



STATE OF WASHINGTON
STATE BUILDING CODE COUNCIL

062
Proponent Revision
6/01/22

Log No. 21-GP2-062

1. State Building Code to be Amended:

- | | |
|---|---|
| <input type="checkbox"/> International Building Code | <input type="checkbox"/> International Mechanical Code |
| <input type="checkbox"/> ICC ANSI A117.1 Accessibility Code | <input type="checkbox"/> International Fuel Gas Code |
| <input type="checkbox"/> International Existing Building Code | <input type="checkbox"/> NFPA 54 National Fuel Gas Code |
| X International Residential Code | <input type="checkbox"/> NFPA 58 Liquefied Petroleum Gas Code |
| <input type="checkbox"/> International Fire Code | <input type="checkbox"/> Wildland Urban Interface Code |
| <input type="checkbox"/> Uniform Plumbing Code | |

For the Washington State Energy Code, please see specialized [energy code forms](#)

Section(s):

R202, M1503.3, M1503.5, M1505.4.1, M1505.4.1.4, M1505.4.3.2, M1505.4.4.1, M1505.4.4.2, M1505.4.4.3, M1505.4.4.3.1, Chapter 15

Title:

Increased Range Hood Ventilation

2. Proponent Name (Specific local government, organization or individual):

Proponent: Mark Vossler

Title: President, Washington State Physicians for Social Responsibility

Date: 4/8/22

3. Designated Contact Person:

Name: Mark Vossler

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4. Proposed Code Amendment. Reproduce the section to be amended by underlining all added language, striking through all deleted language. Insert new sections in the appropriate place in the code in order to continue the established numbering system of the code. If more than one section is proposed for amendment or more than one page is needed for reproducing the affected section of the code, additional pages may be attached.

Clearly state if the proposal modifies an existing amendment or if a new amendment is needed. If the proposal modifies an **existing amendment**, show the modifications to the existing amendment by underlining all added language and striking through all deleted language. If a new amendment is needed, show the modifications to the **model code** by underlining all added language and striking through all deleted language.

Code(s) Residential _____ Section(s) R202, M1503.3, M1503.5, M1505.4.1, M1505.4.1.4, M1505.4.3.2, M1505.4.4.1, M1505.4.4.2, M1505.4.4.3, M1505.4.4.3.1, Chapter 15

Enforceable code language must be used.
Amend section to read as follows:

SECTION R202 DEFINITIONS

Enclosed kitchen: A kitchen whose permanent openings to interior adjacent spaces do not exceed a total of 60 ft² (6 m²).

SECTION M1503 DOMESTIC COOKING EXHAUST EQUIPMENT

M1503.3 Exhaust discharge. Domestic cooking exhaust equipment shall discharge to the outdoors through a duct. The duct shall have a smooth interior surface, shall be airtight, shall be equipped with a backdraft damper and shall be independent of all other exhaust systems. Ducts serving domestic cooking exhaust equipment shall not terminate in an attic or crawl space or areas inside the building.

Exception: Where installed in accordance with the manufacturer's instructions, and where ~~mechanical or natural ventilation is otherwise provided~~ continuous local exhaust is provided in an enclosed kitchen in accordance with Table M1505.4.4(1), listed and labeled ductless range hoods shall not be required to discharge to the outdoors.

M1503.5 Kitchen exhaust rates. Where domestic kitchen cooking appliances are provided ~~equipped~~ with exhaust equipment ~~ducted range hoods or down-draft exhaust systems~~, the fans shall be sized in accordance with Section M1505.4.4.

SECTION M1505 MECHANICAL VENTILATION

M1505.4.1 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, associated ducts and controls.

Wholehouse mechanical ventilation system with supply and exhaust fans per Sections M1505.4.1.2, M1505.4.1.3, M1505.4.1.4, and M1505.4.1.5. Local exhaust fans are permitted to serve as part of the whole house ventilation system when provided with the proper controls per Section M1505.4.2. The systems shall be designed and installed to exhaust and/or supply the minimum outdoor airflow rates per Section M1505.4.3 as modified by the whole house ventilation system coefficients in Section M1505.4.3.1 where applicable. The whole house ventilation system shall operate continuously at the minimum ventilation rate determined per Section M1505.4.2 unless configured with intermittent off controls per Section M1505.4.3.2.

M1505.4.1.4 Balanced whole house ventilation system. A balanced whole house ventilation system shall include both supply and exhaust fans. The supply and exhaust fans shall have airflow that is within 10 percent of each other. The tested and balanced total mechanical exhaust airflow rate is within 10 percent or 5 cfm, whichever is greater, of the total mechanical supply airflow rate. The flow rate test results shall be submitted and posted in accordance with Section M1505.4.1.7. The exhaust fan shall meet the requirements of Section M1505.4.1.2. The supply fan shall meet the requirements of Section M1505.4.1.3. Balanced ventilation systems with both supply and exhaust fans in a packaged product, such as an ERV/HRV, shall meet the requirements of HVI 920, as applicable. ~~Intermittent dryer exhaust, intermittent range hood exhaust, and intermittent toilet room exhaust airflow rates above the residential dwelling or sleeping unit minimum ventilation rate~~ Local exhaust systems that are not a component of the whole-house mechanical ventilation system are exempt from the balanced airflow calculation.

M1505.4.3.2 Intermittent off operation. Whole-house mechanical ventilation systems shall be provided with advanced controls that are configured to operate the system with intermittent off operation shall operate for a least two hours in each four-hour segment. The whole house ventilation airflow rate determined in accordance with Section M1505.4.3 as corrected by Section M1505.4.3.1 is multiplied by the factor determined in accordance with Table M1505.4.3(23).

M1505.4.4.1 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 M1505.4.4(1). Fans required by this section shall be provided with controls that enable manual override or automatic occupancy sensor, humidity sensor, timer controls or pollutant sensor controls. An "on/off" switch shall meet this requirement for manual controls. Manual fan controls shall be readily accessible in the room served by the fan.

TABLE M1505.4.4(1)
MINIMUM EXHAUST RATES

Area to be exhausted	Exhaust Rate	
	Intermittent	Continuous
<u>Open Kitchens</u>	<u>In accordance with M1505.4.4.3</u>	<u>Not permitted</u>
<u>Enclosed Kitchens</u>	400 cfm <u>In accordance with M1505.4.4.3</u>	<u>5 ACH based on kitchen volume</u> 30 cfm
Bathrooms - Toilet rooms	50 cfm	20 cfm

M1505.4.4.2 Local exhaust fans. Exhaust fans shall meet the following criteria:

1. Exhaust fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, HVI Loudness Testing and Rating Procedure, HVI 916, HVI Airflow Test Procedure, and HVI 920, HVI Product Performance Certification Procedure).

~~**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.~~

2. Fan airflow rating and duct system shall be designed and installed to deliver at least the exhaust airflow required by Table M1505.4.4(1). 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.

3. Design and installation of the system or equipment shall be carried out in accordance with manufacturers' installation instructions.

4. Intermittent local exhaust systems serving kitchens shall be rated for sound at a maximum of 3 sones at one or more airflow settings not less than 100 cfm at a static pressure not less than that determined at working speed as specified in HVI 916 Section 7.2.

5. Continuous local exhaust systems serving kitchens shall be rated for sound at a maximum of 1 sone at one or more airflow settings not less than 100 cfm at a static pressure not less than that determined at working speed as specified in HVI 916 Section 7.2.

~~4. Fan airflow rating and duct system shall be designed and installed to deliver at least the exhaust airflow required by Table M1505.4.4(1).~~

Exceptions:

1. The installed airflow is not required to be field-verified where A an exhaust airflow rating at a pressure of 0.25 in. w.g. may be is used, provided the duct sizing meets the prescriptive requirements of Table M1505.4.4(2).

2. Remote mounted fans need not meet sound requirements. To be considered for this exception, a remote mounted fan shall be mounted outside the kitchen, and there shall be at least 4 ft (1m) of ductwork between the fan and the intake grille.

~~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.~~

M1505.4.4.3 Local intermittent kitchen exhaust system. Kitchen range hoods for domestic cooking appliances shall meet or exceed either the minimum airflow or the minimum capture efficiency in accordance with Table M1505.4.4.3. Capture efficiency ratings shall be determined in accordance with ASTM E3087.

Exception: Other intermittent kitchen exhaust fans, including downdraft, shall meet or exceed 300 cfm airflow.

TABLE M1505.4.4.3

KITCHEN RANGE HOOD AIRFLOW RATES (CFM) AND ASTM E3087 CAPTURE EFFICIENCY (CE) RATINGS ACCORDING TO KITCHEN RANGE FUEL TYPE

<u>Hood Over Electric Range</u>	<u>Hood Over Combustion Range</u>
<u>65% CE or 160 cfm</u>	<u>80% CE or 250 cfm</u>

M1505.4.4.3.1 Field verification and diagnostic testing for local intermittent kitchen exhaust system. The local exhaust system for kitchens shall be installed to comply with local mechanical exhaust requirements specified in M1505.4.4.3 and shall be field verified in accordance with the procedures below to confirm the model is rated by HVI or AHAM to comply with the following requirements:

1. **Local intermittent exhaust systems for kitchens shall be tested and verified to provide a minimum airflow rate or capture efficiency required by M1505.4.4.3. Testing shall include verification of the maximum sound rating as specified in Section M1505.4.4.3.2. Testing for the intermittent kitchen exhaust systems shall occur with the whole house ventilation system operating and with all dwelling unit or sleeping unit entry doors closed. Testing for exhaust systems that require makeup air in accordance with Section M1503.6 shall include verifying that the mechanical makeup air system is controlled to automatically start. Testing for exhaust systems that do not require mechanical makeup air in accordance with Section M1503.6 and that are exempt from pressurize equalization shall be tested with operable openings manually opened unless design exhaust airflow can be achieved with all operable openings closed. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood, flow grid, or other airflow measuring device. Where required by the building official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the building official.**

Exception: The installed airflow is not required to be field-verified where an exhaust airflow rating at a pressure of 0.25 in. w.g. is used, provided the duct sizing meets the prescriptive requirements of Table M1505.4.4(2).

2. The verification shall utilize certified rating data from the HVI Publication 911: Certified Home Ventilating Products Directory or another directory of certified product performance ratings approved by code official for determining compliance. The verification procedure shall consist of visual inspection of the local intermittent kitchen exhaust system to verify and record the following information:
 - 2.1 The manufacturer name and model number.
 - 2.2 The model is listed in the HVI Directory.
 - 2.3 The rated airflow value listed in the HVI directory.
 - 2.4 The sound rating value listed in the HVI directory.
 - 2.5 If the value for the rated airflow given in the directory is greater than or equal to the airflow requirements specified in Section M1505.4.4.3 and if the value for the sone rating given in the directory is less than or equal to the sone rating requirements specified in M1505.4.4.3.2, then the local intermittent kitchen exhaust system complies, otherwise the local intermittent kitchen exhaust system does not comply.

Add reference to Chapter 15

AHAM

Association of Home Appliance Manufacturers
1111 19th St NW
#402
Washington, DC, 20036

HRH-2

Household Range Hoods

M1505.4.4.3.4

Add reference to Chapter 15, under ASTM:

E3087—18: Standard Test Method for Measuring Capture Efficiency of Domestic Range Hoods, M1505.4.4.3.2, Table M1505.4.4.3.2

Add reference to Chapter 15, under ASHRAE:

ASHRAE 62.2 - 2019: Ventilation and Acceptable Indoor Air Quality in Residential Buildings, M1505.4.4.3.3

Add reference to Chapter 44, under HVI:

HVI Publication 911: Certified Home Ventilating Products Directory, M1505.4.4.3.4

5. **Briefly explain your proposed amendment, including the purpose, benefits and problems addressed.** Specifically note any impacts or benefits to business, and specify construction types, industries and services

that would be affected. Finally, please note any potential impact on enforcement such as special reporting requirements or additional inspections required.

Add differentiated ventilation requirements of hood ranges based on fuel type to reduce personal exposure and health impacts from ranges. These requirements are based on research done by Lawrence Berkeley National Laboratory where they found that dwellings are currently not adequately ventilating their stoves, which can increase the risk of asthma for children living in these dwellings.

5. Specify what criteria this proposal meets. You may select more than one.

- The amendment is needed to address a critical life/safety need.
- The amendment clarifies the intent or application of the code.
- The amendment is needed to address a specific state policy or statute.
- The amendment is needed for consistency with state or federal regulations.
- The amendment is needed to address a unique character of the state.
- The amendment corrects errors and omissions.

6. Is there an economic impact: Yes No

If no, state reason:

If yes, provide economic impact, costs and benefits as noted below in items a – f.

- a. **Life Cycle Cost.** Use the OFM Life Cycle Cost [Analysis tool](#) to estimate the life cycle cost of the proposal using one or more typical examples. Reference these [Instructions](#); use these [Inputs](#). Webinars on the tool can be found [Here](#) and [Here](#)). If the tool is used, submit a copy of the excel file with your proposal submission. If preferred, you may submit an alternate life cycle cost analysis.

Operational cost difference should be negligible between a compliant range hood and a non-compliant range hood.¹

- b. **Construction Cost.** Provide your best estimate of the construction cost (or cost savings) of your code change proposal.

Minimum Airflow Requirement	Dwelling Unit Square Footage	Microwave-Range Hood Incremental Cost*	Microwave-Range Hood Incremental Cost/sq ft*	Under Cabinet Incremental Cost*	Under Cabinet Incremental Cost/sq ft*
250 cfm	1,000 ft ²	\$206	\$0.21/sq ft	\$415	\$0.42/sq ft

*Incremental compared to 180 cfm requirement, which 92% of products already meet²

If makeup air is triggered, it will add rough \$1,000 extra, or \$1-\$2 per sq ft, based on dwelling unit size.³ Where complying with the code requires installation of extra ductwork, the estimated cost is ~\$8/lf of 6” duct and ~\$77 for a termination. Assuming 10 ft of extra ductwork, this comes out to be \$157 extra, or \$0.1-\$0.2 per sq ft, based on dwelling unit size.⁴

¹ https://title24stakeholders.com/wp-content/uploads/2020/10/MF-IAO_Final-CASE-Report_Statewide-CASE-Team_Final.pdf,

page 115-117

² <https://efiling.energy.ca.gov/getdocument.aspx?tn=236201>, page 9 - 15

³ <https://drive.google.com/file/d/1HFKNTzrnw6kJXThmr86sjspijEpsZ08J/view?usp=sharing>

⁴ <https://drive.google.com/file/d/1uNrpoIF1Te1As0vOqzq7YjWZwkt3T-T2/view?usp=sharing>

Product availability:

Table 2. Count of Microwave Range Hoods Meeting Proposed Requirements

Rated CFM	Proportion of Compliant Products		Number of Brands with Compliant Products	
	Horizontal (n=66)	Vertical (n=66)	Horizontal (n=20)	Vertical (n=20)
>=110	100%	100%	20	20
>=130	100%	100%	20	20
>=160	100%	100%	20	20
>=180	92%	92%	20	20
>=250	48%	79%	16	19
>=280	17%	30%	6	7

Table 3. Count of Undercabinet Range Hoods Meeting Proposed Requirements

Rated CFM	Proportion of Compliant Products		Number of Brands with Compliant Products	
	Horizontal (n=30)	Vertical (n=43)	Horizontal (n=8)	Vertical (n=9)
>=110	100%	100%	8	9
>=130	100%	100%	8	9
>=160	100%	100%	8	9
>=180	100%	98%	8	9
>=250	77%	91%	8	9
>=280	63%	72%	5	9

Table 4. Count of Chimney Range Hoods Meeting Proposed Requirements

Rated CFM	Proportion of Compliant Products		Number of Brands with Compliant Products	
	Horizontal (n=3)	Vertical (n=64)	Horizontal (n=1)	Vertical (n=11)
>=110	100%	100%	1	11
>=130	100%	100%	1	11
>=160	100%	100%	1	11
>=180	100%	100%	1	11
>=250	100%	100%	1	11
>=280	100%	94%	1	11

- c. **Code Enforcement.** List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

This should have negligible impact on code enforcement time or inspections.

- d. **Small Business Impact.** Describe economic impacts to small businesses:

This should have no impact on small businesses because it is targeted to Group R occupancies.

e. **Housing Affordability.** Describe economic impacts on housing affordability:

This should have a small impact on housing affordability.

f. **Other.** Describe other qualitative cost and benefits to owners, to occupants, to the public, to the environment, and to other stakeholders that have not yet been discussed:

Exposure to poorly ventilated gas stove pollutants, such as nitrogen dioxide (NO₂), can increase the risk of asthma in household occupants, particularly children.⁵ The Environmental Protection Agency (EPA) states that homes with a gas stove have 50-400% higher average NO₂ levels than homes with an electric stove.⁶ The EPA found that even short-term exposure to NO₂ is linked to asthma and other chronic respiratory illnesses.⁷ In addition to respiratory effects NO₂ exposure has been linked to diabetes, cardiovascular disease, and birth outcomes.⁸ This risk of exposure to NO₂ can be lowered when high-performing externally vented range hoods are installed and used to decrease concentrations of NO₂ and other pollutants released from gas combustion.⁹ These findings could translate to a significant health and economic benefit from the regulation of gas stove combustion.

Per person costs of asthma in one California study were estimated to be \$3,288 annually.¹⁰ This estimate included costs of medications as well as office and emergency room visits. Assuming similar health costs for Washington, we could see a significant economic and medical benefit for the 9% of residents affected by asthma and other respiratory illnesses if exposure to gas stove pollution is reduced.¹¹

Please send your completed proposal to: sbcc@des.wa.gov

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.

⁵ Kathleen Belanger et al, "Household levels of nitrogen dioxide and pediatric asthma severity", *Epidemiology* 24(2), March 2013, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3686297/>.

⁶ *Integrated Science Assessment For Oxides Of Nitrogen – Health Criteria* (Final Report, July 2008), US Environmental Protection Agency, Washington, DC, EPA/600/R-08/071, 2008, p. 2-38, <https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=194645>.

⁷ *Integrated Science Assessment (ISA) For Oxides of Nitrogen – Health Criteria* (Final Report, 2016). US Environmental Protection Agency, Washington, DC, EPA/600/R-15/068, 2016, p.1-31, <https://cfpub.epa.gov/ncea/isa/recordisplay>.

⁸ *Ibid*, p. 1-32, 1-33, 1-34, 1-35

⁹ Brett Singer et al., *Effective Kitchen Ventilation for Healthy Zero Net Energy Homes with Natural Gas*, 2021, Lawrence Berkeley National Laboratory, prepared for the California Energy Commission, <https://eta.lbl.gov/publications/effective-kitchen-ventilation-healthy>

¹⁰ American Thoracic Society. 2018. "Asthma costs the US economy more than \$80 billion per year." *ScienceDaily*. January 12. Accessed November 22, 2020. <https://www.sciencedaily.com/releases/2018/01/180112091212.htm> and <https://efiling.energy.ca.gov/getdocument.aspx?tn=236201>, page 15

¹¹ Most Recent Asthma State or Territory Data. March 24. Accessed November 22, 2020. https://www.cdc.gov/asthma/most_recent_data_states.htm