textile articles — Part 2: Determination of maximum force to seam rupture using the grab method*

ISO 13938-2, *Textiles — Bursting properties of fabrics — Part 2: Pneumatic method for determination of bursting strength and bursting distension*

ISO 13996, *Protective clothing — Mechanical properties — Determination of resistance to puncture*

ISO 13997, *Protective clothing — Mechanical properties — Determination of resistance to cutting by sharp objects*

ISO 15025:2000, *Protective clothing — Protection against heat and flame — Method of test for limited flame spread*

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

ISO 17493, *Clothing and equipment for protection against heat — Test method for convective heat resistance using a hot air circulating oven*

EN 167:2001, *Personal eye-protection — Optical test methods*

EN 168:2001, *Personal eye-protection — Non-optical test methods*

EN 170, *Personal eye-protection — Ultraviolet filters — Transmittance requirements and recommended use*

EN 172, *Personal eye protection — Sunglare filters for industrial use*

EN 388:2003, *Protective gloves against mechanical risks*

EN 420:2003 + A1:2009, *Protective gloves — General requirements and test methods*

EN 471:2003 + A1:2007, *High-visibility warning clothing for professional use — Test methods and requirements*

EN 13087-1:2000 + A1:2001, *Protective helmets — Test methods — Part 1: Conditions and conditioning*

EN 13819-1:2002, *Hearing protectors — Testing — Part 1: Physical test methods*

EN 13819-2:2002, *Hearing protectors — Testing — Part 2: Acoustic test methods*

EN 15090, *Footwear for firefighters*

ASTM F 1868-02, *Standard Test Method for Thermal and Evaporative Resistance of Clothing Materials Using a Sweating Hot Plate*

CIE 54.2, *Retroreflexion — Definition and measurement*

NFPA 1977, *Standard on Protective Clothing and Equipment for Wildland Fire Fighting*

3 Terms and definitions

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

3.1
behind-the-head headband earplug
earplug designed to be worn with the headband passing behind the head

3.2
behind-the-head earmuff
earmuff designed to be worn with the headband passing behind the head

3.3
brim
⟨helmet⟩ ridge protruding outwards from the basic shape of the shell, forming the lower edge of the shell and including its associated fairings and radiusing

3.4
char
brittle residue that results when material is exposed to thermal energy

3.5
cleaning cycle
washing and drying cycle or a dry cleaning cycle

3.6
closure system
method of fastening the openings in the garment including combinations of more than one method of achieving a secure closure

NOTE This term does not cover seams.

3.7
clothing assembly
garments designed to always be worn together

NOTE If several garments are used to achieve the performance levels, they are clearly labelled to this effect.

3.8
component assembly
combination of all materials of a multilayer item presented exactly as the finished item's construction