ANSI/ASHRAE/IES Addenda ch, cl, and db to
ANSI/ASHRAE/IESNA Standard 90.1-2007

ASHRAE ADDENDA

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on June 26, 2010; by the ASHRAE Board of Directors on June 30, 2010; by the IES Board of Directors on June 23, 2010; and by the American National Standards Institute on July 1, 2010.

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FOREWORD

This addendum address changes necessary to Section 11 and Appendix G related to addenda H and AS.

The baseline minimum volume setpoints for fan-powered boxes specified in Section 11 were clarified to reference the correct exception from Section 6.5.2.1.

The baseline minimum volume setpoints for VAV reheat boxes specified in Section 11 and Appendix G were modified to be consistent with Section 6.5.2.1 which limits simultaneous reheating and recooling and no longer allows 0.4 cfm/ft2 of zone conditioned floor area as an exception. Supply air temperature reset requirements are also modified to be consistent with baseline reset requirements specified in Appendix G and to eliminate conflict with the 20°F supply-air-to-room-air temperature difference requirement for sizing design supply air flow.

Exception (c) to Section G3.1.1 was eliminated to be consistent with changes made in Addendum AS. The original intent of the exception was to allow constant volume baseline systems for hospitals and laboratory type spaces where pressurization or minimum ventilation requirements made variable air volume impractical. Laboratory spaces have been addressed in previous addenda and pressure relationships no longer justify using constant volume systems for hospital applications.

Exception (2) to Section G3.1.1 is modified with the intent that laboratory systems with greater than 5000 cfm of exhaust air use a single VAV baseline system. Previous wording was being interpreted as only requiring VAV baseline systems on individual laboratory zones with greater than 5000 cfm of exhaust. The minimum 50% turndown on the baseline laboratory VAV system is moved to Section G3.1.3.13 to be located with other minimum VAV requirements.

Exceptions to the 50% laboratory VAV minimum air flow were added to address minimum ventilation requirements lab designers follow to meet codes and accreditation standards.

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

Addendum ch to 90.1-2007

Modify the Standard as follows (I-P Units)

Modify footnotes a and b to Table 11.3.2A as follows

[a] **VAV with parallel boxes:** Fans in parallel VAV fan-powered boxes shall be sized for 50% of the peak design flow rate and shall be modeled with 0.35 W/cfm fan power. Minimum volume setpoints for fan-powered boxes shall be equal to the minimum rate for the space required for ventilation consistent with Section 6.5.2.1 Exception (a) ~~1.~~ 2 Supply air temperature setpoint shall be constant at the design condition [see Section 11.3.2 (h)].

[b] **VAV with reheat:** Minimum volume setpoints for VAV reheat boxes shall be ~~0.4 cfm/ft^2 of floor area,~~ 30% of zone peak air flow or the minimum ventilation rate, whichever is larger, consistent with Section 6.5.2.1 Exception (a)1~~2~~. ~~Supply air temperature shall be reset based on zone demand from the design temperature difference to a 10°F temperature difference under minimum load conditions. Design airflow rates shall be sized for the reset supply air temperature, i.e., a 10°F temperature difference~~ The supply air temperature for cooling shall be reset higher by 5°F under the minimum cooling load conditions

Modify G31.1 as follows:

G3.1.1 Baseline HVAC System Type and Description. HVAC systems in the baseline building design shall be based on usage, number of floors, conditioned floor area, and heating source as specified in Table G3.1.1A and shall conform with the system descriptions in Table G3.1.1B. For systems 1, 2, 3, and 4, each thermal block shall be modeled with its own HVAC system. For systems 5, 6, 7, and 8, each floor shall be modeled with a separate HVAC system. Floors with identical thermal blocks can be grouped for modeling purposes.

Exceptions:

~~c. If the baseline HVAC system type is 5, 6, 7, or 8, use separate single zone systems conforming with the requirements of System 3 or System 4 (depending on building heat source) for any zones having special pressurization relationships, cross contamination requirements, or code-required minimum circulation rates.~~

c. For laboratory spaces in a building having a total laboratory exhaust rate greater than ~~spaces with a minimum of~~ 5000 cfm ~~of exhaust~~, use a single system of type 5 or 7 serving only those spaces ~~that reduce the exhaust and makeup air volume to 50% of design values during unoccupied periods~~. For all-electric buildings, the heating shall be electric resistance.

Modify the footnote to Table G3.1.1A as follows:

For laboratory spaces in a building having a total laboratory exhaust rate greater than ~~spaces with a minimum of~~ 5000 cfm ~~of exhaust~~, use a single system of type 5 or 7 serving only those spaces ~~that reduce the exhaust and makeup air volume to 50% of design values during unoccupied periods~~. For all-electric buildings, the heating shall be electric resistance.

Modify G3.1.13 as follows:

G3.1.3.13 VAV Minimum Flow Setpoints (Systems 5 and 7). Minimum volume setpoints for VAV reheat boxes shall be ~~0.4 cfm/ft^2 of floor area served~~ 30% of zone peak air flow, ~~or~~ the minimum ~~ventilation~~ outdoor air flow rate or the

air flow rate required to comply with applicable codes or accreditation standards, whichever is larger.

Exception: Systems serving laboratory spaces shall reduce the exhaust and makeup air volume during unoccupied periods to the largest of 50% of zone peak air flow, the minimum outdoor air flow rate, or the air flow rate required to comply with applicable codes or accreditation standards.

Modify the Standard as follows (SI Units)

Modify footnotes a and b to Table 11.3.2A as follows

[a] **VAV with parallel boxes:** Fans in parallel VAV fan-powered boxes shall be sized for 50% of the peak design flow rate and shall be modeled with 0.74 W per L/s fan power. Minimum volume setpoints for fan-powered boxes shall be equal to the minimum rate for the space required for ventilation consistent with Section 6.5.2.1 Exception (a) ~~1.~~ 2 Supply air temperature setpoint shall be constant at the design condition [see Section 11.3.2 (h)].

[b] **VAV with reheat:** Minimum volume setpoints for VAV reheat boxes shall be ~~0.4 cfm/ft^2 of floor area,~~ 30% of zone peak air flow or the minimum ventilation rate, whichever is larger, consistent with Section 6.5.2.1 Exception (a)1~~2~~. ~~Supply air temperature shall be reset based on zone demand from the design temperature difference to a 5.6°C temperature difference under minimum load conditions. Design airflow rates shall be sized for the reset supply air temperature, i.e., a 5.6°C temperature difference~~ The supply air temperature for cooling shall be reset higher by 2.8°C under the minimum cooling load conditions

Modify G31.1 as follows:

G3.1.1 Baseline HVAC System Type and Description. HVAC systems in the *baseline building design* shall be based on usage, number of floors, conditioned floor area, and heating source as specified in Table G3.1.1A and shall conform with the system descriptions in Table G3.1.1B. For systems 1, 2, 3, and 4, each thermal block shall be modeled with its own HVAC system. For systems 5, 6, 7, and 8, each floor shall be modeled with a separate HVAC system. Floors with identical thermal blocks can be grouped for modeling purposes.

Exceptions:

~~e. If the baseline HVAC system type is 5, 6, 7, or 8, use separate single zone systems conforming with the requirements of System 3 or System 4 (depending on building heat source) for any zones having special pressurization relationships, cross contamination requirements, or code required minimum circulation rates.~~

c. For laboratory spaces in a building having a total laboratory exhaust rate greater than ~~spaces with a minimum of~~ 2400 L/s ~~of exhaust~~, use a single system of type 5 or 7 serving only those spaces ~~that reduce the exhaust and makeup air volume to 50% of design values during unoccupied periods~~. For all-electric buildings, the heating shall be electric resistance.

Modify the footnote to Table G3.1.1A as follows:

For laboratory spaces in a building having a total laboratory exhaust rate greater than ~~spaces with a minimum of~~ 2400 L/s ~~of exhaust~~, use a single system of type 5 or 7 serving only those spaces ~~that reduce the exhaust and makeup air volume to 50% of design values during unoccupied periods~~. For all-electric buildings, the heating shall be electric resistance.

Modify G3.1.13 as follows:

G3.1.3.13VAV Minimum Flow Setpoints (Systems 5 and 7). Minimum volume setpoints for VAV reheat boxes shall be ~~0.4 cfm/ft^2 of floor area served~~ 30% of zone peak air flow, ~~or~~ the minimum ~~ventilation~~ outdoor air flow rate or the air flow rate required to comply with applicable codes or accreditation standards, whichever is larger.

Exception: Systems serving laboratory spaces shall reduce the exhaust and makeup air volume during unoccupied periods to the largest of 50% of zone peak air flow, the minimum outdoor air flow rate, or the air flow rate required to comply with applicable codes or accreditation standards.

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FOREWORD

The proposed text would clarify how to interpret the use of dynamic glazing products which are designed to be able to vary a performance property such as SHGC, rather than having just a single value. As the ratings for these products give a range of performance values, designers and code officials require an interpretation on what to use for compliance with the standard

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Addendum cl to 90.1-2007

Modify the Standard as follows (I-P and SI Units)

Modify Section 3.2 definitions as follows:

dynamic glazing: Any *fenestration* product that has the fully reversible ability to change its performance properties, including *U-factor*, *SHGC*, or *VT.*

Add new exception to Section 5.5.4.4.1 SHGC of Vertical Fenestration:

d. For *dynamic glazing*, the minimum *SHGC* shall be used to demonstrate compliance with this section. *Dynamic glazing* shall be considered separately from other *vertical fenestration*, and area-weighted averaging with other *vertical fenestration* that is not *dynamic glazing* shall not be permitted.

Add new exception to Section 5.5.4.4.2 SHGC of Skylights:

Exception: For *dynamic glazing*, the minimum *SHGC* shall be used to demonstrate compliance with this section. *Dynamic glazing* shall be considered separately from other *skylights*, and area-weighted averaging with other *skylights* that is not *dynamic glazing* shall not be permitted.

Modify Appendix C, Section C1.3 as follows:

C1.3 For Fenestration. The classification, area, *U-factor*, *SHGC*, *VT*, overhang *PF* for *vertical fenestration*, and width, depth, and height for *skylight wells* shall be specified. (See Figure C1.3 for definition of width, depth, and height for *skylight wells*.) Each *fenestration* element is associated with a surface (defined in Section C1.2) and has the orientation of that surface. For *dynamic glazing*, the *SHGC* and *VT* shall be equal to that determined in accordance with C3.5 for the base envelope design.

Add the following exception to Table G3.1 #5 proposed building (left column) as follows:

Automatically controlled *dynamic glazing* may be modeled. Manually controlled *dynamic glazing* shall use the average of the minimum and maximum *SHGC* and *VT.*

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FOREWORD

Design Airflow Rates: *The usual supply-air-to-room-air temperature difference in commercial applications is 20 deg F. However, the minimum airflow rates in typical commercial buildings are much lower than those required in laboratory occupancies. The higher minimum airflow rates warrant a smaller temperature difference, to avoid excessive reheat. Therefore this change directs the user to use a 17 deg.F supply-air-to-room-air temperature difference to determine baseline airflow for laboratory systems.*

System Fan Power Distribution: *Section G3.1.2.9 System Fan Power informs the user that the how to determine the sum of the fan power for supply, return, exhaust, and relief fans. However it does not direct the user how to distribute that power amongst those fans. This change directs the user to distribute the baseline fan power in the same proportion as the proposed design.*

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Addendum db to 90.1-2007

Modify the Standard as follows (I-P Units)

G3.1.2.8 Design Air Flow Rates. System design supply air flow rates for the *baseline building design* shall be based on a supply-air-to-room-air temperature difference of 20°F or the required ventilation air or makeup air, whichever is greater. 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 minimum *outdoor air*, or 90% of the supply fan air quantity, whichever is larger.

Exception: For systems serving laboratory spaces, use a supply-air-to-room-air temperature difference of 17°F or the required ventilation air or makeup air, whichever is greater.

G3.1.2.9 System Fan Power. System fan electrical power for supply, return, exhaust, and relief (excluding power to fan-powered VAV boxes) shall be calculated using the following formulas:

....

G3.1.2.9.1 The calculated system fan power shall be distributed to supply, return, exhaust, and relief fans in the same proportion as the proposed design.

Modify the Standard as follows (SI Units)

G3.1.2.8 Design Air Flow Rates. System design supply air flow rates for the *baseline building design* shall be based on a supply-air-to-room-air temperature difference of 11°C or the required ventilation air or makeup air, whichever is greater. 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 minimum *outdoor air*, or 90% of the supply fan air quantity, whichever is larger.

Exception: For systems serving laboratory spaces, use a supply-air-to-room-air temperature difference of 9.4°C or the required ventilation air or makeup air, whichever is greater.

G3.1.2.9 System Fan Power. System fan electrical power for supply, return, exhaust, and relief (excluding power to fan-powered VAV boxes) shall be calculated using the following formulas:

....

G3.1.2.9

G3.1.2.9.1 The calculated system fan power shall be distributed to supply, return, exhaust, and relief fans in the same proportion as the proposed design.

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.