

## 2018 Residential Ventilation Compliance Summary

Applicant: 40TH MERCER ISLAND Parcel: \_\_\_\_\_ Permit Number: DWEL21-0295

### VENTILATION AND INDOOR AIR QUALITY REQUIREMENTS

Whole House Ventilation fan(s) shall be sized according to International Residential Code M1505.4:

Ventilation rate CFM = (0.01 x total sq.ft.) + [7.5 x (# of bedrooms + 1)] but not less than 30 cfm.: 85 cfm (Eq. 15-1)

Ventilation systems shall provide minimum flows per Table M1505.4.3(1) and adjusted per M1505.4.3.1 by coefficients of Tables M1505.4.3(2) and M1505.4.3(3) according to the formula  $Q_f = Q_r \times C_q \times C_f$

**WHOLE HOUSE VENTILATION SYSTEM** \_\_\_ Exempt: Addition less than 500 sq.ft. or Remodel only.

- \_\_\_ Exhaust fan with 24-hr timer and fresh air inlets in each habitable room per IRC M1505.4.1.2  
 \_\_\_ Integrated with forced air system per IRC M1505.4.1.5 \_\_\_ Balanced and Distributed  
 \_\_\_ Supply fan per IRC M1505.4.1.3 \_\_\_ Balanced and NOT Distributed  
 \_\_\_ Balanced Supply and Exhaust fans per IRC M1505.4.1.4 \_\_\_ NOT balanced and Distributed  
 \_\_\_ Engineered design complying with IMC section 403.8.10.  NOT balanced and NOT distributed

Specify location of Whole House Fan: LAUNDRY Size: 128 cfm CONTIN. hrs./day

**2018 Table M1505.4.3(1) WHOLE-HOUSE SYSTEM MINIMUM VENTILATION RATES,  $Q_r$**

Floor Area (sq.ft.)	Number of Bedrooms					
	0	1	2	3	4	>4
0 to 500	30	30	30	35	45	50
501 to 1000	30	30	35	40	50	55
1001 to 1500	30	30	40	45	55	60
1501 to 2000	35	35	45	50	60	65
2001 to 2500	40	40	50	55	65	70
2501 to 3000	45	45	55	60	70	75
3001 to 3500	50	50	60	65	75	80
3501 to 4000	55	55	65	70	80	85
4001 to 4500	60	60	70	75	85	90
4501 to 5000	65	65	75	80	90	95
Greater than 5000	Use equation 15-1 for minimum flow rate					

**2018 Table M1505.4.3(2) WHOLE-HOUSE VENTILATION QUALITY ADJUSTMENT ( $C_q$ )**

SYSTEM TYPE	DISTRIBUTED	NOT DISTRIBUTED	Min. adjusted fan size (cfm)
BALANCED	1.0	1.25	
NOT BALANCED	1.25	<span style="border: 1px solid red; padding: 2px;">1.5</span>	

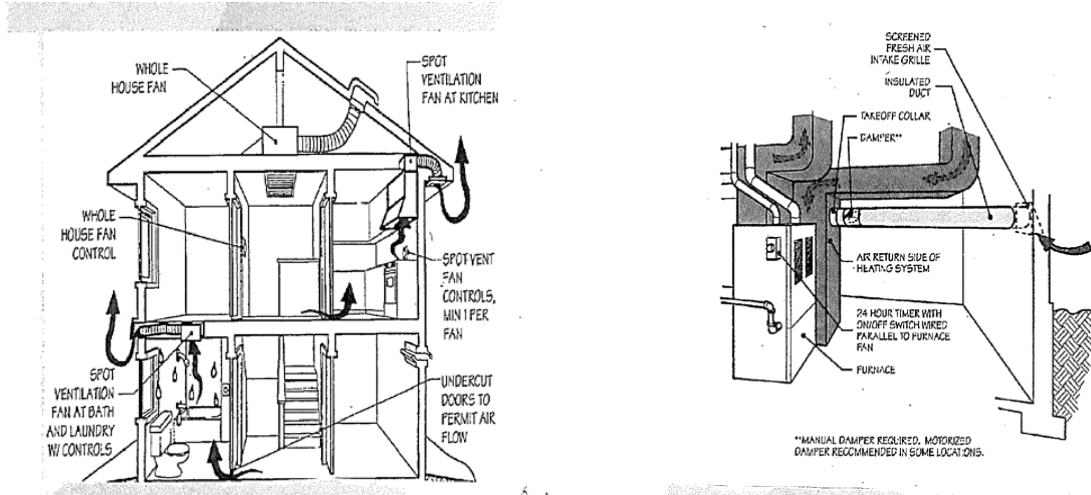
**2018 Table M1505.4.3(3) INTERMITTENT WHOLE-HOUSE VENTILATION RATE FACTORS ( $C_f$ )**

Run-time % in each 4-hour segment	Rate Multiplier	Min. adjusted Fan Size (cfm)	Specified Fan Size (cfm)
50% ( 2 hrs every 4 hrs; 12 hrs /day)	2		
66% ( 2 hrs 40 min every 4 hrs; 16 hrs /day)	1.5		
75% ( 3 hrs every 4 hrs; 18 hrs /day)	1.3		
<span style="border: 1px solid red; padding: 2px;">100% (continuously operating)</span>	1.0	1.5	128

## WHOLE HOUSE VENTILATION SYSTEM

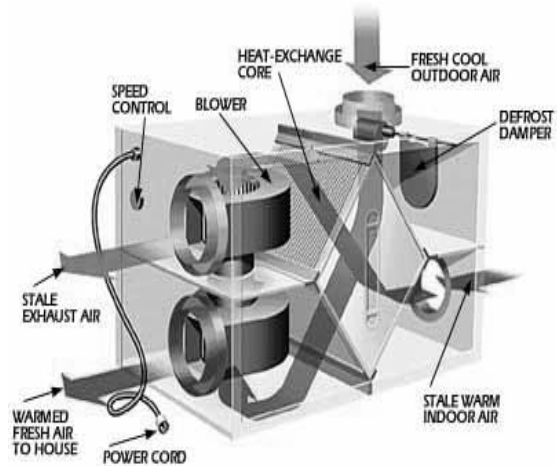
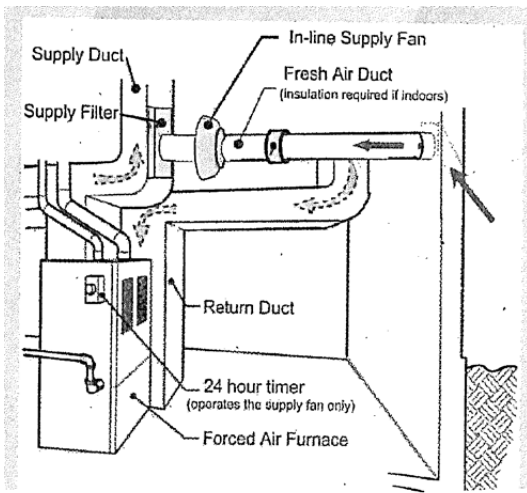
**Balanced whole house ventilation** is any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10% or 5 cfm of the total mechanical supply airflow rate, whichever is greater.

**Distributed whole house ventilation** is when outdoor air is supplied directly (not transfer air) to each habitable space and the exhausts air from all kitchen and bathrooms is vented directly to the outside.



**M1507.3.4 Exhaust Fan System**

**M1507.3.5 Integrated System with Furnace**



**M1507.3.6 Supply Fan System**

**M1507.3.7 Heat Recovery System**

<b>AIR BARRIER AND INSULATION INSTALLATION TABLE R402.4.1.1</b>		
<b>COMPONENT</b>	<b>AIR BARRIER CRITERIA<sup>d</sup></b>	<b>INSULATION CRITERIA<sup>d</sup></b>
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material. Class I or II vapor retarders are required on the interior side of framed cavities.
Cavity insulation installation	All cavities in the thermal envelope shall be filled with insulation. The density of the insulation shall be at the manufacturers' product recommendation and said density shall be maintained for all volume of each cavity. Batt type insulation will show no voids or gaps and maintain an even density for the entire cavity. Batt insulation shall be installed in the recommended cavity depth. Where an obstruction in the cavity due to services, blocking, bracing or other obstruction exists, the batt product will be cut to fit the remaining depth of the cavity. Where the batt is cut around obstructions, loose fill insulation shall be placed to fill any surface or concealed voids, and at the manufacturers' specified density. Where faced batt is used, the installation tabs must be stapled to the face of the stud. There shall be no compression to the batt at the edges of the cavity due to inset stapling installation tabs. Insulation that upon installation readily conforms to available space shall be installed filling the entire cavity and within the manufacturers' density recommendation.	
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	Batt insulation installed in attic roof assemblies may be compressed at exterior wall lines to allow for required attic ventilation. The insulation in any dropped ceiling or soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers shall be insulated by completely filling the cavity with a material having a minimum thermal resistance of R-3 per inch. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and	Space between window/door jambs and framing and skylights and framing shall be sealed.	
Rim joists	Rim joists shall include the air barrier.	Rim joists shall be insulated
Floors (including above-garage and cantilevered)	The air barrier shall be installed at any exposed edge of insulation.	Installed to maintain permanent contact with underside of subfloor decking or permitted to be in contact with the topside of sheathing or continuous insulation installed on the underside of floor framing and extend from the bottom to the top of all perimeter floor
Crawl space walls	Soil in unvented crawl spaces shall be covered with Class I, black vapor retarder with joints taped.	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	
Narrow cavities		Batts in narrow cavities shall be cut to fit and installed to the correct density without any voids or gaps or compression. Narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	
Recessed lighting	Shall be sealed to the drywall.	Shall be air tight, and IC rated.
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls. There shall be no voids or gaps or compression where cut to fit. Insulation that readily conforms to available space shall extend behind piping and wiring.
Shower and/or tub	Installed at exterior walls adjacent to showers and tubs shall separate them from showers and tubs.	Exterior walls adjacent to showers or tubs shall be insulated
Electrical/phone	Barrier shall be installed behind electrical or communication boxes on exterior wall or install air sealed boxes.	
HVAC register boots	Boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	
Concealed Sprinklers	When required to be sealed, fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	

**AIR INFILTRATION AND TESTING**

The building shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour. Energy Credit options may modify maximum air leakage allowed.

Testing shall be conducted with a blower door at a pressure of 0.2 in. w.g. For this test only, the volume of the home shall be the square feet of conditioned floor area multiplied by 8.5 feet. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

**During testing:**

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open, access hatches to conditioned crawl spaces and conditioned attics shall be open.
4. Exterior or interior terminations for continuous ventilation systems and heat recovery ventilators shall be sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.

**Exceptions:**

1. Additions less than 500 square feet (46 m<sup>2</sup>) of conditioned floor area.
2. Additions tested with the existing home having a combined maximum air leakage rate of 7 air changes per hour. To qualify for this exception, the date of construction of the existing house must be prior to the 2009 Washington State Energy Code.

**Blower door test calculated flow: BLDG Volume** 44000 **ft.<sup>3</sup> x 3 ACH / 60 min. =** 2200 **cfm**  
Adjusted rate per Energy Credit Option \_\_\_\_\_ ACH

**DUCT LEAKAGE AND TESTING**

1. Ducts shall be leak tested in accordance with WSU RS-33, using the maximum 4 cfm per 100 square feet of conditioned floor area. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm per 100 square feet of conditioned floor area.

**Total sq.ft.** 4087 **sq.ft. / 100 sq.ft. X 3 cfm =** 123 **cfm**

**Exceptions:**

1. The total leakage test or leakage to the outdoors is not required for ducts and air handlers located entirely within the building thermal envelope. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. Ducts located in crawl spaces do not qualify for this exception.
2. A duct air leakage test shall not be required for ducts serving heat or energy recovery ventilators that are not integrated with ducts serving heating or cooling systems.

**A written report of results shall be signed by the party conducting the test and given to the King County Building Inspector.**