

**Soojuskeskkondade ergonoomika.
Meetodid, millega hinnata inimese
reaktsiooni kokkupuutel pinnaga. Osa
3: Külmad pinnad**

Ergonomic of the thermal environment - Methods for
the assessment of human responses to contact with
surfaces - Part 3: Cold surfaces

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 13732-3:2006 sisaldab Euroopa standardi EN ISO 13732-3:2005 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 25.01.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 13732-3:2006 consists of the English text of the European standard EN ISO 13732-3:2005.</p> <p>This document is endorsed on 25.01.2006 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: This European Standard describes methods for the assessment of the risk of cold injury and other adverse effects when a cold surface is touched by bare hand/finger skin.</p>	<p>Scope: This European Standard describes methods for the assessment of the risk of cold injury and other adverse effects when a cold surface is touched by bare hand/finger skin.</p>
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ICS 13.040.20, 13.180

Võtmesõnad: area, human factors engineering, mathematics, operating stations, tempera, temperature limit, thermal comfort, thermal environment, thermal environment systems, thermal properties, threshold value, touching, use, working places, workplace safety

ICS 13.040.20; 13.180

English Version

**Ergonomic of the thermal environment - Methods for the
assessment of human responses to contact with surfaces - Part
3: Cold surfaces (ISO 13732-3:2005)**

Ergonomie des ambiances thermiques - Méthodes
d'évaluation de la réponse humaine au contact avec les
surfaces - Partie 3: Surfaces froides (ISO 13732-3:2005)

Ergonomie der thermischen Umgebung -
Bewertungsmethoden für Reaktionen des Menschen bei
Kontakt mit Oberflächen - Teil 3: Kalte Oberflächen (ISO
13732-3:2005)

This European Standard was approved by CEN on 19 May 2005.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Foreword

This document (EN ISO 13732-3:2005) has been prepared by Technical Committee CEN/TC 122 "Ergonomics", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 159 "Ergonomics".

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 June 2006, and conflicting national standards shall be withdrawn at the latest by June 2006.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

For relationship with EU Directives, see informative Annex ZA which is an integral part of this document.

EN ISO 13732 consists of the following parts, under the general title "Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces"¹⁾:

- Part 1: Hot surfaces;
- Part 3: Cold surfaces.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

¹⁾ Part 2: has been published as ISO Technical specification ISO/TS 13732-2:2001 Human contact with surfaces at moderate temperature.

Introduction

This European Standard is a type B standard as stated in EN ISO 12100. The provisions of this document may be supplemented or modified by a type C standard.

NOTE For machines which are covered by the scope of a type C standard and which have been designed and built according to the provisions of that standard, the provisions of that type C standard take precedence over the provisions of this type B standard.

Working with unprotected hands is often inevitable in the cold operation when a precision task is demanded. However the contact of bare skin with cold surfaces reduces skin temperature, causing acute effects such as discomfort, pain, numbness or frostbite. In addition repeated cold exposures with severe cooling of the skin may induce non-freezing cold injury (possible damage of nerves or vessels). Although the existing international standards are at hand for the assessment of the cold hazards involved, no standard concerns the special problems of contacting cold surfaces so far. Assessment of contact cooling is thus considered necessary.

To assess the risk of the cold injury, it is necessary to know the major factors affecting principally hand/finger cooling on cold surfaces. These factors involve:

- properties of the object surface;
- temperature of the cold surface and ambience;
- duration of contact between the skin and the surface;
- characteristics of hand/finger skin and the type and nature of the contact.

In practice, these factors are somewhat interacted and complicated. The type of contact material has an impact on the contact time at various cold temperatures. Thus, the contact time for the critical contact temperature limits on cold surfaces were empirically correlated with the major factors such as thermal penetration coefficient and surface temperature of the material, respectively. The statistically non-linear models (empirical models) based on the database of lower quartile (75 % protected) are able to estimate the finger/hand contact cooling of a large range of individuals on the cold surfaces.

This European Standard is designed to integrate all results obtained from the experimental research with both human fingers and an artificial finger. It outlines a guideline document for the specification of safe time limits of hand/finger contact with various cold surfaces.

1 Scope

This European Standard describes methods for the assessment of the risk of cold injury and other adverse effects when a cold surface is touched by bare hand/finger skin.

This standard provides ergonomics data to establish temperature limit values for cold solid surfaces. The values established can be used in the development of special standards, where surface temperature limit values are required.

The data of this standard will be applicable to all fields where cold solid surfaces cause a risk of acute effects: pain, numbness and frostbite.

The data are not limited to the hands but apply to human skin in general.

The standard is applicable to the healthy skin of adults (females and males). Considerations on the extension of applications are given in Annex B.

2 Normative references

The following referenced documents are indispensable for the application 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 12100-1:2003, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

3.1

touchable surface

surface of a product, which can be touched by a person

3.2

surface temperature

T_s

temperature of a material surface in °C

3.3

critical contact temperature

T_c

contact temperature at which defined skin response criteria are elicited in °C

3.4

contact period

D

duration during which contact of the skin with the surface takes place in s

3.5

thermal inertia

product of density (ρ), thermal conductivity (K) and specific thermal capacity (c) of a material