

WAC 51-11C-40326 Section C403.2.7—Exhaust systems.

C403.2.7 Exhaust systems.

C403.2.7.1 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space shall not exceed the greater of the following:

1. The ventilation rate required to meet the space heating or cooling load.

2. The hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

Where total kitchen hood exhaust airflow rate is greater than 2,000 cfm each hood shall be a factory built commercial exhaust hood listed by a nationally recognized testing laboratory in compliance with UL 710. Each hood shall have a maximum exhaust rate as specified in Table C403.2.7.1 and shall comply with one of the following:

1. Not less than 50 percent of all replacement air shall be transfer air that would otherwise be exhausted.

2. Demand ventilation systems on not less than 75 percent of the exhaust air that are configured to provide not less than a 50-percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.

3. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent on not less than 50 percent of the total exhaust airflow.

Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

- EXCEPTIONS:
1. Where not less than 75 percent of all the replacement air is transfer air that would otherwise be exhausted.
 2. Certified grease extractor hoods that require a face velocity no greater than 60 fpm.

**Table C403.2.7.1
Maximum Net Exhaust Flow Rate,
CFM Per Linear Foot of Hood Length**

TYPE OF HOOD	LIGHT-DUTY EQUIPMENT	MEDIUM-DUTY EQUIPMENT	HEAVY-DUTY EQUIPMENT	EXTRA-HEAVY-DUTY EQUIPMENT
Wall-mounted canopy	140	210	280	385
Single island	280	350	420	490
Double island (per side)	175	210	280	385
Eyebrow	175	175	NA	NA
Backshelf/pass-over	210	210	280	NA

For SI: 1 cfm = 0.4719 L/s; 1 foot = 305 mm
NA = Not allowed

C403.2.7.2 Laboratory exhaust systems. Buildings with laboratory exhaust systems having a total exhaust rate greater than 5,000 cfm (2360 L/s) shall include heat recovery systems to precondition makeup air from laboratory exhaust. The heat recovery system shall be capable of increasing the outside air supply temperature at design heating conditions by 25°F (13.9°C). A provision shall be made to bypass or control

the heat recovery system to permit air economizer operation as required by Section C403.3.

- EXCEPTIONS:
1. Variable air volume laboratory exhaust and room supply systems configured to reduce exhaust and make-up air volume to 50 percent or less of design values; or
 2. Direct make-up (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) below room set point, cooled to no cooler than 3°F (1.7°C) above room set point, no humidification added, and no simultaneous heating and cooling used for dehumidification control; or
 3. Combined energy reduction method: VAV exhaust and room supply system configured to reduce exhaust and makeup air volumes and a heat recovery system to precondition makeup air from laboratory exhaust that when combined will produce the same energy reduction as achieved by a heat recovery system with a 50 percent sensible recovery effectiveness as required above. For calculation purposes, the heat recovery component can be assumed to include the maximum design supply airflow rate at design conditions. The combined energy reduction (Q_{ER}) shall meet the following:

$$\begin{aligned} Q_{ER} &\geq Q_{MIN} \\ Q_{MIN} &= CFM_S \cdot (T_R - T_O) \cdot 1.1 \cdot 0.6 \\ Q_{ER} &= CFM_S \cdot (T_R - T_O) \cdot 1.1(A + B)/100 \end{aligned}$$

Where:

- Q_{MIN} = Energy recovery at 60 percent sensible effectiveness (Btu/h)
- Q_{ER} = Combined energy reduction (Btu/h)
- CFM_S = The maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute
- T_R = Space return air dry bulb at winter design conditions
- T_O = Outdoor air dry bulb at winter design conditions
- A = Percentage that the exhaust and makeup air volumes can be reduced from design conditions
- B = Percentage sensible heat recovery effectiveness

[Statutory Authority: RCW 19.27A.025, 19.27A.160, and 19.27.074. WSR 16-03-072, § 51-11C-40326, filed 1/19/16, effective 7/1/16. Statutory Authority: RCW 19.27A.025, 19.27A.045, 19.27.020, and 19.27.074. WSR 14-24-122, § 51-11C-40326, filed 12/3/14, effective 1/3/15. Statutory Authority: RCW 19.27A.020, 19.27A.025 and chapters 19.27 and 34.05 RCW. WSR 13-04-056, § 51-11C-40326, filed 2/1/13, effective 7/1/13.]