ANSI/ASHRAE/IESNA Addendum *ad* to
ANSI/ASHRAE/IESNA Standard 90.1-2004

# ASHRAE STANDARD

# Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on February 3, 2005; by the ASHRAE Board of Directors on February 10, 2005; and by the American National Standards Institute on March 11, 2005.

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 U.S. and Canada).



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When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at http://www.ashrae.org.

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## SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

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 the Standard,
c. offering constructive criticism for improving the Standard,
d. permission to reprint portions of the Standard.

**(This foreword 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.)**

## FOREWORD

*The Cool Roof Rating Council is a not-for-profit organization that was established for a number of purposes, one of which is to implement and communicate fair, accurate, and credible radiative energy performance rating systems for roof surfaces.*

*In 2002 the Cool Roof Rating Council completed its task of initiating a roofing product rating program. The intent of the CRRC was to develop a program that was uniform for determining radiative properties of roofing products. The program allows manufacturers and sellers to have the opportunity to label their roofing products. The radiative properties (e.g., solar reflectance and thermal emittance) are determined and verified through both laboratory testing and a process of random testing.*

*This addendum identifies the CRRC program as a way to establish a common and uniform evaluation to determine compliance with the standard. Verification of a roofing product is available through two means: (1) a "label" that may be placed directly on the product, on the wrapping or container, or on the manufacturer's technical literature and (2) the Cool Roof Rating Council's Web site directory (http://www.coolroofs.org).*

*This addendum also deletes two of the ASTM standard test methods. The basis for this is that the CRRC determined through its development of the product rating program that, although those two test methods (ASTM C835 and E1175) were recognized as opportunities for compliance, the availability of these test methods (e.g., the number of testing laboratories open to the general public) is restricted.*

*The new test method (ASTM C1549) recognizes a test procedure that is considered comparable to the ASTM solar reflectance test methods currently cited. Although CRRC-1 cites its own testing procedure, it is effectively identical to the ASTM test. The reason for two test standards is directly related to the date of publication for each document. The CRRC-1 document was produced prior to ASTM producing their document.*

## Addendum *ad* to 90.1-2004 (I-P and SI editions)

*Revise the following exception as shown:*

**Exception to 5.5.3.1:** For roofs where the exterior surface has a minimum total solar reflectance of 0.70 when tested in accordance with one of the solar reflectance test methods listed below, and has a minimum thermal emittance of 0.75 when tested in accordance with one of the thermal emittance test methods below, other than roofs with ventilated attics or roofs with semiheated spaces, the U-factor of the proposed roof shall be permitted to be adjusted using Equation 5-1 for demonstrating compliance~~:~~. The values for solar reflectance and thermal emittance shall be determined by a laboratory accredited by a nationally recognized accreditation organization, such as the Cool Roof Rating Council CRRC-1 Product Rating Program, and shall be *labeled* and certified by the manufacturer.

$$U_{roofadj} = U_{roofproposed} \times Factor_{roofmultiplier} \quad (5\text{-}1)$$

where

$U_{roofadj}$ = the adjusted roof U-factor for use in demonstrating compliance;

$U_{roofproposed}$ = the U-factor of the proposed roof, as designed;

$Factor_{roofmultiplier}$ = the roof U-factor multiplier from Table 5.5.3.1.

Solar Reflectance Test Methods: ASTM C1549, ASTM E903, ~~ASTM E1175,~~ or ASTM E1918.

Thermal Emittance Test Methods: ~~ASTM C835,~~ ASTM C1371~~,~~ or ASTM E408

*Revise the normative references in Section 12 as follows:*

## 12. NORMATIVE REFERENCES

**American Society for Testing and Materials, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959**

~~ASTM C835-95 (1999), Standard Test Method for Total hemispherical Emittance of Surfaces from 20°C to 1400°C.~~

ASTM C1549-02, Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.

~~ASTM E1175-87 (1996), Standard Test Method for Determining Solar or Photoic Reflectance, Transmittance, and Absorptance of Materials Using a Large Diameter Integrating Sphere.~~

*Revise the informative references in Appendix E as follows:*

## Informative Appendix E
## Informative References

CRRC

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http://www.coolroofs.org

| Subsection No. | Reference | Title/Source |
|---|---|---|
| Exception to 5.5.3.1 | CRRC-1-2002 | Cool Roof Rating Council Product Rating Program |

## 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.