ADDENDA

ANSI/ASHRAE/IES Addendum eb to
ANSI/ASHRAE/IES Standard 90.1-2013

Energy Standard for Buildings Except Low-Rise Residential Buildings

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FOREWORD

This revision to Standard 90.1 generally addresses minor inconsistencies in terminology in Appendices C and G that have developed over time. Terminology is coordinated with the definitions in Section 3.

[Note: 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.]

Addendum eb to 90.1-2013

Revise Section 3 as follows (I-P and SI):

…

building: ~~a structure wholly or partially enclosed within exterior walls or within exterior and party walls, and a roof, affording shelter to persons, animals, or property~~ any structure used or intended for supporting or sheltering any use or occupancy.

…

exterior wall: see *building envelope* and *wall*.

…

floor area, gross: the sum of the floor areas of the spaces within the building, including basements, mezzanine and intermediate-floored tiers, and penthouses with a headroom height of 7.5 ft (2.3 m) or greater. It is measured from the exterior faces of ~~exterior~~ walls or from the centerline of walls separating buildings, but excluding covered walkways, open roofed-over areas, porches and similar spaces, pipe trenches, exterior terraces or steps, chimneys, roof overhangs, and similar features.

…

grade: the finished ground level adjoining a building at all ~~exterior~~ walls.

…

semi-exterior wall: see *building envelope* and *wall*.

Revise Section C1.2 as follows (I-P and SI):

C1.2 At the Exterior and Semi-Exterior Surface Level. The *building envelope* assembly type, gross area, orientation, tilt, and associated space-conditioning category and building area type shall be specified. The surface shall be designated as exterior or semi-exterior. A semi-exterior surface separating a conditioned space from a ~~semi-exterior~~ semiheated space shall be specified with two associated space-conditioning categories. A semi-exterior surface separating a conditioned space from an unconditioned space shall be specified with an associated space-conditioning category and with an adjacency to an unconditioned space. Exterior surfaces with the same building envelope assembly type and associated space-conditioning category and building area type whose orientations differ by no more than 22.5 degrees and whose tilts differ by no more than 22.5 degrees are allowed to be described as a single surface.

Revise Section C3.5.5.3 as follows:

C3.5.5.3~~Infiltration~~ Air Leakage. The ~~peak infiltration~~ air leakage rate of the *building envelope* (I_{75Pa}) at a ~~fixed building~~ pressure differential of 0.3 in. H_2O shall be 0.4 cfm/ft^2 (2.03 L/s·m^2) of ~~exterior~~ *building* ~~enclosure~~ *envelope* area. The ~~peak infiltration rate~~ air leakage rate of the *building envelope* shall be converted to the appropriate units to describe the ~~peak infiltration~~ air leakage as a function of the area of ~~exterior~~ walls ~~area~~ that separate conditioned spaces and semiheated spaces from the exterior as follows:

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$$I_{\cancel{EW}\underline{AGW}} = 0.112 \times I_{75Pa} \times S/A_{\cancel{EW}\underline{AGW}}$$

where

I_{75Pa} = air leakage rate of the *building envelope* ~~expressed in,~~ cfm/ft^2 (L/s·m^2), at a fixed building pressure differential of 0.3 in. wc, or 1.57 psf (75 Pa)

S = ~~the~~ total area of the *building envelope*, ft^2 (m^2), ~~air pressure boundary~~ including the lowest floor, any below-~~grade walls,~~ or above-grade walls, and roof ~~(or ceiling)~~ (including ~~windows~~ vertical fenestration and skylights). ~~, separating the interior conditioned spaces and semiheated spaces from the unconditioned environment exterior measured in square feet (square meters), ft^2 (m^2)~~

$I_{\cancel{EW}\underline{AGW}}$ = adjusted air leakage rate of the *building envelope* ~~in,~~ cfm/ft^2 (L/s·m^2), at a reference wind speed of 10 mph (4.47 m/s) and relative to the area of the above-~~ground~~ grade ~~exterior~~ walls ~~area~~

$A_{\cancel{EW}\underline{AGW}}$= ~~the~~ total area of above-grade ~~exterior~~ walls ~~area~~ that comprise the *building envelope*, ft^2 (m^2)

Exception: If the simulation program cannot simulate ~~infiltration~~ air leakage as a function of the area of ~~exterior~~ walls ~~area~~ that separate conditioned spaces and semiheated spaces from the exterior, the ~~peak infiltration~~ air leakage of the *building envelope* shall be converted to the appropriate units to describe the ~~peak infiltration~~ air leakage as a function of gross floor area as follows:

$$I_{FLR} = 0.112 \times I_{75Pa} \times S/A_{FLR}$$

where

I_{FLR} = adjusted air leakage rate of the *building envelope* ~~in,~~ cfm/ft^2 (L/s·m^2), at a reference wind speed of 10 mph (4.47 m/s) and relative to the ~~above ground exterior wall~~ gross floor area

A_{FLR} = ~~the total~~ gross floor area, ft^2 (m^2)

Revise Section C3.6 as follows (I-P and SI):

C3.6 Calculation of Base Envelope Performance Factor. The simulation model for calculating the base envelope performance factor shall modify the simulation model for calculating the proposed envelope performance factor as follows:

a. …

b. …

c. Fenestration shall be assumed to be flush with the ~~exterior~~ wall or roof. …

d. …

e. …

Revise Section Table G3.1 as follows (I-P and SI):

Table G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance

…

5. Building Envelope
Baseline Building Performance

Equivalent dimensions shall be assumed for each ~~exterior~~ *building envelope* component type as in the proposed design; i.e., the total gross area of ~~exterior~~ walls shall be the same in the proposed and baseline building designs. The same shall be true for the areas of roofs, floors, and doors, and the exposed perimeters of concrete slabs on grade shall also be the same in the proposed and baseline building designs. The following additional requirements shall apply to the modeling of the baseline building design:

a. …

b. …

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c. **Vertical Fenestration Areas.** For building area types included in Table G3.1.1-1, vertical fenestration areas for new buildings and additions shall equal that in Table G3.1.1-1 based on the area of gross above-grade ~~exterior~~ walls ~~area~~ that separate conditioned spaces and semiheated spaces from the exterior. …

d. …

e. …

f. …

g. …

…

7. Thermal Blocks—HVAC Zones Designed, Proposed Building Performance

Where HVAC zones are defined on HVAC design drawings, each HVAC zone shall be modeled as a separate thermal block.

Exceptions: Different HVAC zones may be combined to create a single thermal block or identical thermal blocks to which multipliers are applied, provided all of the following conditions are met:

1. The space-use classification is the same throughout the thermal block.
2. All HVAC zones in the thermal block that are adjacent to glazed *exterior walls* and glazed *semi-exterior walls* face the same orientation or their orientations are within 45 degrees of each other.
3. All of the zones are served by the same HVAC system or by the same kind of HVAC system.

…

8. Thermal Blocks— HVAC Zones Not Designed, Proposed Building Performance

Where the HVAC zones and systems have not yet been designed, thermal blocks shall be defined based on similar internal load densities, occupancy, lighting, thermal and space temperature schedules, and in combination with the following:

a. Separate thermal blocks shall be assumed for interior and perimeter spaces. Interior spaces shall be those located more than 15 ft (5 m) from an exterior wall or *semi-exterior wall*. Perimeter spaces shall be those located closer than 15 ft (5 m) from an exterior wall or *semi-exterior wall*. A separate thermal zone does not need to be modeled for areas adjacent to semi-exterior walls that separate semi-conditioned space from conditioned space.

b. Separate thermal blocks shall be assumed for spaces adjacent to glazed exterior walls or glazed *semi-exterior walls*; a separate zone shall be provided for each orientation, except that orientations that differ by no more than 45 degrees may be considered to be the same orientation. Each zone shall include all floor area that is 15 ft (5 m) or less from a glazed perimeter wall, except that floor area within 15 ft (5 m) of glazed perimeter walls having more than one orientation shall be divided proportionately between zones.

c. …

d. …

…

Revise Section G3.1.1.4 as follows (I-P and SI)::

G3.1.1.4 Modeling Building Envelope Infiltration. The air leakage rate of the *building envelope* (I_{75Pa}) at a pressure differential of 0.3 in. H_2O (75 Pa) shall be converted to appropriate units for the simulation program using one of the following formulas:

For methods describing ~~infiltration~~ air leakage as a function of floor area,

$$I_{FLR} = 0.112 \times I_{75Pa} \times S/A_{FLR}$$

For methods describing ~~infiltration~~ air leakage as a function of the area of above grade ~~exterior~~ walls ~~area~~ that separate conditioned spaces and semiheated spaces from the exterior,

$$I_{\cancel{EW}\underline{AGW}} = 0.112 \times I_{75Pa} \times S/A_{\cancel{EW}\underline{AGW}}$$

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When using the measured air leakage rate of the *building envelope* at a pressure differential of 0.3 in. H_2O (75 Pa) for the proposed design, the air leakage rate shall be calculated as follows:

$$I_{75Pa} = Q/S$$

where

I_{75Pa} = air leakage rate of the *building envelope* ~~expressed in~~, cfm/ft^2 (L/s·m^2), at a fixed building pressure differential of 0.3 in. H_2O, or 1.57 psf (75 Pa)

Q = volume of air in cfm (L/s) flowing through the ~~whole~~ *building envelope* when subjected to a~~n indoor/outdoor~~ pressure differential of 0.3 in. H_2O, or 1.57 psf (75 Pa), in accordance with ASTM E 779

S = total area of the *building envelope* ~~air pressure boundary~~ ~~(expressed in~~, ft^2 (m^2)~~)~~, including the lowest floor, any below- or above-grade walls, and roof ~~(or ceiling)~~ (including ~~windows~~ vertical fenestration and skylights)~~, separating the interior conditioned space from the unconditioned environment measured, in ft^2 (m^2).~~

I_{FLR} = adjusted air leakage rate ~~(expressed in cfm/ft^2 (L/s·m^2))~~ of the *building envelope* in cfm/ft^2 (L/s·m^2), at a reference wind speed of 10 mph (4.47 m/s) and relative to the ~~total~~ gross floor area

A_{FLR} = ~~total~~ gross floor area, ft^2 (m^2)

$I_{\cancel{EW}AGW}$ = adjusted air leakage rate ~~(expressed in cfm ft^2 (L/s·m^2))~~ of the *building envelope*~~, in~~ cfm/ft^2 (L/s·m^2), at a reference wind speed of 10 mph (4.47 m/s) and relative to the area of the above-~~ground~~grade ~~exterior~~ walls ~~area~~ of the *building envelope*

$A_{\cancel{EW}AGW}$ = total area of above-grade ~~exterior~~ walls ~~area~~ of the *building envelope* ~~in,~~ ft^2 (m^2)

Exception: A multizone airflow model alternate method to model *building envelope* ~~infiltration~~ air leakage may be used provided the following criteria are met:

1. If the calculations are made independently of the energy simulation program, the proposed method must comply with Section G2.5.
2. The method for converting the air ~~infiltration~~ leakage rate of the *building envelope* at 0.3 in. H_2O, or 1.57 psf (75 Pa), to the appropriate units for the simulation program is fully documented and submitted to the rating authority for approval.

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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.

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