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Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P Edition)

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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FOREWORD

The original Standard 90.1 was published in 1975, and revised editions were published in 1980, 1989, and 1999 using the ANSI and ASHRAE periodic maintenance procedures. Based upon these procedures, the entire standard was publicly reviewed and published in its entirety each time. As energy prices and technology began changing more rapidly, the ASHRAE Board of Directors voted in 1999 to place the standard on continuous maintenance, permitting the standard to be updated several times each year through the publication of approved addenda to the standard. As of the 2001 edition, the standard is now published in its entirety in the fall of every third year. This schedule allows the standard to be submitted and proposed by the deadline for inclusion or reference in model building and energy codes. All approved addenda and errata are included in the new edition issued every three years. This procedure allows users to have some certainty of the timing of publication of new editions.

The 2013 edition of the standard includes numerous energy-saving measures resulting from continuous maintenance proposals from the public and from volunteers on the committee. The Project Committee welcomes suggestions for improvement, and users are encouraged to use the continuous maintenance proposal (CMP) form included in the back of this standard to submit recommended changes. The committee takes formal action on every CMP received.

More than 110 addenda were processed by the committee and approved by the ASHRAE and IES Boards of Directors and are included in this edition. This edition also corrects all known typographical errors in the 2010 standard. Appendix F gives brief descriptions and publication dates of the addenda to Standard 90.1-2010 that are incorporated into this new edition.

The most significant changes included are as follows:

- a. **Building Envelope.** Opaque elements and fenestration requirements have been revised to increase stringency while maintaining a reasonable level of cost-effectiveness. Opaque and fenestration assemblies in Tables 5.5-1 through 5.5-8 are revised in most climates. These changes include
 1. criteria requiring double-glazed fenestration in many climates;
 2. minimum VT/SHGC ratio to enable good daylighting with minimum solar gain, while not restricting triple and quadruple glazing; and
 3. simplification of the skylighting criteria.
- b. **Lighting.** These changes include improvements to daylighting and daylighting controls, space-by-space light-

ing power density limits, thresholds for toplighting, and revised controls requirements and format.

- c. **Mechanical.** Equipment efficiencies were revised upward for heat pumps, packaged terminal air conditioners (PTAC), single-package vertical heat pumps and air conditioners (SPVHP and SPVAC), and evaporative condensers. Also, fan efficiency requirements were introduced for the first time. Additional provisions that have been included address commercial refrigeration equipment, improved controls on heat rejection and boiler equipment, requirements for expanded use of energy recovery, small motor efficiencies, and fan power control and credits. Control revision requirements were added to the standard, such as DDC controls in many applications. Finally, the 2013 edition completes the work that was begun on equipment efficiencies for chillers in the 2010 edition.
- d. **Energy Cost Budget (ECB) and Modeling.** Improvements were made to the ECB and Appendix G provisions in the standard to clarify the use of the prescriptive provisions when performing building-energy-use modeling. In addition, these sections were revised to enhance capturing daylighting when performing the modeling calculations.

Another important change for the 2013 edition is the first alternate compliance path in Section 6. Section 6.6 was added to the 2010 edition to provide a location for alternate methods of compliance with the standard. The first such alternate path has been developed for computer room systems and was formulated with the assistance of the data center technical committee (TC9.9). This path uses the PUE (Power Usage Effectiveness) metric that was established by that industry. This alternate efficiency path format provides a framework that could be considered for other energy-using facets of buildings not easily covered in the prescriptive provisions of the standard. Also new to the standard are requirements for operating escalators and moving walkways at minimum speed, per ASME A17.1, when not conveying passengers.

Standard 90.1 is a fluid document. As technology evolves, the project committee is continually considering new changes and proposing addenda for public review. When addenda are approved, notices will be published on the ASHRAE and IES websites. Users are encouraged to sign up for the free ASHRAE and IES Internet listserv for this standard to receive notice of all public reviews and approved and published addenda and errata.

The Chair and Vice-Chairs extend grateful thanks to the committee volunteers, public review commenters, and all involved throughout the open, consensus-building process.

1. PURPOSE

To establish the minimum energy efficiency requirements of buildings other than low-rise residential buildings for

- a. design, construction, and a plan for operation and maintenance; and
- b. utilization of on-site, renewable energy resources.