INTERNATIONAL STANDARD

ISO 7730

Second edition
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Moderate thermal environments — Determination of the PMV and PPD indices and specification of the conditions for thermal comfort

Ambiances thermiques modérées — Détermination des indices PMV et PPD et spécifications des conditions de confort thermique

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Contents

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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.

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 7730 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 5, *Ergonomics of the physical environment*.

This second edition cancels and replaces the first edition (ISO 7730:1984), of which it constitutes a technical revision.

Annexes A, B and C form an integral part of this International Standard. Annexes D, E and F are for information only.

Introduction

This International Standard is one of a series of standards, specifying methods of measuring and evaluating moderate and extreme thermal environments to which man is exposed.

This International Standard covers the evaluation of moderate thermal environments.

Man's thermal sensation is mainly related to the thermal balance of his body as a whole. This balance is influenced by his physical activity and clothing, as well as the environmental parameters: air temperature, mean radiant temperature, air velocity and air humidity.

When these factors have been estimated or measured, the thermal sensation for the body as a whole can be predicted by calculating the predicted mean vote (PMV) index as described in clause 3.

The predicted percentage of dissatisfied (PPD) index provides information on thermal discomfort or thermal dissatisfaction by predicting the percentage of people likely to feel too hot or too cold in a given environment. The PPD can be obtained from the PMV as described in clause 4.

Thermal discomfort may also be caused by an unwanted local cooling (or heating) of the body. The most common local discomfort is draught, defined as a local cooling of the body caused by air movement. Clause 5 describes how the percentage of dissatisfied due to draught can be predicted from the model of draught rating.

Clause 6 deals with specifications on thermal environmental conditions acceptable for comfort. Dissatisfaction may be caused by hot or cold discomfort for the body as a whole. Comfort limits can in this case be expressed by the PMV and PPD indices. But thermal dissatisfaction may also be caused by draught and comfort limits may be expressed by the model of draught rating.

Recommended comfort requirements are given separately in annex D. If required, wider thermal comfort limits than recommended in annex D may be established following the principles laid down in this International Standard.

Moderate thermal environments — Determination of the PMV and PPD indices and specification of the conditions for thermal comfort

1 Scope

The purpose of this International Standard is

a) to present a method for predicting the thermal sensation and the degree of discomfort (thermal dissatisfaction) of people exposed to moderate thermal environments, and

b) to specify acceptable thermal environmental conditions for comfort.

The International Standard applies to healthy men and women. It was originally based on studies of North American and European subjects but agrees also well with recent studies of Japanese subjects exposed to moderate thermal environments. It is expected to apply with good approximation in most parts of the world, but ethnic and national-geographic deviations may occur and require further studies. It applies to people exposed to indoor environments where the aim is to attain thermal comfort, or indoor environments where moderate deviations from comfort occur. In extreme thermal environments other International Standards apply (see clause 2 and annex F). Deviations may occur for sick and disabled people. This International Standard may be used in the design of new environments or in assessing existing ones. It has been prepared for working environments but can be applied to any kind of environment.

1) To be published.

2 Normative references

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

ISO 7726:1985, *Thermal environments — Instruments and methods for measuring physical quantities.*

ISO 8996:1990, *Ergonomics — Determination of metabolic heat production.*

ISO 9920:—[1], *Ergonomics of the thermal environment — Estimation of the thermal insulation and evaporative resistance of a clothing ensemble.*

3 Predicted mean vote (PMV)

3.1 Determination

The PMV is an index that predicts the mean value of the votes of a large group of persons on the following 7-point thermal sensation scale: