BSR/ASHRAE/IES Addendum bv
to ANSI/ASHRAE/IES Standard 90.1-2022

Public Review Draft

Proposed Addendum bv to Standard 90.1-2022, Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

First Public Review (Jan 2025)
(Draft Shows Proposed Changes to Current Standard)

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(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

Section 12 Energy Cost Budget includes equations to remove the fan power from the hypothetical baseline mechanical system. New efficiency metrics were introduced in the Section 6 mechanical equipment tables where SEER and HSPF values were updated to SEER2 and HSPF2 values.

These equations apply to baseline systems 3, 4, 9, and 11 when the systems are under 65,000 btu/h. The Department of Energy issued EERE–2014–BT–STD– 0048 which identifies the translation of SEER to SEER2 and HSPF to HSPF2 equivalency. The single package AC and HP had a SEER of 14 with a new rating of SEER2 of 13.4. The single package heat pump HSPF went from 8.0 to an HSPF2 of 6.7. Lacking further industry data, this proposal uses the ratio of the old to new metrics to update the equations:

Original Equations (IP):

$COP_{nfcooling} = -0.0076 \times SEER^2 + 0.3796 \times SEER$

$COP_{nfheating} = -0.0296 \times HSPF^2 + 0.7134 \times HSPF$

New Equations (IP):

$COP_{nfcooling} = -0.0076 \times (14/13.4*SEER2)^2 + 0.3796 \times (14/13.4*SEER2)$
$= -0.0083 \times SEER2^2 + 0.3966 \text{ x } SEER2$

$COP_{nfheating} = -0.0296 \times (8/6.7*HSPF2)^2 + 0.7134 \times (8/6.7*HSPF2)$
$= -0.0422 \times HSPF2^2 + 0.8518 \text{ x } HSPF2$

Original Equations (SI):

$COP_{nfcooling} = -0.0885 \times SCOP_C^2 + 1.295 \times SCOP_C$
$COP_{nfheating} = -0.3446 \times SCOP_H^2 + 2.434 \times SCOP_H$

New Equations (SI):

$COP_{nfcooling} = -0.0885 \times (4.1/3.93*SCOP2_C)^2 + 1.295 \times (4.1/3.93*SCOP2_C)$
$= -0.0963 \times SCOP2_C^2 + 1.351 \times SCOP2_C$

$COP_{nfheating} = -0.3446 \times (2.34/1.96*SCOP_H)^2 + 2.434 \times (2.34/1.96*SCOP_H)$
$= -0.4912 \times SCOP2_H^2 + 2.906 \times SCOP2_H$

[Note to Reviewers: 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. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum bv to 90.1-2022

12.5 Calculation of Design Energy Cost and Energy Cost Budget

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12.5.2 HVAC Systems.

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c. **Supply Fan Energy in Certain Package Equipment.** Where *efficiency* ratings include supply fan *energy*, the *efficiency* rating shall be adjusted to remove the supply fan *energy*. For budget *system* Types 3, 4, 6, 8, 9, 10, and 11, calculate the minimum $COP_{nfcooling}$ and $COP_{nfheating}$ using the equation for the applicable performance rating as indicated in Tables 6.8.1-1, 6.8.1-2, 6.8.1-4, and 6.8.1-15. Where a full- and part-load *efficiency* rating is provided in Tables 6.8.1-1, 6.8.1-2, 6.8.1-4, and 6.8.1-15, the full-load equation below shall be used:

(IP)

$$COP_{nfcooling} = 7.84E\text{-}8 \times EER \times Q + 0.338 \times EER$$

~~$COP_{nfcooling} = -0.0076 \times SEER^2 + 0.3796 \times SEER$~~

$\underline{COP_{nfcooling} = -0.0083 \times SEER2^2 + 0.3966 \times SEER2}$

(applies to cooling *efficiency* only)

$$COP_{nfheating} = 1.48E\text{-}7 \times COP_{47} \times Q + 1.062 \times COP_{47}$$

(applies to Systems 6 and 9 heating *efficiency* only)

~~$COP_{nfheating} = -0.0296 \times HSPF^2 + 0.7134 \times HSPF$~~

$\underline{COP_{nfheating} = -0.0422 \times HSPF2^2 + 0.8518 \times HSPF2}$

$$COP_{nfcooling} = 0.3322 \times EER - 0.2145$$

(applies to Systems 8 and 10 cooling *efficiency* only)

$$COP_{nfheating} = 1.1329 \times COP - 0.214$$

(applies to System 8 heating *efficiency* only)

(SI)

$$COP_{nfcooling} = 9.13E\text{-}4 \times COPC \times Q + 1.15 \times COPC$$

~~$COP_{nfcooling} = -0.0885 \times SCOP_C^2 + 1.295 \times SCOP_C$~~

$\underline{COP_{nfcooling} = -0.0963 \times SCOP2_C^2 + 1.351 \times SCOP2_C}$

(applies to cooling efficiency only)

$$COP_{nfheating} = 5.05E\text{-}4 \times COP_{H8.3} \times Q + 1.062 \times COP_{H8.3}$$

(applies to Systems 6 and 9 heating efficiency only)

~~$COP_{nfheating} = -0.3446 \times SCOP_H^2 + 2.434 \times SCOP_H$~~

$\underline{COP_{nfheating} = -0.4912 \times SCOP2_H^2 + 2.906 \times SCOP2_H}$

$$COP_{nfcooling} = 1.1338 \times COP - 0.2145$$

(applies to Systems 8 and 10 cooling efficiency only)

$$COP_{nfheating} = 1.1329 \times COP - 0.214$$

(applies to System 8 heating efficiency only)