



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

**Public Review Draft**

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

**First Public Review (February 2024)  
(Draft Shows Proposed Changes to Current Standard)**

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at [www.ashrae.org/standards-research--technology/public-review-drafts](http://www.ashrae.org/standards-research--technology/public-review-drafts) and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at [www.ashrae.org/bookstore](http://www.ashrae.org/bookstore) or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

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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

The addendum modifies Section 6.5.6.1.1, to provide clear requirements for exhaust air energy recovery for non-transient dwelling units and add compliance path using CSA 439.

The current language does not clearly define:

- what air flows are regulated
- the amount of airflow requiring energy recovery
- the rating methods necessary to determine if the recovery efficiency targets are met.

It is unclear which exhaust air streams must have energy recovery. For a dwelling unit, this could include bathrooms, kitchen range hoods, and even laundry. These air streams can greatly exceed the required minimum ventilation/outdoor airflow, may be intermittent in operation, and sometimes are prohibited from use in an energy recovery system.

Energy recovery has been intended to be tied to the outdoor air ventilation air stream, not exhaust. For example, Section 6.5.6.1.2 sets the trigger for energy recovery to the outdoor air quantity and the system circulation airflow.

Currently, Section 6.5.6.1.1 sets efficiency targets without naming a standard for determining the effectiveness of the equipment, though it's requirements that only be met using AHRI 1060. New language, provided options to use AHRI 1060 or CAN/CSA C439. This aligns with a change that has been approved for IECC 2024.

The addendum is also reorganized to match the organization used in Section 6.5.6.1.2, simplifying the application of exceptions without changing the scope. Also, charging language is added to Section 6.5.6.1 where there had been no prior charging information.

Finally, this draft addendum includes definitions for “required minimum outdoor air rate” and “design minimum outdoor air rate” that were introduced in draft addendum p. That addendum has undergone public review but is not yet published. They are included here to allow the alignment of the energy recovery language with that addendum.

### Cost Justification:

The proposal does not change the stringency of the standard. It provides builders and designers an alternate path for compliance, and will not increase the cost of construction.

*[Note to Reviewers: This public review draft makes proposed independent substantive changes to the previous public review draft. 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 previous draft 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 substantive changes.]*

## Addendum y to 90.1-2022

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Revise Section 3.2 as follows (I-P and SI):

**Outdoor air rate, required minimum:** the larger of the minimum *outdoor air* rate required for ventilation; the required minimum exhaust air rate; or the *outdoor air* rate required to meet pressurization requirements as defined by one or more of the following as applicable to the *HVAC zone* or *HVAC system*:

- a. ASHRAE Standard 62.1 using the Ventilation Rate Procedure for all spaces and systems and the Simplified Procedure for multiple zone recirculating HVAC systems
- b. ASHRAE Standard 62.2
- c. ASHRAE Standard 170
- d. Other codes or accreditation standards approved by the authority having jurisdiction

**Outdoor air rate, design minimum:** the lowest quantity of *outdoor air* an *HVAC system* is designed to supply to the *space(s)* it serves when these *space(s)* are occupied at design occupancy levels.

**Informative note:** The *design minimum outdoor air* rate is selected by the designer and is typically not less than the *required minimum outdoor air* rate and meets the limits of Section 6.5.3.8.

Revise Section 6.5.6.1 as follows (I-P and SI):

### 6.5.6 Energy Recovery

**6.5.6.1 Exhaust Air to Outdoor Air Energy Recovery.** *Non-transient dwelling units* shall comply with Section 6.5.6.1.1. All other spaces shall comply with Section 6.5.6.1.2 ~~and have a ventilation system with energy recovery to transfer energy between the system exhaust air and outdoor air at the design minimum outdoor air rate.~~

**6.5.6.1.1 Nontransient Dwelling Units.** *Nontransient dwelling units* shall ~~be provided with outdoor air energy recovery have a ventilation systems.~~ with energy recovery to transfer energy between the system exhaust air and outdoor air at not less than the design minimum outdoor air rate and comply with one of the following:

~~For nontransient dwelling units, energy recovery systems shall result in an enthalpy recovery ratio of at least 50% at the cooling design condition.~~

~~At the heating design condition, energy recovery performance shall be as follows:~~

- a. ~~Where active humidification is provided to spaces served by the system, energy recovery systems shall result in an enthalpy recovery ratio of at least 60%.~~
- b. ~~Where active humidification is not provided to spaces served by the system, energy recovery systems shall result in a sensible energy recovery ratio of at least 60%.~~

~~The energy recovery system shall provide the required enthalpy recovery ratio or sensible energy recovery ratio at both heating and cooling design conditions, unless one mode is not required for the climate zone by the exceptions below.~~

- a. The exhaust air energy recovery performance of the heat exchanger shall be determined in accordance with AHRI 1060 [AHRI 1061]. and, at the heating *design condition*, the heat exchanger shall comply with the following:
  1. In Climate Zones 0 through 3 at the cooling *design condition*, the *enthalpy recovery ratio* at the *design minimum outdoor air rate* shall be not less than 50%.
  2. In Climate Zones 3 through 8, where active humidification is provided to *spaces* served by the *system*, the heat exchanger's *enthalpy recovery ratio* at the heating design condition at the *design minimum outdoor air rate* shall be not less than 60%.
  3. In Climate Zones 3 through 8, when active humidification is not provided to *spaces* served by the *system*, the heat exchanger's *sensible energy recovery ratio* at the heating design condition at the *design minimum outdoor air rate* shall be not less than 60%.
- b. The *equipment's* energy recovery performance shall be determined in accordance with CAN/CSA C439 and shall comply with the following:
  1. In Climate Zones 4 through 8, the equipment's sensible recovery efficiency rating at the 32°F (0°C) outdoor air heating mode test condition shall not be less than 65%
  2. In Climate Zones 0A, 1A, 2A, and 3A, the equipment's total recovery efficiency rating at the 95°F (35°C) outdoor air cooling mode test condition shall not be less than 50%.
  3. In Climate Zones other than 0A, 1A, 2A, and 3A, where active humidification is provided to *spaces* served by the *system*, the equipment's net moisture transfer ratio rating at the 32°F (0°C) outdoor air heating mode test condition shall not be less than 0.40.
  4. The *equipment's* sensible recovery efficiency and net moisture transfer shall be determined from a rated value or interpolation of rated values, at an airflow rate not less than the *design minimum outdoor air rate*.

#### Exceptions to 6.5.6.1.1:

1. *Nontransient dwelling units* in Climate Zone 3C.
2. *Nontransient dwelling units* with not more than 500 ft<sup>2</sup> of *gross conditioned floor area* in Climate Zones 0, 1, 2, 3, 4C, and 5C.
3. ~~Energy recovery performance requirements at heating design condition in Climate Zones 0, 1, and 2.~~
4. ~~Enthalpy recovery ratio requirements at cooling design condition in Climate Zones 4, 5, 6, 7, 8.~~

**6.5.6.1.2 Other Spaces ~~Other than Nontransient Dwelling Units~~.** Each fan system serving ~~other spaces other than nontransient dwelling units~~ shall have an energy recovery system where the design supply fan airflow rate exceeds the value listed in Tables 6.5.6.1.2-1 and 6.5.6.1.2-2, based on the climate zone and percentage of *design minimum outdoor air rate* ~~outdoor air~~ at design airflow conditions. Table 6.5.6.1.2-1 shall be used for all *ventilation systems* that operate less than 8000 hours per year, and Table 6.5.6.1.2-2 shall be used for all *ventilation systems* that operate 8000 or more hours per year.

#### Exceptions to 6.5.6.1.2:

1. Laboratory systems meeting Section 6.5.7.3.
2. Systems serving *spaces* that are not cooled and that are heated to less than 60°F.
3. Heating energy recovery where more than 60% of the *outdoor air heating energy* is provided from *site-recovered energy* or *on-site renewable energy* in Climate Zones 5 through 8.
4. *Enthalpy recovery ratio* requirements at heating design condition in Climate Zones 0, 1, and 2.
5. *Enthalpy recovery ratio* requirements at cooling design condition in Climate Zones 3C, 4C, 5B, 5C, 6B, 7, and 8.

6. Where the sum of the airflow rates exhausted and relieved within 20 ft of each other is less than 75% of the *design minimum outdoor airflow* rate, excluding exhaust air that is
- used for another *energy recovery system*,
  - not allowed by ASHRAE/ASHE Standard 170 for use in *energy recovery systems* with leakage potential, or
  - of Class 4 as defined in ASHRAE Standard 62.1.
7. *Systems* in Climate Zones 0 through 4 requiring dehumidification that employ *series energy recovery* and have a minimum *SERR* of 0.40.
8. *Systems* expected to operate less than 20 hours per week at the *design minimum outdoor air rate* percentage covered by Table 6.5.6.1.2-1.
9. *Indoor pool dehumidifiers* meeting Section 6.5.6.4.

**6.5.6.1.2.1 Minimum-Enthalpy Energy Recovery Performance Ratio.** ~~The exhaust air energy recovery performance of the heat exchanger shall be determined in accordance with AHRI 1060. *Energy recovery systems required by this section shall result in an*~~ At the cooling *design condition*, the *enthalpy recovery ratio* at the *design minimum outdoor air rate* shall be not less than ~~of at least 50% at the cooling design condition.~~ and, ~~At the heating design condition, the heat exchanger shall comply with the following *energy recovery performance shall be as follows*:~~

- Where active humidification is provided to *spaces* served by the *system*, ~~*energy recovery systems shall result in an*~~ the heat exchanger's *enthalpy recovery ratio* at the *design minimum outdoor air rate* shall be not less than ~~of at least 50%.~~
- Where active humidification is not provided to *spaces* served by the *system*, ~~*energy recovery systems shall result in a*~~ the heat exchanger's *sensible energy recovery ratio* at the *design minimum outdoor air rate* shall be not less than ~~of at least 50%.~~

The *energy recovery system* shall provide the required *enthalpy recovery ratio* or *sensible energy recovery ratio* at both heating and cooling *design conditions* unless one mode is not required for the climate zone by the exceptions to Section 6.5.6.1.2.

**6.5.6.1.2.2 Provision for Air Economizer or Bypass Operation.** Provision shall be made for both *outdoor air* and exhaust air to bypass or *control* the *energy recovery system* to enable *economizer* operation as required by Section 6.5.1.1. The bypass or *control* shall meet the following criteria:

- For *energy recovery systems* where the transfer of *energy* cannot be stopped, bypass provision shall prevent the total airflow rate of either *outdoor air* or exhaust air through the *energy recovery exchanger* from exceeding 10% of the full design airflow rate.
- The pressure drop of the *outdoor air* through the *energy recovery exchanger* shall not exceed 0.4 in. of water; the pressure drop of the exhaust air through the *energy recovery exchanger* shall not exceed 0.4 in. of water.

**Exception to 6.5.6.1.2.2:** *Energy recovery systems* with 80% or more *design minimum outdoor air rate* at full design airflow rate and not exceeding 10,000 cfm.

Modify Table 6.5.6.1.2-1 as follows (the rest of the table is unchanged):

**Table 6.5.6.1.2-1 Exhaust Air Energy Recovery Requirements for Ventilation Systems  
Operating Less than 8000 Hours per Year  
% Design Minimum Outdoor Air Rate at Full Design Airflow Rate**

Modify Table 6.5.6.1.2-2 as follows (the rest of the table is unchanged):

**Table 6.5.6.1.2-2 Exhaust Air Energy Recovery Requirements for Ventilation Systems  
Operating Greater than or Equal to 8000 Hours per Year  
% Design Minimum Outdoor Air Rate at Full Design Airflow Rate**

*Add to Section 13 as follows (I-P):*

Reference	Section
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**Air Conditioning, Heating and Refrigeration Institute  
(AHRI) 2311 Wilson Blvd., Arlington, VA 22201**

<u>AHRI 1060 (I-P/2018)</u>	<u>Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment</u>	<u>6.5.6.1.1.a,</u> <u>6.5.6.1.2.1</u>
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**CSA Group  
178 Rexdale Blvd., Toronto, ON, Canada M9W 1R3**

<u>CSA C439-2018</u>	<u>Laboratory Methods of Test For Rating The Performance Of Heat/Energy-Recovery Ventilators</u>	<u>6.5.6.1.1.b</u>
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*Add to Section 13 as follows (SI):*

Reference	Section
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**Air Conditioning, Heating and Refrigeration Institute  
(AHRI) 2311 Wilson Blvd., Arlington, VA 22201**

<u>AHRI 1061 (SI/2018)</u>	<u>Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment</u>	<u>6.5.6.1.1.a,</u> <u>6.5.6.1.2.1</u>
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<u>CSA C439-2018</u>	<u>Laboratory Methods Of Test For Rating The Performance Of Heat/Energy-Recovery Ventilators</u>	<u>6.5.6.1.1.b</u>
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