

Standard 55-2023



ANSI/ASHRAE Standard 55-2023, *Thermal Environmental Conditions for Human Occupancy*

Purpose

Specifies the combinations of indoor environmental factors (temperature, thermal radiation, humidity, and air speed) and personal factors (activity and clothing) that will produce satisfactory thermal environmental conditions to a substantial majority (>80%) of occupants within a space.

Significance

Roughly 40%¹ of building occupants are dissatisfied with the thermal environment, which is why Standard 55 is important. Improvements in architecture, building envelope and interior elements may help improve thermal comfort and reduce energy use. Increasing the level of personal control over the thermal environment also increases thermal comfort. By considering the right combination of thermal comfort factors in architectural, enclosure and interior design, HVAC systems can be strategically selected to enhance indoor environmental quality (IEQ) while also promoting energy preservation and conservation. Thermal discomfort issues (being too hot or too cold) are the primary drivers for increases in heating and cooling utility bills.

Compliance with Standard 55 reduces the probability of thermal discomfort by promoting strategic combinations of enclosure (envelope) design with mechanical design and interior systems. The standard provides criteria for evaluating comfort in existing buildings, as well as requirements and calculation procedures for design compliance.

While building codes generally consider only air temperature, Standard 55 elevates thermal satisfaction by considering several other factors contributing to thermal comfort, including personal as well as environmental factors. This standard can be used in different building types, including residential, commercial and institutional buildings.

Scope

This standard addresses six general environmental and personal factors: temperature, thermal radiation, humidity, air speed, personal clothing, and activity level. It specifies thermal environmental conditions acceptable for healthy adults in indoor spaces designed for human occupancy for at least 15 minutes. This standard does not cover non-thermal environmental factors such as air quality, acoustics, illumination or other physical, chemical, or biological space contaminants. The standard shall not be used to override any safety, health, or critical process requirements.

Use by Governments and Certification Organizations

- Standard 55 is referenced by the National Institute for Occupational Safety and Health.²
- Standard 55 and thermal comfort are critical considerations in Passive House, Active House, Well Standard, Living Building Challenge, and the LEED certification.
- Standard 55 is referenced in ASHRAE Standards and Guidelines that address IAQ (Standard 62.2, *Ventilation and Acceptable Indoor Air Quality in Residential Buildings*, and Guideline 10, *Interactions Affecting the Achievement of Acceptable Indoor Environments*), energy (Standard 90.2, *High-Performance Energy Design of Residential Buildings*) and sustainability (*International Green Construction Code* and ASHRAE Standard 189.1, *Standard for the Design of a High-Performance Green Buildings*).

¹Buildings & Cities Journal. 2(1):166–184, 2021. Lessons Learned from 20 Years of CBE's Occupant Surveys. <https://journal-buildingscities.org/articles/10.5334/bc.76>

²Center for Disease Control and Prevention: The National Institute for Occupational Safety and Health. February 25, 2022. Indoor Environmental Quality. <https://www.cdc.gov/niosh/topics/indoorenv/hvac.html>

Changes and Improvements from Standard 55-2020

- Includes a new method for the assessment of local thermal discomfort with vertical air temperature gradient between the head and ankle levels.
- Broadens the applicability of the standard to cover additional metabolic rates associated with different activity levels of occupants.
- Consolidates and simplifies the calculation methods in the standard, which are now limited to two methods, standard and adaptive, as well as guidance on when to use each.
- Overhauls the documentation requirements (Section 6), which include a new example spreadsheet compliance form.
- Contains updated examples to make the process easier to follow.