



# **ASHRAE GUIDELINE**

## **Interactions Affecting the Achievement of Acceptable Indoor Environments**

Approved by the ASHRAE Standards Committee on January 29, 2011, and by the ASHRAE Board of Directors on February 2, 2011.

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#### NOTE

Approved addenda, errata, or interpretations for this guideline can be downloaded free of charge from the ASHRAE Web site at [www.ashrae.org/technology](http://www.ashrae.org/technology).

**(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)**

## FOREWORD

*This guideline is intended to provide users with the currently available knowledge on the effects of interactions on achieving acceptable indoor environments. In contrast to ASHRAE Standard 55 and the ASHRAE series 62 standards (ASHRAE 2004, 2007a, 2007b), which address thermal comfort and ventilation/indoor air quality (IAQ) respectively but separately, this document emphasizes interactions among these and other factors that determine indoor environmental quality (IEQ) with the intention of increasing understanding of how to improve the acceptability of the indoor environment as a whole. However, current knowledge on interactions between and among the factors that most affect occupants of indoor environments is limited. Meeting the requirements of standards for various aspects of indoor environments, such as air quality, thermal conditions, acoustics, and illumination, is not always sufficient to ensure the overall acceptability of the environment to all relevant parties. This guideline presents a preliminary effort to describe the interactions relevant for achieving acceptable indoor environments. It can provide assistance to building design professionals and building operators as well as investigators and researchers. The guideline project committee believes the guideline will call attention to the significance of interactive effects in determining the acceptability and limitations of an indoor environment.*

*This guideline is intended to help people understand and use all of the documents that deal with indoor environments, such as ASHRAE Standards 55, 62.1, and 62.2 (ASHRAE 2004, 2007a, 2007b) and Indoor Air Quality Guide: Best Practices for Design, Construction, and Commissioning (ASHRAE 2009a), as a whole rather than separately. The guideline focuses on thermal conditions, IAQ, and the interactions between these environmental conditions as they affect the acceptability of the indoor environment. In addition, but to a lesser extent, the guideline also addresses mechanical energy (including noise and vibration) and electromagnetic radiation (including environmental lighting and ultraviolet and infrared radiation) as additional sources of interactions affecting the acceptability of the indoor environment as well as limitations that exist in the ability to achieve acceptability.*

*The guideline reflects the current scientific data known to the project committee or brought to its attention by commenters and accepted by the committee as valid and relevant. Thus the information in this guideline represents the professional judgment of the project committee members.*

*Operation and maintenance of buildings can introduce environmental stressors or simply fail to remove those that occur or accumulate over time. These stressors may introduce further interactions. Designers must consider operations and maintenance in the selection and specification of building features and the parameters to be adjusted by the environmental control systems and features of a building.*

*This guideline does not make recommendations or provide explicit guidance for many of the issues covered. The*

*state of the science and its application is not yet advanced sufficiently to inform such guidance. However, in some cases the committee has indicated what appear to be the implications of the available information. This guideline is intended to summarize the available information and to make designers and others who are responsible for the quality of the indoor environment aware of issues that should be addressed in their work.*

*Designers and building operators should be aware of the major interactions that have potential to affect the indoor environment. Although there are other important factors that determine the acceptability of the indoor environment but have not been identified or addressed in this document, the project committee anticipates that future versions of this guideline will include more details on these factors as well as new information on the factors included in this version.*

## 1. PURPOSE

The purpose of this guideline is to provide guidance regarding factors and their interactions as they affect the indoor environmental conditions acceptable to human occupants with regard to comfort and health.

## 2. SCOPE

**2.1** This guideline provides guidance regarding factors and their interactions and includes thermal comfort, indoor air quality, sound and vibration, and non-ionizing electromagnetic radiation (including visible light).

**2.2** It applies to the design, construction, commissioning, operation, and maintenance of buildings.

**2.3** It applies to all indoor or enclosed spaces that people may occupy, with the following exceptions:

- a. Areas of buildings intended primarily for manufacturing, commercial processing, or industrial processing.
- b. Parking garages.
- c. Storage spaces intended for only incidental human occupancy.
- d. Other such enclosed spaces not designed primarily for human occupancy.

## 3. DEFINITIONS

**acceptable indoor environment:** an environment that has been determined to be acceptable according to the process that defines acceptability and the individuals involved in this process. Acceptability of an indoor environment is the determination of any affected party that the environment is suitable for the purposes of the intended occupancy. It should be noted that acceptability is not identical with the satisfaction of most or all occupants, which would generally require a somewhat higher level of environmental quality. Ultimately, acceptability is defined by the process used to determine it as well as by the individuals who make the evaluations, assessments, or judgments that are part of the process. These individuals decide what is acceptable for them, whether they are occupants, operators, owners, or visitors. This guideline recognizes