

Low-power fans

IECC: 403.8.5 (New), Table 403.8.5 (New)

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2018 International Energy Conservation Code

Add new text as follows:

403.8.5 Low-capacity ventilation fans. Mechanical ventilation system fans with motors less than 1/12 horsepower in capacity shall meet the efficacy requirements of Table C403.8.5.

Exceptions:

1. Where ventilation fans are a component of a listed heating or cooling appliance
2. Dryer exhaust duct power ventilators, domestic range hoods, and domestic range booster fans that operate intermittently.

Table 403.8.5
LOW-CAPACITY VENTILATION FAN EFFICACY

FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIR FLOW RATE MAXIMUM (CFM)
<u>HRV or ERV</u>	<u>Any</u>	<u>1.2 cfm/watt</u>	<u>Any</u>
<u>In-line fan</u>	<u>Any</u>	<u>3.8 cfm/watt</u>	<u>Any</u>
<u>Bathroom, utility room</u>	<u>10</u>	<u>2.8 cfm/watt</u>	<u>< 90</u>
<u>Bathroom, utility room</u>	<u>90</u>	<u>3.5 cfm/watt</u>	<u>Any</u>

a. When tested in accordance with HVI Standard 916. Fan efficacy for HRV, ERV, balanced, and in-line fans shall be taken at a static pressure ≥ 0.2 in. w.c. Fan efficacy for range hoods, bathroom, and utility room fans shall be taken at a static pressure ≥ 0.1 in. w.c.

Reason Statement: Exhaust fan efficacies were introduced in the code in 2012 IECC for whole-house ventilation in low-rise residential buildings, but have never been included in the commercial provisions of the IECC. Mid-rise residential occupancies and small commercial buildings often utilize the same small ventilation fans leaving a loophole for a common energy load. These fans are used for point-of-source contaminant exhaust and are frequently utilized as part of a ventilation strategy in multifamily buildings. These fans are also smaller than the threshold for fan size (1/12 HP) that is attached to the other commercial fan requirements. This makes them a common load, and a potentially significant load in multifamily buildings, that is completely unregulated in commercial buildings.

This proposal adopts the table approach already utilized for these fans in the residential section of the code. However, it updates the efficiency requirements. The current residential IECC fan efficacies are from an older version of Energy Star (Version 2.0), so these have been updated to align the latest Energy Star requirement Version 4.0. These fan efficacy values are very conservative based on what is currently on the market.

It sets the efficiency requirement at a level that can reasonably be met by a large number of products available on the market. According to the HVI database of fans, the average efficiency of bath fans is around 7 CFM/W, and the average efficiency of in-line fans is 3.1. This proposal, therefore, places the requirement far below the market average efficiency for bath fans and close to the market average for in-line fans, making this a reasonable requirement.

Another proposal has been submitted to the residential section of the code to update those fan efficacy requirements to the same levels.

Cost Impact: The code change proposal will increase the cost of construction

The proposal could increase the cost of construction. Cost for the kinds of fans covered by this requirement are not driven solely by efficacy. Cost is also a function of flow rate, finishes, design and noise and whether they include other features like lights, sensors, or heaters. In some cases, fans that meet this requirement can be obtained for less other fans that do not. Nevertheless, a comparison of the low-cost exhaust fans shows that this proposal can result in no incremental first costs or short simple paybacks where incremental costs are incurred.

For example, no-frills bath fans from major manufacturers moving a minimum of 50 to ~100 cfm at 0.25" w.c. have an immediate payback (i.e., no cost premium) or a simple payback estimated at ≤6 years where there is a cost premium (see Tables 1 and 2). The 2021 IRC requires exhaust fans to be rated at a static pressure of 0.25" w.c., which is widely recognized as a typical installed static pressure found in bath fan exhaust ducts.

Table 1. Lowest cost exhaust fans for major manufacturers having a flow rate ≥ 50 cfm and < 90 cfm at 0.25" w.c.:

Fan	Efficacy at 0.1" w.c.	Flow at 0.25" w.c.	Price Premium by Manufacturer	Simple Payback (years)
AirKing BFQ75 (compliant with proposal)	3.0	70	--	N/A
AirKing AS70 (entry-level at 0.25" w.c.)	1.4	62	\$11.02	6
Broan AE80B (compliant with proposal)	3.0	60	--	N/A
Broan A70L (entry-level at 0.25" w.c.)	1.7	60	\$1.61	1
DeltaBreeze SLM70 (entry-level at 0.25" w.c. is compliant with proposal)	4.7	54	--	immediate

*Simple payback assumes \$0.1178/kWh (DOE EIA national average for residential and commercial), 1-hour of operation per day. Pricing sourced from homedepot.com on 1/9/2019. For Delta, the lowest price fan having at flow rate ≥ 50 cfm and < 90 cfm at 0.25" w.c. also had a fan efficacy meeting the proposed value, so there is no price premium associated with the manufacturer's lowest cost product, and payback is "immediate".

Table 2. Lowest cost exhaust fans for major manufacturers having a flow rate ≥ 90 cfm at 0.25" w.c.:

Fan	Efficacy at 0.1" w.c.	Flow at 0.25" w.c.	Price Premium by Manufacturer	Simple Payback (years)
AirKing BFQ140 (entry-level at 0.25" w.c.)	1.6	109	--	N/A
AirKing AK110LS (compliant with proposal)	3.9	90	\$48.32	6
Broan AN110 (entry-level at 0.25" w.c.)	2.3	102	--	N/A
Broan AEN110 (compliant with proposal)	4.7	92	\$41.09	6
DeltaBreeze VFB25AEH (entry-level at 0.25" w.c. is compliant with proposal)	5.9	105	--	immediate
Panasonic FV-08-11VF5 (entry-level at 0.25" w.c. is compliant with proposal)	4.2	104	--	immediate

*Simple payback assumes \$0.1178/kWh (DOE EIA national average for residential and commercial), 4-hours of operation per day (higher run time associated with assumption that higher flow rate bath fans are more likely to be installed in commercial bathrooms which are more likely to run continuously or at longer run times than a typical 1-hour residential assumption). Pricing sourced from homedepot.com on 1/9/2019. For some manufacturers, such as Delta and Panasonic, the lowest price fan having at flow rate ≥ 50 cfm and < 90 cfm at 0.25" w.c. also had a fan efficacy meeting the proposed value, so there is no price premium associated with the manufacturer's lowest cost product, and payback is "immediate".