



**BSR/ASHRAE/IES Addendum dl
to ANSI/ASHRAE/IES Standard 90.1-2022**

Public Review Draft

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

**First Public Review (July 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

Gas-fired heat pumps for space heating are an emerging technology that can reduce natural gas or propane consumption for users who choose this technology. This equipment can achieve a coefficient of performance (COP) greater than 100 percent, even in cold temperatures, which exceeds even the most efficient boilers. The existing language in the standard does not recognize gas-fired heat pumps in either Section 6.5.4.8, which requires higher than minimum efficiencies for large capacity systems, or the energy credits in Section 11.5.2.2 – “Improved HVAC Performance.”

This proposal:

- adds CSA/ANSI Z21.40.4-CSA 2.94 as a testing method for gas-fired heat pumps, with the rating point at 17°F.
- inserts text into Section 6.5.4.8 that allows the use of gas-fired heat pumps to meet the requirements of that section.
- Expands Section 11.5.2.2 – “Improved HVAC Performance” to allow the use of gas-fired heat pumps and increases the maximum heating improvement from 20 percent to 30 percent.

Cost-effectiveness: This addendum provides an additional path to meet high-efficiency gas heating requirements, and does not increase the cost of construction unless users select gas-fired heat pumps.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (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 dl to 90.1-2022

Make the following changes to Section 6.4.7

6.4.7 Performance Rating Requirements for Equipment Without Minimum Efficiency Requirements System Components. The *equipment* listed in Table 6.4.7 shall be rated in accordance with the rating procedure listed.

Table 6.4.7 Performance Rating Procedures for Equipment Without Minimum Efficiency Requirements ~~System Components~~

Equipment	Rating Procedure
Plate-type liquid-to-liquid heat exchangers	AHRI 400
Fin-and-tube heating and cooling coils (hydronic and DX)	AHRI 410
Exhaust air energy recovery heat exchangers	AHRI 1060
<u>Gas-fired heat pumps</u>	<u>The rated COP at 17°F [-8.3°C] outdoor air temperature when tested and rated in accordance with CSA/ANSI Z21.40.4-CSA 2.94</u>

Modify Section 6.5.4.8 (I-P and SI) as follows:

6.5.4.8 Buildings with High-Capacity Space-Heating Gas Boiler or Gas-fired Hydronic Heat Pump Systems. New buildings with gas hot-water boiler systems or gas-fired heat pump hydronic systems, or a combination thereof, for space heating with a total system input of ~~at least~~ not less than 1,000,000 Btu/h [290 kW] but not more than 10,000,000 Btu/h [2900 kW] shall comply with Sections 6.5.4.8.1 and 6.5.4.8.2. Individual gas boilers with input capacity less than 300,000 Btu/h [87 kW] shall not be included in the calculations of the total system input or total system efficiency.

Exceptions to 6.5.4.8:

1. Where 25% of the annual space heating requirement is provided by on-site renewable energy, site-recovered energy, or heat recovery chillers.
2. Space heating boilers or gas-fired hydronic heat pumps installed in individual dwelling units.
3. Where 50% or more of the design heating load is served using perimeter convective heating, radiant ceiling panels, or both.
4. ~~Individual gas boilers with input capacity less than 300,000 Btu/h [87 kW] shall not be included in the calculations of the total system input or total system efficiency.~~

6.5.4.8.1 Boiler and Gas-fired Hydronic Heat Pump Efficiency. ~~Systems with a single gas hot-water boiler or gas-fired hydronic heat pump shall have a minimum thermal efficiency (E_t) of 90% when rated in accordance with the test procedures in Table 6.8.1-6, with the following:~~

1. Boilers shall be rated in accordance with the test procedures in Table 6.8.1-6
2. Gas-fired hydronic heat pumps shall be rated in accordance with Section 6.4.7, and the rated COP, expressed as a percent, shall be the E_t of that equipment.

~~Systems with multiple boilers, gas-fired hydronic heat pumps, or combinations thereof, are allowed to meet this requirement if the space heating input provided by equipment with thermal efficiency (E_t) above and below 90% provides an input capacity-weighted average thermal efficiency of at least 90%. For boilers rated only for combustion efficiency, the calculation for the input capacity-weighted average thermal efficiency shall use the combustion efficiency value.~~

Modify Section 11.5.2.2 (I-P and SI) as follows:

11.5.2.2 Improved HVAC Performance. To achieve these credits, equipment shall provide HVAC performance improvement in accordance with Section 11.5.2.2.2, 11.5.2.2.3, 11.5.2.2.4, 11.5.2.2.5, or 11.5.2.2.6. Equipment shall also meet applicable requirements of Sections 6.4 and 6.5. Credits shall be as shown in Section 11.5.3 or as specified in each subsection for building use types where base credits are included in Section 11.5.3 tables. Use of multiple credits from this section shall be allowed.

- **H01: HVAC System Performance Improvement (Reserved)**
- **H02: HVAC Heating Performance Improvement.** To achieve this credit, space heating equipment shall exceed the minimum heating efficiency requirements by 5% or more than listed in the tables in Section 6.8.1. The measure energy credit for heating efficiency improvement (EC_{HE}) shall be determined as follows:

$$EC_{H02_adj} = EC_{H02_base} \times \frac{EI_{heat}}{0.05}$$

where

EC_{H02_adj} = energy credits achieved for heating *efficiency* improvement

EC_{H02_base} = H02 base energy credit from Section 11.5.3

EI_{heat} = ~~lesser of~~ the percentage improvement (as a fraction) above minimum *efficiency* requirements or 20% (0.20)30% (0.30). Where heating *equipment* with different minimum efficiencies are included in the *building*, a heating capacity weighted-average improvement shall be used. Where *electric resistance* primary heating or *reheat* is included in the *building*, it shall be included in the weighted-average improvement with an EI_{heat} of 0. Supplemental gas and electric heat for heat-pump *systems* shall be excluded from the weighted EI_{heat} . ~~For heat pumps rated at multiple ambient temperatures, use the efficiency at 47°F.~~

~~Gas-fired boiler systems that are required to meet provisions of Section 6.5.4.8 shall use the minimum system efficiency (HM_{min}) as defined in Section 6.5.4.8.1. Gas-fired boiler systems that are required to meet provisions of Section 6.5.4.8 shall use the minimum system efficiency as defined in Section 6.5.4.8.1.~~

For metrics that increase as *efficiency* increases, EI_{heat} shall be calculated as follows:

$$EI_{Heat} = \frac{HM_{des}}{HM_{min}} - 1$$

Where:

HM_{des} = design heating *efficiency* metric, part-load or annualized, where available. For electric heat pumps rated at multiple ambient temperatures, use the efficiency at 47°F[8.3°C]. Gas-fired hydronic heat pumps shall be rated in accordance with Section 6.4.7.

HM_{min} = minimum required heating *efficiency* metric, part-load or annualized ~~where available from in~~ Section 6.8.1 for equipment other than gas-fired heat pumps. HM_{min} for gas-fired heat pumps shall be the same as for a boiler or furnace of the same input rating. For electric heat pumps rated at multiple ambient temperatures, use the efficiency at 47°F[8.3°C]. Where gas-fired boiler systems or gas-fired hydronic heat pump systems are required to meet provisions of Section 6.5.4.8, the minimum system efficiency HM_{min} shall be the minimum E_t required in Section 6.5.4.8. —or Informative Appendix F

Informative Note: An example of an annualized or part-load heating efficiency is AFUE rather than E_t or E_c . Where only one efficiency rating is provided for equipment in Section 6.8.1 ~~or Informative Appendix F~~, use that metric.

Add to Section 13 (I-P or SI):

Canadian Standards Association (CSA)
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CSA/ANSI Z21.40.4 - CSA 2.94.- Performance Testing and Rating of Gas-Fired, Air Conditioning and Heat Pump Appliances
2023