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

Part 1: Principles and methods for assessment of thermal stress

Ergonomie des ambiances thermiques — Évaluation des ambiances thermiques dans les véhicules —

Partie 1: Principes et méthodes d'évaluation de la contrainte thermique

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This first edition of ISO 14505-1 cancels and replaces ISO/TS 14505-1:2007.

The main change is as follows:

— inclusion of information from ISO 14505-4:2021.

A list of all parts in the ISO 14505 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The interaction of convective, radiative and conductive heat exchange in a vehicle compartment is very complex. External thermal loads in combination with the internal heating and ventilation system of the vehicle create a local climate that can vary considerably in space and time. Asymmetric thermal conditions arise and these are often the main cause of complaints of thermal discomfort. In vehicles without or with poor heating, ventilating and air-conditioning system (HVAC-system), thermal stress is determined largely by the impact of the ambient climatic conditions on the vehicle compartment. Subjective evaluation is integrative, as the individual combines into one reaction the combined effect of several thermal stimuli. However, it is not sufficiently detailed or accurate for repeated use. Technical measurements provide detailed and accurate information, but must be integrated in order to predict the thermal effects on humans. Since several climatic factors play a role for the final heat exchange of a person, these factors must be integrated to a measure, representing their relative importance.

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

Part 1: Principles and methods for assessment of thermal stress

1 Scope

This document gives guidelines for the assessment of thermal stress inside vehicles used for land, sea and air operation. It offers information about the assessment of hot, cold as well as moderate thermal environments by referring to different methods and specifying the constraints and necessary adjustments for the special case of vehicle climate assessment.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 13731, *Ergonomics of the thermal environment — Vocabulary and symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13731 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
cold stress
climatic conditions under which body heat loss is just equal to, or too large for, heat balance at the expense of significant and sometimes uncompensated physiological strain

3.2
equivalent temperature
temperature of a standard homogenous space in which a person exchanges the same heat loss by convection and radiation as in the actual conditions under assessment

Note 1 to entry: The standard homogenous space is defined as an environment in which the mean radiant temperature is equal to the air temperature and there is zero air velocity.

3.3
heat stress
climatic conditions under which the body heat loss is just equal to, or too small for, heat balance at the expense of significant and sometimes uncompensated physiological strain (heat storage)

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