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Descriptors: personal protective equipment, protective clothing, heat protection, heat resistant materials, fire resistant materials, filling, thermal tests, heat transfer, flames, heat transfer coefficient

English version

Protective clothing — Protection against heat and fire — Method of determining heat transmission on exposure to flame

Vêtements de protection — Protection contre
la chaleur et les flammes — Détermination de
la transmission de chaleur à l'exposition d'une
flamme

Schutzkleidung — Schutz gegen Wärme und
Flammen — Verfahren zur Bestimmung des
Wärmedurchgangs bei Flammenwirkung

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CEN

European Committee for Standardization
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Europäisches Komitee für Normung

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Foreword

This European Standard was prepared by CEN/TC 162 'Protective clothing including hand and arm protection and lifejackets' of which the secretariat is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 1993, and conflicting national standards shall be withdrawn at the latest by April 1993.

The standard was approved and in accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

0 Introduction

This method has been developed from an ASTM method which was based on the Du Pont thermal protective index (TPI) method. It has been considerably modified from previous versions following extensive interlaboratory trials carried out by ISO/TC 94/SC 13/WG 2.

The heat transmission through clothing is largely determined by its thickness including any air gaps trapped between the different layers. The air gaps can vary considerably in different areas of the same clothing assembly. The present method provides a grading of materials when tested under standard test conditions.

The following major modifications have been made from previous versions of this test method.

- a) The air gap between the back of the test specimen and the calorimeter has been eliminated. This was found to increase all the values recorded and to distort the results with some materials more than others.
- b) The specimen size has been increased and the mass of the location plate has been specified. The mass of the location plate is used to hold the specimen in position so that the specimen is compressed by a standard mass and is also restricted from shrinking.
- c) The method of measuring the heat transmission has been drastically simplified and a new term heat transfer index (HTI) has been introduced to avoid confusion with the thermal protective index (TPI) or other terms used in previous versions of this test. This change makes it easier to perform the test and reduces the possibility of mathematical errors in calculating the results. The heat transfer index provides a method of grading materials which does not imply that the material tested will give any precise protection time under actual use conditions.
- d) Other methods of restraining the test specimens using clamps or pins have been rejected on the basis of interlaboratory trials because of practical difficulties which were believed to increase the interlaboratory variability.
- e) All terminology which implies that the test method measures the protection time provided by the test material has been eliminated. The protection provided under actual use conditions will vary considerably, depending on the severity of the actual flame source and the thickness of the clothing, including intermediate air gaps, in the exposed area.

1 Scope

This European Standard specifies a method for comparing the heat transmission through materials or material assemblies used in protective clothing. Materials are ranked by calculation of a heat transfer index, which is an indication of the relative protection under the specified test conditions. The heat transfer index should not be taken as a measure of the protection time given by the tested materials under actual use conditions.

2 Normative references

This European 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 amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- ISO 139 *Textiles — Standard atmosphere for conditioning and testing*
- IEC 584-1 *Thermocouples. Part 1 : Reference tables*

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 test specimen

All the layers of fabric or other materials arranged in the order and orientation as used in practice and including undergarments.

3.2 incident heat flux density

The amount of energy incident per unit time on the exposed face of the specimen, expressed in kW/m^2 .

3.3 heat transfer index (flame)

A whole number calculated from the mean time in seconds to achieve a temperature rise of $(24,0 \pm 0,2)^\circ\text{C}$ when testing by this method using a copper disc of mass $(18,00 \pm 0,05) \text{ g}$ and a starting temperature of $(25 \pm 5)^\circ\text{C}$.