

# **Ergonomics of the thermal environment - Evaluation of the thermal environment in vehicles - Part 3: Evaluation of thermal comfort using human subjects**

Ergonomics of the thermal environment - Evaluation  
of the thermal environment in vehicles - Part 3:  
Evaluation of thermal comfort using human subjects

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 14505-3:2006 sisaldab Euroopa standardi EN ISO 14505-3:2006 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 30.08.2006 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 14505-3:2006 consists of the English text of the European standard EN ISO 14505-3:2006.</p> <p>This document is endorsed on 30.08.2006 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><b>Käsitlusala:</b></p> <p>This part of ISO 14505 gives guidelines and specifies a standard test method for the assessment, using human subjects, of thermal comfort in vehicles. It is not restricted to any particular vehicle but provides the general principles that allow assessment and evaluation.</p>	<p><b>Scope:</b></p> <p>This part of ISO 14505 gives guidelines and specifies a standard test method for the assessment, using human subjects, of thermal comfort in vehicles. It is not restricted to any particular vehicle but provides the general principles that allow assessment and evaluation.</p>
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**ICS** 13.180, 43.020

**Võtmesõnad:**

English Version

**Ergonomics of the thermal environment - Evaluation of the  
thermal environment in vehicles - Part 3: Evaluation of thermal  
comfort using human subjects (ISO 14505-3:2006)**

Ergonomie des ambiances thermiques - Évaluation des  
ambiances thermiques dans les véhicules - Partie 3:  
Évaluation du confort thermique en ayant recours à des  
sujets humains (ISO 14505-3:2006)

Ergonomie der thermischen Umgebung - Bewertung der  
thermischen Umgebungen in Fahrzeugen - Teil 3:  
Bewertung der thermischen Behaglichkeit durch  
Versuchspersonen (ISO 14505-3:2006)

This European Standard was approved by CEN on 12 May 2006.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN ISO 14505-3:2006) 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 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 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## Endorsement notice

The text of ISO 14505-3:2006 has been approved by CEN as EN ISO 14505-3:2006 without any modifications.

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thermiques dans les véhicules —*

*Partie 3: Évaluation du confort thermique en ayant recours à des sujets  
humains*



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Published in Switzerland

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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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14505-3 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 5, *Ergonomics of the physical environment*.

ISO 14505 consists of the following parts, under the general title *Ergonomics of the thermal environment — Evaluation of the thermal environment in vehicles*:

- *Part 1: Principles and methods for assessment of thermal stress*
- *Part 2: Determination of equivalent temperature*
- *Part 3: Evaluation of thermal comfort using human subjects*



## Introduction

Direct methods for the assessment of thermal environments (hot, moderate, cold) in vehicles involve measurements of the responses of human subjects. There are three types: subjective methods, objective methods, and behavioural methods. *Subjective methods* quantify the responses of people to an environment using subjective scales. *Objective methods* are those which quantify the physical, physiological or mental condition of a person by the use of instrumentation or measures of an output such as performance measures. *Behavioural methods* quantify or represent human behaviour in response to an environment. Each of these methods has been developed according to basic principles and the most appropriate form of the method and combination of methods used in concert for the assessment of thermal environments in vehicles will depend upon the context and vehicle environment of interest. This part of ISO 14505 provides both principles and application of methods for the assessment of thermal comfort in vehicle environments using human subjects. The most appropriate methods for evaluating thermal comfort in vehicles are subjective. The principles for the construction of subjective assessment scales are given in ISO 10551 and are used in the development of the test method specified in this part of ISO 14505. Physiological measurements on human subjects are described in ISO 9886 and are beyond the scope of this part of ISO 14505.

This part of ISO 14505 complements standards concerned with the ergonomics of thermal environments and in particular can be used together with thermal indices that are valid for use in vehicle environments.

# Ergonomics of the thermal environment — Evaluation of thermal environments in vehicles —

## Part 3: Evaluation of thermal comfort using human subjects

### 1 Scope

This part of ISO 14505 gives guidelines and specifies a standard test method for the assessment, using human subjects, of thermal comfort in vehicles. It is not restricted to any particular vehicle but provides the general principles that allow assessment and evaluation. The method can be used to determine a measure of the performance of a vehicle for conditions of interest, in terms of whether it provides thermal comfort to people or not. This can be used in vehicle development and evaluation.

This part of ISO 14505 is applicable to all types of vehicles, including cars, buses, trucks, off-road vehicles, trains, aircraft, ships, submarines, and to the cabins of cranes and similar spaces. It applies where people are enclosed in a vehicle and when they are exposed to outside conditions. For those exposed to outside conditions, such as riders of bicycles or motorcycles, drivers of open sports cars and operators of fork lift trucks without cabins, vehicle speed and weather conditions can dominate responses. The principles of assessment, however, will still apply.

This part of ISO 14505 applies to both passengers and operators of vehicles where its application does not interfere with the safe operation of the vehicle.

It presents the principles of the assessment and evaluation of thermal comfort, including the use of test methods and trials. It also presents subjective methods that can be used in assessment.

This part of ISO 14505 is a basic ergonomics standard which can contribute to the development of standards concerned with specific vehicles and products.

### 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 12894, *Ergonomics of the thermal environment — Medical supervision of individuals exposed to extreme hot or cold environments*

ISO 13731, *Ergonomics of the thermal environment — Vocabulary and symbols*