
**Building environment design — Indoor air
quality — Methods of expressing the
quality of indoor air for human
occupancy**

*Conception de l'environnement des bâtiments — Qualité de l'air
intérieur — Méthodes d'expression de la qualité de l'air intérieur pour
une occupation humaine*



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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 16814 was prepared by Technical Committee ISO/TC 205, *Building environment design*.

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Introduction

This document is one of a series of International Standards intended for use in the design of buildings and heating, ventilation and air conditioning systems. This series of International Standards specifies the methods of deriving design criteria for new buildings and systems and the retrofit of existing buildings for acceptable indoor environment. The indoor environment includes thermal, acoustic and lighting conditions, and indoor air quality (IAQ).

This International Standard covers methods of expressing IAQ and incorporating the goal of achieving good IAQ into the design process.

This International Standard recognizes that local laws, directives and regulations always apply and this document allows a compliance path which is consistent with such requirements.

The framework is established by the general principle documents.

This document does not prescribe a specific method but rather refers to existing methods in published standards and guidance, as referenced in this document. The referenced methods can be used to specify ventilation rates and other design requirements. The methods have in common the fact that they are based on a consideration of human health and/or comfort requirements. Therefore, the aim of the methods is to control indoor air pollutants to concentration levels below which, under the prevailing hygro-thermal conditions, the pollutants do not have the potential to

- cause a significant risk of adverse health effects,
- adversely affect the comfort of the majority of occupants.

The pollutants considered include human bioeffluents, which have often been the principal consideration for IAQ and ventilation, but also all groups and sources of pollutants that can reasonably be anticipated to occur in the building being designed. The pollutants to be considered can, depending on the sources present, include

- volatile organic compounds (VOCs) and other organics, such as formaldehyde,
- environmental tobacco smoke (ETS),
- radon,
- other inorganic gases, such as ozone, carbon monoxide and oxides of nitrogen,
- viable particles, including viruses, bacteria and fungal spores,
- non-viable biological pollutants, such as particles of mites or fungi and their metabolic products,
- non-viable particles, such as dusts and fibres.

In addition, carbon may be considered as an indicator of the ventilation rate rather than as a health risk in its own right.

Depending on the method selected, the designer can apply a range of approaches to achieve a good IAQ. In addition to the provision of ventilation, some consideration is given to sources of pollution and their control. When specific contaminant sources are present, it is necessary to consider alternative or additional control measures, such as air cleaning or local exhaust ventilation.

Again, depending on the method selected, the designer has the option of setting different target levels of IAQ. Furthermore, different methods can lead to different decisions in relation to, for example, ventilation rate. It is also true that different designers can reach different decisions, even when using the same method, where the method requires the designer to make assumptions or interpretations. Nevertheless, following a rational and documented process is expected to (a) enhance the design and (b) make it easier to address any problems that do arise and incorporate experience gained into future designs.

NOTE See Reference [44] for WHO recommendations on smoking areas in buildings.

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Building environment design — Indoor air quality — Methods of expressing the quality of indoor air for human occupancy

1 Scope

This International Standard is intended

- to specify methods to express the quality of indoor air suitable for human occupancy,
- to allow several acceptable target levels of IAQ, depending on local requirements, constraints and expectations.

This International Standard applies to

- the design of new buildings and their systems and the retrofit of existing buildings and systems,
- indoor environments where the major concern is that of human occupants,
- buildings having any combination of mechanical and natural ventilation,
- commercial and institutional buildings.

This International Standard does not apply to residential buildings, industrial buildings and hospitals although those parts of such buildings that are similar to commercial buildings are covered.

The requirements of this International Standard might not achieve acceptable IAQ for all people in all buildings, due to one or more of the following sources of uncertainty.

- The outdoor air brought into the building can be unacceptable or might not be adequately cleaned.
- Indoor air has a wide diversity of sources and contaminants.
- There are many factors that affect occupant perception and acceptance of IAQ, such as air temperature, humidity, noise, odours, lighting and psychological stress.
- There is a range of susceptibility and preference in the population.

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 16813, *Building environment design — Indoor environment — General principles*