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Varovalna obleka za voznike dirkalnih avtomobilov - Zaščita pred učinki toplote in plamena - Zahtevane lastnosti in preskusne metode (ISO/DIS 14460:2023)

Protective clothing for automobile racing drivers - Protection against heat and flame - Performance requirements and test methods (ISO/DIS 14460:2023)

Schutzkleidung für Auto Rennfahrer - Schutz gegen Hitze und Feuer - Leistungsanforderungen und Prüfverfahren (ISO/DIS 14460:2023)

Habillement de protection pour pilotes automobiles - Protection contre la chaleur et les flammes - Exigences de performance et méthodes d'essai (ISO/DIS 14460:2023)

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Vêtements de protection pour pilotes automobiles — Protection contre la chaleur et le feu — Exigences de performance et méthodes d'essai

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ISO/DIS 14460:2022(E)

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).

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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 13, *Protective clothing*.

The intent of this document is to provide a standard for drivers of automobiles that do not fall within the scope of the FIA. The intent is to provide a similar level of protection as FIA 8856.

This second edition cancels and replaces the first edition (ISO 14460:1999), which has been technically revised.

The main changes are as follows:

- Terms and Definition, added new CEN & ISO Documents
- Normative references updated
- [Annex ZA](#) updated

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.

Protective clothing for automobile racing drivers — Protection against heat and flame — Performance requirements and test methods

1 Scope

This document specifies test methods, performance requirements and design parameters for clothing for protection against heat and flame intended for drivers in automobile competitions. This document concerns outer garments, under garments, socks, gloves and balaclava. Shoes and helmets are excluded.

The intent of this is to provide a standard for drivers of automobiles that do not fall within the scope of the FIA. The intent is to provide a similar level of protection as FIA 8856

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 3175-1:2017, *Textiles — Dry-cleaning and finishing — Part 1: Method for assessing the cleanability of textiles and garments*

ISO 3758:2012, *Textiles — Care labelling code using symbols*

ISO 4675:2017, *Rubber- or plastics-coated fabrics — Low-temperature bend test*

ISO 6330:2021, *Textiles — Domestic washing and drying procedures for textile testing*

ISO 9151:2016, *Protective clothing against heat and flame — Determination of heat transmission on exposure to flame*

ISO 13688:2013, *Protective clothing — General requirements*

ISO 13688:2013/Amd1:2021, *Protective clothing — General requirements – Amendment 1*

ISO 13935-1:2014, *Textiles — Seam tensile properties of fabrics and made-up textile articles — Part 1: Determination of maximum force to seam rupture using the strip method*

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

ISO 17493:2016, *Clothing and equipment for protection against heat — Test method for convective heat resistance using a hot air circulating oven*

ISO 23407:2021, *Protective gloves against thermal risks (heat and/or fire)*

ISO 5077:2007, *Textiles — Determination of dimensional change in washing and drying*

ISO 21420:2020, *Protective gloves — General requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 11610 and the following apply.

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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**balaclava**

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

3.2**garment**

single item of clothing which may consist of a single or multiple layers

3.4**outer garment**

one-piece garment which is worn as an outermost layer over an under garment and which is designed to entirely cover the wearer except for the head, hands and feet

3.5**under garment**

garment which is designed to be worn between an outer garment and the wearer's body

3.6**component assembly**

combination of materials of a multilayer garment, presented exactly as in the finished garment construction

3.7**innermost layer**

lining found on that face of the component assembly which is intended to be nearest to the wearer's skin

3.8**closure system**

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

EXAMPLE A slide fastener covered by an overflap fastened down with a touch and close fastener.

3.9**seam**

junction of two edges of material which are permanently attached in the garment by sewing or any other method

3.10**structural seam**

seam which holds the outer garment together and which if broken would expose the under garments and reduce the protection

4 Design**4.1 General**

Any garment and its component shall meet the relevant requirements of ISO 13688 in addition to the requirements set in this document. For gloves, these shall meet the requirements of ISO 21420.

Garment and glove sizes shall be in accordance with the requirements respectively of ISO 13688 and ISO 21420.

4.2 Garments

4.2.1 General

All garments shall meet the requirements of [Clause 6](#), unless specified differently in the subclauses below.

NOTE Any garments worn underneath or above garments of this document need to have FR properties that do not imperil the protective properties of the garments of this document.

4.2.2 Outer Garments

The outer garment shall be constructed as one piece and have a minimum weight of 190 g/m² before pre-treatment of [clause 5](#). It shall extend to cover the neck and be close-fitting at the wrists and ankles.

The collar shall be at least 50 mm high at the back of the neck and 35 mm high at the front.

All structural seams shall be constructed so as to maintain the integrity of the garment.

It is possible to incorporate elastic bands that do not comply with limited flame clause, provided that the bands are covered and are not in direct contact with the undergarment or skin. One exception is permitted at ankle level, in order to ensure that the lower legs of the overalls are kept in position, and only allowed in case in contact exclusively with the sock (see [4.2.6](#)) and the inside of the shoe.

Embroidery sewn or labels directly onto the outer garment shall be stitched onto the outermost layer only. They shall meet the requirements of limited flame.

Straps intended for lifting the wearer shall be incorporated in the garment in the following places:

- on top of each shoulder;
- on each side, at waist level, forward of the median line between the armpit and hip.

Straps shall be placed so as not to make contact with the car seat.

The entry-exit of the cooling system tubes, communication or biometric device cables through the outer garment shall be particularly well executed and the design must be validated by the laboratory on a case by case basis. The maximum length of the aperture is 50 mm. The outer garment shall be equipped with a flap which closes over this opening when tubes or cables are not used.”

4.2.3 Pockets and closures of outer garment

The construction of the pockets shall meet the requirements of limit flame clause

In the case of pockets constructed by cutting through the outer garment material or assembly and adding an envelope attached internally (hidden pockets), the assembly created by the envelope material and any other layer between the envelope (whatever the position of the envelope) and the undergarment shall also meet the requirements of Convective heat clause.

Closure systems shall be constructed so as to fulfil the performance requirements of the garment and shall be covered by an overflap of the same materials as in the component assembly

Any closure system of an opening longer than 50 mm shall provide continuous closing

Zip fasteners shall be made from metal and the teeth must be at least size T3. The teeth shall be covered by an overflap on the innermost side so that they are not in direct contact with the undergarment

The closure system shall meet the requirements of limit flame, Convective heat, Thread test, Structural seam clauses

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4.2.4 Under garments

Under garments for the upper body shall be designed to cover the wearer's neck and upper arm, and shall be designed to cover the wearer's neck (e.g. polo neck).

The minimum collar height of 40 mm.

Under garments for the lower body shall consist of boxer shorts, with a minimum inner leg measurement of 50 mm, or long underpants. Long underpants are recommended.

It is possible to incorporate elastic bands that do not to comply with [Article 6.1](#), provided that the bands are covered and are not in direct contact with the driver's skin.

4.2.5 Balaclava

All the part of the balaclava seen in frontal projection when the garment is worn, shall consist of at least two layers and shall have not more than two apertures, no larger than is necessary for normal vision. A maximum of four supplementary apertures with a maximum area of 1 cm² each and a maximum length of 20 mm are permitted.

The mass per area of the two layers together shall be ≥ 180 g/m². The lower part shall be designed to extend inside the outer or inner garment all around the neck so that it will not come free whichever way the head is moved.

A minimum overlap with top undergarments of at least 30 mm around the driver's neck once the helmet is tightened, except at the front central line where they shall overlap by at least 80 mm.

4.2.6 Socks

Socks shall be half-hose with a minimum length of 250 mm from bottom of heel to mid-calf and the materials shall have a mass per area ≥ 180 g/m².

4.2.7 Gloves

The back of the glove shall be composed of at least two layers. The mass per area of the two layers together shall be ≥ 180 g/m². Seam stitching shall be invisible. The glove shall be fitted at the wrist, and shall be designed to normally cover at least 8 cm above the wrist joint as defined in 3.1.19 of ISO 8559-1:2017. Gloves shall cover the cuffs of the wearer's outer garment.

As leather shrinks considerably on exposure to flame, it is recommended that its use is limited only to the tactile areas of the hand. The thickness of the leather shall be maximum 0,8 mm and preferably as thin as possible to limit the strain due to shrinkage.

5 Sampling and pre-treatment

5.1 Samples submitted for testing shall consist of at least one new complete garment. Additional garments or material samples may be required and these shall be to the same specifications as the appropriate component assemblies (see [3.4](#)).

5.2 If all regions of the garment are not composed of the same materials, each different region shall be sampled and tested.

5.3 The number and size of specimens for the different tests shall be in accordance with the respective standards.

5.4 In all surface tests the outermost surface shall be exposed.