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ADDENDA

ANSI/ASHRAE/IBPSA Addendum d to
ANSI/ASHRAE Standard 209-2018

Energy Simulation Aided Design for Buildings Except Low-Rise Residential Buildings

Approved by ASHRAE and the American National Standards Institute on September 30, 2024, and by the International Building Performance Simulation Association on September 26, 2024.

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 (www.ashrae.org/continuous-maintenance).

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FOREWORD

Addendum d expands the applicability of Informative Appendix C. It also renames the appendix, "Modeling Input for Simple Box and Other Cycles." These changes reflect the use cases of the default assumptions presented in the appendix beyond simple box modeling. Additional changes have been made to clarify the language and standardize how each clause is introduced. The importance of using the assumption only if specific information is not known is now clear in the standard. To further expand the usefulness of Informative Appendix C, Section C1, "General Information Resources," has been added. The updates in this addendum will help with the adoption of Standard 209 by adding more resources for modelers looking to complete daily tasks.

Informative 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 d to Standard 209-2018

Modify Informative Appendix C as shown.

INFORMATIVE APPENDIX C
MODELING INPUT FOR SIMPLE BOX ~~MODELING~~ AND OTHER CYCLES

1. Create a ~~simple box~~ model of the project using an energy *simulation program*. Some programs use preprocessor or expert ("wizard") ~~systems~~ workflows to help create these models. For ~~The~~ *simple box models*, the energy *simulation program* may use monthly design day hourly information (288 hour in lieu of 8760 hour simulation).
2. ~~Initial input parameters~~ Where design parameters or targets of the building are known, those should be used ~~otherwise~~ when creating the model. Design targets can be found in the *OPR*, if available. Otherwise, the following should be used as the assumptions to set input parameters of the model.
   ~~2.2~~2.1 **Building type** (e.g., assembly, healthcare, hotel/motel, light manufacturing, office, restaurant, retail, school, warehouse, ~~laboratory~~, etc.). The building type infers information about building program area allocations and locations (core or perimeter space) as well as occupancy and internal load information by program area.
   ~~2.3~~2.2 **Building form.** If the rough building form has not been otherwise prescribed, follow the parameters given in Table 13 of NREL/TP-5500-46861, "U.S. Department of Energy Commercial Reference Building Models of the National Building Stock." Aspect ratio is defined as the overall length in the east-west direction divided by the overall length in the north-south direction. If the building type is not one given in Table 13, and no other information is known, use a rectangle with an aspect ratio of 1.62, floor-to-floor height 12.5 ft (3.81 m), flat roof, glazing fraction 30%. **Note:** The table found in NREL/TP-5500-46861, "U.S. Department of Energy Commercial Reference Building Models of the National Building Stock," is equivalent to the PNNL/DOE prototype buildings.
   ~~2.4~~2.3 **Site location by weather file location**. See Appendix A ~~Section 5.6~~ for types and sources of weather files.
   ~~2.5~~2.4 **Total conditioned square footage**. The accuracy of this parameter should be order of magnitude for *simple box models*.
   ~~2.6~~2.5 **Number of floors, ~~if known~~**. If not known, use the number of floors given in Table 13 of NREL/TP-5500-46861 referenced above~~. Unless known otherwise~~ and each of multiple floors shall have the same footprint.
   ~~2.7~~2.6 **Glazing ~~Fenestration~~ amount**. ~~Use~~ If not known, use Table 13 of NREL/TP-5500-46861 or the applicable local energy code or ASHRAE/IES Standard 90.1, Table G3.1.1-1, to define default WWR percent ~~for various~~ according to building types ~~if actual WWR is not known~~. Allocate percent window-to-wall ratio~~, by orientation if known~~, evenly distributed on all faces ~~if not~~.
   ~~2.8~~2.7 **Internal loads ~~(people~~ lighting, equipment, and ~~lighting people)~~**.If not known, ~~allocate by program area. If unknown, distribute evenly over the conditioned area. Lighting~~ lighting power densities should be the maximum allowed by applicable local energy code. ~~If unknown, use applicable local~~

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~~energy code or~~ Equipment power and occupant densities can be found in Standard 90.1 User's Manual, Section C and Appendix G tables~~, for schedules, equipment power, and occupant densities~~. Additional information on internal loads and schedules may be found in NREL/TP-5500-46861, Appendices A and B.

2.8 **Schedules**. If not known, Standard 90.1 User's Manual, Section C and Appendix G tables, should be used. Additional information on schedules may be found in NREL/TP-5500-46861, Appendices A and B.

2.9 **Ventilation** ~~shall~~, if not known, should be in accordance with applicable local building codes. Ventilation rates should be determined according to the Ventilation Rate Procedures in ASHRAE Standard 62.1 for commercial buildings, ASHRAE Standard 62.2 for residential buildings, ~~outside air rate per occupant, or,~~ ASHRAE/ASHE Standard 170 for healthcare, and ANSI/ASSP Z9.5, *Laboratory Ventilation*, for laboratory buildings. ~~air change rate by usage, whichever is largest~~.

2.10 **Perimeter/core zoning**. If not known, perimeter zone depth ~~shall~~ should be no greater than 1.5 times floor to floor height.

2.11 **Building envelope assemblies** ~~shall~~, if not known, should be in accordance with the applicable local building codes or the *baseline* performance of ASHRAE/IES Standard 90.1, Table G3.1.5.

2.12 **HVAC System**, if not known, should be determined according to ASHRAE/IES Standard 90.1, Appendix G, *baseline HVAC system* type. ~~is only to be used when sufficient information on the HVAC system has not been provided to the energy modeler. Refer to Appendix C, Section 2.1.~~

2.13 **Infiltration**, if not known, should be in accordance with applicable local building codes; *ASHRAE Handbook—Fundamentals*, Chapter 16, Table 11; ASHRAE/IES Standard 90.1, Table G3.1.5.b; or established project goals.

Table 13 Reference Building Form Assignments

Building Type	Floor Area		Aspect Ratio	No. of Floors	Floor-to-Floor Height		Floor-to-Ceiling Height		Glazing Fraction
	ft^2	m^2			ft	m	ft	m	
Small Office	5,500	511	1.5	1	10	3.05	10	3.05	0.21
Medium Office	53,628	4,982	1.5	3	13	3.96	9	2.74	0.33
Large Office	498,588	46,320	1.5	12*	13	3.96	9	2.74	0.38
Primary School	73,960	6,871	E-Shape	1	13	3.96	13	3.96	0.35
Secondary School	210,887	19,592	E-Shape	2	13	3.96	13	3.96	0.33
Stand-Alone Retail	24,962	2,294	1.3	1	20	6.10	20	6.10	0.07
Strip Mall	22,500	2,090	4.0	1	17	5.18	17	5.18	0.11
Supermarket	45,000	4,181	1.5	1	20	6.10	20	6.10	0.11
Quick Service Restaurant	2,500	232	1.0	1	10	3.05	10	3.05	0.14
Full Service Restaurant	5,500	511	1.0	1	10	3.05	10	3.05	0.17
Small Hotel	43,200	4,013	3.0	4	11** 9	3.35** 2.74	11** 9	3.35** 2.74	0.11
Large Hotel	122,120	11,345	3.8** 5.1	6	13** 10	3.96** 3.05	13** 10	3.96** 3.05	0.27
Hospital	241,351	22,422	1.3	5*	14	4.27	14	4.27	0.15
Outpatient Healthcare	40,946	3,804	1.4	3	10	3.05	10	3.05	0.19
Warehouse	52,045	4,835	2.2	1	28	8.53	28	8.53	0.006
Midrise Apartment	33,740	3,135	2.7	4	10	3.05	10	3.05	0.15

* Plus basement (not included in the table number)

** First floor

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C1. INFORMATIVE RESOURCES

Source	Name	Link
BEMcyclopedia	Internal Gains and Schedules Lookup Tables	https://apps.bemcyclopedia.com/lookups/
BEMcyclopedia	Simple Box Models Wiki	https://bemcyclopedia.com/wiki/Simple_Box_Models
California Energy Commission	Nonresidential ACM Reference Manual Appendices	https://www.energy.ca.gov/files/2019-nonresidential-acm-reference-manual-appendices
COMNET	Modeling Guidelines—Reference Appendices	https://www.comnet.org/reference-appendices
Office of Energy Efficiency & Renewable Energy	Prototype Building Models	https://www.energycodes.gov/prototype-building-models

Modify Informative Appendix F, "Informative References," as shown.

ANSI. 2022. ANSI/ASSP Z9.5, *Laboratory Ventilation*. Washington, D.C., American National Standards Institute.

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

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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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