

**SLOVENSKI
PREDSTANDARD**

oSIST prEN ISO 11079:2006

januar 2006

Ergonomija toplotnega okolja - Ugotavljanje in razlaga obremenitev zaradi mraza ob uporabi zahtevanih zaščitnih oblačil (IREQ) in učinkov lokalnega ohlajevanja (ISO/DIS 11079:2005)

(istoveten prEN ISO 11079:2005)

Ergonomics of the thermal environment - Determination and interpretation of cold stress when using required clothing insulation (IREQ) and local cooling effects (ISO/DIS 11079:2005)

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ICS 13.180

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English Version

Ergonomics of the thermal environment - Determination and interpretation of cold stress when using required clothing insulation (IREQ) and local cooling effects (ISO/DIS 11079:2005)

Ergonomie des ambiances thermiques - Détermination et interprétation de la contrainte liée au froid en utilisant l'isolement thermique requis du vêtement et les effets du refroidissement local (ISO/DIS 11079:2005)

This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 122.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (prEN ISO 11079:2005) has been prepared by Technical Committee ISO/TC 159 "Ergonomics" in collaboration with Technical Committee CEN/TC 122 "Ergonomics", the secretariat of which is held by DIN.

This document is currently submitted to the parallel Enquiry.

This document will supersede ENV ISO 11079:1998.

Endorsement notice

The text of ISO 11079:2005 has been approved by CEN as prEN ISO 11079:2005 without any modifications.

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DRAFT INTERNATIONAL STANDARD ISO/DIS 11079

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Ergonomics of the thermal environment — Determination and interpretation of cold stress when using required clothing insulation (IREQ) and local cooling effects

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(Revision of ISO/TR 11079:1993)

ICS 13.180

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The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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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 3.

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.

International Standard ISO 11079 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 5, *Ergonomics of the Physical Environment*.

This is the first edition of this ISO standard and replaces the technical report (ISO TR11079:1993).

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Introduction

Wind-chill is commonly encountered in cold climates, but low temperatures first of all endanger body heat balance. By proper adjustment of clothing man can often control and regulate body heat loss, to balance a change in the ambient climate. The method presented here is therefore based on the evaluation of the clothing insulation required to maintain in equilibrium the thermal balance of the body. The heat balance equation used takes into account the most recent scientific findings concerning heat exchanges at the surface of the skin as well as the clothing.

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Ergonomics of the thermal environment — Determination and interpretation of cold stress when using required clothing insulation (IREQ) and local cooling effects

1 Scope

This International Standard specifies methods and strategies to assess the thermal stress associated with exposure to cold environments. These methods apply to continuous, intermittent as well as occasional exposure and type of work, indoors and outdoors. This International Standard is not applicable to specific effects associated with certain meteorological phenomena (e.g. precipitation). These effects must be assessed by other methods.

2 Normative references

The following standards contain provisions that, through reference in this text, constitute provisions of the Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers with currently valid International Standards.

ISO 7726, *Thermal Environments — Specifications relating to appliances and methods for measuring physical characteristics of the environment*

ISO 8996, *Ergonomics of the thermal environment — Determination of metabolic rate*

ISO 9920, *Ergonomics of the thermal environment — Estimation of the thermal insulation and evaporative resistance of a clothing ensemble*

ISO 9237, *Textiles — Determination of permeability of fabrics to air*

ISO/FDIS 13732-3, *Ergonomics of the thermal environment — Methods for assessment of human responses to contact with surfaces — Part 3: Cold surfaces*

ISO 15831 *Clothing — Physiological effects — Measurement of thermal insulation by means of a thermal manikin*

3 Terms, definitions and symbols

3.1 Definitions

Terms and definitions used are described in ISO 13731, Ergonomics of the thermal environment – vocabulary and symbols.

Additional definitions used in this document are given below.

3.1.1

cold stress

climatic conditions under which the body heat exchange is just equal or too large for heat balance at the expense of significant and sometimes uncompensable physiological strain (heat debt)

3.1.2

heat stress

climatic conditions under which the body heat exchange is just equal or too small for heat balance at the expense of significant and sometimes uncompensable physiological strain (heat storage)

3.1.3

IREQ

required clothing insulation for the preservation of body heat balance at defined levels of physiological strain

3.1.4

thermoneutral zone

the temperature interval within which the body maintains heat balance exclusively by vasomotor reactions

3.1.5

wind chill index

defines a temperature that is related to the cooling sensation on a local skin segment

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3.2 Symbols

Symbols and units used in subsequent equations are described below.

A_{Du}	body surface area, m^2
ap	air permeability, $lm^{-2}s^{-1}$
A_r	effective radiating area of the body, m^2
C	convective heat flow, $W m^{-2}$
c_e	water latent heat of vaporization, Jkg^{-1}
c_p	specific heat of dry air at constant pressure, $Jkg^{-1}K^{-1}$
C_{res}	respiratory convective heat flow, Wm^{-2}
D_{lim}	duration limited exposure, h
D_{rec}	recovery time, h
E	evaporative heat flow at the skin, Wm^{-2}
E_{res}	respiratory evaporative heat flow, Wm^{-2}
f_{cl}	clothing area factor, n.d.
h_c	convective heat transfer coefficient, $W m^{-2} K^{-1}$
h_r	radiative heat transfer coefficient, $W m^{-2} K^{-1}$
I_a	boundary layer thermal insulation, $m^2 K W^{-1}$
I_{cl}	basic clothing insulation, $m^2 K W^{-1}$
I_{clr}	resultant clothing insulation, $m^2 K W^{-1}$
I_{IREQ}	mathematical symbol for IREQ, $m^2 K W^{-1}$
I_T	total insulation, $m^2 K W^{-1}$
I_{Tr}	resultant total insulation, $m^2 K W^{-1}$
i_m	moisture permeability index, n.d.
$IREQ$	required clothing insulation, $m^2 K W^{-1}$
$IREQ_{min}$	minimal required clothing insulation, $m^2 K W^{-1}$
$IREQ_{neutral}$	neutral required clothing insulation, $m^2 K W^{-1}$
K	conductive heat flow, Wm^{-2} .
M	metabolic rate, Wm^{-2}
p_a	water vapour partial pressure, kPa