

**BSR/ASHRAE/IES Addendum cc**

**to ANSI/ASHRAE/IES Standard 90.1-2022**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Public Review Draft**

Proposed Addendum cc to

Standard 90.1-2022, Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

**First Public Review (March 2025)**

**(Draft Shows Proposed Changes to Current Standard)**

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**FOREWORD**

*This addendum is a routine update to the Section 13 references to ensure the most updated information will be published when the next standard is released in 2025.*

***[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]***

**Addendum cc to 90.1-2022**

**13. NORMATIVE REFERENCES**

**Reference Section**

**Air Conditioning, Heating and Refrigeration Institute (AHRI) 2311 Wilson Blvd., Arlington, VA 22201**

~~AHRI 210/240 (2017) with addendum 1 Unitary Air Conditioning and Air-Source Heat Pump Equipment~~

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AHRI 210/240-2023 (2020) Unitary Air Conditioning and Air-Source Heat Pump Equipment

~~(applicable on or after 1/1/2023)~~

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**~~American Architectural Manufacturers Association (AAMA)~~ Fenestration and Glazing Industry Alliance (FGIA)**

**1900 E. Golf Rd, Suite 1250, Schaumburg, IL 60173-4268**

**Canadian Standards Association (CSA)**

**78 Rexdale Blvd., Toronto, On, Canada M9W 1R3**

**Window and Door Manufacturers Association (WDMA) ~~2025 M Street, NW, Suite 800~~ 2001 K Street, NW, 3rd floor, Washington, DC ~~20036~~20006**

AAMA/WDMA/CSA 101/I.S.2/A440-17(R2022) NAFS-North American Fenestration Standard/Specification for

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**American Iron and Steel Institute (AISI) 25 Massachusetts Avenue, NW, Suite 800**

**Washington, DC 20001**

ANSI/AISI S250-~~20~~21 North American Standard for Thermal Transmittance of Building Envelopes with Cold-Formed Steel Framing

**~~American National Standards Institute (ANSI)~~**

**~~1899 L Street, NW, 11th Floor, Washington, DC 20036~~**

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**American Society of Mechanical Engineers (ASME) Two Park Avenue, New York, NY 10016-5990**

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**ASHRAE**

**180 Technology Parkway, Peachtree Corners, GA 30092**

ANSI/ASHRAE Standard 51-2016 Laboratory Methods of Testing Fans for Certified Aerodynamic

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ASHRAE Standard 241-2023 Control of Infection Aerosols 6.5.3.8.2

~~ANSI/ASHRAE/IESNA Standard 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings 6.4.1.2.1~~

~~ANSI/ASHRAE/IESNA Standard 90.1-2013 Energy Standard for Buildings Except Low-Rise Residential Buildings 6.4.1.2.1~~

~~ANSI/ASHRAE/IES Standard 90.1-2016 Energy Standard for Buildings Except Low-Rise Residential Buildings 6.4.1.2.1~~

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**Association of Home Appliance Manufacturers (AHAM)**

|  |  |  |
| --- | --- | --- |
| **1111 19th Street NW, Suite 402, Washington, DC 20036** | | |
| ANSI/AHAM HRF-1-~~2016~~2019 | Energy and Internal Volume of Refrigerating Appliances | Table G3.10.1 |
| ANSI/AHAM RAC-1-2020 | Room Air Conditioners | Table 6.8.1-4 |
| **ASTM International**  **100 Barr Harbor Dr., West Conshohocken, PA 19428-2959** | | |
| ASTM C90-~~16~~24A | Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units | 5.5.3.2, A3.1.1, A9.4.4 |
| ASTM C177-19~~e1~~EO1 | Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmittance Properties by Means of the Guarded-Hot- Plate Apparatus | A9.3.1 |
| ASTM C272/C272M-18(2024) | Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions | 5.8.1.7.3 |
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| ASTM C835-06 ~~(2013) e1~~(2020) | Standard Test Method for Total Hemispherical Emittance of Surfaces up to 1400°C | 5.5.3.2.2 |
| ASTM C1224 (2020) | Standard Specification for Reflective Insulation for Building Applications | A9.4.2,  Table A9.4.2-2 |
| ASTM C1363-~~19~~24 | Standard Test Method for the Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus | A3.3.3.2, A9.3.1, A9.3.2, A10.1 |
| ASTM C1371-15(2022) | Standard Test Method for Determination of Emittance of Materials Near Room Temperature using Portable Emissometers. | 5.5.3.2.2 |
| ASTM C1549-16(2022) | Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer | 5.5.3.2.2 |

ASTM D1003-21 Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics

ASTM E283/E283M-19 Standard Test Method for Determining Rate of Air Leakage through

Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

ASTM E408-13 (2019) Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques

ASTM E3158-~~18~~24 Standard Test Method for Measuring the Air Leakage Rate of a Large or Multizone Building

ASTM E779-19 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

ASTM E972-96 (2021) Standard Test Method for Solar Photometric Transmittance of Sheet Materials Using Sunlight

ASTM E1677-~~19~~23 Standard Specification for an ~~Air Retarder (AR)~~ Barrier (AB) Material or System for Low-Rise Framed Building Walls

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Using an Orifice Blower Door

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**Attachments Energy Rating Council (AERC)**

**355 Lexington Ave., 15th Floor, New York, NY 10017**

AERC-1-~~2021~~2023 Procedures for Determining Energy Performance Properties of Fenestration Attachments

**Cool Roof Rating Council (CRRC)**

**2435 N. Lombard St., Portland, OR 97217, United States**

ANSI/CRRC S100 (~~2021~~2025) Standard Test Methods for Determining Radiative Properties of

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**CSA Group**

**178 Rexdale Blvd., ~~Toronto, ON, Canada, M9W 1R3~~ Etobicoke/Toronto, ON or under the US Headquarters at 5801 E. Pleasant Valley Rd., Independence, OH 44131**

CSA C439-2018 (R2022) Laboratory Methods of Test for Rating the 6.4.7

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**Cooling Technology Institute (CTI)**

**~~3845 Cypress Creek Parkway, Suite 420, Houston, TX 77068;~~ 13231 Champion Forest Drive, Suite 230, Houston, TX 77069; P.O. Box 681807, Houston, TX 77268**

CTI ATC-105 (~~19~~22) Acceptance Test Code for Water Cooling Towers Table 6.8.1-7

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CTI ATC-106 (11) Acceptance Test Code for Mechanical Draft Evaporative Vapor Condensers

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**Door and Access Systems Manufacturers Association (DASMA) 1300 Sumner Avenue, Cleveland, OH 44115-2851**

ANSI/DASMA 105-2020 Test Method for Thermal Transmittance and Air Infiltration of Garage Doors and Rolling Doors

**International Association of Plumbing and Mechanical Officials (IAPMO) 4755 E. Philadelphia Street, Ontario, CA 91761-2816**

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IAPMO/ANSI WE·Stand-~~2017~~2023 Water Efficiency and Sanitation Standard for the Built Environment 11.5.2.3.5

**International Organization for Standardization (ISO) ISO Central Secretariat BIBC II Chemin de Blandonnet 8, CP 401, 1214, Vernier, Geneva, Switzerland**

|  |  |  |
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| ISO 5801:2017  ISO 9050 (2003) | Fans—Performance Testing Using Standardized Airways  Glass in Building—Determination of Light Transmittance, Solar Direct Transmittance, Total Solar Energy Transmittance, Ultraviolet Transmittance and Related Glazing Factors | 6.5.3.1.1.2  5.5.3.2.2 |
| ISO 10211 (2017) | Thermal bridges in building construction—Heat flows and surface temperatures—Detailed calculations | A10.1 |
| ANSI/AHRI/ASHRAE/ISO 13256-1:1998  (2021) | Water-Source Heat Pumps—Testing and Rating for Performance— Part 1: Water-to-Air and Brine-to-Air Heat Pumps | Table 6.8.1-15 |
| ANSI/AHRI/ASHRAE/ISO 13256-2:1998  (2021) | Water-Source Heat Pumps—Testing and Rating for Performance— Part 2: Water-to-Water and Brine-to-Water Heat Pumps | Table 6.8.1-15 |
| ISO 14683 (2017) | Thermal bridges in building construction—Linear thermal transmittance—Simplified methods and default values | A10.1 |
| ISO 25745-2:2015 | Energy Performance of Lifts, Escalators and Moving Walks—Part 2: | 10.4.3.4, 10.9.3, |
|  | Energy Calculation and Classification for Lifts (Elevators) | 11.5.2.7.1 |

**National Electrical Manufacturers Association (NEMA) 1300 N. 17th Street, Suite 900, Arlington, VA 22209**

ANSI/NEMA MG 1-~~2016, with 2021~~2024

~~Revisions~~

Motors and Generators 3.2

**National Fenestration Rating Council (NFRC)**

**6305 Ivy Lane, Suite 140, Greenbelt, MD 20770-6323**

ANSI/NFRC 100-~~2020~~2023 Procedure for Determining Fenestration Product U-Factors 5.8.2.4

ANSI/NFRC 200-~~2020~~2023 Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence

ANSI/NFRC 203-~~2020~~2023 Procedure for Determining Visible Transmittance of Tubular Daylighting Devices

NFRC 300-~~2020~~2023 Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems

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**National Fire Protection Association (NFPA)**

**1 Battery March Park, Quincy, MA 02269-9101; P.O. Box 9101**

NFPA 70-~~2020~~2023 National Electric Code 6.5.1, 8.4. 3.1, 8.4.3.2

NFPA 96-~~2021~~2024 Ventilation Control and Fire Protection of Commercial Cooking Operations

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**Telecommunications Industry Association (TIA)**

|  |  |  |
| --- | --- | --- |
| **1320 North Courthouse Road, Suite 200** |  |  |
| ANSI/TIA-942-~~REV B~~C, ~~July 12, 2017~~2024 | Telecommunication Infrastructure Standard for Data Centers | 6.5.1 |
| **UL, LLC**  **333 Pfingsten Rd., Northbrook, IL 60062** |  |  |
| UL 181A-2021 | Closure Systems for Use with Rigid Air Ducts and Air Connectors | 6.4.4.2.1 |
| UL 181B-2021 | Closure Systems for Use with Flexible Air Ducts and Air Connectors | 6.4.4.2.1 |
| UL 727-~~2018~~2024 | UL Standard for Safety—Oil Fired Central Furnaces | Table 6.8.1-5 |
| UL 731-2021 | UL Standard for Safety—Oil-Fired Unit Heaters | Table 6.8.1-5 |
| **U.S. Department of Defense**  **3010 Defense Pentagon, Washington, DC 20301** | | |
| MIL-P-17639F (~~1996~~2017) | Pumps, Centrifugal, Miscellaneous Service, Naval Shipboard Use | 10.4.8 |
| MIL-P-17840~~C~~D (~~1986~~2018) | Pumps, Centrifugal, Close-Coupled, Navy Standard (for Surface Ship Application) | 10.4.8 |
| MIL-P-17881D (1972) | Pumps, Centrifugal, Boiler Feed (Multi-Stage) | 10.4.8 |
| ~~MIL-P-18472G (1989)~~ | ~~Pumps, Centrifugal, Condensate, Feed Booster, Waste Heat Boiler, and Distilling Plant~~ | ~~10.4.8~~ |
| ~~MIL-P-18682D~~ | ~~Pump, Centrifugal, Main Condenser Circulating, Naval Shipboard~~ | ~~10.4.8~~ |

**U.S. Department of Energy (DOE)**

**1000 Independence Avenue, SW, Washington, DC 20585**

10 CFR Part 430 Subpart B, App N Uniform Test Method for Measuring the Energy Consumption of

Furnaces Other Than Boilers

10 CFR Part 430, Subpart B App U Uniform Test Method for Measuring the Energy Consumption of

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10 CFR Part 431.304 Uniform Test Method for the Measurement of Energy Consumption of Walk-In Coolers and Walk-In Freezers

10 CFR 431 Subpart K, App A Uniform Test Method for Measuring the Energy Consumption of

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10 CFR Part 431, Subpart B, App B Uniform Test Method for Measuring ~~Nominal Full-Load~~ the Efficiency of Electric Motors

10 CFR Part 431, Subpart Y Pumps: Definitions, Energy Conservation Standards, and Uniform

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42 USC 6831, et seq., Public Law 102-486 Energy Policy Act of 1992, EPACT 2005, and EISA 2007 6.4.1.1

**~~U.S. Security and Exchange Commission (SEC) 100 F Street, NE, Washington, DC 20549~~**

The Interagency Paper on Sound Practices to Strengthen the Resilience of the US Financial System

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Exemptions to 6.5.1

**16 INFORMATIVE APPENDIX e INFORMATIVE REFERENCES**

ASTM E2813-~~18~~24 Standard Practice for Building Enclosure Commissioning 5.9.1, H1

[ . . . ]

Revised Table G3.1 to accommodate the normative reference update to ASHRAE Standard 55

1. **Schedule**

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| --- | --- |
| Schedules capable of modeling hourly variations in occupancy, lighting power, miscellaneous *equipment* power, *thermostat set points*, and *HVAC system* operation shall be used. The schedules shall be typical of the proposed *building* type as determined by the designer and approved by the *rating authority*.  **Temperature and Humidity Schedules.** Temperature and humidity control *set points* and schedules as well as *temperature control throttling range* shall be the same for *proposed design* and *baseline building design*.  **HVAC System Fan Schedules.** Schedules for *HVAC system* fans that provide *outdoor air* for *ventilation* shall run continuously whenever *spaces* are occupied and shall be cycled ON and OFF to meet heating and cooling loads during unoccupied hours.  **Exceptions:**   1. Where no heating and/or cooling *system* is to be installed, and a heating or cooling *system* is being simulated only to meet the requirements described in this table, heating and/or cooling *system* fans shall not be simulated as running continuously during occupied hours but shall be cycled ON and OFF to meet heating and cooling loads during all hours. 2. *HVAC system* fans shall remain on during occupied and unoc- cupied hours in *spaces* that have health- and safety-mandated minimum *ventilation* requirements during unoccupied hours. 3. *HVAC system* fans shall remain on during occupied and unoc- cupied hours in *systems* primarily serving *computer rooms*. 4. Dedicated *outdoor air* supply fans shall stay off during unoc- cupied hours. | Same as *proposed design.*  **Exceptions:**   1. *Set points* and schedules for *HVAC systems* that *automati- cally* provide occupant thermal comfort via means other than directly controlling the air dry-bulb and wet-bulb tempera- ture may be allowed to differ, provided that equivalent levels of occupant thermal comfort are demonstrated via the meth- odology in ASHRAE Standard 55, Section ~~5.3.3~~5.3.4, “Elevated Air Speed,” or Standard 55, Appendix B, “Computer Pro- gram for Calculation of PMV-PPD.” 2. When the proposed *building* design includes *HVAC systems* serving *dwelling units* or *sleeping units* that have controls meeting requirements of Section 11.5.2.2.4 “H04: Residential Space HVAC Control”:    1. The *baseline building design* shall be modeled using heating temperature setback of 5°F (3°C) higher than in the *proposed design* but not higher than the occupied temperature for a maximum of 9 hours per day.    2. The *baseline building design* shall be modeled using cooling temperature setback of 5°F (3°C) lower than the *proposed design* but not lower than the occupied temperature for not more than 9 hours per day. 3. Schedules may be allowed to differ between *proposed design* and *baseline building design* when necessary to model non- standard *efficiency* measures, provided that the revised schedules have been approved by the *rating authority*. Mea- sures that may warrant use of different schedules include but are not limited to *automatic* lighting controls, *automatic* nat- ural *ventilation* controls, *automatic demand control ventila- tion* controls, and *automatic* controls that reduce *service water-heating* loads. In no case shall schedules differ where the controls are *manual* (e.g., *manual* operation of light switches or *manual* operation of windows). 4. *HVAC system* fan schedules may be allowed to differ when Section G3.2.1.2(a) applies. 5. For *Systems* 6 and 8, only the *terminal*-unit fan and *reheat* coil shall be energized to meet heating *set point* during unoc- cupied hours 6. Lighting schedules may be allowed to differ based on occupancy sensor reduction factor in Tables G3.7-1 and G3.7-2. |