ADDENDA

ANSI/ASHRAE Addendum f to
ANSI/ASHRAE Standard 55-2020

Thermal Environmental Conditions for Human Occupancy

Approved by ASHRAE and the American National Standards Institute on June 30, 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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FOREWORD

Addendum f to Standard 55-2020 changes the air speed definition to account for moving occupants. Additionally, activity-generated air speed and clothing insulation adjustment for an active person are now included within the PMV code of Normative Appendix B, in order to align with ISO 7730 and the original intent of the PMV model.

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

Addendum f to Standard 55-2020

Revise Section 3 as shown. The remainder of Section 3 is unchanged.

air speed, average (V_a): the average air speed surrounding a representative occupant. The average is with respect to location and time. The spatial average is for three heights as defined for average air temperature t_a. For an occupant moving in a space the sensors shall follow the movements of the occupant. The air speed is averaged over an interval not less than one and not greater than three minutes. Variations that occur over a period greater than three minutes shall be treated as multiple different air speeds.

Revise Section 5.2.2.2 as shown. The remainder of Section 5.2.2.2 is unchanged.

[. . .]

5.2.2.2 Insulation Determination. Use one or a combination of the following methods to determine clothing insulation I_{cl}:

[. . .]

~~e. For moving occupants, it is permitted but not required to adjust any of the previous methods using the following formula:~~

$$~~I_{el,~active} = I_{el} \times (0.6 + 0.4/M)~~$$
$$~~1.2 \text{ met} < M < 2.0 \text{ met}~~$$

~~where M is the metabolic rate in mets, and I_{el} is the insulation without movement.~~

~~f.~~e. Interpolate between or extrapolate from the values given in Tables 5-3 and 5-4.

~~g.~~f. Use Figure 5-1 to determine the clothing insulation I_{cl} of a representative occupant for a day as a function of outdoor air temperature at 06:00 a.m., $t_{a(out,6)}$.

Clothing insulation I_{cl} determined in accordance with Figure 5-1 is permitted but not required to be adjusted to account for unique dress code or cultural norms using other methods in Section 5.2.2.2 or approved engineering methods.

~~h.~~g. Use measurement with thermal manikins or other approved engineering methods.

Revise Normative Appendix B as shown. The remainder of Normative Appendix B is unchanged.

NORMATIVE APPENDIX B
COMPUTER PROGRAM FOR CALCULATION OF PMV-PPD

The following code is one implementation of the PMV-PPD calculation using JavaScript in SI units. This calculation does not include discomfort risk due to local discomfort factors. The input variable "clo" in the PMV function shall be calculated using the following equation:

$$\text{clo} = I_{cl} \times (0.6 + 0.4/M) \text{ for } M \geq 1.2$$

$$\text{clo} = I_{cl} \text{ for } M < 1.2$$

where M is the metabolic rate in met units, and I_{cl} is the clothing insulation.

The input variable *vel* in the PMV function is the sum of the average air speed (V) plus the activity-generated air speed (V_{ag}) (m/s [fpm]). Where V_{ag} is the activity-generated air speed caused by motion of individual body parts. It is a function of metabolic rate and is added to the average air speed to determine convective cooling of the body. V_{ag} is assumed to be 0 for metabolic rates equal and lower than 1 met and otherwise equal to

$$V_{ag} = 0.3\ (M - 1)\ \text{(m/s, °C)}$$

$$V_{ag} = 59.1\ (M - 1)\ \text{(fpm, °F)}$$

for $M > 1$ met.

```
pmv = function(ta, tr, vel, rh, met, clo, wme) {
    /*
        returns [pmv, ppd]
        ta, air temperature (°C)
        tr, mean radiant temperature (°C)
        vel, ~~relative air speed (m/s)~~average air speed (Va)+ activity-
            generated air speed (Vag)(m/s)
        rh, relative humidity (%) Used only this way to input humidity
            level
        met, metabolic rate (met)
        clo, clothing (clo)
        wme, external work, normally around 0 (met)
    */


pmv = function(ta, tr, vel, rh, met, clo, wme) {
/*
```

Revise Informative Appendix G as shown. The remainder of Informative Appendix G is unchanged.

INFORMATIVE APPENDIX G
CLOTHING INSULATION

[. . .]

Tables 5-2 and 5-3 are for a person that is not moving. Body motion decreases the insulation of a clothing ensemble by pumping air through clothing openings and/or causing air motion within the clothing. This effect varies considerably, depending on the nature of the motion (e.g., walking versus lifting) and the nature of the clothing (stretchable and snug fitting versus stiff and loose fitting). Because of this variability, accurate estimates of clothing insulation I_{cl} for an active person are not available unless measurements are made for the specific clothing under the conditions in question (e.g., with a walking manikin). An approximation of the clothing insulation for an active person is

$$I_{cl,\ active} = I_{cl} \times (0.6 + 0.4/M)$$

~~1.2 met < M < 2.0 met~~

for $M \geq 1.2$

where M is the metabolic rate in met units and I_{cl} is the insulation without activity. For metabolic rates less than or equal to 1.2 met, no adjustment for motion is required. This clothing adjustment for an active person is applied automatically as part of the PMV code as described in Normative Appendix B.

[. . .]

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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