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

Vêtements et équipement de protection contre la chaleur — Méthode d'essai de la résistance à la chaleur de convection au moyen d'un four à circulation d'air chaud

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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 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

This second edition cancels and replaces the first edition (ISO 17493:2000), which has been technically revised with the following changes:

— the specifications for the apparatus have been improved and completed (5.1, 5.2, 5.4, new 5.5, 5.6, 5.7);

— procedures for the calibration of the test oven have been added (new Clause 7);

— a list of ASTM standards related to ISO 17493 is given in the Bibliography.

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Introduction

This test method allows for the evaluation of the heat resistance of materials, protective clothing and equipment when suspended in a hot air circulating oven at a specified temperature of typically 180 °C or 260 °C for typically 5 min. Visible observations of charring, deformation, delamination, hole formation, ignition, melting of the specimen are recorded. The exposure in the hot air circulating oven may be used either for a visual evaluation only or as a pre-treatment for a material property measurement such as shrinkage or other property measurement which is not specified in this document.

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

1 Scope

This document describes a test method for evaluating the heat resistance of protective clothing materials or items and equipment when exposed in a hot air circulating oven. The method is intended to evaluate physical changes in a material at a given exposure temperature. Materials are evaluated for defined visible changes including the measurement of shrinkage.

Different procedures are provided depending on the type of the protective clothing material or item being tested.

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

ISO 3873, *Industrial safety helmets*

ISO 4643:1992, *Moulded plastics footwear — Lined or unlined poly(vinyl chloride) boots for general industrial use — Specification*

IEC 60584-1, *Thermocouples — Part 1: EMF specifications and tolerances*

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 http://www.electropedia.org/

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

3.1
charring
response of the test specimen to heat evidenced by the formation of a carbonaceous residue

3.2
clothing assembly
series of garments arranged in the order as worn

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

3.3
component assembly
combination of all materials and *hardware* (3.7) presented exactly as the finished garment construction

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3.4
deformation
response of the test specimen to heat evidenced by a change in the shape of the test specimen that is irreversible at room temperature

Note 1 to entry: *Shrinkage* (3.12) is a form of deformation.

3.5
delamination
response of the test specimen to heat evidenced by separation into two or more layers, in whole or in part

3.6
equipment
footwear, helmets, gloves, and eye or face protection devices

3.7
hardware
non-fabric items forming part of or optional extras in a garment

EXAMPLE Metal or plastic buttons or zippers and touch and close fasteners or hook and loop fasteners.

3.8
hole formation
opening, break, or discontinuity of any size in the original structure of the test specimen's fabric caused by application of heat

3.9
ignition
response of the test specimen to heat evidenced by initiation of combustion

3.10
melting
response of the test specimen to heat evidenced by a change of state from solid to liquid

Note 1 to entry: The practical observation of melting, as a material response at the end of the heat exposure, is to visually see evidence that the specimen has liquefied, in whole or in part, by displaying flow patterns or droplet formation.

3.11
separating
response of the test specimen to heat evidenced by *splitting* (3.13), *delamination* (3.5) or flaking

3.12
shrinkage
response of the test specimen to heat evidenced by a decrease in one or more dimensions

3.13
splitting
response of the test specimen to heat evidenced by breaking into two pieces, in whole or in part

4 Principle

Specimens are suspended in a hot air circulating oven for 5 min at the specified test temperature. Any visible observations such as charring, deformation, degradation, delamination, embrittlement, flaking, hole formation, ignition, melting, separating, or splitting of the specimen are recorded. Shrinkage may also be measured. Specimens may also be subject to other property determinations following heat exposure.

Observations of degradation, embrittlement, splitting, separating, or flaking can be considered as subjective and should not be used as a pass/fail criteria for a product standard.

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