From: Eric Vander Mey <ericv@rushingco.com>
Sent: Thursday, September 26, 2019 11:31 PM
To: DES SBCC <sbcc@des.wa.gov>
Subject: Public Comment - 2018 IMC Washington Amendments

See below for my editorial and correlating comments for the WS amendments to the 2018 IMC.
Let me know if you have questions.

Comment IMC Section 401.4:
New exception needs editorial corrections.

Recommended Changes in Red:

401.4 Intake opening location. Air intake openings shall comply with all of the following:

3. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening.

EXCEPTION: Separation is not required between intake air openings and living space environmental air exhaust air openings of an individual dwelling unit or sleeping unit where a factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the manufacturer's instructions. A minimum of 3 feet (914 mm) separation shall be maintained between other environmental air exhaust outlets and other dwelling or sleeping unit factory-built intake/exhaust combination termination fittings.

Comment IMC Section 403.3:
Tag modified section to just refer to Group R so this is inclusive of R-1. Change was not picked up in CR-102.

Recommended Changes in Red:

403.3 Outdoor air and local exhaust airflow rates. Group R ~~-2, R-3 and R-4~~ occupancies ((~~three stories and less in height above grade plane~~)) shall be provided with outdoor air and local exhaust in accordance with Section 403.8. All other buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

Comment IMC Table 403.3:
Tag modified table to refer to local exhaust tables. Changes were not picked up in CR-102.

Recommended Changes in Red:

Occupancy	Occupant Density #/1000 ft^{2a}	People Outdoor Airflow Rate in Breathing Zone R_p cfm/Person	Area Outdoor Airflow Rate in Breathing Zone R_a cfm/ft^{2a}	Exhaust cfm/ft^{2a}
Classification Private				
dwellings, single and multiple	—	—	—	0.75
Garages, common for multiple	—	—	—	~~25/100~~[f] **See Table 403.8.4**
units[b] ((Kitchens[b]	~~Based on the number of bedrooms. First bedroom, 2; each additional bedroom~~, 1	~~See Tables 403.8.1 and 403.8.5.1~~ **See Table 403.8.2**	—	—
Living areas[c]	—	—	—	~~20/50~~[f]))**See Table 403.8.**
~~Toilet rooms, bathrooms and laundry~~ areas[g, i]				

Comment IMC Table 403.8.1:
Table should be titled 403.8.2. Needs to move to Section 403.8.2 above equations.

Recommended Changes in Red:

403.8.2 Whole house mechanical ventilation rates. The sleeping unit whole house mechanical ventilation minimum outdoor airflow rate shall be determined in accordance with the breathing zone ventilation rates minimum outdoor airflow rate shall be determined in accordance with the breathing zone ventilation rates requirements of Section 403.3.1.1.1.2 using Equation 4-2. The dwelling unit whole house me- chanical ventilation minimum outdoor airflow rate shall be determined in accordance with Equation 4-10 or Table 403.8.~~1~~2.

Table 403.8.~~1~~2
WHOLE HOUSE MECHANICAL VENTILATION AIRFLOW RATE (CONTINUOUSLY OPERATING SYSTEMS)

Floor Area (ft^2)	Bedrooms[1]				
	1	2	3	4	≥ 5
<500	30	30	35	45	50
500 - 1000	30	35	40	50	55
1001 - 1500	30	40	45	55	60
1501 - 2000	35	45	50	60	65
2001 - 2500	40	50	55	65	70
2501 - 3000	45	55	60	70	75
3001 - 3500	50	60	65	75	80
3501 - 4000	55	65	70	80	85
4001 - 4500	60	70	75	85	90
4501 - 5000	65	75	80	90	95

1 Minimum airflow (Q_r) is set at not less than 30 cfm for each dwelling unit~~s~~.

Comment IMC Section 403.8.1:
Sentence needs reformatting to make sense.

Recommended Changes in Red:

403.8.1 System design. The whole house ventilation system shall consist of one or more supply fans, one or more exhaust fans, or an ERV/HRV with integral fans; and the associated ducts and controls. Local exhaust fans shall be permitted to serve as part of the whole house ventilation system when provided with the proper controls in accordance with Section 403.8.5. The systems shall be designed and installed to supply and exhaust the minimum outdoor airflow rates per Section 403.8.2 as corrected by the balanced and/or distributed whole house ventilation system coefficients in accordance with Section 403.8.3 where applicable.

Comment IMC Table 403.8.2:
Table should be titled 403.8.3. Needs to move to Section 403.8.3 below equations at end of section. Defined terms were not italicized.

Recommended Changes in Red:

403.8.3 Ventilation quality adjustment. The minimum whole house venti- lation rate from Section 403.8.2 shall be adjusted by the system coef- ficient in Table 403.8.~~2~~3 based on the system type not meeting the def- inition of a *balanced whole house ventilation* system and/or not meeting the definition of a *distributed whole house ventilation* system.

Table 403.8.~~2~~3

SYSTEM COEFFICIENT (C_{system})

System Type	Distributed	Not Distributed
Balanced	1.0	1.25
Not Balanced	1.25	1.5

Comment IMC Table 403.8.2:
Code proposals and TAG recommendations removed these 2015 WSMC sections. In the CR-102 these are not shown as removed. These sections need to be removed as they are no longer required.

Recommended Changes in Red:

~~**403.8.5 Whole house ventilation system controls.**~~

~~1. The whole house ventilation system shall be controlled with manual switches, timers or other means that provide for automatic op- eration of the ventilation system that are readily accessible by the occupant;~~

~~2. Whole house mechanical ventilation system shall be provided with controls that enable manual override off of the system by the oc- cupant during periods of poor outdoor air quality. Controls shall in- clude permanent text or a symbol indicating their function. Recommen- ded control permanent labeling to include text similar to the follow- ing "Leave on unless outdoor air quality is very poor." Manual con- trols shall be provided with ready access for the occupant.~~

~~EXCEPTION: Central whole house mechanical systems with supply air and/or exhaust that serves more than one dwelling or sleeping unit are not required to have manual override off controls accessible by the occupant.~~

~~3. Whole house ventilation systems shall be configured to operat- ing continuously except where intermittent off controls are provided in accordance with Section 403.8.6.5 and allowed by Section 403.8.4.2.~~

~~**403.8.5.1 Outdoor air.** *Outdoor air* shall be distributed to each habit- able space.~~

~~Where *outdoor air* supply intakes are separated from exhaust vents by doors, means shall be provided to ensure airflow to all separated habitable spaces by installing distribution ducts, installed grilles, transoms, doors undercut to a minimum of 1/2-inch above the surface of~~

the finish floor covering, or other similar means where permitted by the *International Building Code*.

The mechanical system shall operate continuously to supply at least the volume of *outdoor air* required in Table 403.3.1.1 or Table 403.8.1.

EXCEPTION: Intermittently operating ventilation systems: The whole house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table 403.3.1.1 or Table 403.8.1 is multiplied by the factor determined in accordance with Table 403.8.5.1.

((**TABLE 403.8.5.1**

INTERMITTENT WHOLE HOUSE MECHANICAL VENTILATION RATE FACTORS[a, b]

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	**25%**	**33%**	**50%**	**66%**	**75%**	**100%**
Factor[a]	4	3	2	1.5	1.3	1.0

[a] For ventilation system run-time values between those given, the factors are permitted to be determined by interpolation.

[b] Extrapolation beyond the table is prohibited.))

403.8.5.2 Whole house supply system general requirements. Whole house ventilation systems integrated with a forced-air system, systems using supply fans and systems using a heat or energy recovery ventilation system shall comply with the following.

1. *Outdoor air* louvers shall be adequately sized for the required airflow and shall comply with Section 401.5. *Outdoor air* intake loca- tions shall comply with mechanical air intakes requirements of Section 403.8.3.

2. *Outdoor air* ducts for dedicated or central supply systems and exhaust ducts for heat or energy recovery systems shall be provided with a means for balancing the system to the required airflow via bal- ance dampers or other devices.

3. *Outdoor air* ducts for dedicated or central systems shall be provided with motorized dampers.

EXCEPTIONS: 1. *Outdoor air* ducts at heat or energy recovery ventilation systems are not required to have motorized dampers.
2. *Outdoor air* ducts at continuous ventilation systems are not required to have motorized dampers.

4. *Outdoor air* ducts in the conditioned space shall be insulated to a minimum of R-4. In heat or energy recovery ventilation systems, ducts upstream of the heat exchanger shall also be insulated to at least R-4.

5. All *outdoor air* ducts shall be designed and installed to de- liver at least the outdoor airflow required by Section 403.8.5.1. The airflows required refer to the delivered airflow of the system as in- stalled and tested using a flow hood, flow grid, or other airflow measurement device.

EXCEPTION: The *outdoor air* duct for supply fan systems and heat or energy recovery systems may be prescriptively sized per Table 403.8.5.2 for dedicated *outdoor air* ducts upstream of the supply fan. Supply fans shall have the capacity to provide the amount of *outdoor air* required by Section 403.8.5.1 at 0.40 in. w.g. as per HVI 916 (April 1995). When prescriptively sized the system shall be tested and balanced using a flow hood, flow-grid, or other airflow measurement device.

~~6. Whole house ventilation controls for intermittent operation shall allow concurrent operation of the forced-air fan and the associ- ated outdoor air motorized damper.~~

~~7. Whole house ventilation controls for continuous operation shall be provided at the forced-air fan.~~

~~EXCEPTION: Engineered central ventilation systems serving dwelling units or sleeping units are not required to have individual controls for each dwelling or sleeping unit when designed for continuous operation and approved by the code official.~~

~~TABLE 403.8.5.2 PRESCRIPTIVE SUPPLY FAN DUCT SIZING~~

~~Supply Fan Tested cfm at 0.40" w.g.~~		
~~Specified Volume from Table 408.1~~	~~Minimum Smooth Duct Diameter~~	~~Minimum Flexible Duct Diameter~~
~~50 - 90 cfm~~	~~4 inch~~	~~5 inch~~
~~90 - 150 cfm~~	~~5 inch~~	~~6 inch~~
~~150 - 250 cfm~~	~~6 inch~~	~~7 inch~~
~~250 - 400 cfm~~	~~7 inch~~	~~8 inch~~

Comment IMC Table 403.8.4:
Table should be titled 403.8.6.5. Needs to move to Section 403.8.6.5 at end of section.

Recommended Changes in Red:

403.8.6.5 Intermittent off operation. Whole house mechanical ventilation systems shall be provided with advanced controls that are config- ured to operate the system with intermittent off operation and shall operate for a least two hours in each four-hour segment. The whole house ventilation airflow rate determined in accordance with Section 403.8.2 as corrected by Section 403.8.3 shall be multiplied by the factor determined in accordance with Table 403.8.~~3~~6.5.

Table 403.8.~~3~~6.5
INTERMITTENT WHOLE HOUSE MECHANICAL VENTILATION RATE FACTORS[a,b]

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	50%	66%	75%	100%
Factor[a]	2	1.5	1.3	1.0

a For ventilation system run-time values between those given, the factors are permitted to be determined by interpolation.

b Extrapolation beyond the table is prohibited.

Comment IMC Table 403.8.4:
Table should be titled 403.8.7. Needs to move to Section 403.8.7 at end of section.

Recommended Changes in Red:

403.8.7 Local exhaust. Bathrooms, toilet rooms and kitchens shall include a local exhaust system. Such local exhaust systems shall have the capacity to exhaust the minimum airflow rate in accordance with Table 403.8.47 and Table 403.3.1.1, including notes. Fans required by this section shall be provided with controls that enable manual over- ride or automatic occupancy sensor, humidity sensor or pollutant sen- sor controls. An "on/off" switch shall meet this requirement for man- ual controls. Manual fan controls shall be provided with ready access in the room served by the fan.

Table 403.8.47
MINIMUM EXHAUST RATES

Area to be exhausted	Exhaust Rate	
	Intermittent	Continuous
Kitchens	100 cfm	30 cfm
Bathrooms - Toilet Rooms	50 cfm	20 cfm

Comment IMC Table 403.8.7.1:
Code proposals and TAG recommendations removed these 2015 WSMC sections. In the CR-102 these are not shown as removed. These sections need to be removed as they are no longer required.

Recommended Changes in Red:

~~**403.8.7.1 Outdoor air.** Forced-air system fan ventilation systems shall provide *outdoor air* through one of the following methods:~~

~~1. A dedicated *outdoor air* louver and *outdoor air* duct for each dwelling unit or sleeping unit shall supply *outdoor air* to the return side of the forced-air system fan; or~~

~~2. A central *outdoor air* delivery system that supplies multiple dwelling units or sleeping units shall supply *outdoor air* to the re- turn side of the forced air system fan.~~

~~3. For interior adjoining spaces without *outdoor air* openings, one of the following two options shall be used to ventilate the inte- rior adjoining space:~~

~~3.1. Provide a whole house transfer fan at the interior adjoining space sized to provide a minimum of the ventilation rate required per Section 403.8.5.1. The transfer fan shall circulate air between the interior room~~

~~or space and the adjacent habitable space. The transfer fan may operate continuously or intermittently using controls per Sec- tion 403.8.2.~~

~~3.2. Provide a permanent opening to the interior adjoining space. Opening shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior adjoining space, but not less than 25 square feet.~~

Comment IMC Table 403.8.5:
Table should be titled 403.8.7.2. Needs to move to Section 403.8.7.2 at end of section after the exceptions.

403.8.7.2 Local exhaust fans. Exhaust fans shall meet the following criteria.

4. Exhaust fans shall be tested and rated in accordance with HVI 915, HVI 916, and HVI 920.

EXCEPTION: Where a range hood or down draft exhaust fan is used for local exhaust for a kitchen, the device is not required to be rated per these standards.

5. Fan airflow rating and duct system shall be designed and in- stalled to deliver at least the exhaust airflow required by Table 403.8.4. The airflows required refer to the delivered airflow of the system as installed and tested using a flow hood, flow grid, or other airflow measurement device. Local exhaust systems shall be tested, balanced and verified to provide a flow rate not less than the minimum required by this section.

6. Design and installation of the system or equipment shall be carried out in accordance with manufacturers' installation instruc- tions.

7. Fan airflow rating and duct system shall be designed and in- stalled to deliver at least the exhaust airflow required by Table 403.8.3.

EXCEPTIONS: 1. An exhaust airflow rating at a pressure of 0.25 in. w.g. may be used, provided the duct sizing meets the prescriptive requirements of Table 403.8.57.2.
2. Where a range hood or down draft exhaust fan is used to satisfy the local ventilation requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 in. w.g.

TABLE
((~~403.8.4.2~~))
403.8.~~5~~7.2
PRESCRIPTIVE
EXHAUST
DUCT SIZING

Fan Tested cfm at 0.25 inches w.g.	Minimum Flex Diameter	Maximum Length in Feet	Minimum Smooth Diameter	Maximum Length in Feet	Maximum Elbows[a]
50	4 inches	25	4 inches	70	3
50	5 inches	90	5 inches	100	3
50	6 inches	No Limit	6 inches	No Limit	3
80	4 inches[b]	NA	4 inches	20	3
80	5 inches	15	5 inches	100	3
80	6 inches	90	6 inches	No Limit	3
100	5 inches[b]	NA	5 inches	50	3
100	6 inches	45	6 inches	No Limit	3
125	6 inches	15	6 inches	No Limit	3
125	7 inches	70	7 inches	No Limit	3

a. For each additional elbow, subtract 10 feet from length.
b. Flex ducts of this diameter are not permitted with fans of this size.

Comment IMC Table 403.8.8:
Code proposals and TAG recommendations removed these 2015 WSMC sections. In the CR-102 these are not shown as removed. These sections need to be removed as they are no longer required.

Recommended Changes in Red:

~~**403.8.8 Whole house ventilation with supply fan systems.** This section establishes minimum requirements for mechanical whole house ventila- tion systems using supply fan systems.~~

~~**403.8.8.1 Outdoor air.** Supply fan ventilation systems shall provide *outdoor air* through one of the following methods:~~

~~1. A dedicated *outdoor air* louver and *outdoor air* duct for each dwelling unit or sleeping unit shall supply *outdoor air* to a supply fan; or~~

~~2. A central *outdoor air* supply fan system shall distribute un- conditioned or conditioned air to multiple dwelling units or sleeping units.~~

~~3. For interior adjoining spaces without *outdoor air* openings, one of the following two options shall be used to ventilate the inte- rior adjoining space:~~

3.1. Provide a whole house transfer fan at the interior adjoining space sized to provide a minimum of the ventilation rate required per Section 403.8.5.1. The transfer fan shall circulate air between the interior room or space and the adjacent habitable space. The transfer fan may operate continuously or intermittently using controls per Sec- tion 403.8.2.

3.2. Provide a permanent opening to the interior adjoining space. Opening shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior adjoining space, but not less than 25 square feet.

403.8.8.2 Whole house supply system. Where *outdoor air* is provided to each habitable dwelling unit or sleeping unit by supply fan systems the *outdoor air* shall be filtered.

The system filter may be located at the intake device or inline with the fan. The filter shall be accessible for regular maintenance and replacement. The filter shall have a Minimum Efficiency Rating Value (MERV) of at least 6.

403.8.9 Whole house ventilation with heat recovery or energy recovery ventilation systems. This section establishes minimum requirements for mechanical whole house ventilation systems using heat recovery or en- ergy recovery ventilation systems.

403.8.9.1 Outdoor air. Heat recovery or energy recovery ventilation systems shall provide *outdoor air* through one of the following meth- ods:

1. A dedicated *outdoor air* louver and *outdoor air* duct for each dwelling unit or sleeping unit shall supply *outdoor air* to the heat recovery or energy recovery ventilator; or

2. A central *outdoor air* heat recovery or energy recovery unit shall distribute conditioned air to multiple dwelling units or sleep- ing units.

3. For interior adjoining spaces without *outdoor air* openings, one of the following two options shall be used to ventilate the inte- rior adjoining space:

3.1. Provide a whole house transfer fan at the interior adjoining space sized to provide a minimum of the ventilation rate required per Section 403.8.5.1. The transfer fan shall circulate air between the interior room or space and the adjacent habitable space. The transfer fan may operate continuously or intermittently using controls per Sec- tion 403.8.2.

3.2. Provide a permanent opening to the interior adjoining space. Opening shall be unobstructed and shall have an area of not less than 8 percent of the floor area of the interior adjoining space, but not less than 25 square feet.

403.8.9.2 Whole house heat recovery ventilator system. Where *outdoor air* is provided to each habitable dwelling

~~unit or sleeping unit by heat recovery or energy recovery ventilator the *outdoor air* shall be filtered. The filter shall be located on the upstream side of the heat exchanger in both the intake and exhaust airstreams with a Minimum Ef- ficiency Rating Value (MERV) of at least 6. The system filter may be located at the intake device or inline with the fan. The filter shall be accessible for regular maintenance and replacement.~~

~~Each habitable space in the dwelling or sleeping unit shall be served by a heat recovery ventilator with outdoor air connection.~~

~~**403.8.10 Local exhaust ventilation and whole house ventilation alter- nate performance or design requirements.** In lieu of complying with Sections 403.8.4 or 403.8.5 compliance with the section shall be dem- onstrated through engineering calculations by an engineer licensed to practice in the state of Washington or by performance testing. Docu- mentation of calculations or performance test results shall be submit- ted to and approved by the building official. Performance testing shall be conducted in accordance with approved test methods.~~

~~**403.8.11 Alternate systems.** When approved by the code official, sys- tems designed in accordance with ASHRAE Standard 62.2 shall be permitted.~~

Comment IMC Section 501.3.1:
Sentence as filed in CR-102 is missing commas and therefore is unclear. As filed the sentence is not consistent with final language recommended by IMC TAG.

Recommended Changes in Red:

WAC 51-52-0501 Section 501—General.

501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

5. For enclosed parking garage exhaust system outlets and transformer vault exhaust system outlets: 10 feet (3048 mm) from property lines which separate one lot from another; 10 feet (3048 mm) from operable openings into buildings; ((~~10 feet (3048 mm) above~~)) 3 feet (914 mm) horizontally from, 10 feet above, or 10 feet below adjoining finished sidewalk.

Comment IMC Section 501.4:
Recommend adding the word intermittent to be consistent with other sections in Chapter 4.

Recommended Changes in Red:

501.4 Pressure equalization. Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhaus- ted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required

in a room or space, such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust for a room, adequate means shall be provided for the natural or mechanical exhaust of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical ex- haust system than is supplied by a mechanical ventilating supply sys- tem for a room, adequate makeup air consisting of supply air, transfer air or outdoor air shall be provided to satisfy the deficiency. The calculated building infiltration rate shall not be used to satisfy the requirements of this section.

EXCEPTION: Intermittent domestic range exhaust, intermittent domestic dryer exhaust, and intermittent local exhaust systems in R-3 occupancies and dwelling units in R-2 occupancies are excluded from the pressure equalization requirement unless required by Section ((~~504.5~~)) 504 or Section ((~~505.2~~)) 505.

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