INTERNATIONAL STANDARD

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AMENDMENT 1
2002-03-15

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

AMENDMENT 1: Modified flexion test

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

AMENDEMENT 1: Essai de flexion modifié

Reference number
ISO 14460:1999/Amd.1:2002(E)

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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Attention is drawn to the possibility that some of the elements of this Amendment may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to International Standard ISO 14460:1999 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

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

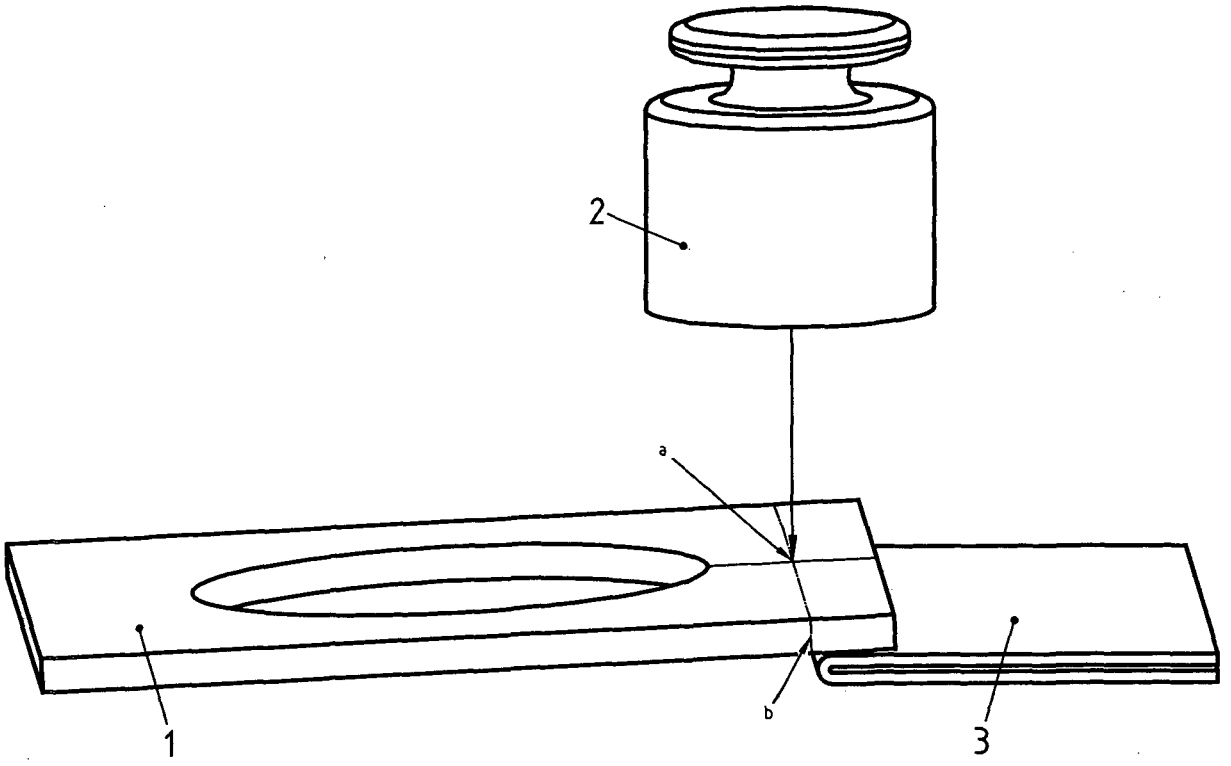
AMENDMENT 1: Modified flexion test

Page 3, subclause 6.3

Delete the entire subclause 6.3 and replace it with the following text and Figure 1:

6.3 The mechanical resistance of component assemblies after exposure to flame shall be tested in accordance with the following test.

Mount a component assembly specimen, 140 mm by 140 mm centrally face downwards on the ISO 9151 test apparatus. Apply the flame for (11,0 ± 0,2) s. Within 1 min following the removal of the flame, place the specimen on a horizontal plane. Manually fold the specimen 180°, along the middle of the burn. The calorimeter location plate of ISO 9151 apparatus is then placed on the specimen as shown in Figure 1. Place a 2-kg weight piece on the calorimeter location plate, centring the weight piece over the middle of the folded edge of the specimen (point A in Figure 1). Leave the weight piece in this position for 3 s, then remove both the weight piece and the calorimeter location plate. Fold the specimen in the opposite direction along the same edge. Again place the calorimeter location plate on the specimen followed by the weight piece, centring it on the middle of the folded edge of the specimen. Leave the weight piece again for 3 s. Repeat this folding procedure four times to reach a total of five times.



Key

1 Calorimeter location plate
2 2-kg weight piece
3 Folded specimen

a Point A, centre of the weight piece aligned with the middle of the folded edge of the specimen
b Line of folded edge of the specimen

Figure 1 — Arrangement of the calorimeter location plate used to restrain the specimen

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Annex ZA forms a normative part of this International Standard. Annex A is for information only.

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

1 Scope

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

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3175-1:1998, *Textiles — Dry-cleaning and finishing — Part 1: Method for assessing the cleanability of textiles and garments.*

ISO 3758:1991, *Textiles — Care labelling code using symbols.*

ISO 4675:1990, *Rubber- or plastics-coated fabrics — Low-temperature bend test.*

ISO 5077:1984, *Textiles — Determination of dimensional change in washing and drying.*

ISO 6330:—[1], *Textiles — Domestic washing and drying procedures for textile testing.*

ISO 9151:1995, *Protective clothing against heat and flame — Determination of heat transmission on exposure to flame.*

ISO 13688:1998, *Protective clothing — General requirements.*

ISO 13935-1:1999, *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:—[2], *Protective clothing — Protection against heat and flame — Method of test for limited flame spread.*

3 Terms and definitions

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

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[1] To be published. (Revision of ISO 6330:1984)

[2] To be published.

3.1
garment
single item of clothing which may consist of a single or multiple layers

3.2
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

3.3
under garment
garment which is designed to be worn between an outer garment and the wearer's body

3.4
component assembly
combination of materials of a multilayer garment, presented exactly as in the finished garment construction

3.5
innermost layer
lining found on that face of the component assembly which is intended to be nearest to the wearer's skin

3.6
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.

3.7
seam
junction of two edges of material which are permanently attached in the garment by sewing or any other method

3.8
structural seam
seam which holds the outer garment together and which if broken would expose the under garments and reduce the protection

3.9
balaclava hood
one-piece garment designed to fit closely over the entire head and to extend downwards to cover the neck

4 Design

4.1 Outer garment

The outer garment shall be constructed as one piece. It shall extend to cover the neck and be close-fitting at the wrists and ankles.

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.

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

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.

4.2 Under garments

Under garments for the upper body shall be designed to cover the wearer's neck and upper arm, and shall have a polo neck. Under garments for the lower body shall consist of boxer shorts, with a minimum inner leg measurement of 50 mm, or long underpants.

4.3 Balaclava hoods

All the part of the balaclava hood 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. The mass per area of the two layers together shall be ≥ 360 g/m^2. 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.

4.4 Socks

Socks shall be half-hose (to mid-calf) and the materials shall have a mass per area ≥ 180 g/m^2.

4.5 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 ≥ 360 g/m^2. Seam stitching shall be invisible. The glove shall be fitted at the wrist, and shall be designed to normally cover at least 2 cm above the wrist joint. Gloves shall cover the cuffs of the wearer's outer garment.

5 Sampling and pretreatment

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.

5.5 All tests shall be carried out on materials as received. Tests 6.1 and 6.2 shall also be carried out on materials which have been pretreated. The pretreatment shall consist of 15 washing cycles in accordance with ISO 6330, using the procedure specified by the manufacturer or procedure 2A if not otherwise specified, and 15 dry cleaning cycles in accordance with ISO 3175-1. Materials, such as leather, which are unsuitable for dry cleaning should be washed only.

6 Testing

6.1 The flame resistance properties of materials shall be tested in accordance with ISO 15025:—, Procedure A (surface ignition), both before and after the pretreatment specified in 5.5.

6.2 The heat transmission of component assemblies on exposure to flame shall be tested in accordance with ISO 9151, both before and after the pretreatment specified in 5.5.

6.3 The mechanical resistance of component assemblies after exposure to flame shall be tested in accordance with the following mechanical resistance test.

Mount centrally face downwards on the ISO 9151 test apparatus, a component assembly specimen, 100 mm by 60 mm. Apply the flame for (11 ± 0,2) s. Within 1 min following the removal of the flame, mount the specimen on the bending jig as specified in ISO 4675, with the outer surface in contact with the jig. As soon as the test specimen is in position, release the trigger and permit the flexing plate to make a free fall.

NOTE 1 The test specimen is smaller than that specified in ISO 9151 and wider than that specified in ISO 4675.

NOTE 2 The flexing test is carried out in ambient conditions and not in the cold chamber specified in ISO 4675.

6.4 The resistance of the sewing thread on exposure to flame shall be tested in accordance with ISO 15025:—, Procedure A, using new specimens of the component assembly with the seam vertically down the centre. The igniting flame shall impinge on the line of sewing.

6.5 The tensile strength of structural seams shall be tested, using new specimens in accordance with ISO 13935-1.

NOTE This method is not suitable for use with knitted fabrics.

6.6 Dimensional change for washing shall be carried out in accordance with ISO 5077 and for dry cleaning in accordance with ISO 3175-1. One specimen shall be subjected to five washing or five dry cleaning processes, according to the manufacturer's cleaning instructions. If washing and dry cleaning are both permitted, the specimen shall only be washed.

7 Performance requirements

7.1 When each material used in the outer garment, inner garment, balaclava hood, socks or gloves is tested in accordance with 6.1, the mean after-flaming time shall not exceed 2 s. There shall be no flaming debris, molten debris or holes formed.

7.2 When each component assembly used in the outer garment is tested in accordance with 6.2, the HTI shall be equal or superior to 11.

7.3 When each component assembly used in the outer garment is subjected to the mechanical resistance test in accordance with 6.3, the innermost layer shall remain intact; i.e. there shall be no crack in the fabric structure of the innermost layer.

7.4 When each thread used in the component assembly is tested in accordance with 6.4, the thread shall not melt or give any period of after-flaming.

7.5 When each structural seam used in the outer garment is tested in accordance with 6.5, the tensile strength shall be greater or equal to 300 N.

7.6 When the outer material of the outer garment is tested in accordance with 6.6, the change in dimension of material shall not exceed ± 3 % in either length or width (± 5 % for knitted fabrics).

8 Marking

8.1 General

Each piece of protective clothing shall be marked in accordance with ISO 13688:1998, clause 7, as appropriate to it.

8.2 Marking, specific

The marking shall include the following information.

a) Name, trade mark or other means of identification of the manufacturer or his authorized representative.

b) Designation of the product type, commercial name or code.

c) Size designation according to clause 6 of ISO 13688:1998.

d) Number of this International Standard, ISO 14460.

e) Care labelling: washing or cleaning instructions given according to ISO 3758.

f) A pictogram for clothing for protection against heat and fire according to ISO 13688.

8.3 Marking, optional

The following additional marking may be applied if relevant or specified:

— an indication of conformity [see 9b) and A.3].

9 Information supplied by the manufacturer

Protective clothing shall be supplied with manufacturer's information in accordance with ISO 13688:1998, clause 8.

The following additional information shall also be provided.

a) Instructions concerning repairs and maintenance:

— repairs should only be carried out using the same thread as used in the manufacture; it should be recommended that garments are checked by the manufacturer or replaced every 3 years.

b) Indication of conformity:

— where the conformity of the protective clothing model [see 8.2b)] has been established by type approval certificate issued by an approved testing body and is indicated by the marking with an indication of conformity [see 8.3b)], information on the source of this certificate shall be provided. Copies of the type approval certificate and supporting test data shall be available for inspection.

Annex A
(informative)

Information for users

A.1 Protective clothing is not able to protect against all the possible hazards which might be encountered in automobile racing. The clothing specified in this International Standard has to provide protection against heat and flame whilst having the minimum effect on driver comfort. Users should ensure that garments are not too tight, as this reduces the level of protection, and that they are comfortable to wear under the actual conditions of use.

A.2 The complete clothing ensemble should be used in order to obtain the maximum protection. Wearers are warned of the particular vulnerability of neck, wrists and ankles. The neck, ankles and wrists should always be covered by at least two articles of protective clothing.

A.3 Conformity with this International Standard will normally be assessed by type approval testing carried out by an approved testing laboratory. Where such testing has been carried out an indication of conformity may be specified [see 8.3b)]. At those competitions where FIA regulations specify the wearing of protective clothing, the labels on overalls and other clothing may be verified by the organizers for the indication of conformity.

A.4 WARNING: When fixing badges and signs on the protective garment, heat-bonding should not be used and the garment should not be cut. Badges and signs should be made from flame retardant and non-melting materials (see 7.1).

Annex ZA
(normative)

Corresponding International and European Standards for which equivalents are not given in the text

This standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent addition to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 3175	1995	*Textiles — Evaluation of stability to machine dry-cleaning*	EN ISO 3175	1995
ISO 3758	1991	*Textile — Care labelling code using symbols*	EN 23758	1993
ISO 5077	1984	*Textiles — Determination of dimensional change in washing and drying*	EN 25077	1993
ISO 6330	1984	*Textiles — Domestic washing and drying procedures for textile testing*	EN 26330	1993
ISO 13688	1998	*Protective clothing — General requirements*	EN 340	1993
ISO 15025	—	*Textile fabrics — Burning behaviour — Measurement of flame resistance properties of vertically oriented specimens*	EN 532	1995

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