



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

Public Review Draft

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

**Third Public Review (June 2022)
(Draft Shows Proposed Independent Changes to
Previous Public Review Draft)**

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FOREWORD

SSPC 90.1 accepted or accepted in principle several comment comments to the second public review of addendum bo that require independent substantive changes. These are:

- A new pressure allowance for gas and oil furnaces with thermal efficiency or AFUE of greater than 90% were added. These furnaces save energy compared to standard furnaces but do create additional pressure drop.
- A fan power allowance for exhaust systems serving fume hoods was added. This value exists in the current standard but was overlooked.
- Additional fan power was added for renovations. The values increased significantly for exhaust systems, as there was a spreadsheet error in the table created for the second public review.
- Units were corrected in of Section 6.1.5.3.1(3)
- A footnote was added to the energy recovery section to each fan power table that states “Substitute sensible recovery ratio for enthalpy recovery ratio in when a sensible energy recovery device meets the requirements of Section 6.5.6.1.1.1(b) or Section 6.5.6.1.2.1(b).” A commenter suggested this to align the table with the changes in addendum bz. That addendum can be seen here [\(link\)](#).

Cost-effectiveness

All the changes allow extra fan power or have no effect on the cost. The cost justification from the second public review is still valid.

[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 ~~striketrough~~ (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 bo to 90.1-2019

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

Make the following changes in Section 3.2 - Definitions:

fan system airflow: is the sum of the airflow of all fans with *fan electrical input power* greater than 1 kW at *fan system design conditions*, excluding the airflow that passes through downstream fans with *fan electrical input power* ~~less not greater than~~ than 1 kW.

Make the following changes to the text of Section 6.1.5.3.1 (3) (I-P and SI):

- Multiply the *fan system* design airflow by the sum of the fan power allowances for the *fan system*, then divide by 1,000 to convert to *kW*.

$$FPL = \frac{Q_{sys} \cdot FPA_{sum}}{1,000}$$

Where:

FPL is the fan power limit in *kW*

Q_{sys} is the *fan system* airflow in cfm (L/s)

FPA_{sum} is the sum of the fan power allowances for the *system* in W/cfm (W/L/s).

1000 is the conversion from W to *kW*

Add or change these values in Table 6.5.3.1-1 (I-P)

Table 6.5.3.1-1 Fan Power Allowances for Supply Fan systems

Air System Component	Multi-Zone VAV Fan System ^a Airflow (cfm)			All Other Fan Systems Airflow (cfm)		
	<5,000	5,000 to <10,000	≥ 10,000	<5,000	5,000 to <10,000	≥ 10,000
	W/cfm					
Heating (select all that apply)						
Gas or oil furnace <90% E _t or <90% AFUE	0.071	0.060	0.073	0.061	0.063	0.075
Gas or oil furnace ≥90% E _t or ≥90% AFUE	0.117	0.099	0.092	0.122	0.104	0.094
Energy recovery^f						
Other						
Project is an <i>alteration</i> where the duct system is not replaced	0.313 0.358	0.320 0.386	0.306 0.372	0.334 0.460	0.334 0.468	0.305 0.434

f. Substitute *sensible recovery ratio* for *enthalpy recovery ratio* in when a sensible energy recovery device meets the requirements of Section 6.5.6.1.1.1(b) or Section 6.5.6.1.2.1(b).

Add or change these values in Table 6.5.3.1-2 (I-P):

Table 6.5.3.1-2 Fan Power Allowances for Exhaust, Return, Relief, Transfer Fan systems

Air System Component	Multi-Zone VAV Fan System ^a airflow (cfm)			All Other Fan Systems Airflow (cfm)		
	<5,000	5,000 to <10,000	≥ 10,000	<5,000	5,000 to <10,000	≥ 10,000
	W/cfm					
Energy recovery^d						
Special exhaust and return system requirements (select all that apply)						
Exhaust system serving fume hoods	0.085	0.074	0.066	0.085	0.075	0.067

Other						
Project is an <i>alteration</i> where the duct system is not replaced	0.106 <u>0.253</u>	0.119 <u>0.256</u>	0.110 <u>0.232</u>	0.109 <u>0.289</u>	0.126 <u>0.291</u>	0.113 <u>0.262</u>

d. Substitute *sensible recovery ratio* for *enthalpy recovery ratio* in when a sensible energy recovery device meets the requirements of Section 6.5.6.1.1(b) or Section 6.5.6.1.2.1(b).

Add or change these values in Table 6.5.3.1-1 (SI)

Table 6.5.3.1-1 Fan Power Allowances for Supply Fan systems

Air System Component	Multi-Zone VAV Fan System ^a airflow (L/s)			All Other Fan Systems Airflow (L/s)		
	<2,360	2360 to <4720	≥ 4,720	<2,360	2360 to <4720	≥ 4,720
W/L/s						
Heating (select all that apply)						
Gas or oil furnace <90% E_t or <90% AFUE	0.033	0.028	0.035	0.029	0.030	0.036
<u>Gas or oil furnace ≥90% E_t or ≥90% AFUE</u>	<u>0.055</u>	<u>0.047</u>	<u>0.043</u>	<u>0.057</u>	<u>0.049</u>	<u>0.044</u>
Energy recovery^d						
Other						
Project is an alteration where the duct system is not replaced	0.106 <u>0.169</u>	0.119 <u>0.182</u>	0.110 <u>0.176</u>	0.109 <u>0.217</u>	0.126 <u>0.221</u>	0.113 <u>0.205</u>

f. Substitute *sensible recovery ratio* for *enthalpy recovery ratio* in when a sensible energy recovery device meets the requirements of Section 6.5.6.1.1(b) or Section 6.5.6.1.2.1(b).

Add or change these values in Table 6.5.3.1-2 (SI)

Table 6.5.3.1-2 Fan Power Allowances for Exhaust, Return, Relief, Transfer Fan systems

Air System Component	Multi-Zone VAV Fan System ^a airflow (L/s)			All Other Fan Systems Airflow (L/s)		
	<2,360	≥2360 to <4720	≥ 4,720	<2,360	2360 to <4720	≥ 4,720
W/L/s						
Energy recovery^d						
Special exhaust and return system requirements (select all that apply)						
<u>Exhaust system serving fume hoods</u>	<u>0.040</u>	<u>0.035</u>	<u>0.031</u>	<u>0.040</u>	<u>0.035</u>	<u>0.032</u>
Other						
Project is an alteration where the duct system is not replaced	0.050 <u>0.119</u>	0.056 <u>0.121</u>	0.052 <u>0.109</u>	0.054 <u>0.136</u>	0.059 <u>0.137</u>	0.053 <u>0.124</u>

d. Substitute *sensible recovery ratio* for *enthalpy recovery ratio* in when a sensible energy recovery device meets the requirements of Section 6.5.6.1.1(b) or Section 6.5.6.1.2.1(b).