



STATE OF WASHINGTON
STATE BUILDING CODE COUNCIL

Log No. 24-GP1-137 Ver. 3
~~Proponent Revision 11/20/24~~
Proponent Revision 12/06/24

1. State Building Code to be Amended:

- | | |
|---|--|
| <input type="checkbox"/> International Building Code | <input checked="" 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 |
| <input type="checkbox"/> 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):

Definitions, Sections 403.4.4.1, 403.4.4.2

Title:

Distributed whole-house ventilation system

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

Proponent: Mike Moore, Stator LLC, representing Broan-NuTone

Title: Principal Consultant

Date: July 25, 2024; Revised December 6, 2024

3. Designated Contact Person:

Name: Mike Moore, Stator LLC, representing Broan-NuTone

Title: Principal Consultant

Address: 926 W State St., Hartford, WI 53027

Office Phone: (303) 408-7015

Cell: (303) 408-7015

E-Mail address: mmoore@statorllc.com

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) Washington State Mechanical Code **Section(s)** Chapter 2, Section 403.4.4.1, and Section 403.4.4.2

Enforceable code language must be used.

Amend the existing amendment in Washington State’s Mechanical Code to read as follows:

BALANCED WHOLE-HOUSE VENTILATION. Any combination of concurrently operating residential dwelling or sleeping unit mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10 percent or 5 cfm, whichever is greater, of the total mechanical supply airflow rate.

DISTRIBUTED WHOLE-HOUSE VENTILATION SYSTEM. A whole-house ventilation system shall be considered distributed where it supplies outdoor air directly (not transfer air) to each dwelling or sleeping unit habitable space other than adjoining spaces used for eating or cooking, and where it supplies outdoor air directly, or indirectly through an obstructed fixed opening sized in accordance with Section 402.3, to adjoining spaces used for eating or cooking (living room, den, office, interior adjacent room, interior adjoining spaces or bedroom) and exhausts air from all kitchens and bathrooms directly outside.

~~**NOT DISTRIBUTED WHOLE-HOUSE VENTILATION.** A whole-house ventilation system shall be considered not distributed where either the supply system or the exhaust system is not distributed. Supply systems are not distributed where a habitable space is supplied with outdoor air to ventilate an interior adjacent room or an interior adjoining space. Exhaust systems are not distributed where all bathrooms and kitchens are not exhausted by the whole-house ventilation system. If either the supply system or the exhaust system is not distributed, then the ventilation quality adjustment system coefficient adjustment is required in accordance with Section C403.4.3.~~

[BG] HABITABLE SPACE. A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

INTERIOR ADJACENT ROOM. An enclosed room, qualifying as habitable space, without exterior windows or openings to the outdoors, located within a dwelling or sleeping unit, that does not have interior unobstructed openings required for an *interior adjoining space*.

INTERIOR ADJOINING SPACE ~~A room or~~ habitable space without openings to the outdoors that is naturally ventilated from another *habitable space* by unobstructed fixed openings sized in accordance with Section 402.3.

403.4.4.1 Whole-house ventilation in Group R-2 occupancies.

Residential dwelling and sleeping units ~~whole-house ventilation systems~~ in Group R-2 occupancies shall ~~include supply and exhaust fans and be~~ have a *distributed whole-house ventilation system that is also a balanced whole-house ventilation system* in accordance with Section 403.4.6.3. The system shall include a heat or energy recovery ventilator with a sensible heat recovery effectiveness as prescribed in Section C403.3.6 or when selected as an option of R406 of the Washington State Energy Code. The ~~whole-house ventilation~~ system shall operate continuously at not less than the minimum ventilation rate determined in accordance with Section 403.4.2, unless configured with intermittent off controls in accordance with Section 403.4.6.5. ~~The whole-house supply fan shall provide ducted outdoor ventilation air to each habitable space within the residential unit.~~

Exceptions:

1. *Interior adjoining spaces used for living or sleeping* that are ventilated from another *habitable space* are not required to have *outdoor air* ducted directly to the *interior adjoining space*. For this case, the ~~These systems are~~ shall not be considered ~~not a~~ *distributed whole-house ventilation systems* and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3.
2. *Interior adjacent rooms* that are ventilated from another *habitable space* are not required to have *outdoor air* ducted directly to the *interior adjacent room*. For this case, ~~These the systems are~~ shall not be considered ~~a not~~ *distributed whole-house ventilation systems* and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3. The *interior adjacent room* shall be provided with a transfer fan with a minimum airflow rate of 30 cfm or with relief air inlet with a minimum airflow of 20 cfm that is connected to the exhaust relief air inlet of an ERV/HRV *whole-house ventilation system*. Transfer fans that ventilate *interior adjacent rooms* shall meet the sone rating in Section 403.4.6 and shall have whole-house ventilation controls in accordance with Section 403.4.5.

403.4.4.2 Whole-house ventilation for other than Group R-2 occupancies.

Residential dwelling and sleeping units in other than Group R-2 occupancies, including Group I-1 Condition 2 occupancies, shall have a *distributed whole-house mechanical ventilation system* with supply and exhaust fans in accordance with Section 403.4.6.1, 403.4.6.2, 403.4.6.3 or 403.4.6.4. The ~~whole-house ventilation~~ system shall operate continuously at not less than the minimum ventilation rate determined in accordance with Section 403.4.2 unless configured with intermittent off controls in accordance with Section 403.4.6.5. ~~The whole house supply fan shall provide ducted outdoor ventilation air to each habitable space within the residential unit.~~

Exceptions:

1. *Interior adjoining spaces used for living or sleeping* that are ventilated from another *habitable space* are not required to have *outdoor air* ducted directly to the *interior adjoining space*. For this case, the ~~These systems are~~ shall not be considered ~~not a~~ *distributed whole-house ventilation systems* and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3.
2. *Interior adjacent rooms* that are ventilated from another *habitable space* are not required to have *outdoor air* ducted directly to the *interior adjacent room*. For this case, ~~These the systems are~~ shall not be considered ~~not a~~ *distributed whole-house ventilation systems* and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3. The *interior adjacent room* shall be provided with a transfer fan with a minimum airflow rate of 30 cfm or with a relief air inlet with a minimum airflow rate of 20 cfm that is connected to the exhaust/relief air inlet of an ERV/HRV *whole-house ventilation system*. Transfer fans that ventilate *interior adjacent rooms* shall meet the sone rating in Section 403.4.6 and shall have whole-house ventilation controls in accordance with Section 403.4.5.

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

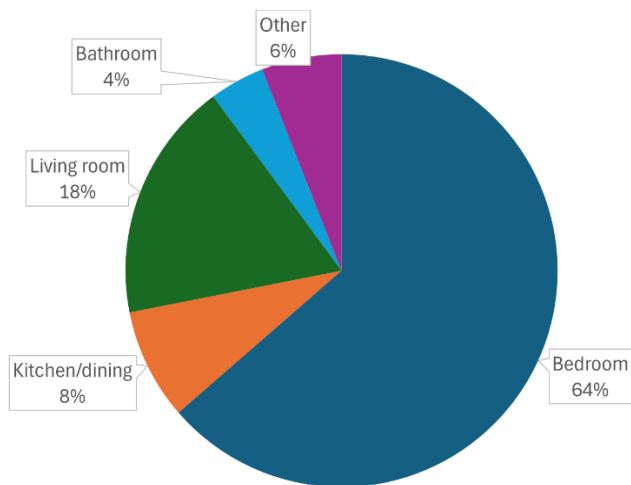
that would be affected. Finally, please note any potential impact on enforcement such as special reporting requirements or additional inspections required.

Section 403.4.3 assesses a ventilation rate coefficient for whole-house ventilation systems that are *not distributed* and that are *not balanced*. The definition of *not distributed* is as follows:

NOT DISTRIBUTED WHOLE-HOUSE VENTILATION. A whole-house ventilation system shall be considered not distributed where either the supply system or the exhaust system is not distributed. Supply systems are not distributed where a habitable space is supplied with outdoor air to ventilate an *interior adjacent room or an interior adjoining space*. Exhaust systems are not distributed where all bathrooms and kitchens are not exhausted by the whole-house ventilation system. If either the supply system or the exhaust system is not distributed, then the ventilation quality adjustment system coefficient adjustment is required in accordance with Section C403.4.3.

As written, the definition of *not distributed whole-house ventilation* applies to all unitary whole-house ventilation systems required by Sections 403.4.4.1 and 403.4.4.2, because Section 501.2 requires kitchen exhaust to be ducted “independent of all other systems.” As soon as the kitchen exhaust is ducted separately from the unitary whole-house ventilation system in compliance with Section 501.2, “all bathrooms and kitchens are not exhausted by the whole-house ventilation system,” and therefore the system is considered *not distributed*. This seems like an unintended consequence of the definition, and the reference to kitchen exhaust should be removed for this reason. A second reason to remove the reference to kitchen exhaust from the definition of not distributed is that encouraging kitchen exhaust to be part of the whole-house ventilation system disincentivizes designers from specifying intermittent kitchen exhaust with high capture efficiency. If a designer fails to specify kitchen exhaust with high capture efficiency, it can be expected to increase the cook’s exposure to cooking contaminants. For these reasons, the reference to kitchens should be removed from the definition of *distributed whole-house ventilation* and *not distributed whole-house ventilation*.

The primary objective of distributing ventilation is to provide outdoor air to the occupants within a dwelling unit. Combining EPA data¹, Gallup poll data², and independent survey data^{3,4}, a reasonable estimate for the percent of time that occupants spend in different rooms is as follows:



¹ Klepeis, Neil & Tsang, Andy & Behar, Joseph. (1996). Analysis of the National Human Activity Pattern Survey (NHAPS) Respondents from a Standpoint of Exposure Assessment - Final EPA Report. Final Rpt EPA. https://www.researchgate.net/publication/242014860_Analysis_of_the_National_Human_Activity_Pattern_Survey_NHAPS_Respondents_from_a_Standpoint_of_Exposure_Assessment_-_Final_EPA_Report.

² Jones, J. December 19, 2013. In U.S., 40% Get Less Than Recommended Amount of Sleep. Gallup. <https://news.gallup.com/poll/166553/less-recommended-amount-sleep.aspx>. Sourced July 30, 2024.

³ American Freight. Unpacking How Americans Spend Their Time at Home. <https://www.americanfreight.com/c/how-long-americans-spend-at-home>. Accessed July 30, 2024.

⁴ Crawford, Jaclyn. October 6, 2021. "Study Reveals The State Of Home Offices In 2021." CraftJack. <https://craftjack.com/toolbox/remote-work-from-home-statistics-2021/>. Accessed July 30, 2024.

The model code (both the IRC and IMC) characterizes distributed ventilation as the supply of outdoor air to each bedroom and to either the living room, kitchen, or dining room. Revising the Washington State definition of distributed ventilation to require outdoor air to be directly supplied to all habitable spaces except adjoining spaces used for eating or cooking (in which case, the outdoor air can be directly or indirectly supplied), should result in good distribution of outdoor air across habitable space.

While the model code method for qualifying distribution is simplistic and effective, Washington’s requirement for supply systems to supply outdoor air directly to all “habitable” spaces to be considered *distributed whole-house ventilation* is unnecessarily complex and introduces opportunities for misinterpretation. The Washington State Mechanical Code does not define “habitable space.” A definition is provided in the Washington State Residential Code, but this appears to be overridden by the parenthetical explanation of the term contained in the definition of *distributed whole-house ventilation*, as follows: “(living room, den, office, *interior adjacent room*, *interior adjoining spaces* or bedroom).”

The definition of *interior adjacent room* is as follows: “an enclosed room without exterior windows or openings to the outdoors located within a dwelling or sleeping unit that does not have interior unobstructed openings required for an interior adjoining space.” Considering this definition, the inclusion of *interior adjacent rooms* within the description of habitable space could lead an AHJ to require a supply system (or supply side of an HRV or ERV) to provide outdoor air to all interior bathrooms, laundry rooms, mechanical rooms, and closets to be considered distributed. This cannot be the intention of Washington State’s definitions.

The proposed definition of distributed ventilation will better align with the IMC’s criteria and should be easier to interpret, implement, and enforce than WA State’s current language, while still providing good distribution of outdoor air.

Section 403.4.3, Section 403.4.4.1, and Section 403.4.4.2 reference *distributed whole-house ventilation system*. For consistency, the definition should be revised to also use “system.” Finally, to avoid confusion between trying to fully define both *distributed whole-house ventilation system* and *not distributed whole-house ventilation system*, the definition of non-distributed can be deleted, and this system can be referred to as a system that is not distributed.

6. 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.

7. 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.

This proposal will not increase costs. The proposal could reduce costs by reducing the number of habitable spaces requiring direct supply of outdoor air, in alignment with the model code. Potential savings would vary widely based on the application and are not estimated here. If required by the subcommittee, an estimate could be provided for a representative configuration.

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

\$Click here to enter text./square foot

(For residential projects, also provide \$Click here to enter text./ dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

- c. **Code Enforcement.** List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:
- d. **Small Business Impact.** Describe economic impacts to small businesses:
- e. **Housing Affordability.** Describe economic impacts 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:

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.