SLOVENSKI STANDARD
SIST EN ISO 9920:2010

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Nadomešča:
SIST EN ISO 9920:2008

Ergonomija toplotnega okolja - Ocenitev toplotne izolativnosti in odpornosti oblačil proti vodni pari (ISO 9920:2007, popravljena različica 2008-11-01)

Ergonomics of the thermal environment - Estimation of thermal insulation and water vapour resistance of a clothing ensemble (ISO 9920:2007, Corrected version 2008-11-01)

Ergnomie der thermischen Umgebung - Abschätzung der Wärmeisolation und des Verdunstungswiderstandes einer Bekleidungskombination (ISO 9920:2007, Korrigierte Fassung 2008-11-01)

Ergonomie des ambiances thermiques - Détermination de l'isolement thermique et de la résistance à l'évaporation d'une tenue vestimentaire (ISO 9920:2007, Version corrigé 2008-11-01)

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13.180	Ergonomija	Ergonomics
61.020	Oblačila	Clothes

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 9920

June 2009

ICS 13.180; 61.020

Supersedes EN ISO 9920:2007

English Version

Ergonomics of the thermal environment - Estimation of thermal insulation and water vapour resistance of a clothing ensemble (ISO 9920:2007, Corrected version 2008-11-01)

Ergonomie des ambiances thermiques - Détermination de l'isolement thermique et de la résistance à l'évaporation d'une tenue vestimentaire (ISO 9920:2007, Version corrigé 2008-11-01)

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Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

The text of ISO 9920:2007, corrected version 2008-11-01 has been prepared by Technical Committee ISO/TC 159 “Ergonomics” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 9920:2009 by Technical Committee CEN/TC 122 “Ergonomics” the secretariat of which 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of an identical text or by endorsement, at the latest by December 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

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Endorsement notice

The text of ISO 9920:2007, corrected version 2008-11-01 has been approved by CEN as a EN ISO 9920:2009 without any modification.

INTERNATIONAL STANDARD

ISO 9920

Second edition
2007-06-01

Ergonomics of the thermal environment — Estimation of thermal insulation and water vapour resistance of a clothing ensemble

Ergonomie des ambiances thermiques — Détermination de l'isolement thermique et de la résistance à l'évaporation d'une tenue vestimentaire

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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 2.

The main task of technical committees is to prepare International Standards. 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.

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ISO 9920 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 5, *Ergonomics of the physical environment*.

This second edition cancels and replaces the first edition (ISO 9920:1995), which has been technically revised. It includes major changes to the sections on clothing vapour resistance as well as those dealing with the effects of air movement and body motion on clothing insulation and vapour resistance.

Introduction

This International Standard is one of a series of International Standards intended for use in the study of thermal environments. It is a basic document for evaluation of the thermal characteristics of a clothing ensemble (thermal insulation and water vapour resistance). It is necessary to know these values when evaluating the thermal stress or degree of comfort provided by the physical environment according to standardized methods. The thermal characteristics determined in this International Standard are values for steady-state conditions. Properties like “buffering”, adsorption of water and similar are not dealt with.

The emphasis in this International Standard is on the estimation of the thermal characteristics. The heat and vapour resistance may also be measured directly, and this is discussed in the annexes.

This International Standard does not deal with the local thermal insulation on different body parts, nor the discomfort due to a non-uniform distribution of the clothing on the body.

Man’s thermal balance in neutral, cold and warm environments is influenced by the clothing worn. For evaluating the thermal stress on human beings in the cold (IREQ, see ISO/TR 11079, insulation index), neutral environments (PMV-PPD, see ISO 7730, indices) and the heat (predicted heat strain, see ISO 7933, index), it is necessary to know the thermal characteristics of the clothing ensemble, i.e. the thermal insulation and the water vapour resistance.

Ergonomics of the thermal environment — Estimation of thermal insulation and water vapour resistance of a clothing ensemble

1 Scope

This International Standard specifies methods for estimating the thermal characteristics (resistance to dry heat loss and evaporative heat loss) in steady-state conditions for a clothing ensemble based on values for known garments, ensembles and textiles. It examines the influence of body movement and air penetration on the thermal insulation and water vapour resistance.

This International Standard does not

— deal with other effects of clothing, such as adsorption of water, buffering or tactile comfort,

— take into account the influence of rain and snow on the thermal characteristics,

— consider special protective clothing (water-cooled suits, ventilated suits, heated clothing), or

— deal with the separate insulation on different parts of the body and discomfort due to the asymmetry of a clothing ensemble.

2 Terms and definitions

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

2.1
thermal insulation
I
resistance to dry heat loss between two surfaces, expressed in square metres Kelvin per watt ($m^2 \cdot K \cdot W^{-1}$)

NOTE 1 In this International Standard it is considered as the *equivalent uniform thermal resistance*, or thermal insulation, on a human body. This is the clothing *heat resistance* (thermal insulation) that, when uniformly covering the whole body surface (including hands, face, etc.), would result in the same heat loss as the actual, possibly non-uniform, clothing heat resistance. This heat resistance is the quotient of the temperature gradient between the surfaces (the driving force) over the dry heat loss per unit of body surface area (the flux):

$$I = \frac{\text{temperature gradient}}{\text{heat loss per unit of body surface area}} \quad (1)$$

For the human body, this resistance can be divided into specific layers, as illustrated in Figure 1 (see also Annex F).

NOTE 2 Because of the special definition of thermal insulation in this International Standard, it is usually expressed in clo, the unit of thermal insulation of clothing. Although it can be converted into SI units in similar fashion to the thermal insulation of, for example, textile samples [symbol: R_{ct}; 1 clo = 0,155 ($m^2 \cdot K \cdot W^{-1}$)], the meaning is not the same.