

**Ergonomics of the thermal environment  
- Analytical determination and  
interpretation of heat stress using  
calculation of the predicted heat strain**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 7933:2004 sisaldab Euroopa standardi EN ISO 7933:2004 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 23.11.2004 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 7933:2004 consists of the English text of the European standard EN ISO 7933:2004.</p> <p>This document is endorsed on 23.11.2004 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><b>Käsitlusala:</b></p> <p>This International Standard specifies a method for the analytical evaluation and interpretation of the thermal stress experienced by a subject in a hot environment. It describes a method for predicting the sweat rate and the internal core temperature that the human body will develop in response to the working conditions.</p>	<p><b>Scope:</b></p> <p>This International Standard specifies a method for the analytical evaluation and interpretation of the thermal stress experienced by a subject in a hot environment. It describes a method for predicting the sweat rate and the internal core temperature that the human body will develop in response to the working conditions.</p>
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ICS 13.180

Võtmesõnad:

**English version**

Ergonomics of the thermal environment

**Analytical determination and interpretation of heat  
stress using calculation of the predicted heat strain  
(ISO 7933 : 2004)**

Ergonomie des ambiances thermiques – Détermination analytique et interprétation de la contrainte thermique fondées sur le calcul de l'astreinte thermique prévisible (ISO 7933 : 2004)

Ergonomie der thermischen Umgebung – Analytische Bestimmung und Interpretation der Wärmebelastung durch Berechnung der vorhergesagten Wärmebeanspruchung (ISO 7933 : 2004)

This European Standard was approved by CEN on 2004-08-08.

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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

The European Standards exist 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Management Centre: rue de Stassart 36, B-1050 Brussels**

## Foreword

International Standard

ISO 7933 : 2004 Ergonomics of the thermal environment – Analytical determination and interpretation of heat stress using calculation of the predicted heat strain,

which was prepared by ISO/TC 159 'Ergonomics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 122 'Ergonomics', the Secretariat of which is held by DIN, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by February 2005 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

## Endorsement notice

The text of the International Standard ISO 7933 : 2004 was approved by CEN as a European Standard without any modification.

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## Introduction

Other International Standards of this series describe how the parameters influencing the human thermoregulation in a given environment must be estimated or quantified. Others specify how these parameters must be integrated in order to predict the degree of discomfort or the health risk in these environments. The present document was prepared to standardize the methods that occupational health specialists should use to approach a given problem and progressively collect the information needed to control or prevent the problem.

The method of computation and interpretation of thermal balance is based on the latest scientific information. Future improvements concerning the calculation of the different terms of the heat balance equation, or its interpretation, will be taken into account when they become available. In its present form, this method of assessment is not applicable to cases where special protective clothing (reflective clothing, active cooling and ventilation, impermeable, with personal protective equipment) is worn.

In addition, occupational health specialists are responsible for evaluating the risk encountered by a given individual, taking into consideration his specific characteristics that might differ from those of a standard subject. ISO 9886 describes how physiological parameters must be used to monitor the physiological behaviour of a particular subject and ISO 12894 describes how medical supervision must be organized.

## 1 Scope

This International Standard specifies a method for the analytical evaluation and interpretation of the thermal stress experienced by a subject in a hot environment. It describes a method for predicting the sweat rate and the internal core temperature that the human body will develop in response to the working conditions.

The various terms used in this prediction model, and in particular in the heat balance, show the influence of the different physical parameters of the environment on the thermal stress experienced by the subject. In this way, this International Standard makes it possible to determine which parameter or group of parameters should be modified, and to what extent, in order to reduce the risk of physiological strains.

The main objectives of this International Standard are the following:

- a) the evaluation of the thermal stress in conditions likely to lead to excessive core temperature increase or water loss for the standard subject;
- b) the determination of exposure times with which the physiological strain is acceptable (no physical damage is to be expected). In the context of this prediction mode, these exposure times are called "maximum allowable exposure times".

This International Standard does not predict the physiological response of individual subjects, but only considers standard subjects in good health and fit for the work they perform. It is therefore intended to be used by ergonomists, industrial hygienists, etc., to evaluate working conditions.

## 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.

ISO 7726, *Ergonomics of the thermal environment — Instruments for measuring physical quantities*

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

ISO 9886, *Ergonomics — Evaluation of thermal strain by physiological measurements*

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