International Standard

ISO 11999-1

Second edition
2024-10

PPE for firefighters — Test methods and requirements for PPE used by firefighters who are at risk of exposure to high levels of heat and/or flame while fighting fires occurring in structures —

Part 1: General

Équipement de protection individuelle pour pompiers — Méthodes d'essai et exigences pour les équipements de protection individuelle utilisés par les pompiers qui risquent d'être exposés à des niveaux élevés de chaleur et/ou de flamme lorsqu'ils combattent des incendies dans des structures —

Partie 1: Généralités

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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

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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 document 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).

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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 second edition of ISO 11999-1, together with ISO/TS 11999-2 to ISO 11999-10, cancels and replaces ISO 11999-1:2015, which has been technically revised.

The main changes are as follows:

— the content has been revised with a focus on single performance requirements;

— performance requirements for respiratory protection are covered in ISO 17420-5.

A list of all parts in the ISO 11999 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

In a world where there is an ever-increasing focus on worker occupational health and safety, Fire services are faced with the dilemma of trying to provide firefighters with as safe a work environment as is reasonably possible whilst also having to deal with the known and unknown risks our firefighters face whilst fighting fires in both the urban and wildland environments.

In the course of their duty's firefighters are exposed to many hazardous chemicals that include smoke, soot, carcinogens and the biproducts of combustion such as heavy metals, benzene and per-fluorinated compounds which are regularly inhaled and/or deposited on the skin of firefighters.

With the recent statement by the World Health Organization (WHO) elevating the classification of occupational exposure as a firefighter to Group 1, ISO TC94/SC 14 Working Group on contaminants are taking all possible steps to reduce the exposures to firefighters by reviewing all standards pertaining to PPE used by firefighters and making recommendations to address identified shortfalls.

The following is an extract from the statement released by the WHO:

"— International Agency for Research on Cancer (IARC), the cancer agency of the World Health Organization (WHO), has evaluated the carcinogenicity of occupational exposure as a firefighter.

— A Working Group of 25 international experts, including 3 Invited Specialists, from 8 countries was convened by the IARC Monographs program for a meeting in Lyon.

— After thoroughly reviewing the available scientific literature, the Working Group classified occupational exposure as a firefighter as carcinogenic to humans (Group 1), on the basis of sufficient evidence for cancer in humans."

This document specifies minimum design and performance requirements for personal protective equipment (PPE) worn by firefighters to reduce injury and loss of life whilst fighting fires occurring in structures. Amongst other hazards faced by firefighters is exposure to high thermal loads, including flames, particulates, and other hazardous chemicals. Additional information may also be found in ISO 20345 and ISO 21420.

This document details minimum design and performance requirements for the various items of PPE covered in each part and provides information regarding compatibility between these items of PPE when worn together.

ISO 11999-2, specifies design and performance requirements to achieve compatibility across the PPE covered in ISO 11999-3 to ISO 11999-10 when all the items are worn together, thereby creating a PPE ensemble, whether sold by a manufacturer or composed by a user. In either case, the PPE ensemble should meet the requirements of ISO 11999-2. This becomes significantly important when considering the issue of particulate protection and potential health risks posed to firefighters from exposure to products of combustion.

All items are also required to meet general requirements for marking and manufacturer's instructions (this document), as well as specific marking and manufacturer's instructions within each of the respective parts of ISO 11999. In the case of an ensemble, each item of PPE should also be marked according to ISO 11999-2.

ISO/TR 21808 provides guidance on how to carry out a risk assessment, the guideline was developed previously based on the work of CEN Technical Committee TC 162, Joint Working Group for firefighters Personal Protective Equipment and has been modified to encompass PPE worn by all emergency service personnel. (CEN/TC 162/JWG FFPPE N 52 "Risk assessment guidelines for choosing the PPE for firefighters")".

During incidents being undertaken by emergency service personnel, many different hazards may be encountered, including exposures to a range of chemicals that are biproducts of fires occurring in the urban and wildland environment. Where possible, the level of risk that each hazard presents to firefighters should be eliminated or reduced to an acceptable level. The guidance given in ISO/TR 21808 indicates how to carry out a Risk Assessment by acknowledging the hazards that may be present, the likelihood of the firefighters becoming exposed to them and possible consequence of such exposure if not addressed. Where hazards are identified and cannot be removed from a workplace, the items of PPE selected to protect personnel should be fit for their intended use while allowing personnel to carry out the work required of them. In environments

where firefighters may be required to work, not only should the PPE protect the firefighters while enabling them to achieve their objectives at an incident, it should also safeguard them and allow safe escape. The PPE should also allow firefighters to carry out their duties without undue physiological stress being caused by the PPE itself.

Workplace hazards for firefighters are varied but can be common from workplace to workplace; therefore firefighters PPE can be somewhat multipurpose. The significant change in this document is the establishment of a harmonised approach to a single level of performance for heat and flame within each part by setting single minimum design and performance requirements for PPE, including optional requirements where identified. This does not mean that the same heat and flame level will be required for each part, but a coherent approach to provide an overall minimum level of protection for firefighters engaged in fighting fires occurring in structures without neglecting other tasks required to be performed by firefighters wearing this PPE across different regions of the world. This can include fires in domestic and commercial buildings, fires in industry, including aviation, petrochemical, transportation, chemical, pharmaceutical, land-based marine incidents, rescue, etc. The emergence of alternative energy storage systems and associated risks to firefighters requires proper research, review and consideration to inform the development and revision of performance based PPE standards.

The proper cleaning, inspection and repair of PPE should be addressed in ISO 23616 currently being developed in response to growing concerns about contamination and potential health hazards for firefighters. It is the responsibility of the firefighter, both initially and ongoing, to undertake regular inspections of their PPE, and there should also be a reliable system or mechanism in place to ensure that this can be effectively achieved and supported by appropriate training.

As PPE necessary to protect each part of the body can be complex, this document draws from the expertise of other Technical Committees in ISO which specialize in such protection.

PPE covered in the ISO 11999 series will not protect from all possible exposures. Nothing in this document is intended to restrict any jurisdiction, purchaser, or manufacturer from exceeding the minimum performance requirements specified in this document series.