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Ergonomie de l'environnement thermique - Détermination du métabolisme énergétique (ISO 8996:2021)

Ergonomie der thermischen Umgebung - Bestimmung des körpereigenen Energieumsatzes (ISO 8996:2021)

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European foreword

This document (EN ISO 8996:2021) 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of an identical text or by endorsement, at the latest by June 2022, and conflicting national standards shall be withdrawn at the latest by June 2022.

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INTERNATIONAL STANDARD

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Ergonomics of the thermal environment — Determination of metabolic rate

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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 documents 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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This document was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 5, *Ergonomics of the physical environment*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 122, *Ergonomics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 8996:2004), which has been technically revised.

The main changes to the previous edition are as follows:

— The metabolic rate associated with a given task and estimated using the methods described in this document is expressed in watts.

— At level 1, Screening, the method classifying metabolic rate according to occupation has been removed, and revised procedures are provided for the evaluation of metabolic rate for given activities (level 2, Observation) and when using heart rate (level 3, Analysis).

— The accuracy of the methods for estimating the metabolic rate has been reevaluated in light of the recent literature and consequently the integral method is no longer recommended at level 4, Expertise.

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Introduction

The metabolic rate, as a conversion of chemical into mechanical and thermal energy, measures the energetic cost of muscular load and gives a quantitative estimate of the activity. Metabolic rate is an important determinant of the comfort or the strain resulting from exposure to a thermal environment. In particular, in hot climates, the high levels of metabolic heat production associated with muscular work aggravate heat stress, as large amounts of heat need to be dissipated, mostly by sweat evaporation. On the contrary, in cold environments, high levels of metabolic heat production help to compensate for excessive heat losses through the skin and therefore reduce the cold strain.

The estimations, tables and other data included in this document concern the general working population. Corrections can be needed when dealing with special populations, including children, aged persons or people with physical disabilities. Personal characteristics, such as body mass, may be used if the body is moved due to walking or climbing (Annex B). Gender, age and body mass are considered in Annex C for the evaluation of the metabolic rate from heart rate.

INTERNATIONAL STANDARD ISO 8996:2021(E)

Ergonomics of the thermal environment — Determination of metabolic rate

1 Scope

This document specifies different methods for the determination of metabolic rate in the context of ergonomics of the thermal working environment. It can also be used for other applications, e.g. the assessment of working practices, the energetic cost of specific jobs or sport activities and the total energy cost of an activity. The methods are classified in four levels of increasing accuracy: level 1, Screening, with a table giving examples of activities with low, moderate and high metabolic rates; level 2, Observation, where the metabolic rate is estimated by a time and motion study; level 3, Analysis, where the metabolic rate is estimated from heart rate recordings or accelerometers measurements; and level 4, Expertise, where more sophisticated techniques are described. The procedure to put into practice these methods is presented and the uncertainties are discussed.

2 Normative references

There are no normative references in this document.