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Interested committees:

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 11612.2

Protective clothing — Clothing to protect against heat and flame — Minimum performance requirements

ICS: 13.340.10

ISO/TC **94**/SC **13**

Secretariat: **SNV**

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2024-12-02

Voting terminates on:
2025-01-27

This document is circulated as received from the committee secretariat.

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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 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 13, *Protective clothing*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 162, *Protective clothing including hand and arm protection and lifejackets*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement). This fourth edition cancels and replaces the third edition (ISO 11612:2015), which has been technically revised.

The main changes are as follows:

- Number of samples or test specimens required for testing specified in each relevant clause;
- Amended requirements for pockets (4.3);
- Throughout the document 'zippers' changed to 'slide fasteners';
- Text modified for flame spread testing of main closure system (6.3.2.4);
- Amended dimensional stability to align knitted and nonwoven requirements (6.4);
- Tensile and tear requirements for nonwoven materials added (6.5);
- Correction made to burst strength in 6.5.3. related to 7,3 cm² test area. Corrected from 200 kPa to 260 kPa based on Pascal's law; a diameter of 50 cm² is 7,98 cm, and a diameter of 7,3 cm² is 3,05 cm. The ratio of the diameter is 2,61;
- Graphical symbol for single use added;
- End point requirement for molten aluminium splash defined;
- End point requirement for molten iron splash defined;
- Sustainability statement added to Annex C;
- Annex E provides extended guidance on uncertainty of measurement;

- Addition of [Annex F](#) relating to smart garments;
- Addition of [Table ZA.2](#) to [Annex ZA](#);
- Updated bibliography.

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

The purpose of this document is to provide minimum performance requirements for clothing to protect against heat and flame, which could be worn for a wide range of end uses. All the other standards listed in this introduction deal also with clothing to protect against heat and flame, but rather for quite specific products or end uses.

Within many of the hazards listed in this document there are three performance levels:

- Level 1 to indicate exposure to low risk;
- Level 2 to indicate exposure to medium risk;
- Level 3 to indicate exposure to high risk.

For protection against extreme exposures to radiant heat, there is a fourth performance level to take into account, high performance materials such as aluminized and similar materials. The level of personal protection to be provided is based on the outcome of the risk assessment and some comments on risk assessment are given in [Annex D](#).

For complete protection against exposure to heat and/or flame, it is probable that it will be necessary to protect the head, face, hands, and/or feet with suitable personal protective equipment (PPE) and in some cases, appropriate respiratory protection might also be considered necessary.

Attention is drawn to ISO/TR 2801:2007,^[1] which sets out guidelines for selection, use, care, and maintenance of protective clothing against heat and flame and with respect to industrial garments CEN/TR 14560:2018 may also be a relevant source of guidance.

Nothing in this document is intended to restrict any jurisdiction, purchaser, or manufacturer from exceeding these minimum requirements. It is one of several standards for clothing that have been developed to protect persons against heat and/or flames. Other standards include:

- ISO 11611, *Protective clothing for use in welding and allied processes*;
- ISO 11613, *Protective clothing for firefighters — Laboratory test methods and performance requirements*;
- ISO/FDIS 14460:2024, *Protective clothing for automobile racing drivers — Protection against heat and flame — Performance requirements and test methods*;
- ISO 15384, *Protective clothing for firefighters — Laboratory test methods and performance requirements for wildland firefighting clothing*;
- ISO 21942, *Station uniform for firefighters*;
- IEC 61482-2, *Protective clothing against the thermal hazards of an electric arc - Part 2: Requirements*;
- EN 469, *Protective clothing for firefighters — Performance requirements for protective clothing for firefighting*.

Protective clothing — Clothing to protect against heat and flame — Minimum performance requirements

1 Scope

This document specifies performance requirements for protective clothing made from flexible materials, which are designed to protect the wearer's body, except the hands, from heat and/or flame. For protection of the wearer's head and feet, the only items of protective clothing falling within the scope of this document are gaiters, hoods, and overboots. However, concerning hoods, requirements for visors and respiratory equipment are not given.

The performance requirements set out in this document are applicable to protective clothing which could be worn for a wide range of end uses, where there is a need for clothing with limited flame spread properties and where the user can be exposed to radiant or convective or contact heat or to molten metal splashes.

This document is not applicable to protective clothing that is specified by other International Standards (see Introduction).

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 2418, *Leather — Chemical, physical, mechanical and fastness tests — Position and preparation of specimens for testing*

ISO 3376:2020, *Leather — Physical and mechanical tests — Determination of tensile strength and percentage elongation*

ISO 3377-1, *Leather — Physical and mechanical tests — Determination of tear load — Part 1: Single edge tear*

ISO 3759, *Textiles — Preparation, marking and measuring of fabric specimens and garments in tests for determination of dimensional change*

ISO 4044, *Leather — Chemical tests — Preparation of chemical test samples*

ISO 4048, *Leather — Chemical tests — Determination of matter soluble in dichloromethane and free fatty acid content*

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

ISO 6942:2022, *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 9185, *Protective clothing — Assessment of resistance of materials to molten metal splash*

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

ISO 13506-1:2024, *Protective clothing against heat and flame — Part 1: Test method for complete garments — Measurement of transferred energy 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 13937-2, *Textiles — Tear properties of fabrics — Part 2: Determination of tear force of trouser-shaped test specimens (Single tear method)*

ISO 13938-1, *Textiles — Bursting properties of fabrics — Part 1: Hydraulic method for determination of bursting strength and bursting distension*

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

ISO 15025:2016, *Protective clothing — Protection against flame — Method of test for limited flame spread*

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

3 Terms and definitions

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

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

ageing

change of the product performance over time during use or storage

Note 1 to entry: For example

- cleaning, maintenance, or disinfecting processes;
- exposure to visible light and/or ultraviolet radiation;
- exposure to high or low temperatures or to changing temperatures;
- exposure to chemicals including humidity;
- exposure to biological agents such as bacteria, fungi, insects or other pests;
- exposure to mechanical action such as abrasion, flexing, pressure and strain;
- exposure to contaminants such as dirt, oil, splashes of molten metal, etc.;
- exposure to wear and tear.

[SOURCE: ISO 11610:2023, [\[2\]](#) 4.6.13]

3.2

balaclava hood

hood

one piece garment designed to fit closely over the entire head and to extend downwards to cover the neck, sometimes the shoulders

[SOURCE: ISO 11610:2023, 4.5.12 with sometimes the shoulders added]

3.3

cleaning

process by which a garment is made again serviceable and/or hygienically wearable by removing any dirt or contamination

[SOURCE: ISO 11610:2023, 4.6.16]

3.4

cleaning cycle

washing plus drying or dry cleaning treatment followed, if required, by ironing or finishing

[SOURCE: ISO 11610:2023, 4.6.17]

3.5

component

any material, part, or sub-assembly used in the construction of an item of PPE

3.6

component assembly

material assembly

combination of all materials of a multi-layer garment (including *hardware* (3.10)) presented exactly as the finished garment construction

[SOURCE: ISO 11610:2023, 4.3.28]

3.7

conditioning

one or more operations intended to bring a sample or test specimen into a state of equilibrium with regard to temperature and humidity

[SOURCE: ISO 11610:2023, 4.6.14]

3.8

gaiter

removable covering of the part of the leg below the knee which can also cover the upper surface of shoes

[SOURCE: ISO 11610:2023, 4.5.11]

3.9

garment assembly

series of garments arranged in the order as worn

Note 1 to entry: It may contain multilayer materials, material combinations, or a series of separate garments in single or multiple layers.

[SOURCE: ISO 11610:2023, 4.3.30]

3.10

hardware

non-fabric integral part, object, or the like of a garment

Note 1 to entry: Hardware (3.9) includes those made of metal or plastic, e.g. fasteners (such as buttons, slide fasteners, touch and close fasteners or hook and loop fasteners), rank markings.

[SOURCE: ISO 11610:2023, 4.3.26, with examples of fasteners added in Note 1 to entry]

3.11

hole

break in original structure of the test specimen's fabric in any dimension and having a continuous perimeter caused e.g. by melting, glowing or flaming

Note 1 to entry: Hole includes particularly any opening, break, or discontinuity of any size in the original structure of the test specimen's fabric caused by application of the test flame.