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**Protective gloves for firefighters —
Laboratory test methods and performance
requirements**

*Gants de protection pour sapeurs-pompiers — Méthodes d'essai en
laboratoire et exigences de performance*

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15383 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

Annexes A to C form a normative part of this International Standard. Annexes D and E are for information only.

This corrected version of ISO 15383:2001 incorporates the following corrections.

In clause 2,

- normative reference ISO 5470-1 has been deleted and replaced by normative reference ISO 12947-4,
- ISO 6942 was published in 2002.

In 6.2.3 and annex E, reference to ISO 6942 has been updated to ISO 6942:2002.

In 6.3.1 and annex E, reference to ISO 5470-1 has been replaced by ISO 12947-4.

Introduction

This International Standard specifies three types of gloves with different performance requirements. Type 1 gloves provide the lowest level of performance. Criteria for these gloves were partly based on requirements considered suitable for wildland fire fighting with certain requirements consistent with the same level of protection provided by clothing as specified in ISO 15384. Type 2 gloves provide an intermediate level of performance. The performance requirements for Type 2 gloves are based partly on EN 659 but uses some of the criteria from EN 469 for thermal and heat protection. Type 3 gloves provide the highest level of performance. The performance requirements for Type 3 gloves have been adapted from NFPA 1971. Three levels of performance are established for all performance requirements except for flame resistance and ergonomic requirements. In some cases, two of the levels require the same performance. The intent of this International Standard is to specify a level of glove performance consistent with the performance of the garments worn, where practical.

This International Standard also provides guidance on selection of firefighter's protective gloves and considerations for conducting a risk assessment of protective gloves. The selection of firefighter gloves should be based on a risk assessment.

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

A list of standards related to this International Standard is given in the Bibliography.

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Protective gloves for firefighters — Laboratory test methods and performance requirements

1 Scope

This International Standard specifies test methods and minimum requirements for protective gloves to be worn during fire fighting and associated activities where there is a risk of heat and/or flame.

The purpose of this International Standard is to provide minimum performance requirements for protective gloves designed to protect against injury in fire fighting operations.

This International Standard covers the general glove design, the minimum performance levels of the materials used and the methods of test for determining these performance levels. With the exception of flame resistance and ergonomic requirements, this International Standard establishes three levels of performance for all other performance requirements. Type 3 gloves provide a higher level of thermal insulation and physical protection, and require liquid penetration resistance (including synthetic blood) as compared to Type 2 gloves. Type 1 gloves are intended to provide minimum requirements for gloves in any fire fighting application, such as for wildland fire fighting. Annex E provides a comparison of the performance requirements for all three glove types.

This International Standard does not cover special gloves for use in other high risk situations such as specialized fire fighting. It does not cover protection for the head, torso, arms, legs and feet or protection of the hands against other hazards, e.g. chemical, biological, radiation and electrical hazards, except for limited, accidental exposure to fireground chemicals and contaminated blood or body fluids (Type 3 gloves). These aspects may be dealt with in other standards.

Selection of the appropriate system of clothing, including gloves, is dependant on carrying out an effective risk assessment which identifies the hazards to be faced, evaluates the likelihood of those hazards and provides the means of reducing or eliminating these hazards. Guidelines for conducting a risk assessment and some factors for consideration are included in annex D.

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

ISO 811, *Textile fabrics — Determination of resistance to water penetration — Hydrostatic pressure test*.

ISO 6330: 2000, *Textiles — Domestic washing and drying procedures for textile testing*.

ISO 6942:2002, *Protective clothing — Protection against heat and fire — Method of test: Evaluation of materials and material assemblies when exposed to a source of radiant heat*.

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

ISO 12127, *Clothing for protection against heat and flame — Determination of contact heat transmission through protective clothing or constituent materials.*

ISO 12947-4, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 4: Assessment of appearance change.*

ISO 13688, *Protective clothing — General requirements.*

ISO 13994:1998, *Clothing for protection against liquid chemicals — Determination of the resistance of protective clothing materials to penetration by liquids under pressure.*

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

EN 388:1994, *Protective gloves against mechanical risks.*

EN 420:1994, *General requirements for gloves.*

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3 Terms and definitions

ISO 15383:2001

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

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3.1

component assembly

combination of all materials of a multi-layer glove presented exactly as the finished glove construction

3.2

drip, verb

to run or fall in drops or blobs

3.3

firefighters' protective gloves

specific gloves providing protection for the firefighters' hands and wrists

3.4

firefighters' protective clothing

specific garments providing protection for the firefighters' upper and lower torso, neck, arms and legs, but excluding the head, hands and feet

3.5

cuff

that circular, flared or otherwise expanded part of the glove that extends beyond the opening of the glove body to cover the wrist area

3.6**glove body**

that part of the glove that extends from the tip of the fingers to 25 mm beyond the wrist crease

3.7**innermost lining**

lining of the innermost face of a component assembly closest to the wearer's skin

NOTE Where the innermost lining forms part of the material combination, the material combination is regarded as the innermost lining

3.8**melt**, verb

to liquefy a material by exposure to heat resulting in a non-reversible change

NOTE For the purposes of this International Standard, melting is observed as the response to heat as evidenced by flowing or dripping.

3.9**main seam**

seam that is necessary for the integrity of the glove

3.10**moisture barrier**

that portion of the component assembly designed to prevent the transfer of liquids

NOTE Moisture barriers might not prevent the passage of chemical, biological or radiological agents through the glove. Such incidents should be handled with appropriate chemical protective clothing and procedures.

3.11**outer material**

outermost material of which the protective glove is made

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 http://www.iso.org/iso/standards/sist/15383-2001/15383-2001-01.html

3.12**seam**

any method of permanent fastening between two or more pieces of material

3.13**wristlet**

circular, close-fitting part of the glove, usually made of knitted material, that extends beyond the opening of the glove body to cover the wrist area

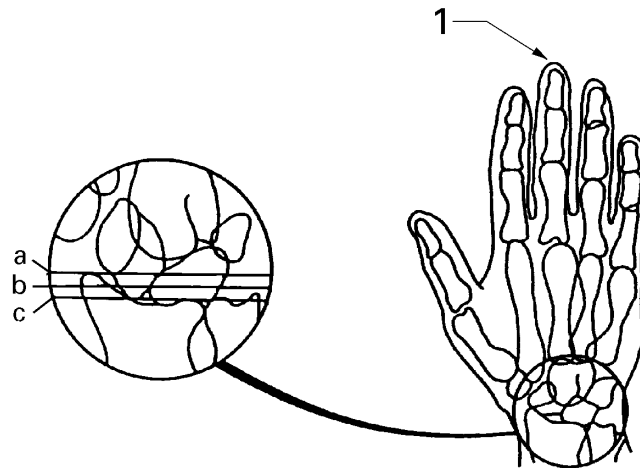
NOTE May be contained within a cuff.

4 Design requirements**4.1 Component assembly**

Gloves shall consist of a component assembly meeting the performance requirements of this International Standard. This component assembly shall be permitted to be configured as a continuous or joined single layer, or as continuous or joined multiple layers.

4.2 Glove body length

The glove body shall extend circumferentially beyond the wrist crease not less than 25 mm. The location of the wrist crease shall be determined as shown in Figure 1.



Key

- 1 Dactylion III
- a Stylium
- b Wrist crease
- c Proximal edge of navicular

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Figure 1 — Anatomical landmarks at base of hand

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4.3 Wristlet or cuff <https://standards.iteh.ai/catalog/standards/sist/f43be7e3-acb8-4156-8894-b7a9fdec0ebc/iso-15383-2001>

Gloves shall be permitted to be provided with either a cuff or a wristlet or both. Where gloves are provided with a cuff or a wristlet, the sample glove body and the cuff or wristlet shall extend circumferentially at least 50 mm beyond the wrist crease, taking into consideration the requirement specified in 4.2. Where gloves are not provided with a cuff or a wristlet, the sample glove body shall extend circumferentially at least 50 mm beyond the wrist crease which is a 25 mm addition to the requirement specified in 4.2.

4.4 Glove sizing

4.4.1 Minimum sizing

Gloves shall be provided in a minimum of 6 unique and distinct sizes. The manufacturer shall indicate the range in hand circumference and hand length for wearers of each glove size as determined in 4.4.2.

NOTE The intent of this requirement is to allow manufacturers to report information to the user that assists in their selection of the appropriate size. Standard sizes are not defined by this International Standard.

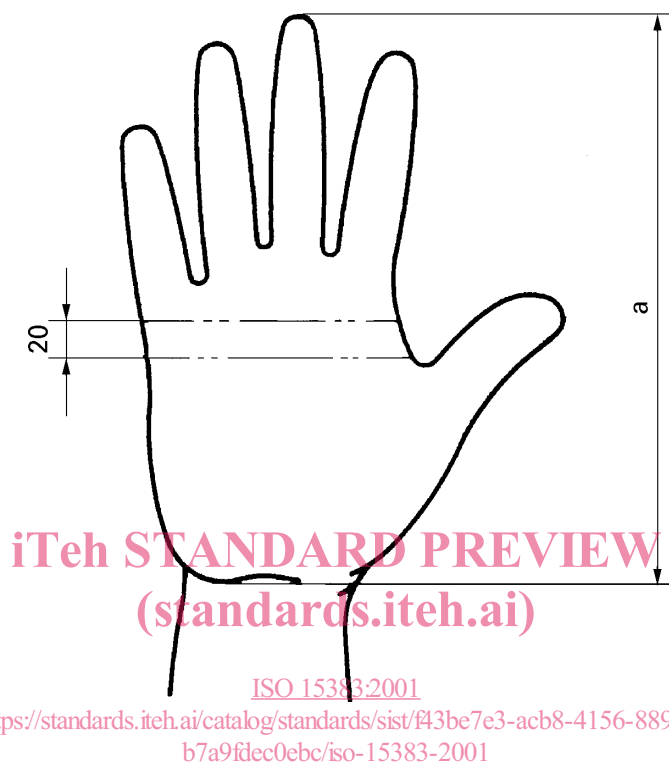
4.4.2 Hand dimensions

Hand dimensions for selection of proper glove size shall consist of measuring two dimensions, hand circumference and hand length, as shown in Figure 2.

Hand circumference shall be measured by placing the measuring tape on a table or other flat surface with the numerals facing downward. The subject shall place the right hand, palm down and fingers together, in the middle of the tape so that the tape can pass straight across the knuckles (metacarpals). The circumference shall be measured to the nearest millimetre, 20 mm from the crotch between thumb and index finger as shown in Figure 2.

Hand length shall be measured by placing the subject's hand, palm down, on a piece of paper with the fingers together and the hand and arm in a straight line. The thumb shall be fully abducted, extended away from the palm as far as possible. The paper shall be marked at the tip of the third, or middle, finger. A pencil mark shall be placed in the notch at the base of the thumb where the thumb joins the wrist. The straight line distance between the two points shall be measured to the nearest millimeter, as shown in Figure 2.

Dimensions in millimetres



^a Hand length

Figure 2 — Method of measuring hand dimensions for selection of proper glove

4.4.3 Marking of glove size

Glove size shall be indicated on the label.

NOTE Manufacturers should also provide information to the end-user or purchaser on how they have defined their sizes in terms of hand length and circumference.

4.5 Leather chromium VI content

Leather used in the construction of gloves shall have a Cr(VI) content of less than 10 mg/kg when tested in accordance with clause 6.1 of EN 420:1994.

4.6 Other design requirements

Gloves shall be designed to restrict the entry of embers or foreign particles through the glove openings.

Gloves shall be compatible with the sleeves of the firefighters' protective clothing used.

Any labels or accessories shall not adversely affect the performance of the gloves or present a hazard to the wearer.

5 Sampling and pretreatment

5.1 Sampling levels

Sampling levels for testing and inspection shall be established by the responsible testing laboratory and the manufacturer in order to assure a reasonable and acceptable reliability at a reasonable and acceptable confidence level that products certified as being compliant with this International Standard are, in fact, compliant.

5.2 Inspection

Inspection for determining compliance with the design requirements specified in clause 4 shall be performed on whole gloves.

5.3 Testing

5.3.1 Specimens

Testing for determining material and component compliance with the requirements specified in clause 6 shall be performed on samples representative of materials and components used in the actual construction of the protective glove. If suitably sized representative materials and components for the respective test method cannot be obtained, then samples from the glove shall be used as specified in the performance requirement. The responsible testing laboratory organization shall be permitted to also use sample materials cut from representative protective gloves.

5.3.2 Exposure surface

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

5.3.3 Interpretation criteria

In all tests involving measurements, the determination of compliance shall be based on the mean value.

5.4 Pretreatments

5.4.1 Washing pretreatment

When pretreatment is specified as part of the test procedure or performance requirement, then the test materials shall be cycled through five washings and five dryings. Washing shall be carried out by procedure 2A at $60\text{ °C} \pm 3\text{ °C}$ using a front loading horizontal drum machine with a detergent which achieves a pH of 7,0 and drying shall be carried out by procedure E (tumble drying) of ISO 6330:2000 unless otherwise specified in the care labelling. A total of five washing and drying cycles shall be used. A laundry bag shall not be used.

After the five washing and drying cycles, sample gloves shall be donned by a test subject and shall be flexed by making a tight fist 10 times during a 30 s period.

5.4.2 Dry conditioning

Sample gloves and sample specimens shall be conditioned at a temperature of $(20 \pm 2)\text{ °C}$ and at a relative humidity of $(65 \pm 5)\%$ for at least 24 h in accordance with ISO 139.

Sample gloves and sample specimens shall be tested within 5 min of removal from conditioning.

NOTE This conditioning is used in some cases after washing pretreatment to ensure that the gloves are totally dry before testing.