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Protective gloves against thermal risks (heat and/or fire)

Gants de protection contre les risques thermiques (chaleur et/ou feu)

Перчатки защитные от термических рисков (тепла и/или пламени)

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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 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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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*.

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

This document has been developed to cover all type of personal protective equipment protecting the hand, a part of the hand or a part of the arm against thermal risks, no matter where they are used (professional use, consumer, domestic use…). This document is the adoption of the European Standard EN 407.

The document is adopted using fast-track procedure in line with the decision to adopt the European standard without changes and propose that any comments would be incorporated during the next revision schedule five years after the publication date. The intent for the next revision is to have a combined EN ISO standard whichever the EN or ISO standard is revised first.

Protective gloves against thermal risks (heat and/or fire)

1 Scope

This document specifies requirements, test methods, marking and information for protective gloves and other hand protective equipment against thermal risks for professional use, consumer, domestic use.

This document is also applicable to arm protective equipment.

It is used for all gloves and other hand protective equipment which protect the hands or part of the hand against heat and/or fire in one or more of the following forms: flame, contact heat, convective heat, radiant heat, small splashes or large quantities of molten metal.

This document is only applicable in conjunction with ISO 21420:2020.

This document does not apply to gloves for fire-fighters or welding that have their own standards.

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 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*

ISO 7500-1:2018, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 9150:1988, *Protective clothing — Determination of behaviour of materials on impact of small splashes of molten metal*

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

ISO 9185:2007, *Protective clothing — Assessment of resistance of materials to molten metal splash*

ISO 12127-1:2015, *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 15025:2016, *Protective clothing — Protection against flame — Method of test for limited flame spread*

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

EN 659:2003+A1:2008, *Protective gloves for firefighters*

3 Terms and definitions

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

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
after flame time
length of time for which a material continues to flame, under the specified test conditions, after the ignition source has been removed

3.2
afterglow time
time for which a material continues to afterglow, under specified test conditions after cessation of after flaming or after removal of the ignition source

3.3
back of the glove
back of hand, excluding fingers

3.4
cuff
part of the glove that extends beyond the opening of glove body to cover the wrist area and sometimes part of the forearm

3.5
debris
material separating from the specimen during the test procedure and falling from the specimen without flaming

3.6
dripping
detachment of molten droplets during the melting process

3.7
flaming debris
material separating from the specimen during the test procedure and igniting the filter paper

3.8
hands protective equipment against thermal risks
equipment which protect hand and/or areas of the hand intended to be exposed to thermal risks

Note 1 to entry: See examples in Annex A.

3.9
high thermal resistant gloves
gloves which claimed at least level 3 for one of the following properties: convective heat, contact heat, radiant heat, small metal splashes, large quantities of molten metal

3.10
hole
opening, break, or discontinuity of any size in the original structure of the test specimen's material caused by application of the test flame

3.11
melting
liquefaction of the material under the influence of heat

3.12
innermost layer
layer closest to the wearer's skin

3.13
reinforcement
additional layer which does not cover the full area where the protection is claimed

Note 1 to entry: Most of the time, this area has a limited surface to preserve comfort and dexterity of the gloves.

4 General requirements

4.1 General

Where protection against other than thermal risk is needed the specific standard shall be used.

The protective gloves according to this document shall meet all the applicable requirements of ISO 21420:2020.

When parts of the glove are made from dissimilar materials, these dissimilar materials shall be tested separately, except if another way is specified in the standard. The results of each material shall comply with the requirements given in 4.5.

In those circumstances when the sample size is significantly larger than the particular part of the glove or hands protective equipment against thermal risks being tested, then the manufacturer shall be requested to supply samples of identical material.

4.2 Cleaning

All tests required in this document shall be performed on unused gloves or hand protective equipment unless otherwise specified.

If care instructions are provided, the relevant tests shall be performed on the gloves or hand protective equipment, before and after they have been subjected to the procedure described in the care instruction, including the maximum recommended number of cleaning cycles. The levels of performance and the mechanical strength (see 4.3) are given by the lowest of the 2 results obtained before and after cleaning.

NOTE Manufacturer's instructions typically indicate one or several of the various methods and processes of ISO 6330, ISO 15797 or equivalent as standardized processes for cleaning.

4.3 Mechanical strength

The glove material(s) shall be tested according to 6.8. The tear strength resistance shall have at least a value of 10 N.

4.4 Sizes and dimensions

4.4.1 Gloves

The gloves shall correspond to the relevant requirements of ISO 21420:2020, 5.1.

If according to the intended use, the hand protector needs to be taken off quickly, the protective gloves of performance levels 3 and 4 as specified in 4.5.2 to 4.5.7 shall be manufactured so that they can easily be removed in case of an emergency. The test shall be performed according to EN 659:2003 + A1:2008, 3.15 using the same requirement. This property shall be justified and explained in a warning included in the manufacturer's information.

The removal test shall be carried out only in the dry state if the manufacturer's information states that the glove is not intended for use in wet conditions.

If protection against metal splashes as described in 4.5.6 and/or 4.5.7 is claimed, the minimal length of the glove shall correspond to the requirements of Table 1.

Table 1 — Minimal length of the glove

Size of the hand	5	6	7	8	9	10	11	12	13
Minimal length of glove mm	290	300	310	320	330	340	350	360	370

4.4.2 Hand protective equipment

Hand protective equipment against thermal risks shall have a sufficient dimension to fully cover the part of the hand intended to be protected against thermal risk. The property shall be verified by visual inspection.

The manufacturer information shall contain precise information about how to use the hand protective equipment and which part of the hand is protected.

4.5 Thermal performances

4.5.1 General

For each of the following test methods the defined performance level depends upon the intended field of application of the glove or hand protective equipment. Only the tests which are relevant to the risks in the intended end-use application shall be carried out.

For the choice of relevant testing, examples are given in Annex B.

4.5.2 Limited flame spread

Using test method 6.2 the glove and other hand protective equipment, as well as all outer materials shall correspond to the requirements of Table 2. Surface of the innermost layer of the glove shall be inspected, it shall show no sign of melting. No hole shall appear on all layers of the tested area. The seam shall not come apart after the ignition time.

For high thermal resistant gloves (level 3 or 4), all outer materials different to the finger area shall be tested according to ISO 15025:2016, method A and comply at least with level 3 of Table 2. Seams and outer accessories with a surface area greater than 10 cm^2 shall also be tested.

Table 2 — Performance levels for limited flame spread

Performance level	After flame time s	After glow time s
1	≤15	no requirement
2	≤10	≤120
3	≤3	≤25
4	≤2	≤5

If the outermost layer melts, the material shall not produce molten or flaming debris

After flame time is measured to the nearest second and after flame times of less than 1,0 s should be recorded as zero.

Afterglow time is measured to the nearest second and afterglow times of less than 1,0 s should be recorded as zero.

4.5.3 Contact heat

Using the test method 6.3 the material shall correspond to the requirements of Table 3.