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HVI Comment - CEC 2022 Pre-Rulemaking - Range Hoods - 02172021

Additional submitted attachment is included below.

HOME VENTILATING INSTITUTE

HARCA

ANSI ACCREDITED
ISO/IEC 17065
Product Certification Body
#0841

MEMBER OF
Indoor Air Quality ASSOCIATION INC.

RESNET
RESIDENTIAL ENERGY SERVICES NETWORK

17 February 2021

Building Standards Office
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

Re: Docket No. 19-BSTD-03, 2022 Energy Code Pre-Rulemaking; *Response to TN 236696*

Dear CEC Staff:

The Home Ventilating Institute (HVI) represents 104+ manufacturers of residential ventilating products, including range hoods, located in North America, South America, Asia, and Europe. As stated in TN 236371, HVI supports CASE's and CEC's proposal to update range hood rating metrics and associated performance targets in Title 24, with modifications to simplify the compliance tiers and to reference a rated airflow that provides a better approximation of as-installed airflow (i.e., the Nominal Installed Airflow or "NIA"). In response HVI's TN 236371, Whirlpool submitted TN 236696, requesting that CEC "(allow) this cycle to pass without revision to the requirements." For CEC's consideration, this letter provides rebuttals to several of the statements made in that letter, enumerated below as "WP_."

WP1: "While the subcommittee* agreed to establish ratings at a Nominal Installed Airflow rate (NIA), this decision was directional only and did not include discussion of the formula by which it is calculated."

HVI Response: The referenced subcommittee is the ASHRAE 62.2 Range Hood Rating Metric (RHRM) Workgroup. This group was composed of manufacturer (including Whirlpool), association (including HVI and AHAM), laboratory, regulatory (CEC), and industry expert representatives. The RHRM Workgroup produced a report containing "recommendations for revision of range hood rating metrics within codes, standards, and rating agencies." The report was distributed without restriction to the RHRM workgroup and to the ASHRAE 62.2 committee in January 2020 and is also appended to this letter. Within the report, the RHRM Workgroup detailed that the "'nominal installed flow' should be determined by the intersection of the hood's fan curve and the system curve." Further, the report specified that "the system curve should be developed from a regression of static pressure as a function of flow within a 'typical' duct system, as defined in Table 1." This table includes the explicit formulas and assumptions that were adopted by HVI 920 to calculate Nominal Installed Airflow (NIA).

WP2: "There are a number of issues with the HVI formula, a simple example is the difference in the calculation of flow area for a rectangular duct which is not the same as within ASHRAE 62.2."

HVI Response: HVI issued Clarification #1 to HVI 920 on September 3, 2020, stating that the formula to be used when calculating the hydraulic diameter for a rectangular duct is the same as within ASHRAE 62.2-2019 Table 5.3 footnote "a" and the 2017 ASHRAE Handbook of Fundamentals, Chapter 21 Equation 24.

WP3: "The subcommittee to establish the rating conditions was reopened and is currently scheduling meetings on this topic. It is therefore premature to consider the HVI NIA rating as a valid condition until it has been subjected to a consensus review by an independent body, which it has not."

HVI Response: The formulas and assumptions for calculating NIA are available for review and were derived from the best available data identified by the RHRM, which included ASHRAE Fundamentals and industry data on termination loss coefficients. Formulas and assumptions were vetted with the RHRM (across six meetings from September-December 2019), presented and circulated to the ASHRAE 62.2 subcommittee and the 62.2 main committee (January 2020), vetted by the HVI general membership, and approved for publication in HVI 920 (February 2020).

WP4: "…the implementation of the Capture Efficiency rating program has not been reviewed for repeatability… Even though the test is an alternative compliance path, its reference adds validity and the Energy Commission should not refer to a non-consensus test standard for a performance measurement."

HVI Response: As noted by Whirlpool, CEC is not proposing to require a range hood capture efficiency (RHCE) metric to be used for compliance with Title 24-2022. Rather, CEC is proposing that an RHCE, determined in accordance with ASTM E3087, be permitted as an optional compliance path for manufacturers. To ensure that manufacturers only use this compliance path once a certification body has determined that the RHCE ratings that are determined in accordance with consensus standard ASTM E3087 are repeatable, HVI recommends that CEC requires a "listed RHCE rating" when used for compliance.

WP5: "The data that the Home Ventilating Institute (HVI) presented provides evidence why additional performance requirements should be delayed until appropriate conditions are developed through consensus of all concerned parties. While the method to determine the Nominal Installed Airflow (NIA) rating from the existing data was not shared, it predicts a wide variation of up to 40% from the current standard rating conditions."

HVI Response: Whirlpool participated as a voting member on the RHRM Workgroup that developed the method that is used by HVI to determine the NIA. This method was published within HVI 920 and is publicly available through HVI's website. The fact that calculation of the NIA shows a deviation of up to 40% from the airflow at the legacy rating condition (i.e., 0.1" w.g.) demonstrates both the limitation of the legacy rating condition at predicting a typical installed airflow and the need to migrate from the legacy rating condition to an NIA.

WP6: "Manufacturers are still conducting additional testing to capture the sound requirement at working speed, a condition that ASHRAE rejected, and additional requirements could lead to more testing with a questionable future value."

HVI Response: In Title 24-2019, CEC approved the use of sones determined at the working speed static pressure as an option for range hood manufacturers to comply with Title 24's sound requirements. There is no need for manufacturers to conduct additional sound testing at working speed if they elect to comply using test data determined at the ASHRAE static pressure rating point of 0.1" w.g. (see Section 120.1(b)2.A.vi for the relevant language). With respect to the use of NIA as an alternative to RHCE, the RHRM Workgroup voted 9-0 in support the following recommendation: "In the short-term, and until a reasonable time has passed after a certified rating program method of test is available, any requirement

for a minimum RHCE should be accompanied by an alternative option of having a rated 'nominal installed flow' no less than X cfm." Similarly, the RHRM Workgroup voted 9-0 to identify an NIA as the cornerstone for range hood ratings in the future, via the following recommendation: "In the long-term, flow, static pressure, sound, and RHCE should all be determined at the 'nominal installed flow' rate." These positions support the current and future value of the NIA and RHCE metrics.

Thank you for the opportunity to provide these responses in support of updating Title 24's range hood rating metrics and targets.

Sincerely,

Jacki Donner, CEO

Enclosure: ASHRAE 62.2 Range Hood Rating Metrics Workgroup Recommendations

ASHRAE 62.2 Range Hood Rating Metrics Workgroup Recommendations

Date: January 20, 2020
Overview: This document contains recommendations from the ASHRAE 62.2 Range Hood Rating Metrics Workgroup (RHRM or "the workgroup"), which was established through the direction of the ASHRAE 62.2 chair at the 2019 ASHRAE 62.2 winter meeting and met several times during 2019. The intended audience for these recommendations includes codes, standards, regulatory bodies, industry associations, and manufacturers.
Background: There is a lack of coordination across industry, ASHRAE, CEC, ENERGY STAR, HVI, and ICC rating metrics for range hood performance in the areas of flow and sound. With a third metric, capture efficiency, anticipated to be introduced in the near future, it is critical that these metrics be coordinated with industry across codes, standards, and ratings bodies, starting with ASHRAE 62.2. The primary reason for divergence in rating metrics is the desire to reference metrics that are more representative of "typical installations", which are generally expected to experience higher static pressures than those regularly reported by rating agencies. The workgroup was convened to make recommendations that would help establish consistency across metrics as the industry, codes, and standards transition to referencing ratings that are more representative of typical installations.
Goal: Review, and where appropriate, develop recommendations for revision of range hood rating metrics within codes, standards, and rating agencies. Disseminate recommendations to interested parties.
Method: Draft recommendations for modifications to range hood rating metrics. Seek input from workgroup members through emails and conference calls, modifying draft recommendations as needed to encourage consensus. Circulate draft recommendations through a series of online surveys. Survey questions and votes are provided in this document. Recommendations achieving a majority of votes are considered to represent the workgroup's views. Those with a supermajority can be interpreted as more representative of the group's views as a whole.
Participants: Philip Fairey, Paul Raymer, Jeff Miller, Randy Cooper, Russell Pope, John Rose, Bobby Windmeyer, Steve Gatz, Don Stevens, Iain Walker, Daniel Forest, Jim Sweeney, Loic Ares, Israel Quinel, Kirk Bolton, Jim Boldt, and John Fox. This group was chaired by Mike Moore and represented manufacturers and their associations, a state regulatory agency, and technical specialists.

Timeline
September 24, 2019: RHRM meeting
October 1, 2019: RHRM meeting
October 18, 2019: RHRM meeting
October 31, 2019: RHRM meeting
November 18, 2019: RHRM meeting
December 4, 2019: RHRM meeting
October 17-23, 2019: Survey dates for RHRM Airflow and Dampers/Terminations. Results will be summarized and presented to HVI at the fall meeting. Results will also be shared with CEC, the California CASE team, and ASHRAE 62.2.
Oct 31 – Nov 18, 2019: Survey dates for RHRM Sones (long-term)
November 18 – December 12, 2019: Survey dates for RHRM Range Hood Capture Efficiency
December 12 – 18, 2019: Survey dates for RHRM Sones (short-term)
October 2, 2019: California's utility-sponsored CASE team will meet to discuss a draft proposal for range hood capture efficiency
October 28 – 29, 2019: HVI fall meeting
January 31 – Feb 1, 2020: ASHRAE 62.2 winter meeting
February 25 – 28, 2020: HVI spring meeting
June 26-27, 2020: ASHRAE 62.2 summer meeting

Following are the recommendations of the workgroup

Topic 1: Range Hood Airflow Rates
1.1 Nominal installed flow (NIF) is the term that should be used for the flow rate that is expected to be achieved in a "typical" duct system.

Vote: Yes (9-1; 90%)

1.2 HVI should require manufacturers to list, within the HVI directory, a flow rate derived from a point on the range hood fan curve that is expected to be achieved in a "typical" duct system.
Vote: Yes (9-2; 82%)

1.3 The "nominal installed flow" should be determined by the intersection of the hood's fan curve and the system curve.
Vote: Yes (10-1; 91%)

1.4 For hoods listed in the HVI database, the hood's fan curve should be developed from one or more regressions that combine to include no less than ten flow and static pressure test points determined in accordance with HVI 916. Each regression shall contain no less than three consecutive data points determined in accordance with HVI 916.
Vote: Yes (11-0; 100%)

1.5 The goodness of fit for the fan curves should be demonstrated by one or more regressions producing a value of the root mean square error that is determined as acceptable by HVI's Engineering Committee.
Vote: Yes (8-2; 80%)

1.6 The system curve should be developed from a regression of static pressure as a function of flow within a "typical" duct system, as defined in Table 1: TypicalDuctSystemAssumptions.
Vote: Yes (10-1; 91%)

1.7 The goodness of fit for the system curves should be demonstrated by a regression producing a value of the root mean square error that is determined as acceptable by HVI's Engineering Committee, or other consensus body.
Vote: Yes (7-3; 70%)

Duct System Parameter	**Recommended Characteristics**
Length	10 ft (no reference)
Dimension	Same as the range hood's duct take-off for the listed configuration and speed
Roughness coefficient	0.00024 (source: avg of min and max reported in 2017 ASHRAE HoF, Chapter 21, Table 1 for smooth duct; used in developing ASHRAE 62.2 prescriptive duct sizing table)
Elbows	Number: 2 (no reference); Loss coefficient: 0.42 (source: 3-gore elbow with a bend radius to duct diameter ratio of 1.0, ASHRAE HoF, fitting CD3-12 Elbow; used in developing ASHRAE 62.2 prescriptive duct sizing table)
Termination	Loss coefficient derived from regression of data from Escatel[1] thesis as a function of velocity (consistent with values assumed in developing ASHRAE 62.2 prescriptive duct sizing table). See Figure 2 for more information.
Friction factor	Calculated using the Haaland equation $f = \left\{-1.8\log\left[\left(\frac{e/D}{3.7}\right)^{1.11} + \frac{6.9}{\mathrm{Re}}\right]\right\}^{-2}$ where f = friction factor, dimensionless
Flow	Calculated using the ASHRAE HoF Darcy-Weisbach equation $\Delta p = \left(\frac{12fL}{D_h} + \Sigma C\right)\rho\left(\frac{V}{1097}\right)^2$ where D_h = hydraulic diameter, in. V = velocity, fpm ρ = density, lb_m/ft^3 f = friction factor, dimensionless L = duct length, ft Δp = friction losses, in. of water

[1] Escatel, Daniel S. 2011. An experimental study and analysis on vent cap performance. Submitted to the Office of Graduate Studies of Texas A&M University. https://oaktrust.library.tamu.edu/handle/1969.1/ETD-TAMU-2011-05-9399

Table 1: TypicalDuctSystemAssumptions.

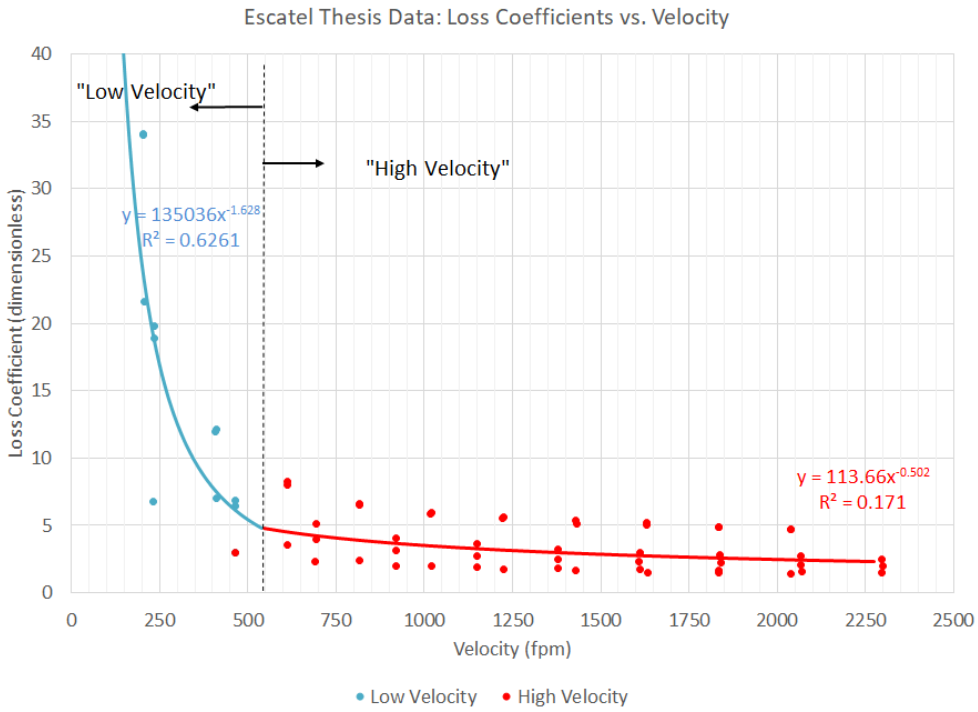

Figure 2. Regression of termination loss coefficient as a function of velocity. Data from the Escatel thesis.

1.8 Where the "nominal installed flow" in a "typical" duct system is reported in a range hood's listing, the associated static pressure should also be reported. For an illustration, see Table 2.

Product Category	Product Subcategory	Brand Name	Brand Owner	Model	Ducting	Discharge	Speed Setting	SP	Rated CFM	Rated Sones	Rated Watts	ESTAR
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS - NIF	0.83	410			No
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS - NIF	0.75	480			No
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.79	440			No
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.52	590			No
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS	0.1	450			No
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS	0.1	550			No
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS	0.1	650			No

Table 2. In this example, the rated cfm for each row in Model 1001's listing is the "nominal installed flow" when configured on the high-speed setting. This is designated by the acronym "HS – NIF" in the speed setting column.
Vote: Yes (8-2; 80%)

1.9 HVI should provide manufacturers with the option of reporting the range hood fan curve developed by regressing the static pressure and flow as tested in accordance with HVI 916.
Vote: Yes (9-0; 100%)

1.10 HVI should provide manufacturers with the option of reporting "nominal installed flow" for three characteristic duct systems representing direct, medium, and long options. The direct run should be 6" long and have no elbows. The medium run should be 10' long with two elbows, and the long run should be 25' long with four elbows. All other parameters should be as defined in Table 1: TypicalDuctSystemAssumptions, which was provided as an attachment to the email invitation for this survey.
Vote: No (6-4; 60% no votes)

1.11 Assuming that HVI will require manufacturers to report "nominal installed flow" in the HVI directory, this metric should be recognized as an alternative method for verifying the in-situ flow of range hoods:

a. When the associated duct system has no more than the number of elbows and the length used to determine the nominal installed flow, or
b. For design/specification only; in-situ flow should be confirmed through other means.

Vote: A-6 (75%); B-2 (25%)

1.12 As referenced in ASHRAE 62.2-2019 Section 5.4, Table 5-3 of ASHRAE 62.2 (Prescriptive Duct Sizing) should continue to be recognized as an alternative method for verifying the in-situ flow of range hoods.
Vote: Yes (6-3; 67%)

1.13 Manufacturer duct-sizing software or tables should be recognized as an alternative method for verifying the in-situ flow of range hoods, provided the manufacturer guidance is bounded by the assumptions listed within Table 1: TypicalDuctSystemAssumptions (provided as an attachment to the email invitation for this survey), with the following modifications:

- Length: as proposed
- Elbows: the number of elbows should be as proposed
- Termination: as an alternative to the calculation method specified in Table 1: TypicalDuctSystemAssumptions, a specific termination's effect on airflow may be determined from its HVI listing, if available

Vote: Yes (7-3; 70%)

1.14 HVI duct-sizing software or tables should be recognized as an alternative method for verifying the in-situ flow of range hoods, provided the guidance is bounded by the assumptions listed within Table 1: TypicalDuctSystemAssumptions (provided as an attachment to the email invitation for this survey), with the following modifications:

- Length: as proposed
- Elbows: the number of elbows should be as proposed
- Termination: as an alternative to the calculation method specified in Table 1: TypicalDuctSystemAssumptions (provided as an attachment to the email invitation for this survey), a specific termination's effect on airflow may be determined from its HVI listing, if available

Vote: Yes (10-1; 91%)

1.15 To clarify the current 62.2 requirements for range hoods, ASHRAE 62.2 Section 5.2.2 should be modified as follows (This is Steve Gatz's proposal with some minor editorial modifications):
5.2.2 Ventilation Rate. The ~~minimum~~ airflow at one or more fan speed settings shall be no less than ~~at least~~ the amount indicated in Table 5-1.
Vote: Yes (8-1; 89%)

Topic 2: Effect of Dampers on Approximating "Nominal Installed Flow"

2.1 Where an internal damper is provided and is included within the test used for a range hood's rating, the HVI directory should indicate that an internal damper is included. See Table 3 for an example of how this might look in the HVI directory.

Product Category	Product Subcategory	Brand Name	Brand Owner	Model	Ducting	Discharge	Speed Setting	SP	Rated CFM	Rated Sones	Rated Watts	ESTAR	Internal Damper Included?
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS - NIF	0.83	410			No	Yes
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS - NIF	0.75	480			No	Yes
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.79	440			No	Yes
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.52	590			No	Yes
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS	0.1	450			No	Yes
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS	0.1	550			No	Yes
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS	0.1	650			No	Yes

Table 3. This is an example of how a listing in the HVI directory might look to account for the provision of an internal damper.

Vote: Yes (10-0; 100%)

2.2 When determining the “nominal installed flow” for a range hood, a typical exterior termination should be assumed for the typical duct system, even if there is an internal damper provided with the range hood.
Vote: Yes (7-3; 70%)

2.3 Where an individual exterior termination is listed within the HVI directory, a manufacturer should be permitted to provide a “nominal installed flow” for a range hood associated with the listed exterior termination. See Table 4 for how this might look in the HVI directory.

Product Category	Product Subcategory	Brand Name	Brand Owner	Model	Ducting	Discharge	Speed Setting	SP	Rated CFM	Rated Sones	Rated Watts	ESTAR	Exterior Termination
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS - NIF	0.83	410			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS - NIF	0.75	480			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.79	440			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.52	590			No	CX10
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS	0.1	450			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS	0.1	550			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS	0.1	650			No	Any

Table 4. This is an example of how a listing in the HVI directory might look to account for the use of a listed termination.
Vote: Yes (8-2; 80%)

2.4 Manufacturers should be permitted to provide a “nominal installed flow” for a range hood associated with exterior termination “classes” or “grades” which correspond to exterior terminations listed within the HVI directory that achieve a performance rating within a specified range. See Table 5 for how this might look in the HVI directory.

Product Category	Product Subcategory	Brand Name	Brand Owner	Model	Ducting	Discharge	Speed Setting	SP	Rated CFM	Rated Sones	Rated Watts	ESTAR	Exterior Termination Class
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS - NIF	0.83	410			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS - NIF	0.75	480			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.79	440			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS - NIF	0.52	590			No	B
Kitchen Range Hoods		A	B	1001	7"	Vertical	HS	0.1	450			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Vertical	HS	0.1	550			No	Any
Kitchen Range Hoods		A	B	1001	3 1/4" X 14"	Horizontal	HS	0.1	650			No	Any

Table 5. This is an example of how a listing in the HVI directory might look to account for the use of a listed termination receiving a “Class B” designation.
Vote: Yes (6-4; 60%)

Topic 3: Range Hood Capture Efficiency (RHCE). *The following recommendations assume that, and are only valid if, HVI has successfully established a certified rating program for RHCE.*
3.1 If a code or standard establishes a requirement for a minimum RHCE value, that minimum value should be achieved at a listed “nominal installed flow” rate.
Vote: Yes (9-0: 100%)

3.2 In the short-term, if a code or standard establishes a requirement for a minimum RHCE, that value should be achieved at least one speed setting, with no requirement for which speed setting must be used to achieve the minimum RHCE.
Vote: Yes (9-0: 100%)

3.3 In the long-term, if a code or standard establishes a requirement for a minimum RHCE, that value should be achieved at a speed setting less than or equal to the speed setting used to satisfy the code or standard’s sound rating requirement.
Vote: Yes (7-2; 78%)

3.4 The RHCE reported as corresponding with a "nominal installed flow" should be permitted to be calculated from a regression of RHCE values as a function of range hood flow rate, provided that data are interpolated and the number of data points and the goodness of fit of the regression equation(s) are adequate to characterize RHCE performance at the "nominal installed flow".
Vote: Yes (9-0; 100%)

3.5 Manufacturers should be permitted to derate a range hood's reported RHCE value. For example, suppose a manufacturer wishes to determine RHCE for a hood having three orientations, producing three different "nominal installed flows" of 220, 240, and 260 cfm. For each of these listed nominal installed flows in the directory, the manufacturer should be permitted to report the RHCE value associated with an RHCE test performed at a flow rate of 220 cfm.
Vote: Yes (9-0; 100%)

3.6 In the short-term, and until a reasonable time has passed after a certified rating program method of test is available, any requirement for a minimum RHCE should be accompanied by an alternative option of having a rated "nominal installed flow" no less than X cfm.
Vote: Yes (9-0; 100%)

3.7 In the long-term, and once a reasonable time has passed after a certified rating program method of test is available, any requirement for a minimum RHCE should be accompanied by an alternative option of having a rated "nominal installed flow" no less than X cfm.
Vote: No (6-3; 67%)

3.8 Understanding that flow, sound, and RHCE performance targets can be affected by the backpressure seen by exhaust systems operating in tightly sealed homes, codes and standards should revisit their makeup air provisions to ensure that range hoods are provided with adequate makeup air to achieve design specifications.
Vote: Yes (9-0; 100%)

3.9 In the long-term, flow, static pressure, sound, and RHCE should all be determined at the "nominal installed flow" rate.
Vote: Yes (9-0; 100%)

Topic 4: Sones

Short- Term Policy

4.1 In the short-term, the current ASHRAE 62.2 requirements to report range hood sones at 0.1 in. w.g. and to achieve 3 sones or less at one or more airflow settings providing a flow rate greater than or equal to 100 cfm should be amended to change the static pressure and/or the sone rating.
Vote: Yes (7-2; 78%)

4.2 In the short-term, because sones are primarily a function of speed setting, ASHRAE 62.2 should be amended to remove minimum static pressure requirements when referencing sones.
Vote: Yes-3 (33%); No-1 (11%); More research is needed-5 (56%)

4.3 In the short-term, ASHRAE 62.2 should be amended to permit range hood sones to be reported at working speed, similar to California's exception enacted in Title 24-2019 (this is essentially Randy Cooper's proposal that was recently submitted to 62.2).
Vote: Yes (6-2; 75%)

Long-Term Policy

4.4 In the long-term, HVI should revise its sound rating requirements to report sound performance in decibels instead of sones.
Vote: No (4-3; 57%)

4.5 In the long-term, ASHRAE 62.2 should reference range hood sound ratings determined at the following static pressure:

a. 0.1 in. w.g., as currently stated in 62.2 (no change)
b. the static pressure associated with achieving the minimum airflow rating required (e.g., the intersection of the fan and system curves when determining the "nominal installed flow")*
   **For example, suppose the minimum airflow rating required is a "nominal installed flow" of 200 cfm. Suppose a range hood has a "nominal installed flow" of 220 cfm on medium speed and also has a rated flow of 280 cfm at 0.1 in. w.g. on the same speed setting. The medium-speed sound test would need to be performed at the "nominal installed flow" of 220 cfm and the associated static pressure (determined by the intersection of the "typical" system curve and the fan curve).*
c. the static pressure dictated by HVI's current sound test procedures at the selected fan speed setting necessary to achieve the minimum airflow rating required**
   ***For the same hood described in the previous example, the range hood sound rating could be determined at the rated flow of 280 cfm at a static pressure of 0.1 in. w.g.*
d. unknown; more research is needed to determine the combined effect of pressure and airflow on the sound rating

Vote: A – 0; B – 5 (56%); C – 0; D – 4 (44%).

4.6 In the long-term, ASHRAE 62.2 should be amended to require range hoods to be rated for a maximum of X sones (e.g., 3) at one or more fan speed settings:

a. achieving a range hood capture efficiency of at least Y% (e.g., 75%).
b. at one or more fan speed settings producing a "nominal installed flow" of no less than Z cfm (e.g., 200 cfm)
c. both options a and b should be permitted

Vote: A – 1 (11%); B – 4 (44%); C – 4 (44%).

4.7 Please provide your recommendations, if any, for the ranges of the variables referenced in the prior question (X sones, Y % Capture Efficiency; and Z cfm).
Vote: Sones – four commenters did not provide recommendations or suggested that more information was needed, and 3 suggested 2-3 sones. RHCE – two commenters needed more information or did not provide a recommendation, and five suggested between 70% and 85%, with an average of 75%. Flow – two commenters needed more information or did not provide a recommendation, and five suggested between 200 and 300 cfm, with an average of 255 cfm.

X (sones)	**Y (RHCE)**	**Z (cfm)**
More information needed	More information needed	More information needed
3	75%	225
?	70%	300 (or flow typically producing RHCE > 70%)
2	70%	250
Depends on condition at which sound would be rated; maybe have different sone rating for low-intensity and high-intensity pollutants		
2	85%	300
?	75%	200

4.8 More consideration should be provided to permit a minimum range hood run-time to be used as a trade-off versus RHCE, provided the RHCE meets a minimum threshold.

Background: Recent NRC research suggests that a 15-min hood run time after a cooking event provides equivalent performance to providing an additional 100 cfm of range hood exhaust that is operated only during the cooking event.
Vote: Yes (6-3; 67%)

4.9 Industry should be provided a reasonable amount of time to retest prior to any new metrics being enforced.
Vote: Yes (9-0)

4.10 What is a recommended acceptable time horizon (months)?
Votes: The general sentiment was 24-36 months, with an average of 24. Following were the detailed responses:

1. The new metrics will likely have an alternative path allowed for the next version of 62.2. This phase in will help determine both thresholds and realistic time frame for full enforcement without an alternative path.
2. 24 to 36 months minimum may be needed especially where redesign and new tooling is required to meet the new requirements. It should be noted that this is similar to an "Industry File Review" from a safety standpoint where all products must meet a new requirement. The time frame for the effectivity of an Industry File Review is typically 3 to 5 years.
3. 24
4. 12
5. We should allow both new and old compliance for some fixed time period, say 24 months
6. 36 months minimum. The design requirements are being revised which will require product reviews and potential redesign. Lab capacity is still a constraint though there are multiple steps being taken to address it.
7. 24
8. 24
9. 24

Topic 5: General
5.1 In the long-term, if a range hood rating is used for compliance with a code or standard, then the rated values for airflow, static pressure, sound, and RHCE at that rating point shall all be listed in the HVI directory, and they shall all be determined using the same airflow rate and the standard, nominal duct system.
Vote: Yes (7-1; 88%)