SLOVENSKI STANDARD
SIST EN 17667:2022

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Preskusna metoda - Določanje toplotne odpornosti polnjenih tekstilnih izdelkov in podobnih izdelkov z uporabo majhnih varovalnih aparatov

Test method - Determination of thermal resistance of filled textile articles and similar items using small guarded hotplate apparatus

Prüfverfahren - Bestimmung des Wärmedurchgangswiderstands von gefüllten textilen Artikeln und ähnlichen Gegenständen unter Verwendung einer kleinen Guarded-Hotplate-Vorrichtung

Méthode d'essai - Détermination de la résistance thermique d'articles textiles garnis et de produits similaires au moyen d'un appareillage à petite plaque chaude gardée

Ta slovenski standard je istoveten z: **EN 17667:2022**

ICS:

97.160	Tekstilije za dom. Perilo	Home textiles. Linen
97.190	Otroška oprema	Equipment for children
97.200.30	Oprema za taborjenje in tabori	Camping equipment and camp-sites

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EUROPEAN STANDARD

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EN 17667

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ICS 97.160; 97.190; 97.200.30

English Version

Test method - Determination of thermal resistance of filled textile articles and similar items using small guarded hotplate apparatus

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This European Standard was approved by CEN on 27 April 2022.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 17667:2022) has been prepared by Technical Committee CEN/TC 248 “Textiles and textile products”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by December 2022, and conflicting national standards shall be withdrawn at the latest by December 2022.

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Introduction

This test method has been developed to provide a simple method of determining the thermal resistance of filled textile products and similar articles using a small guarded hotplate apparatus. Other methods such as ISO 5085-1 and EN ISO 11092 may have limitations on the range of their measurement capability and/or require the use of complex apparatus. The apparatus used in this method is broadly comparable with that specified in ISO 5085-1 but with a number of differences which are intended to provide a more reliable test result. It is based on a test method British Standard BS 8510:2009, which has proven successful in the United Kingdom over a period of more than 10 years.

This test method measures thermal resistance in a similar manner to EN ISO 11092 when using R_{ct} mode but is a simplified version of the test method. Limited trials in the development of this test method indicate that it has a good correlation with other test methods in use including ISO 5085-1 in single plate mode and EN ISO 11092.

1 Scope

This method of test specifies a test method for determining the thermal resistance of textile articles which may be filled, e.g. padded coats and jackets, child sleep bags, cot duvets, etc., or textiles articles with a thermal resistance of up to 0,5 m^2K/W (5,0 tog) and/or which do not have uniform thickness.

The test method is applicable to products with a thermal resistance within the range 0,025 m^2K/W (0,25 tog) to approximately 0,5 m^2K/W (5,0 tog) but is limited only by the ability of the test apparatus to cope with the thickness of the test sample.

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.

EN ISO 139, *Textiles - Standard atmospheres for conditioning and testing (ISO 139)*

ISO 8302, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Guarded hot plate apparatus*

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
textile article
any textile product formed of a single layer of textile or multiple layers of textile material, with or without a filling material (textile or non-textile) present

3.2
children's sleep bag
bedding item consisting of a full length fabric bag, which may be lined or filled, with a neck opening and armholes, designed to contain a child which may be used in conjunction with nightwear

[SOURCE: EN 16781:2018, 3.1]

3.3
cot duvet
bedding item intended to cover the child's body, consisting of a filling material permanently sewn into a textile over intended to be used with or without a secondary removable textile cover

[SOURCE: EN 16779-1:2018, 3.1, modified – Note 1 to entry has been deleted.]

3.4
thermal resistance
R
R_{ct}
ratio of the temperature difference between the two faces of a test sample to the rate of flow of heat per unit area normal to the faces

Note 1 to entry: The thermal resistance may also be known as its 'tog' value.

[SOURCE: ISO 5085-1:1989, 3.1, modified – Note 1 to entry has been added.]

3.5
tog value
ten times the temperature difference between the two faces of a sample (in K) when the heat flow across the unit area is equal to 1 W/m^2

Note 1 to entry: 1 tog = 0,1 m^2K/W.

3.6
indoor ambient condition
for the purpose of this test method, the standard atmosphere as specified in EN ISO 139

4 Principle

The textile article to be tested is placed on a horizontal heated plate at 306 K (skin surface temperature) and the opposite face is exposed to an ambient room temperature. The power required to maintain thermal equilibrium ("steady state") over a period of not less than 60 min is measured and the thermal resistance of the item is determined.

5 Apparatus

5.1 General

The apparatus shall be built and operated in accordance with the principles of ISO 8302. See Figure 1.

5.2 Thermal resistance tester

The apparatus for the determination of thermal resistance shall be designed so that it complies with the following:

a) the apparatus shall be horizontal, with the heat flow upwards and designed so that measurements are made between the upper hot face and the ambient air above the test sample;

b) the surface of the upper hot face of the apparatus shall be flat, isothermal, metal and have a finish such that the emissivity is not less than 0,9. The central measuring area shall be not less than 200 mm by 200 mm but not greater than 350 mm by 350 mm. The guard area or effective guard area around the central measuring area shall be at least 50 mm wide;

NOTE A matt black finish has been found to be suitable.

c) there shall be a suitable means for measuring the temperature of the upper surface of the hot face and of the air temperature of the air layer above the test sample to an accuracy of 0,2 K;

d) sets of at least five temperature sensors, each set uniformly distributed over the central measuring area, shall be used to measure the upper hot face and lower hot face temperatures;

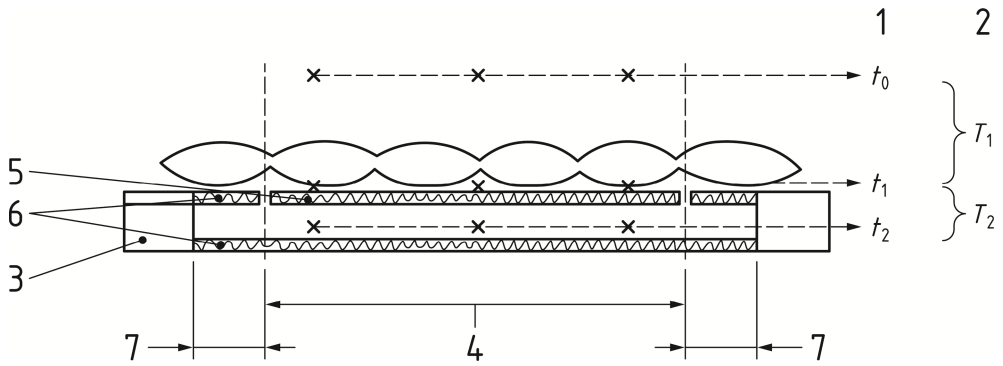
e) a set of at least five shielded temperature sensors uniformly distributed over the central measuring area shall be used to measure the temperature of the air layer above the test sample. These shall be located directly above the corresponding sensors in the central measuring area; (see Annex A for more information);

f) the upper hot face temperature and the temperature of the air layer above the test sample shall be capable of being controlled to ± 2,0 K;

g) the apparatus shall be located within a test environment maintained in accordance with the standard temperate atmosphere as specified in EN ISO 139. The apparatus shall be screened from external sources of heat (e.g. effects of lighting, other apparatus, etc.), and from draughts (e.g. caused by movement of personnel or opening of nearby doors, etc.);

h) the apparatus shall be equipped with suitable instrumentation for the recording of the individual temperatures of the upper hot face, lower hot face and air layer above the test sample and energy required. The instrumentation shall be able to record at least 3 readings per minute;

i) the thermal resistance of the test sample plus the air layer (R_t) is determined from the energy dissipated in the central heater, the area of the central heater and the temperature difference T_1. The temperature difference T_2 is maintained at zero.



Key

1 temperature
2 temperature difference
3 insulation
4 central measuring area
5 central heaters
6 guard heaters
7 guard area
t_0 temperature of the air layer above the quilt
t_1 the upper hot face temperature
t_2 the lower hot face temperature
T_1 the difference between the upper hot face temperature and the temperature of the air layer above the test sample
T_2 the difference between the lower hot face temperature and the upper hot face temperature
x denotes temperature sensors

Figure 1 — Apparatus for the determination of thermal resistance of test sample

5.3 Support frames

Support frame(s) of dimensions so as to ensure the intimate contact of the under-surface of the sample with the hotplate and support any part(s) of the test sample which is greater than the area of the measuring place (including any guard area).

NOTE The materials used for the support frame and its dimensions are not important provided that it is of sufficient size and rigidity to support those parts of the test specimen that are not on the hotplate and ensure good thermal contact between the area of the test specimen and the hotplate.

5.4 Conditioning racks

Racks of dimensions such that it is possible to place the sample to be tested horizontally or vertically and without distortion, and for air to circulate over the whole of the upper surface of the test sample.

It is important that if samples are conditioned vertically that the sample is positioned in an orientation that will not result in a change to the filling distribution (e.g. any filling channels should be oriented horizontally).