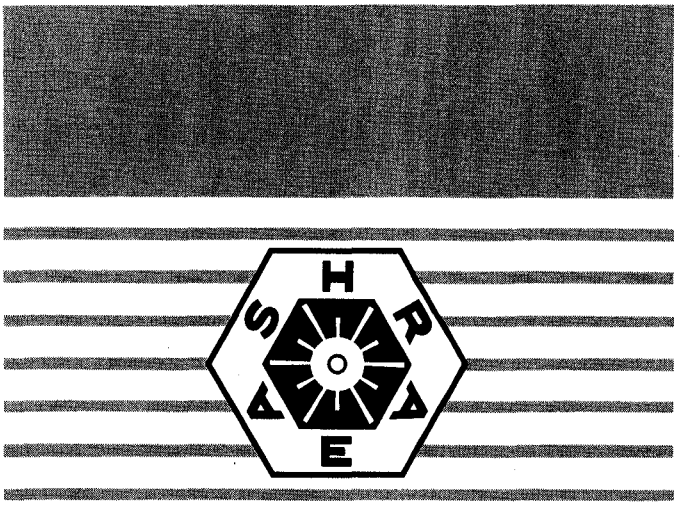

ANSI/ASHRAE 55a-1995

(Addendum to ANSI/ASHRAE 55-1992)

ASHRAE STANDARD

Addendum to

Thermal Environmental Conditions for Human Occupancy

Approved by the ASHRAE Standards Committee January 28, 1995; by the ASHRAE Board of Directors February 2, 1995; and by the American National Standards Institute April 14, 1995.

ASHRAE standards are updated on a five-year cycle; the date following the standard number is the year of approval. The latest copies may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, N.E., Atlanta, GA 30329.

ISSN 1041-2336

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

1791 Tullie Circle, NE • Atlanta, GA 30329

SPECIAL NOTE

This national voluntary consensus standard was developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Consensus is defined as "substantial agreement reached by concerned interests according to the judgment of a duly appointed authority, after a concerted attempt at resolving objections. Consensus implies much more than the concept of a simple majority but not necessarily unanimity." This definition is according to the American National Standards Institute (ANSI) of which ASHRAE is a member.

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

ASHRAE standards are prepared by a Project Committee appointed specifically for the purpose of writing the standard. The Project Committee chair and vice-chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the standard. Every effort is made to balance the concerned interests on all Project Committees.

The Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this standard,
b. participation in the next review of this standard,
c. offering constructive criticism for improving the standard,
d. permission to reprint portions of the standard.

ASHRAE INDUSTRIAL ADVERTISING POLICY ON STANDARDS

ASHRAE standards and guidelines are established to assist industry and the public by offering a uniform method of testing for rating purposes, by suggesting safe practices in designing and installing equipment, by providing proper definitions of this equipment, and by providing other information that may serve to guide the industry. The creation of ASHRAE standards and guidelines is determined by the need for them, and conformance to them in completely voluntary.

In referring to this Standard or Guideline and in marking of equipment and in advertising, no claim shall be made, either stated or implied, that the product has been approved by ASHRAE.

DISCLAIMER

ASHRAE uses its best efforts to promulgate Standards and Guidelines for the benefit of the public in light of available information and accepted industry practices. However, ASHRAE does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with ASHRAE's Standards or Guidelines or that any tests conducted under its Standards or Guidelines will be nonhazardous or free from risk.

(This foreword is not a part of this standard but is included for information purposes only.)

FOREWORD

After Board approval of the proposed ANSI/ASHRAE Standard 55-1992, a comment was received by the ASHRAE Manager of Standards regarding the rationale for the upper humidity limit of Figure 2. Because Standard 55 is a comfort standard, nonthermal environmental factors should not have been used in developing Figure 2.

The life of SPC 55-1981R was extended by the Standards Committee for the purpose of considering an early addendum to the standard. This addendum

(a) revises the standard so that nonthermal environmental factors, such as microbial growth and respiratory health, are not used and

(b) provides consistency between the text, Figure 2, and the title, purpose, and scope of the standard.

The Project Committee thanks Larry G. Berglund and Karl A. Brown for their advice and assistance in the preparation of this addendum.

Note: Strikeouts indicate deletions and shading indicates new material, unless otherwise indicated.

Revise Figure 2: Change the upper humidity limit from 60% relative humidity to 20°C (68°F) wet bulb for the summer conditions and 18°C (64°F) wet bulb for the winter conditions. The Figure 2 legend was also revised by inserting "operative temperature" between "The" and "ranges" of the second sentence. See revised Figure 2.

Revise Subsection 5.1.2 (a) and (b): Change 60% RH to 20°C (68°F) wet bulb for the summer conditions and 18°C (64°F) for the winter conditions.

Text from **5.1.2 Operative Temperature** now reads:

> ...The acceptable range of operative temperatures and humidities for the winter and summer is further defined on the psychrometric chart in Figure 2. The coordinates of the comfort zones are:
>
> **(a)** Winter: t_o = 20°C to 23.5°C (68°F to 74°F) at ~~60% RH~~ 18°C (64°F) wet bulb and t_o = 20.5°C to 24.5°C (69°F to 76°F) at 2°C (36°F) dew point. The slanting side boundaries of the winter zone correspond to 20°C and 23.5°C (68°F and 74°F) effective temperature (ET^*) lines and are loci of constant comfort or thermal sensations.
>
> **(b)** Summer: t_o = 22.5°C to 26°C (73°F to 79°F) at ~~60% RH~~ 20°C (68°F) wet bulb and t_o = 23.5°C to 27°C (74°F to 81°F) at 2°C (36°F) dew point. The slanting side boundaries of the summer zone correspond to 23°C and 26°C (73°F and 79°F) effective temperature (ET^*) lines.
>
> Note: The wet-bulb lines on Figure 2 are based on a wetness of approximately 0.20.

Revise Subsection 5.1.3 to read:

> In the zone occupied by people engaged in light, primarily sedentary activity (≤1.2 met), the humidity ~~shall~~ should conform with the limits shown in Figure 2; note that the upper and lower humidity limits are based on the maintenance of acceptable thermal conditions based solely on comfort considerations including thermal sensation, skin wettedness, skin dryness, and eye irritation. The conditions allowed in Standard 55 may be different from those specified in other standards such as Standard 62, Standard 90.1 and Standard 90.2, and special precautions may be required to assure overall occupant acceptability even though the conditions of Standard 55 have been met. (It should be noted that environmental factors outside the scope of this standard, such as physical, chemical, or biological contaminants, may also be partially dependent on indoor humidity levels during occupied periods.) ~~considerations of dry skin, eye irritation, respiratory health, microbial growth, and other moisture related phenomena. It should be noted that temperatures of building surfaces and materials (e.g., windows, ductwork) must be controlled to avoid condensation.~~

Revise Section 8 to read:

> To comply with this standard, the appropriate requirements of Section 5 shall be met under conditions not exceeding design weather conditions. For example, design conditions include the design weather conditions chosen by the engineer as appropriate for the intended use of the building. Design weather data are statistically based and established to explicitly acknowledge certain percentages of exceedence (i.e., 1% design, four-month summer basis, 29 hours of exceedence). This recognizes the impracticality of providing an HVAC system that can meet all loads under all weather conditions encountered in its lifetime. Thus, in practice, the requirements of the standard may not be met during the number of hours equivalent to the design weather data exceedence percentage or during excursions from the design conditions.

Revise Section 9 References by adding:

ANSI/ASHRAE 62-1989, Ventilation for Acceptable Indoor Air Quality.

Revise APPENDIX A, Bibliography/Paragraph 5.1.3 to add:

Anderson, I., G.R. Lundqvist, and D.F. Proctor. 1973. Human perception of humidity under four controlled conditions. *Archives of Environmental Health* 26:22-27.

ASHRAE. 1993. Physiological principles for comfort and health, chapter 8, pp. 8.1-8.29. *1993 ASHRAE Handbook—Fundamentals.* Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

Berglund, L.G. 1989. Comfort criteria in a low-humidity environment. RP2732-10. Palo Alto, CA: Electric Power Research Institute.

Tanabe, S., K. Kimura, and T. Hara. 1987. Thermal comfort requirements during the summer season in Japan. *ASHRAE Transactions* 93 (1): 564-577.

Revise APPENDIX A, Bibliography/Paragraph 5.1.3 to delete:

Green, G.H. 1979. The effect of indoor relative humidity on colds. *ASHRAE Transactions* 85: 747-757.

Morey, P.R., and J.E. Woods. 1987. Indoor air quality in health care facilities. *Occupational Medicine: State of the Art Reviews* 2: 547-563.

Morey, P.R., M.J. Hodgson, W.G. Sorenson, G.J. Kullman, W.W. Rhodes, and G.S. Visvesvara. 1986. Environmental studies in moldy office buildings. *ASHRAE Transactions* 92(1B):399-419.

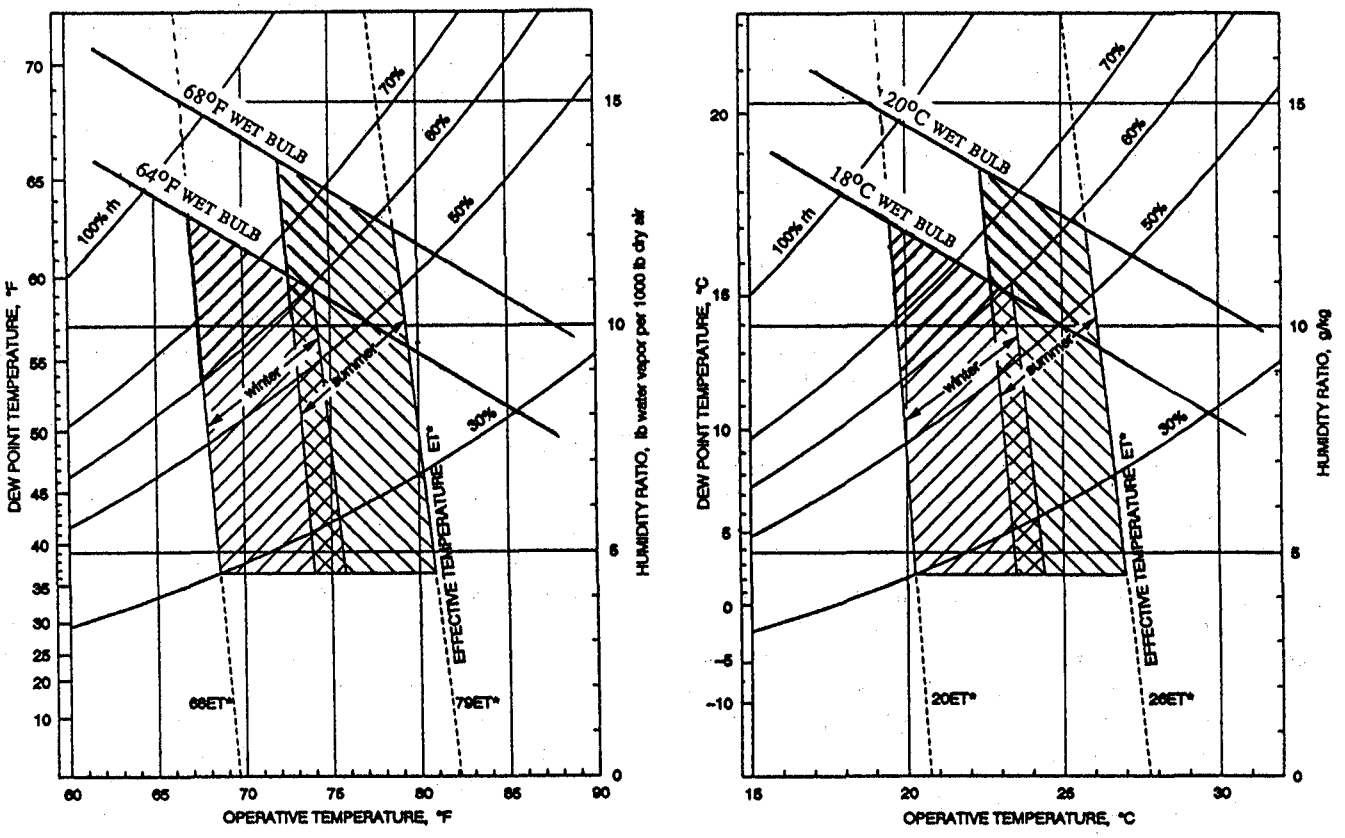

Figure 2 *Acceptable ranges of operative temperature and humidity for people in typical summer and winter clothing during light, primarily sedentary activity (≤ 1.2 met). The operative temperature ranges are based on a 10% dissatisfaction criterion.*

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 effects 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 transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.