



ADDENDA

**ANSI/ASHRAE Addendum h to
ANSI/ASHRAE Standard 55-2017**

Thermal Environmental Conditions for Human Occupancy

Approved by ASHRAE and the American National Standards Institute on January 29, 2021.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASHRAE® website (<https://www.ashrae.org/continuous-maintenance>).

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ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

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FOREWORD

Addendum h to Standard 55-2017 updates normative references to updated versions of ASHRAE publications and also replaces the normative reference to the ASHRAE Thermal Comfort Tool. The current reference to the ASHRAE Thermal Comfort Tool v2 has not been valid for Standard 55 since the 2010 version of the Standard. In the body of the standard, all instances of "ASHRAE Thermal Comfort Tool" have been replaced with "Thermal Comfort Tool." The normative reference in Section 8 has been replaced with a reference to the CBE Thermal Comfort Tool, which is valid with Standard 55-2017 and all subsequent addenda. This version will also be kept up to date with all approved future addenda. In addition to the Thermal Comfort Tool reference changes, normative references to Standards 90.1, 62.1, and 62.2 have been updated to the latest versions. Standards 62.1 and 62.2 are only referenced in Figures 5.3.1.1A, 5.3.1.1B, and 5.3.2.B, which were added by Addendum d. Finally, the references to ASHRAE Handbook—Fundamentals have been updated to the relevant sections of the most current version of the Handbook and consolidated to a single reference. The text as modified below reflects changes previously made to the standard by Addendum d.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum h to Standard 55-2017

Modify Section 5.3.1.2 as shown.

5.3.1.2 Methodology. The computer code³ in Normative Appendix B is to be used with this standard. Compliance is achieved if $-0.5 < PMV < +0.5$. Alternative methods are permitted. If any other method is used, it is the user's responsibility to verify and document that the method used yields the same results. The ~~ASHRAE~~ Thermal Comfort Tool³ is permitted to be used to comply with this section.

Modify Section 5.3.2.2 as shown.

Figure 5.3.2B provides a graphical example of a comfort zone using the Elevated Air Speed Comfort Zone Method with occupant control (lighter shade zone; Section 5.3.2.3) compared to one using the Analytical Comfort Zone Method (darker shade zone; Section 5.3.1). Direct use of this chart to comply with the Elevated Air Speed Comfort Zone Method with occupant control using the lighter shade zone is allowable for the specific input conditions described on the chart.

Alternative methods are permitted. If any other method is used, the user shall verify and document that the method used yields the same results. The ~~ASHRAE~~ Thermal Comfort Tool³ is permitted to be used to comply with this section.

When direct beam solar radiation falls on a representative occupant, the mean radiant temperature (t_r) shall account for long-wave mean radiant temperature (t_{rlw}) and short-wave mean radiant temperature (t_{rsw}) in accordance with Section 5.3.1.2.1.

Update reference in Section 6.2 as shown.

6.2 Documentation. The method and design conditions appropriate for the intended use of the building shall be selected and documented as follows. (**Informative Note:** Some of the requirements in items (a) through (h) below are not applicable to naturally conditioned buildings.)

- a. The method of design compliance shall be stated for each space and/or system: Analytical Comfort Zone Method (Section 5.3.1), Elevated Air Speed Comfort Zone Method (Section 5.3.2), or the use of Section 5.4 for Occupant-Controlled Naturally Conditioned Spaces.
- b. The design operative temperature (t_o) and humidity (including any tolerance or range), the design outdoor conditions (see ~~2009~~ ASHRAE Handbook—Fundamentals¹, Chapter 14),

and total indoor loads shall be stated. The design exceedance hours (see Section 3, “Definitions”) shall be documented based on the design conditions used.

[. . .]

Update Section 8 normative references as shown.

8. REFERENCES

1. ASHRAE. 2017~~09~~. ~~2009~~ *ASHRAE Handbook—Fundamentals*. Atlanta: ASHRAE.
2. ASHRAE. 201~~23~~. ANSI/ASHRAE/IES Standard 90.1-~~2013~~, *Energy Standard for Buildings Except Low-Rise Residential Buildings*. Atlanta: ASHRAE.
3. ~~ASHRAE. 2011. ASHRAE Thermal Comfort Tool CD, v2. Atlanta: ASHRAE.~~ Tartarini, F., S. Schiavon, T. Cheung, and T. Hoyt. 2020. CBE Thermal Comfort Tool: Online Tool for Thermal Comfort Calculations and Visualizations. *SoftwareX* 12 (July 2020): 100563. <https://doi.org/10.1016/j.softx.2020.100563>.
4. ASHRAE. 201~~96~~. ANSI/ASHRAE Standard 62.1-~~2016~~, *Ventilation for Acceptable Indoor Air Quality*. Atlanta: ASHRAE
5. ASHRAE. 201~~96~~. ANSI/ASHRAE Standard 62.2-~~2016~~, *Ventilation and Acceptable Indoor Air Quality in Residential Buildings*. Atlanta: ASHRAE
6. ISO. 2005. ISO 7730, *Ergonomics of the Thermal Environment—Analytical Determination and Interpretation of Thermal Comfort using Calculation of the PMV and PPD Indices and Local Thermal Comfort Criteria*. Geneva, Switzerland: International Organization for Standardization.
7. ~~ASHRAE. 2013. ASHRAE Handbook—Fundamentals. Atlanta: ASHRAE.~~

Modify Normative Appendix B normative reference as shown.

NORMATIVE APPENDIX B COMPUTER PROGRAM FOR CALCULATION OF PMV-PPD

(Reference Annex D of ISO 7730⁶. Used with permission from ISO. For additional technical information and an I-P version of the equations in this appendix, refer to the ~~ASHRAE~~ Thermal Comfort Tool³ referenced in Section 8 of this standard. The Thermal Comfort Tool allows for I-P inputs and outputs, but the algorithm is implemented in SI units.)

Update reference in Normative Appendix C as shown below.

C1. CALCULATION PROCEDURE

Solar gain to the human body is calculated using the effective radiant field (*ERF*), a measure of the net radiant energy flux to or from the human body [2013-*ASHRAE Handbook—Fundamentals*¹⁷, Chapter 9.1124]. *ERF* is expressed in W/m^2 (Btu/h/ft²), where “area” refers to body surface area. The surrounding surface temperatures of a space are expressed as mean radiant temperature t_r , which equals long-wave mean radiant temperature $t_{r,lw}$ when no solar radiation is present. The *ERF* on the human body from longwave exchange with surfaces is related to $t_{r,lw}$ by

Update reference in Informative Appendix H, Section H1 as shown.

H1. DETERMINING ACCEPTABLE THERMAL CONDITIONS IN OCCUPIED SPACES

This standard recommends a specific percentage of occupants that constitutes acceptability and values of the thermal environment associated with this percentage.

For given values of humidity, air speed, metabolic rate, and clothing insulation, a comfort zone may be determined. The comfort zone is defined in terms of a range of operative temperatures (t_o) that provide acceptable thermal environmental conditions or in terms of the combinations of air temperature and mean radiant temperature t_r that people find thermally acceptable.

See Normative Appendix A and 2009-*ASHRAE Handbook—Fundamentals*¹, Chapter 9, for procedures to calculate operative temperature t_o . Dry-bulb temperature is a proxy for operative temperature under certain conditions described in Normative Appendix A.

Modify Informative Appendix H, Section H3 as shown.

There are several computer codes available that predict PMV-PPD. The computer code in Normative Appendix B was developed for use with this standard and is incorporated into ~~ASHRAE~~

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~~Thermal Comfort Tool~~ Thermal Comfort Tool³. If any other software is used, it is the user's responsibility to verify and document that the version used yields the same results as the code in Normative Appendix B or the ~~ASHRAE Thermal Comfort Tool~~ Thermal Comfort Tool³ for the conditions for which it is applied.

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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