



**BSR/ASHRAE/IES Addendum b
to ANSI/ASHRAE/IES Standard 90.1-2019**

Public Review Draft

Proposed Addendum b to Standard 90.1-2019, Energy Standard for Buildings Except Low-Rise Residential Buildings

**First Public Review (February 2020)
(Draft Shows Proposed Changes to Current Standard)**

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FOREWORD

Demand Controlled Ventilation (DCV) should be required when cost-effective for occupied spaces considering the required outside air for ventilation required based on number of people in the space, varying space sizes, use of energy recovery equipment, and climate zone. The current requirement has a threshold based only on space size and space occupancy. This proposal seeks to more effectively align DCV requirements with all those variables to produce a cost-effective solution.

*The single threshold parameters are replaced by a table where the floor area threshold requirement is based on climate zone and occupant outside airflow rates per 1,000 sq. ft. determined through ASHRAE Standard 62.1. The requirements are grouped by **occupant outside air flow component** ranges (cfm/1000 square feet) based on default parameters in 62.1. While the exact value for a particular space type varies, the three groups in the table generally correspond to (1) retail, break rooms, or bank lobbies, (2) classrooms or conference rooms, and (3) lecture halls, theatre or assembly.*

The exceptions were modified as follows: The exhaust air energy recovery exception was removed and replaced with higher floor area thresholds in the table. The exception for design outdoor airflow less than 750 cfm was removed, as this factor is accounted for in the cost effectiveness analysis. Note that health care areas covered by Standard 170 would be exempt under Section 2.4 of Standard 90.1 that does not allow circumvention of safety, health, or environmental requirements; so, a specific exception for health care is not required here.

Cost Impact: The net effect of the proposal will increase the cost of construction. Since an economizer or motorized dampers are already required as part of the charging language of this section, the cost to add a sensor and wiring is expected to be \$300 or less per unit. A present value allowance of \$63 is added to the cost to allow for replacement of up to 50% of sensor elements halfway through the measure life. The square footage thresholds in the table result in cost effectiveness for a 15 year life control measure, based on being less than a discounted payback of 11.8 years.

[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 b to 90.1-2019

Modify the standard as follows (IP Units)

6.4.3.8 Ventilation Controls for High-Occupancy Areas

Demand control ventilation (DCV) is required for spaces larger than ~~500 ft²~~ and with a design occupancy for ventilation of ~~25 people per 1000 ft²~~ of the floor area shown in Table 6.4.3.8 based on an occupant outside airflow component in cfm per 1000 square feet and served by systems with one or more of the following:

- a. Air economizer.
- b. Automatic modulating control of outdoor air damper.
- c. Design outdoor airflow greater than 3000 cfm.

Exceptions to 6.4.3.8

1. ~~Systems with exhaust air energy recovery complying with and where required by Section 6.5.6.1.~~
2. ~~Multiple-zone systems without DDC of individual zones communicating with a central control panel.~~
3. ~~Systems with a design outdoor airflow less than 750 cfm.~~
24. Spaces where >75% of the space design outdoor airflow is required for makeup air that is exhausted from the space or transfer air that is required for makeup air that is exhausted from other spaces.
35. Spaces with one of the following occupancy categories as defined in ASHRAE Standard 62.1: correctional cells, daycare sickrooms, science labs, barbers, beauty and nail salons, and bowling alley seating.

Table 6.4.3.8 Demand Controlled Ventilation (DCV) Floor Area Thresholds

Climate	Occupant outside air flow component (cfm/1000 square feet) ^a					
	100 to 199	200 to 399	≥400	100 to 199	200 to 399	≥400
Zone	Minimum space floor area in square feet where DCV is required					
	Areas without exhaust air energy recovery			Areas with exhaust air energy recovery ^b		
7, 8	400	200	150	800	400	250
5A, 6A, 6B	600	250	150	1,400	900	400
0B, 1B, 3A, 4A, 5B, 5C	800	400	250	2,000	1,000	500
2A, 2B, 4C	1,100	600	300	2,300	1,100	600
0A, 1A, 3B, 4B	2,400	1,100	600	5,800	2,600	1,400
3C	7,000	3,000	1,700	12,000	6,000	3,000

^aOccupant outside airflow component in cfm per 1000 square feet shall be calculated as the product of default occupant density and outdoor airflow rate per occupant (R_p) as shown in table 6.2.2.1 of ASHRAE Standard 62.1

^bWhere exhaust air energy recovery is required by ASHRAE Standard 90.1 Section 6.5.6.1.

Modify the standard as follows (SI Units)

6.4.3.9 Ventilation Controls for High-Occupancy Areas

Demand control ventilation (DCV) is required for spaces larger than ~~50 m²~~ and with a design occupancy for ventilation of ~~25 people per 100 m²~~ of the floor area shown in Table 6.4.3.8 based on an occupant outside airflow component in L/s per 100 m² and served by systems with one or more of the following:

- d. Air economizer.
- e. Automatic modulating control of outdoor air damper.
- f. Design outdoor airflow greater than 1500 L/s.

Exceptions to 6.4.3.8

1. ~~Systems with exhaust air energy recovery complying with and where required by Section 6.5.6.1.~~
2. ~~Multiple-zone systems without DDC of individual zones communicating with a central control panel.~~
3. ~~Systems with a design outdoor airflow less than 375 L/s.~~
24. Spaces where >75% of the space design outdoor airflow is required for *makeup air* that is exhausted from the space or transfer air that is required for makeup air that is exhausted from other spaces.
35. Spaces with one of the following occupancy categories as defined in ASHRAE Standard 62.1: correctional cells, daycare sickrooms, science labs, barbers, beauty and nail salons, and bowling alley seating.

Table 6.4.3.8 Demand Controlled Ventilation (DCV) Floor Area Thresholds

	Occupant outside air flow component ((L/s)/100 square meters) ^a					
	50 to 99	100 to 199	≥200	50 to 99	100 to 199	≥200
Climate	Minimum space floor area in square meters where DCV is required					
Zone	Areas without exhaust air energy recovery			Areas with exhaust air energy recovery ^b		
<u>7, 8</u>	40	20	15	80	40	25
<u>5A, 6A, 6B</u>	60	25	15	140	90	40
<u>0B, 1B, 3A, 4A, 5B, 5C</u>	80	40	25	200	100	50
<u>2A, 2B, 4C</u>	110	60	30	230	110	60
<u>0A, 1A, 3B, 4B</u>	240	110	60	580	260	140
<u>3C</u>	700	300	170	1,200	600	300

^aOccupant outside airflow component in L/s per 100 square meters shall be calculated as the product of default occupant density and outdoor airflow rate per occupant (R_p) as shown in table 6.2.2.1 of ASHRAE Standard 62.1

^bWhere exhaust air energy recovery is required by ASHRAE Standard 90.1 Section 6.5.6.1.