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Additional submitted attachment is included below.

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August 1, 2017

California Energy Commission
Docket Unit, MS-4
Re: Docket No. 17-BSTD-01
1516 Ninth Street
Sacramento, California 95814-5512

Re: AHRI Comments – Title 24-2019 Pre-Rulemaking July 18, 2017 Staff Workshop – Residential HVAC Measures *[Docket No. 17-BSTD-01]*

Dear CEC Staff:

These comments are submitted in response to the California Energy Commission (CEC) Staff Workshop on 2019 Residential HVAC Measures held on Tuesday, July 18, 2017, and the draft Codes and Standards Enhancement (CASE) report regarding proposals to update residential measures in California's Building Energy Efficiency Standards (Title 24, Part 6).

AHRI is the trade association representing manufacturers of heating, cooling, water heating, and refrigeration equipment. More than 300 members strong, AHRI is an internationally recognized advocate for the industry, and develops standards for and certifies the performance of many of the products manufactured by our members. In North America, the annual output of the HVACR industry is worth more than $20 billion. In the United States alone, our members employ approximately 130,000 people, and support some 800,000 dealers, contractors, and technicians. In addition to its activities as a global standards developer, AHRI works closely with other global codes and standards developers as well as utilities to ensure their access to the latest technology and innovation from the HVACR and water heating industry.

These comments include responses to the proposals presented at the July 18, 2017 pre-rule making staff workshop for the 2019 Standards update regarding residential Heating Ventilation and Cooling (HVAC) measures and HERS verification updates.

There was a very short deadline to provide comments in response to detailed CASE reports and to staff workshops. AHRI suggests that CEC hold a separate meeting to discuss measures in depth with industry. Additional time would certainly be helpful for industry to supply information requested by the Commission.

Fan Efficacy

While CEC considered the DOE furnace fan rule into its analysis, the July 18th presentation suggested that the furnace fan rule's equations were applied to field data associated with brushless permanent magnet (BPM) units tested by Proctor Engineering in 2006. Only two units were tested which is an unreasonably small sample size to conclude anything. These reports are not outlined in the CASE report, in fact, no CASE report has been published on this proposed measure to date. Without a CASE report detailing the method used to translate the federal furnace fan rule requirement into the proposed 0.45 W/CFM proposal, it is not possible to conclude that this proposal does not violate federal preemption. Additionally, the federal furnace fan rule does not apply to air handlers, but via a blanket 0.45 w/CFM measure, as proposed, adds additional products into the scope. These products have not been evaluated for impact in the Proctor Engineering studies and therefore should not be included in the scope of this measure. As previously mentioned, the draft CASE report has not been published, and based on the July 18th presentation, it is not clear if the 0.40 W/CFM requirement for central forced air system fan efficacy, as presented in the draft code language dated March 2017 is still a current proposal. AHRI objects if this is still a proposal, as no work has been done to justify the fan efficacy for these products.

During the July 18th meeting, CEC confirmed that for this particular measure, the field tests were not conducted with MERV 13 filters, and CEC was confident that an increased MERV requirement would not adversely impact energy consumption. It is clear that the increased filtration and Watts/CFM analyses were done separately, which led CEC to erroneously deduce that both the MERV 13 and 0.45 w/CFM measures are reasonable. There are many published studies (see Exhibit-1) which conclusively show a negative impact on energy efficiency as a result of increased filtration. These two proposals should not be considered in isolation as they both impact the same product.

There are also concerns for possible stranded inventory. The compliance date for the Federal furnace fan rule is July 3, 2019, while the 2019 Title 24 will go into effect on January 1, 2020. Because the Federal furnace fan standard is based on the date of manufacture, the fan efficacy requirement should be based on the date of manufacture as well. Ignoring the date of manufacture will put this provision of the code in violation of federal preemption.

HERS Verification Protocols

AHRI supports the use of the AHRI Certification Directory for the visual verification of heat pump capacity at 47°F and 17°F should inspectors need to confirm this information, as presented at the July 18th meeting.

Conclusion

We reiterate our request for a separate meeting to discuss proposals in depth, as two weeks was not sufficient for complete industry assessment of proposed measures. CEC should also extend the deadline for comments until at least 30 days after the CASE report on Residential HVAC Measures has been published.

AHRI appreciates the opportunity to provide these comments. If you have any questions regarding this submission, please do not hesitate to contact me.

Sincerely,

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Exhibit-1: Relevant Studies on the Energy Impact of High Efficiency Filters and Observations

1. Yang, Li, Braun, James E., Groll and Eckhard A. "The impact of evaporator fouling and filtration on the performance of packaged air conditioners." International Journal of Refrigeration Volume 30, Issue 3 (May 2007): 506-514. Accessed online: http://www.sciencedirect.com/science/article/pii/S0140700706001897

   "Equipment having low efficiency filters had higher EER after fouling than equipment with high efficiency filters, because high efficiency filters result in significantly higher pressure drops than low efficiency filters."

2. Stephens, Brent, Siegel, Jeffrey A., and Novoselac, Atila. "Energy Implications of Filtration in Residential and Light-Commercial Buildings." ASHRAE Transactions OR-10-038 (RP-1299) (2000): 346-357. Accessed online: http://www.ce.utexas.edu/prof/novoselac/Publications/Novoselac_ASHRAE_Transactions_2010.pdf

   Some observations:

   a. The decrease in airflow rate as a result of a higher MERV filter directly conflicts with the minimum 350 cfm/ton Title 24 airflow requirement. Here are the pertinent references within the research paper:
      i. Page 351 - "The results in Table 3 show that high-MERV filters introduced an approximately 45% greater pressure drop than low MERV filters. High-MERV filters caused median airflow rates to decrease by approximately 4% in the fan-only period and by 10% in the cooling mode, relative to low-MERV filters. High MERV filters decreased fan power draw by approximately 1% in the fan-only mode and 4% in the cooling mode relative to low-MERV filters. The net result of the changes in airflow and fan power is that high-MERV filters supplied approximately 4% less volumetric airflow per unit of power in the fan-only mode and 5% less in the cooling mode."
      ii. Page 351 - "The magnitude of flow reductions seen with higher-efficiency filters generally agrees with the flow reductions measured in Parker et al. (1997)."
      iii. Table 3 on page 352 – The variation in fan efficacy is not much while comparing the "High-MERV vs. Low-MERV" and "Mid-MERV vs. Low-MERV" scenarios, but there is a significant disparity in the airflow rate percentages in cooling mode for the two scenarios.
      iv. Page 353 – "According to the regressions, a doubling of the filter pressure drop (due either to loading or replacement with a higher efficiency filter) would likely result in an 6 to 8% decrease in system airflow during fan-only operation and 7 to 10% during cooling operation."

b. Increased energy consumption:
    i. Table 5 on page 354 – the positive change in daily energy consumption in the last column indicates higher energy consumption associated with high-MERV filters relative to lower MERV filters. There are 6 such instances within the table.
        1. The Title 24 CASE report does not thoroughly assess the impact of the proposed MERV 13 measure on energy consumption across the 16 climate zones.
    ii. Page 355 – "…five of seven residential systems showed an increase in energy consumption with high-MERV filters (positive values in Table 5)…"

3. Walker, Iain S., Dickerhoff, Darryl J., Faulkner, David, and Turner,W illiam J. N. "System Effect of High Efficiency Filters in Homes." LBNL. (March 2013) Accessed online: http://escholarship.org/uc/item/2nj5z1xm#page-10

   Some observations:

   a. Page 5 – Section titled "Field testing of filter impacts on HVAC system performance" illustrates potential issues for putting filters into existing systems that were not designed for high-MERV filters and their associated air flow resistance.
       i. CEC should consider that a majority of the installed based is still PSC-dependent, and will continue to be so for a few years even after the 1/1/2020 compliance date. Homeowners will not simply change out their systems upon the occurrence of the 7/3/2019 FER compliance date. Therefore, the mandatory MERV 13 requirement will end up reducing the airflow for installed-base systems with PSC motors (up to 10% per this LBNL study).
   b. Page 6 – "In a couple of cases even BPM driven blowers were unable to maintain airflow because the motors were operating at maximum output before the required airflow rate was met. Other complications for predicting the system performance were that, in one case, a BPM driven blower increased flow with a MERV 16 filter. This shows how the particulars of the BPM control algorithm can confound predictions of performance."
       i. The LBNL figures across pages 7 and 8 don't precisely show the data for MERV 13 filters, but this type of analysis should be included in the CASE report, when published. AHRI suggests a similar analysis for MERV 13 in cooling dominated California regions is warranted to assess the full impact of the proposed residential HVAC measures.
   c. Page 9 – "Filtration causes a higher energy penalty in cooling dominated climates than in heating dominated climates mostly due to higher airflow requirements for cooling systems." This is one of the conclusions within the LBNL study.