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**Ergonomics of the physical  
environment — Subjective judgement  
scales for assessing physical  
environments**

*Ergonomie de l'environnement physique — Échelles de jugements  
subjectifs pour l'évaluation des environnements physiques*





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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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://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*.

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](http://www.iso.org/members.html).

This second edition cancels and replaces the first edition (ISO 10551:1995), which has been technically revised. The main changes compared to the previous edition are as follows:

- the title has been changed;
- the Scope has been reworded;
- new references have been added to [Clause 2](#);
- new entries have been added to [Clause 3](#);
- in [5.2.1](#), a unipolar scale has been added;
- [Annex B](#) has been changed;
- [Annexes C to G](#) have been added.

## Introduction

By using this document, you can construct subjective scales that can be used to ask people how they feel about their physical environment. That is whether they find it too hot, whether there is any noise and if it is annoying, if the light is too bright, is it “smelly” and so on. By constructing the scales and using them correctly, you can see, in a cost-effective way, how people find the environment. The information can be applied to report on the environmental quality and to work out how to improve the environment.

People are exposed to a range of physical environments which can affect their health and safety, comfort and performance. An important method for assessing physical environments, particularly when considering psychological constructs such as comfort or satisfaction, is to use subjective scales. The type of scale used and how it is administered is important in influencing the subjective responses of people. There are principles for constructing scales and procedures for administering them that reduce bias and ensure validity and reliability of response. There are also generic types of scale that can be used across environmental stimuli, for example, scales on which people rate sensation or comfort or acceptability or preference and so on.

This document provides a description of principles of scale construction and procedures for use. It also provides examples of commonly used scales across environmental components. This document does not standardize any particular scale but it provides the principles upon which appropriate scales can be constructed. It is needed to provide consistency in the production of valid and reliable scales. It is particularly useful to people who wish to conduct an environmental survey, for example to assess post occupant satisfaction of new or existing buildings or other spaces, environments where dissatisfaction occurs and a diagnosis of the problems is required and for people who are investigating the relationship between conditions in the physical environment and human perception. A consistent approach to subjective scale construction and use also allows a meaningful comparison of data obtained from investigations internationally.

This document forms part of a group of international standards on the assessment of comfort, stress and strain in physical environments.

This series is concerned, in particular, with:

- 1) establishing specifications on methods for measuring and estimating the characteristic physical parameters of environments;
- 2) establishing methods for assessing stress in environments.

This document proposes a set of specifications on direct expert assessment of comfort/discomfort expressed by persons subjected to various degrees of stress during periods spent in physical environments. The data provided by this assessment can be used on its own or to supplement physical and physiological methods of assessing loads. The methods belong to a psychological approach consisting in gathering, as appropriate, the on-site opinions of persons exposed to the conditions under consideration (diagnosis) and, thus, can complement data provided by predictive approaches described elsewhere in this group. The information provided in this document can be used to construct valid subjective scales for use in determining how people feel in their physical environment. This document does not give guidance on questionnaire design and application although the scales may be used in the construction of questionnaires.

If persons exposed to environments are to be asked about their corresponding experiences or information requested on their cultural attitude in order to obtain the most appropriate subjective judgement scales, favourable relationships may usefully be established between these persons and the organization responsible, through the persons conducting the ergonomic investigation.

The environments which lend themselves to the application of subjective judgement scales relate to conditions which differ to a moderate degree from comfortable conditions. Under extreme conditions, physical and physiological assessment methods of the environmental load are preferred, provided that their results can be used as criteria for a decision. In particular, tolerance limits for load cannot be confidently based on subjective judgements and need to be decided in view of accepted health risk

criteria. The decision of whether a person is exposed to an extreme environment is not left to the person exposed as their judgement can be impaired by the conditions.

The opinions held by persons about their environment have a value in themselves. It is up to the ergonomist whether or not to take them into account. The reputation of these data for lack of reliability does not justify dismissing them out of hand. The aim of this document is precisely to improve their reliability by specifying the appropriate tools to use in collecting them and the requirement for using them.

# Ergonomics of the physical environment — Subjective judgement scales for assessing physical environments

## 1 Scope

This document presents principles and examples of practical application for the construction of appropriate subjective scales for use in the assessment and evaluation of the physical environment. It does not standardize particular scales.

It considers scales of perception, comfort, preference, acceptability, expression form and tolerance, and environmental components such as thermal, visual, air quality, acoustic and vibration.

It does not consider other scales such as:

- scales related to the effects of the environment on the ability to read displays or signs, on manual performance or on psychological conditions such as mood, etc.;
- scales related to pain or scales related to stimuli that can lead to injury.

This document does not present principles of surveys (see Note) or questionnaire design. However, the scales that are developed using this document can be incorporated into surveys or questionnaires.

**NOTE** Environmental surveys are described in ISO 28802. ISO 28802 includes scales that are complementary to, and based upon, the principles of scale construction that are described in this document.

## 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 apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

## 4 Subjective judgement scales for physical environments: Principles of scale construction and use

There are a number of subjective judgement scales for physical environments. They differ in whether emphasis is placed on some aspect of judgement:

- perceptual or affective (evaluative and preferential);
- global (encompassing the whole environment or organism) or localized;
- present or past;