STANDARD

ANSI/ASHRAE/IES Addendum p to ANSI/ASHRAE/IES Standard 90.1-2022

Energy Standard for Sites and Buildings **Except Low-Rise Residential Buildings**

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FOREWORD

Addendum p:

- Makes prescriptive requirements limiting outdoor air more stringently by eliminating options (b) and (c) of Section 6.5.3.8 and reducing the 135% ratio relative to code to 130% (30% above code). This essentially means that the LEED credit for +30% above ANSI/ASHRAE Standard 62.1 rates can be implemented in the design and still comply prescriptively, rather than forcing the use of one of the performance approaches to show compliance if rates are ever higher than code minimum rates.
- Specifically limits the outdoor air component of "equivalent clean air" per ASHRAE Standard 241 and total supply air per ANSI/ASHRAE/ASHE Standard 170 for disease transmission mitigation to the +30% above code rate, meaning the remaining clean air rate must be provided using recirculating air filters, UV, or other air cleaning devices. These other clean air components are not limited by this standard and are left to the discretion of the designer.
- Makes Section 12, "Energy Cost Budget Method," slightly less stringent by allowing outdoor air rates to be 30% above code minimum rates without any penalties but also making this approach consistent with prescriptive requirements. (Normative Appendix G, "Performance Rating Method," remains as-is, so it remains a constant baseline.)
- Ties minimum Standard 62.1 rates to those calculated using the Ventilation Rate Procedure and the Simplified Procedure for design flexibility and ease of demonstrating compliance.
- Disallows the supply of outdoor air during unoccupied hours unless doing so reduces energy costs.
- Creates two new defined terms, "required minimum outdoor air" and "design minimum outdoor air" to replace and clarify the terms "minimum outdoor air" and "minimum ventilation air" used throughout the standard.

Cost Statement

This addendum includes no requirements that would increase first costs for buildings already providing code minimum outdoor air rates. For those buildings for which higher-than-code minimum outdoor air rates were being considered, either for improved indoor air quality or to mitigate disease transmission, this addendum limits those rates and when they can be supplied to occupiable spaces, which will, in general, reduce both first costs and energy costs.

Note: In this addendum, changes to the current standard are indicated in the text by <u>underlining</u> (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum p to Standard 90.1-2022

Modify Section 3 as follows.

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. <u>ANSI/ASHRAE Standard 62.1, using the Ventilation Rate Procedure for all spaces and systems and the</u> <u>Simplified Procedure for multiple zone recirculating *HVAC systems*</u>
- b. ANSI/ASHRAE Standard 62.2
- c. ANSI/ASHRAE/ASHE 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 is subject to the limits in Section 6.5.3.8.

Modify Section 6.4.3.4.2 as follows.

6.4.3.4.2 Shutoff Damper Controls. All *outdoor air* intake and exhaust systems shall be equipped with motorized dampers that will *automatically* shut when the *systems* or *spaces* served are not in use. *Out-door air* and exhaust/relief *dampers* shall be capable of and configured to *automatically* shut off when <u>HVAC systems</u> are operated but <u>HVAC zones</u> served are not scheduled or indicated to be occupied by a <u>device meeting the requirements of Sections 6.4.3.3.1</u>, such as for during pre-occupancy building warm-up, *cooldown*, and *setback*, except when the supply of *outdoor air* reduces *energy* costs or when *outdoor air* must be supplied to meet code requirements the required minimum outdoor air rate.

[...]

Modify Section 6.5.1.1.3 as follows.

6.5.1.1.3 High-Limit Shutoff. All *air economizers* shall be capable of and configured to automatically reduce *outdoor air* intake to the minimum <u>design minimum</u> outdoor air <u>rate</u> quantity when outdoor air intake will no longer reduce cooling *energy* use. High-limit shutoff control types and associated *set points* for specific climate zones shall be chosen from Table 6.5.1.1.3.

Modify Section 6.5.2.1 (Zone Controls) as follows.

[...]

Exceptions to 6.5.2.1:

- 1. Zones for which the volume of air that is reheated, *recooled*, or mixed is less than the larger of the following:
 - a. For systems without DDC, 30% of the zone design peak supply.
 - b. For *systems* with *DDC*, the minimum primary airflow rate required to meet the Simplified Procedure *ventilation* requirements of ASHRAE Standard 62.1 for the zone <u>based on the *design*</u> <u>minimum outdoor air rate</u>, permitted to be the average airflow rate as allowed by ASHRAE Standard 62.1.
 - c. Any higher rate that can be demonstrated to the satisfaction of the *authority having jurisdiction* to reduce overall *system* annual *energy* use by offsetting *reheat/recool energy* losses through a reduction in *outdoor air* intake for the *system*.
 - d. The <u>design minimum outdoor air rate</u> airflow <u>rate</u> required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates
- 2. Zones with *DDC* that comply with all of the following:
 - a. The airflow rate in *dead band* between heating and cooling does not exceed the larger of the following:
 - i. The minimum primary airflow rate required to meet the Simplified Procedure *ventilation* requirements of ASHRAE Standard 62.1 for the zone <u>based on the *design minimum outdoor*</u> <u>air rate</u>, permitted to be the average airflow rate as allowed by ASHRAE Standard 62.1.
 - ii. Any higher rate that can be demonstrated, to the satisfaction of the *authority having jurisdiction*, to reduce overall *system* annual *energy* use by offsetting *reheat/recool energy* losses through a reduction in *outdoor air* intake.
 - iii. The <u>design minimum outdoor air rate</u> airflow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

[...]

Modify Section 6.5.2.3 as follows.

6.5.2.3 Dehumidification. Where humidity controls are provided, such controls shall prevent *reheating*, mixing of hot and cold airstreams, or other means of simultaneous heating and cooling of the same airstream.

Exceptions to 6.5.2.3:

 The system is capable of and configured to reduce supply air volume to 50% or less of the design supply airflow rate or to the <u>design</u> minimum <u>minimum</u> outdoor air <u>ventilation</u> <u>rate</u> rate specified in ASHRAE Standard 62.1 or other applicable federal, state, or local code or recognized standard, whichever is larger, before simultaneous heating and cooling takes place.

[...]

Modify Section 6.5.3.3 as follows.

6.5.3.3 Multiple-Zone VAV System Ventilation Optimization Control. Multiple-zone VAV systems with DDC of individual zone boxes reporting to a central control panel shall include means to *automatically* reduce *outdoor air intake*-flow below the design design minimum outdoor air rate rates-in response to changes in system ventilation efficiency as defined by ASHRAE Standard 62.1, Normative Appendix A.

Exceptions to 6.5.3.3:

- 1. *VAV systems* with zonal transfer fans that recirculate air from other zones without directly mixing it with *outdoor air*, dual-duct dual-fan *VAV systems*, and *VAV systems* with fan-powered *terminal* units.
- 2. *Systems* where total design exhaust airflow is more than 70% of total design <u>design minimum</u> outdoor air <u>rate</u>-intake flow requirements.

Modify Section 6.5.3.8 as follows.

6.5.3.8 Ventilation Design.

6.5.3.8.1 Ventilation for Acceptable Air Quality. The <u>design minimum outdoor air rate to each</u> <u>HVAC zone and each HVAC system</u> required minimum outdoor air rate is the larger of the minimum outdoor air rate or the minimum exhaust air rate required by Standard 62.1, Standard 62.2, Standard 170, or applicable codes or accreditation standards. Outdoor air ventilation systems shall comply with one of the following:

- a. Design minimum system outdoor air provided shall not exceed 135% of the required required minimum outdoor air rate rate by more than 30%. HVAC zones and HVAC systems with a design minimum outdoor air rate greater than 105% of the required minimum outdoor air rate shall include automatic zone flow control dampers or automatic outside air zone flow control dampers.
- b. Dampers, ductwork, and controls shall be provided that allow the system to supply no more than the required minimum outdoor air rate with a single set-point adjustment.
- e. The system includes exhaust air energy recovery complying with Section 6.5.6.1.

Informative Note: This section does not limit outdoor air used for economizing in accordance with Section 6.5.1.

6.5.3.8.2 Ventilation for Disease Transmission Mitigation. Where ventilation is used to mitigate disease transmission to meet ASHRAE Standard 241 or ANSI/ASHRAE/ASHE Standard 170, the outdoor air component of the ventilation rate shall meet the limitation of Section 6.5.3.8.1.

Informative Note: Other methods of mitigating disease transmission, such as cleaned recirculated air, are not limited by this standard.

Modify Section 6.5.7.1 as follows.

6.5.7.1 Transfer Air. Conditioned supply air delivered to any *space* with mechanical exhaust shall not exceed the greater of

- a. the supply flow required to meet the *space* heating or cooling load;
- b. the <u>design minimum outdoor air ventilation rate rate</u> required by the <u>authority having jurisdiction</u>, the facility Environmental Health and Safety department, or ASHRAE Standard 62.1; or

[...]

Modify Section 11.5.2.2.6 as follows.

11.5.2.2.6 H06: Dedicated Outdoor Air System with Zone Fan Control. Credits for this measure are only allowed where single-zone HVAC units are not required to have multispeed or variable-speed fans in accordance with Section 6.5.3.2.1. HVAC controls and *ventilation systems* shall include all of the following:

- a. Zone controls shall cycle the heating/cooling-unit fans off when not providing required heating and cooling or shall limit fan power to 0.12 W/cfm of air delivered to the zone by the unit.
- b. *Outdoor air* shall be supplied by an independent *ventilation system* designed to provide no more than 110% of the <u>required minimum minimum outdoor air rate</u> to each individual occupied space as specified by Standard 62.1.

[...]

Modify Section 12.5.2. as follows.

[...]

d. Minimum Outdoor Air Ventilation-Rate. <u>Design</u> <u>Minimum minimum</u> outdoor air ventilation rates rates shall be the same for both the budget building design and proposed design. Exhaust air energy recovery shall be modeled for the budget building design in accordance with Section 6.5.6.1.

Exceptions to 12.5.2(d):

- 1. When modeling *demand control ventilation* in the *proposed design* for *spaces* where *demand control ventilation* is not required per Section 6.4.3.8.
- Where the <u>design minimum minimum outdoor air rate</u> intake flow in the proposed design is provided in excess of exceeds the amount highest rate allowed by Section 6.5.3.8, the baseline building design shall be modeled to reflect using the highest rate allowed minimum amount by Section 6.5.3.8.
- e. Economizers. All budget *building systems* as listed in Table 12.5.2-1 shall have *air economizers* in accordance with Section 6.5.1 and Section 12.5.2(i). The high-limit shutoff shall be in accordance with Table 12.5.2-4.
- f. **Preheat Coils.** If the *proposed design system* has a preheat coil, the *budget building design*'s *system* shall be modeled with a preheat coil controlled in the same manner.
- g. Supply Airflow Rates. System design supply air rates for the budget building design shall be based on a supply-air-to-room temperature set-point difference of 20°F or the <u>design minimum outdoor air rate</u> minimum outdoor airflow rate, or the airflow rate required to comply with applicable codes or accreditation standards, whichever is greater. For systems with multiple zone thermostat set points, use the design set point that will result in the lowest supply air cooling set point or highest supply air heating set point. If return or relief fans are specified in the proposed design, the budget building design shall also be modeled with fans serving the same functions and sized for the budget system supply fan air quantity less the <u>design</u> minimum <u>minimum outdoor air rate</u>, or 90% of the supply fan air quantity, whichever is larger.

Exceptions to 12.5.2(g):

1. For *systems* serving laboratory *spaces*, airflow rate shall be based on a supply-air-to-room temperature *set-point* difference of 17°F or the required <u>design minimum outdoor air rate</u> ventilation air or makeup air, whichever is greater.

[...]

Modify Section 13 as follows.

Reference		Section
ASHRAE 180 Technology Parkway, Peachtree Corne	rs, GA 30092	
ASHRAE Standard 241-2023	Control of Infectious Aerosols	<u>6.5.3.8.2</u>

Modify Section C3.5.8 as follows.

C3.5.8 HVAC Systems. One *HVAC system* shall be provided for each thermal zone and shall have the following characteristics:

- a. Constant-volume fan control.
- b. Electrically provided cooling with *EER* from Table 6.8.1-1, based on requirements for split-*system* air conditioners with heating section type "all other" between 65,000 Btu/h and 135,000 Btu/h. The *EER* shall be adjusted to remove the fan power in accordance with Section 12.5.2(c).
- c. Gas furnace with constant thermal *efficiency* equal to the minimum *AFUE* allowed for gas-fired warmair furnaces with maximum capacity <225,000 Btu/h, in accordance with Table 6.8.1-5.
- d. The <u>design minimum outdoor air rate</u> ventilation rate for each building area type shall be consistent with the <u>design minimum outdoor air rate</u> ventilation rate in the building envelope trade-off schedules and loads for the applicable building area type.

Modify Section G3.2.2.4 as follows.

G3.2.2.4 Ventilation. <u>Design minimum Minimum ventilation system</u> outdoor air intake flow <u>rate</u> shall be the same for the proposed design and baseline building design.

Exceptions to G3.2.2.4:

- When modeling demand control ventilation in the proposed design in systems with <u>design mini-</u> <u>mum</u> outdoor air <u>rate</u> expansive less than or equal to 3000 cfm serving areas with an average design capacity of 100 people per 1000 ft² or less.
- 2. When designing *systems* in accordance with Standard 62.1, Section 6.2, "*Ventilation* Rate Procedure," reduced *ventilation* airflow rates may be calculated for each *HVAC zone* in the *proposed design* with a zone air distribution effectiveness (Ez) > 1.0 as defined by Standard 62.1, Table 6-2. Baseline *ventilation* airflow rates in those zones shall be calculated using the *proposed design Ventilation* Rate Procedure calculation with the following change only. Zone air distribution effectiveness (Ez) > 1.0. *Proposed design* and baseline *building design Ventilation* Rate Procedure calculations, as described in Standard 62.1, shall be submitted to the *rating authority* to claim credit for this exception.
- 3. Where the <u>design minimum minimum outdoor air rate</u> intake flow in the proposed design is provided in excess of exceeds the <u>required minimum outdoor air rate</u> amount required by the building code or the rating authority, the baseline building design shall be modeled to reflect-using the <u>required minimum outdoor air rate</u> greater of that required by either the rating authority or the building code and will be less than the proposed design.
- 4. For baseline *systems* serving only laboratory *spaces* that are prohibited from recirculating return air by code or accreditation standards, the baseline *system* shall be modeled as 100% *outdoor air*.

Modify Section G3.2.2.7.1 as follows.

G3.2.2.7.1 Baseline All System Types Except System Types 9 and 10. *System* design supply airflow rates for the *baseline building design* shall be based on a supply-air-to-room temperature *set-point* difference of 20°F or the *design minimum outdoor air rate*-minimum outdoor airflow rate, or the airflow rate required to comply with applicable codes or accreditation standards, whichever is greater. For *systems* with multiple zone *thermostat set points*, use the design *set point* that will result in the lowest supply air cooling *set point* or highest supply air heating *set point*. If return or relief fans are specified in the *proposed design*, the *baseline building design* shall also be modeled with fans serving the same functions and sized for the baseline *system* supply fan air quantity less the *design* minimum *minimum outdoor air rate*, or 90% of the supply fan air quantity, whichever is larger.

Exceptions to G3.2.2.7.1:

- 1. For *systems* serving laboratory *spaces*, airflow rate shall be based on a supply-air-to-room temperature *set-point* difference of 17°F or the required *ventilation* air or *makeup air*, whichever is greater.
- 2. If the *proposed design HVAC system* airflow rate based on latent loads is greater than the design airflow rate based on sensible loads, then the same supply-air-to-room-air humidity ratio difference (gr/lb) used to calculate the *proposed design* airflow shall be used to calculate design airflow rates for the *baseline building design*.

G3.2.2.7.2 Baseline System Types 9 and 10. *System* design supply airflow rates for the *baseline building design* shall be based on the temperature difference between a supply air temperature *set point* of 105°F and the design *space*-heating temperature *set point*, or the *design minimum outdoor air rate*-minimum outdoor airflow rate, or the airflow rate required to comply with applicable codes or accreditation standards, whichever is greater. If the *proposed design* includes a fan or fans sized and controlled to provide non-*mechanical cooling*, the *baseline building design* shall include a separate fan to provide non-*mechanical* cooling, sized and controlled the same as the *proposed design*.

Modify Section G3.2.3.13 and 14 as follows.

G3.2.3.13 VAV Minimum Flow Set Points (Systems 5 and 7). Minimum volume *set points* for *VAV reheat* boxes shall be 30% of zone peak airflow, <u>or</u> the <u>design minimum outdoor air rate</u> minimum outdoor airflow rate, or the airflow rate required to comply with applicable codes or accreditation standards, whichever is larger.

Exception to G3.2.3.13: Systems serving laboratory spaces shall reduce the exhaust and makeup air volume during unoccupied periods to the largest of 50% of zone peak airflow, or the <u>design mini-</u><u>mum outdoor air rate</u> minimum outdoor airflow rate, or the airflow rate required to comply with applicable codes or accreditation standards.

G3.2.3.14 Fan Power and Control (Systems 6 and 8). Fans in parallel *VAV* fan-powered boxes shall run as the first stage of heating before the *reheat* coil is energized. Fans in parallel *VAV* fan-powered boxes shall be sized for 50% of the peak design primary air (from the *VAV* air-handling unit) flow rate and shall be modeled with 0.35 W/cfm fan power. Minimum volume *set points* for fan-powered boxes shall be equal to 30% of peak design primary airflow rate or the rate required to meet the *design* minimum *minimum* outdoor air <u>rate</u> ventilation requirement, whichever is larger. The supply air temperature *set point* shall be constant at the *design condition*.

Modify Section G3.2.3.17 as follows.

G3.2.3.17 System 11 Supply Air Temperature and Fan Control. Minimum volume *set point* shall be 50% of the maximum design airflow rate, <u>or</u> the <u>design minimum outdoor air rate</u> minimum ventilation outdoor airflow rate, or the airflow rate required to comply with applicable codes or accreditation standards, whichever is larger.

[...]

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

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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