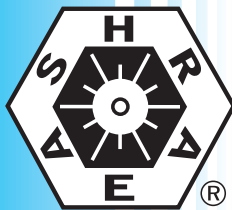


ANSI/ASHRAE Addenda c, d, e, and k
to ANSI/ASHRAE Standard 90.2-2004



ASHRAE STANDARD

Energy-Efficient Design of Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on January 27, 2006; by the ASHRAE Board of Directors on March 2, 2007; and by the American National Standards Institute on March 3, 2007.

This standard is under continuous maintenance 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. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site, <http://www.ashrae.org>, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada).

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**American Society of Heating, Refrigerating
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1791 Tullie Circle NE, Atlanta, GA 30329

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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.

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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.

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FOREWORD

This addendum provides a clearer and more concise definition of conditioned space than what is currently in place in 90.2-2004 by the following changes:

- *Changes the definition by removing the undefined terms “heated space” and “cooled space”.*

- *Removes the term “indirectly conditioned space” since it is not used in the Standard.*
- *Adds language referring to the intent that these spaces are provided with “mechanical heating/cooling” to condition the space.*

Addendum c to 90.2-2004

3. DEFINITIONS, ABBREVIATIONS, ACRONYMS, AND SYMBOLS

Change to read as shown.

conditioned space: ~~cooled space, heated space, or indirectly conditioned space.~~ An enclosed space within a building that is provided with mechanical heating and/or cooling energy.

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FOREWORD

The addendum attempts to address issues related to mass walls. The Standing Standard Project Committee found the following items necessary to further refine the Standard. They are:

Section 3, Definitions: There is a need for the definition for mass walls. The section of the standard where it was originally defined (Section 5.3.2.2) was deleted as part of the Addenda “i” to Standard 90.2-2001. This addendum places a definition of mass wall in the standard to clarify the provisions in the 2004 edition. The Standard 90.1-2001 definition was different because it never required users to calculate heat capacity to determine whether or not a wall is a mass wall for residential standards. The idea is that if the mass part of a wall is structural, it is a mass wall. Brick veneers are not included as a mass wall because they have a cavity in which to put insulation, and are not considered part of the structural elements of a wall, therefore would not be appropriate for applying the mass wall provisions.

Section 5.3, Mass Walls: This revision differentiates between mass walls with insulation on the interior and the exterior of a wall. The language instructs the user how to deal with the case where half the insulation is on the interior and half on the exterior, like an Insulating Concrete Form (ICF) type wall, or where the insulation is within the interior of the mass such as a pre-cast wall panel or the insulated cores of concrete masonry unit walls. The second sentence clarifies that when the exterior insulation requirements are zero, the provisions will state how to address interior insulation requirements if the design has interior light framing with insulation within the cavity.

Informative Note: If Addendum e to 90.2-2004 is approved, then section 5.3 will be renumbered as section 5.4, and subsequent sections will also be renumbered to show the addition of a new section.

Addendum d to 90.2-2004

3. DEFINITIONS, ABBREVIATIONS, ACRONYMS, AND SYMBOLS

Add new text as shown.

walls: those portions of the building envelope that are vertical or tilted at an angle of 30 degrees or less from the vertical plane.

- a. **above-grade walls:** all exterior walls of any given story if 50% or more of the gross wall area of the story is exposed to outside air.
- b. **below-grade walls:** all the exterior walls of any given story if more than 50% of the gross exterior wall area of the story is below grade.
- c. **mass wall:** a wall constructed of concrete, concrete masonry, insulating concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth), and solid timber or logs.

5. BUILDING ENVELOPE REQUIREMENTS

Add new text as shown.

5.3 Mass Walls. Exterior insulation requirements shall apply when at least 50% of the required insulation R-value is on the exterior of, or integral to, the wall. Walls that do not meet this requirement for insulation placement shall meet the requirements for interior insulation. The interior insulation case shall apply when there are no exterior insulation requirements and wood or steel framing is used. When an added R-value of 3.4 or less is required, concrete block walls, in accordance with ASTM C90, with cores filled with material having a maximum thermal conductivity of 0.44 Btu-in./hr-ft²-°F, shall be permitted to be used.

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FOREWORD

This addendum adds insulation requirements for walls adjacent to unconditioned spaces and defines the situations where these requirements apply. Insulation requirements are added in Zones 3 and 4 for wood-frame walls, Zone 4 for steel-frame walls, and Zones 4 through 8 for mass walls. The new Section 5.3 defines the qualifying unconditioned spaces as unconditioned basements, unconditioned enclosed mechanical rooms, and unconditioned enclosed vestibules. The R-value requirements for wood- and steel-framed walls adjacent to unconditioned spaces are combined, simplifying Table 5.2. Mass walls adjacent to unconditioned spaces will have to meet the modest insulation requirements of R-3 in Zones 4 and 5, and R-6 in Zones 6 through 8. The wood- and steel-framed wall requirements are cost-effective based on the 5-year pay-back methodology.

Informative Note: This addendum does not replace the current Section 5.3. If approved, the current Section 5.3 will be renumbered as 5.4, and all subsequent sections shall be renumbered to account for the addition of this section.

Addendum e to 90.2-2004

5. BUILDING ENVELOPE REQUIREMENTS

Add new text as shown.

5.3 Walls Next to Unconditioned Spaces. Unconditioned spaces shall include unconditioned basements, unconditioned enclosed mechanical rooms, and unconditioned enclosed vestibules. Wood- and steel-framed walls adjacent to unconditioned spaces shall comply with the insulation values specified in Table 5.3 category “Frame Adjacent to Unconditioned Spaces.” Mass walls adjacent to unconditioned spaces shall comply with the “Above-Grade Mass, Exterior Insulation” insulation values specified in Table 5.3.

Renumber remaining sections in Chapter 5 accordingly.

Change Table 5.2 to read as shown.

TABLE 5.2 Prescriptive Envelope Criteria

Climate Zone	Frame Adjacent to Unconditioned Space				Mass Adjacent to Unconditioned Space
	Wood		Steel		Continuous Insulation
	Cavity	Cont. Ins.	Cavity	Cont. Ins.	
No.	R	R	R	R	R
1	0	0	0	0	0
2	0	0	0	0	0
3A, 3B	0 11	0	0	0	0
3C	0 11	0	0	0	0
4	0 13	0	15	0	0
5	0 13	0	15	0	0
6	15	0	15	0	0
7	15	0	0	10	0
8	15	0	15	10	15

Change Table 5.11 to read as shown.

TABLE 5.11 Performance Path Envelope Criteria

Climate Zone	Frame Adjacent to Unconditioned Space		Mass Adjacent to Unconditioned Space
	Wood	Steel	
No.	U	U	U
1	0.274	0.442	0.244
2	0.274	0.442	0.244
3A, 3B	0.274 0.094	0.442 0.179	0.244
3C	0.274 0.094	0.442 0.179	0.244
4	0.274 0.089	0.155 0.167	0.244
5	0.274 0.089	0.155 0.167	0.244
6	0.081	0.155	0.244
7	0.081	0.100 0.155	0.244
8	0.081	0.061 0.155	0.071

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FOREWORD

When Addendum f to Standard 90.2-2001 was approved, the printing of the addenda into the standard included a portion of the reason statement, namely, the bibliographical list of references. This was not what was intended by the proponents of the original proposal.

This addendum deletes Appendix D in its entirety, including the advisory note, without substitution.

In order to address the loss of this information from the standard itself, the Standing Standard Project Committee is in process of developing a bibliographical list for inclusion on the SSPC 90.2 Web site as an alternative measure to ensure that information used to develop any addenda for Standard 90.2 is retained in some form.

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 k to 90.2-2004

Remove Informative Appendix D—Informative References.

~~(This appendix is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)~~

APPENDIX D

Informative Bibliography

~~ASHRAE. 1998. Energy Savings of Reflective Roofs, ASHRAE Technical Data Bulletin, Volume 14, Number 2, January.~~

~~American Society of Heating, Refrigerating and Air Conditioning Engineers, Atlanta, GA.~~

~~Akbari, H., and S. Konopacki. 1999. Calculations for Reflective Roofs in Support of Standard 90.2. A Technical Note Prepared for the Reflective Roofs Task Group, June.~~

~~Akbari, H., and S. Konopacki. 1999. Reflective Roofs Task Group ASHRAE SSPC 90.2, Progress Report June, 1999 ASHRAE Annual Meeting, Seattle, WA. A Report Prepared to the Reflective Roofs Task Group, June.~~

**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.