June 6, 2020

To: Oregon Construction Industry Energy Board and Residential and Manufactured Structures Board

Re: Proposed Modifications to Oregon's draft modifications to the 2018 IRC

Agenda Item: IIIB. Code Adoption Update. Residential Energy Provisions (beginning on p38 of the agenda)

From: Mike Moore, P.E., Newport Partners, submitted on behalf of Broan-NuTone

Dear Board Members:

Broan-NuTone commends Oregon on its draft modifications to the 2018 IRC that are intended to improve the indoor air quality (IAQ) of dwelling units and the energy performance of dwelling unit ventilation systems. This comment includes supportive, proposed modifications to Oregon's draft language which are intended to:

1. Increase options for ventilation system selection while yielding equivalent energy performance and expected IAQ
2. Clarify prescriptive equipment performance metrics to improve system specification and enforcement of code provisions
3. Clarify the prescriptive equipment performance metrics associated with ventilation systems when using Part II Alternative Systems Analysis to comply with Chapter 11.

Thank you for the opportunity to provide this comment. Proposed modifications are provided on the following page.

Sincerely,

Mike Moore

Mike Moore, P.E.

ASHRAE 62.2 Vice Chair

Proposed Modification to Draft Language

Modify Section N1105.6 as follows:

N1105.6 Heat recovery ventilator. Whole house ventilation systems shall include an energy recovery ventilator with a fan ~~efficiency~~ efficacy of not less than 1.2 cfm/watt and an adjusted sensible heat recovery efficiency rating of not less than 66 percent or a fan efficacy of not less than 1.6 cfm/watt and an adjusted sensible heat recovery efficiency rating of not less than 63 percent. Fan efficacy and adjusted sensible heat recovery efficiency ratings shall be determined at or above the design flow rate from values listed in accordance with HVI Publication 920 at zero degrees Celsius or shall be interpolated from such values.

Exception: Whole house ventilation systems that meet the exception to Section M1505.4.3 for the 30 percent ventilation rate reduction.

Insert new reference as follows:

The Home Ventilating Institute (HVI) 920-2020. HVI Product Performance Certification Procedure Including Verification and Challenge.

Modify Table NA1109.2 as follows (rest of table remains unchanged):

Table NA1109.2 BASIS FOR COMPARISON

INPUT PARAMETERS FOR ANALYSIS		
Parameter	**Proposed Building**	**Code Baseline**
. . .		
HVAC Systems		
HVAC system type(s)	As designed	Same as proposed
HVAC efficiency	Code efficiencies	Same as proposed
Heating fuel	As designed	Same as proposed
Cooling fuel	As designed	Same as proposed
Temperature setpoints	As designed	Same as proposed
Equipment capacity	As designed	Same as proposed
Mechanical ventilation rate	As designed	Same as proposed
Mechanical ventilation system type	As designed	Energy recovery ventilator meeting the performance specifications of N1105.6.

Rationale:

1. Fan efficacy: The term used by the industry to express fan performance, and also used within the 2018 IECC, is "fan efficacy".
2. ASRE: The Home Ventilating Institute (HVI) is the leading certification body for dwelling unit H/ERV systems. To account for the heating mode fan energy use, fan waste heat contribution, and heat exchanger effectiveness of an H/ERV, the Home Ventilating Institute encourages software simulation programs to use the Adjusted Sensible Recovery Efficiency (ASRE) performance metric (https://www.hvi.org/resources/publications/builder-guide/). This metric is commonly used in building energy performance software, is provided within an H/ERV's listed performance in the HVI database, and should be referenced in Oregon's code when specifying an H/ERV's performance.

3. Rating conditions: Ratings in accordance with HVI are already required in Section M1505.5 of the ORSC. This proposed language helps to clarify which HVI procedure (i.e., HVI 920) is applicable when referencing HVI ratings for H/ERVs and also provides a reference to the HVI procedure. HVI permits manufacturers to list their rated performance parameters at multiple design temperatures and flow rates. To improve compliance and enforcement, the code should clarify the conditions under which rated parameters should be verified. Also, because rated conditions are a function of flow rate, it is important to clarify that interpolation may be used to determine the performance at a design flow rate that is between listed, rated flows. For example, if a Model C12 HRV is specified at a flow rate of 60 cfm, the proposed modifications to the draft language would clarify that the specifier would need to use an ASRE value at or above the flow rate of 60 cfm at zero degrees Celsius (this is conservative and would result in an estimated ASRE of 68 or 65); or the specifier could interpolate to determine the ASRE more precisely (i.e., interpolation between ASRE values of 71 and 68 with associated flows of 50 and 64 cfm would yield an ASRE of 69 for a design flow rate of 60 cfm). See below for a screenshot of the Model C12 HRV performance parameters taken from the HVI database.

Energy Ratings

Brand Name	Model	Temp Mode	°C	°F	Net Airflow (L/s)	Net Airflow (cfm)	Power Consumed (Watts)	SRE	ASRE
Venmar	C12 HRV	HEATING	0	32	23	50	34	66	71
Venmar	C12 HRV	HEATING	0	32	30	64	40	63	68
Venmar	C12 HRV	HEATING	0	32	39	83	48	60	65
Venmar	C12 HRV	HEATING	-25	-13	23	49	50	61	64
Venmar	C12 HRV	HEATING	-25	-13	33	70	62	60	63

4. Secondary option for performance parameters: Oregon's draft language in Section N1105.6 proposes a minimum fan efficacy of 1.2 cfm/W and a "heat recovery rating" (assumed to reference the ASRE as reported by HVI) of 66. This efficacy is close to the upper limit of what can be achieved with permanent split capacitor motors. In the effort to improve H/ERV energy, acoustic, and flow rate performance, manufacturers have begun transitioning to superior, electronically commutated motors (ECMs). To support the transition to more efficient ECMs and increase options for product selection, it is in Oregon's best interest to provide a compliance option for H/ERVs with ECMs that yield comparable performance to H/ERVs with PSC motors. The proposed modification submitted with this comment would permit an H/ERV with a fan efficacy of 1.6 cfm/W and an ASRE of 63 (i.e., an H/ERV with ECMs) to be specified in lieu of an H/ERV with a fan efficacy of 1.2 cfm/W and an ASRE of 66 (i.e., an H/ERV with PSC motors). The alternative performance parameters were identified by performing REM/Rate building energy simulations on a typical single-family home in both Portland, OR and Burns, OR, that would be compliant with the prescriptive path of the draft Chapter 11 ORSC. Following are the results of the simulations, showing that equivalent performance is achieved at the alternative proposed performance parameters of 1.6 cfm/W and ASRE of 63. REM/Rate files are available upon request.

ASRE	66	55	61	62	58	60	63
Fan efficacy (cfm/W)	1.2	1.5	1.5	1.5	1.6	1.6	1.6
Consumption (Mbtu/yr)	100.1	100.8	100.2	100.1	100.4	100.2	100.0
Consumption (Mbtu/yr)	131.6	132.7	131.9	131.8	132.2	132.0	131.6

5. Table NA1109.2: This table sets the conditions under which an alternative systems analysis compliance pathway may be verified. The table should be updated in parallel with updating the minimum performance requirements for ventilation systems in the prescriptive path. The proposed modifications would clarify that the code baseline should be an energy recovery ventilator meeting the performance specifications of N1105.6. This would penalize users that specify ventilation systems that are less efficient than the minimum performance specifications in N1105.6. Also, it would clarify that the mechanical ventilation rate should be the same for both the proposed and code baseline buildings, to limit the gaming that could otherwise be associated with varying ventilation rates.