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August 22, 2019

Catherine Rivest  
Building Technologies Office  
Office of Energy Efficiency and Renewable Energy  
U.S. Department of Energy  
1000 Independence Avenue, S.W.  
Washington, D.C. 20585-0121

Dear Ms. Rivest,

These comments are submitted by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) in response to the U.S. Department of Energy's (DOE) notice of data availability (NODA) regarding DOE's analysis of the energy savings potential of amended industry consensus standards for certain classes of variable refrigerant flow multi-split air conditioners and heat pumps (VRFs) appearing in the Federal Register, reference 84 Fed. Reg. 3232 (July 8, 2019).

AHRI is the trade association representing manufacturers of heating, cooling, water heating, and commercial refrigeration equipment. More than 300 members strong, AHRI is an 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 and water heating industry is worth more than \$44 billion. In the United States alone, the HVACR and water heating industry supports 1.3 million jobs and \$256 billion in economic activity annually. AHRI appreciates the opportunity to comment on behalf of AHRI's VRF equipment manufacturers.

The letter will address the following:

1. Comments on the process of harmonizing federal standards with industry standards
2. Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) Working Group Negotiations
3. Specific issues on which DOE seeks comments

**Comments on the process of harmonizing federal standards with industry standards**

AHRI appreciates the opportunity comment on the Notice of Data Availability for VRF equipment. We note that the NODA was triggered by a statutory requirement for the Department of Energy to amend its regulations consistent with the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Standard 90.1. 42 U.S.C. § 6313(a)(6). AHRI agrees with DOE's assessment that the policy goals of the statutory provision is harmonization between the industry standard and the federal requirements.

In its 2016 standard, ASHRAE made relatively minor adjustments to a discrete number of equipment classes to resolve issues that had not been addressed in a previous publication. As a result, DOE is required to assess that discrete number of products and is not required to address or consider the remaining category of products that were left unchanged by ASHRAE. In its NODA, we understand that DOE is not proposing that minor amendments to ASHRAE Standard 90.1 will trigger the Department to execute a full-scale rulemaking for all product classes that were not address by ASHRAE. AHRI agrees with this approach. In fact, were DOE to react to every ASHRAE amendment with a rulemaking that is larger in scope than the 90.1 amendment, that might have a chilling effect on the standards body that has been driving improvements in commercial equipment efficiency for generations. Were DOE to respond to every 90.1 amendment with a full-scale rulemaking, ASHRAE would be faced with the daunting uncertainty that adjustments and discrete but necessary changes will result in sweeping federal rulemakings that were neither contemplated nor necessary.

We acknowledge that the extended scope of this NODA (i.e. review of non-triggered product categories) falls within EPCA's separate six-year lookback provision. AHRI agrees with the important distinction that triggered product categories should be adopted by DOE to harmonize with ASHRAE 90.1, as contemplated by the statute. Any proposal to amend standards for those categories of equipment that were not amended by ASHRAE must demonstrate clear and convincing evidence of significant energy savings. AHRI has long supported and relied upon the mandate that ASHRAE 90.1 and the experts that contribute to that standard lead, and DOE harmonizes with the changes adopted by 90.1. A full-scale rulemaking in response to a handful of product class adjustments is not harmonization; it's the opposite.

#### **ASRAC Working Group Negotiations**

As the Department is aware, a working group of the Appliance Standards Federal Regulatory Advisory Committee (ASRAC) is currently working on major revisions to AHRI Standard 1230, *Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment*, to incorporate changes to tolerances, test point requirements, model designations, reporting instructions, dehumidification considerations, and controls verification. This Variable Refrigerant Flow Multi-Split Air Conditioners and Heat Pumps ASRAC Working Group is also negotiating a term sheet on VRF energy conservation standards. We anticipate that the working group will close its months-long process with a finalized term sheet that will recommend significant updates to the VRF test procedure, rating standard, and energy efficiency levels. Assuming DOE implements this term sheet, the resulting regulation will likely make major changes to the test procedure. Adjustment of the test procedure will require reevaluation of energy efficiency minimums by DOE. AHRI recognizes that the scope of the NODA is narrower than the scope of the ASRAC negotiations. We also note that the statutorily mandated NODA is a separate process from the ASRAC working group's work, despite the common product at issue. We preface our responses to the NODA with the disclaimer that the below information is independent of the ASRAC negotiation, and DOE's ultimate determination on this NODA will likely be reevaluated given the impending test procedure or standard level changes that result from ASRAC negotiations. In summary, if ASRAC negotiations result in a different test procedure, then all of the below information will likely have to be adjusted accordingly to reflect new measures.

### **Specific Issues on which DOE Seeks Comment**

*Issue 1: DOE requests feedback on its consideration of additional equipment classes for VRF Heat Pumps, Water-source,  $\geq 135,000$  Btu/h and  $< 760,000$  Btu/h, both with and without heat recovery, by separating the equipment classes into units with cooling capacities  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h and units with cooling capacities  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h.*

AHRI supports DOE's proposal to align equipment classes with ASHRAE Standard 90.1. As discussed above, EPCA requires the Department to harmonize its regulations with ASHRAE 90.1 for certain products in most circumstances. This circumstance is no exception. ASHRAE 90.1 updated its tables to reflect necessary, although minor, amendments. AHRI agrees that, for consistency, the Department should abide the statute and make the requisite adjustments.

*Issue 2: DOE requests feedback on its proposal to adopt the levels in ASHRAE 90.1 – 2016 as the Federal standards for the six VRF water-source classes that are triggered by ASHRAE 90.1-2016, listed below:*

- 1. VRF Heat Pumps, Water-source,  $< 17,000$  Btu/h, Without heat recovery*
- 2. VRF Heat Pumps, Water-source,  $< 17,000$  Btu/h, With heat recovery*
- 3. VRF Heat Pumps, Water-source,  $\geq 17,000$  Btu/h and  $< 65,000$  Btu/h*
- 4. VRF Heat Pumps, Water-source,  $\geq 65,000$  Btu/h and  $< 135,000$  Btu/h*
- 5. VRF Heat Pumps, Water-source,  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h, Without heat recovery*
- 6. VRF Heat Pumps, Water-source,  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h, With heat recovery*

AHRI supports DOE's proposal to adopt the energy efficiency levels for the six equipment classes triggered by ASHRAE 90.1-2016. Other equipment classes, such as air-cooled VRF heat pumps and air conditioners, are separated into similar capacity ranges and equipment classes.

*Issue 3: DOE seeks comment on whether, in the context of its consideration of more-stringent standards, there have been sufficient technological or market changes for VRFs since the most recent standards update that may justify a new rulemaking to consider more-stringent standards. Specifically, DOE seeks data and information that could enable the agency to determine whether DOE should propose a "no new standard" determination because a more-stringent standard: (1) Would not result in significant additional savings of energy; (2) is not technologically feasible; (3) is not economically justified; or (4) any combination of the foregoing.*

AHRI believes that adoption of a more-stringent standard is not economically justified for the industry at this time. As mentioned above, impending changes resulting from ASRAC WG negotiations will significantly impact the industry. These adjustments will result in changes to the test procedure and the addition of controls verification. Test changes impose costs because products must be retested, recertified, and in many instances re-designed. The economic burden facing the industry is significant, and the adoption of a more-stringent standard during this industry shift to new procedures is not economically justified.

Further, the stringency of the standards, when evaluated, needs to account for all of the changes being made to the draft test procedure as a result of the ASRAC WG negotiations (especially the inclusion of the controls verification test procedure and setting sensible heat transfer ratio (SHR) limitations to address dehumidification) as these will have a significant impact on current and future efficiency values.

*Issue 4: DOE requests information on the typical applications of VRF multi-split systems and what the most common applications are (e.g., specific building types and climates). DOE also requests information on typical practices for sizing outdoor units (e.g., sized to match calculated building loads or oversized) and zoning indoor units.*

VRF systems can be used in a variety of applications, including (but not limited to):

- High- or low-rise offices
- Educational facilities (schools, universities, etc.)
- Health care facilities, including clinics and long-term-care nursing homes
- Multiple-tenant residential buildings
- Historical buildings
- Retail stores
- Hospitality centers, restaurants, banquet halls, hotels, and motels
- Data center cooling-only applications
- Cultural facilities, including religious centers

Sizing of outdoor units is considered based on several factors, including (but not limited to):

1. Determination of the actual peak cooling and heating load, and then identify whichever is higher.
2. Outdoor ambient temperature conditions with specific considerations given to summer and winter temperature conditions.
3. Impact assessment of piping length and elevation on the overall delivered capacity by the outdoor unit.
4. Development of block loads by combining the load of indoor units in same operating mode (cooling or heating dominant) for each outdoor unit, so as to determine the worst-case scenario.
5. Other miscellaneous factors such as building and application types, dehumidification requirements, solar effects on building loads, and occupancy changes during the day.

Most VRF manufacturers have selection software that provides detailed information, taking into account factors outlined above to ensure proper design and sizing of systems. In addition, several AHRI members and VRF industry stakeholders are involved with the development of ASHRAE Guideline 41P, *Design, Installation, and Commissioning of Variable Refrigerant Flow (VRF) Systems*. This guideline will reference sizing and zoning of VRF system components in more detail. This draft document is expected to be released in 2019/20.

*Issues 5 and 6: DOE seeks historical shipment data for VRF multi-split systems and projections for growth of the market based on trends stakeholders have observed. DOE is interested in this data by equipment class, efficiency, and climatic region. DOE requests data on the breakdown of the market between new construction, replacements, and new owners (i.e. owners that choose to replace their current system with a VRF multi-split system in an existing building).*

AHRI is collecting data for issues 5 and 6 and will send it to the Department after the comment period closes.

*Issue 7: DOE requests the names and contact information of small business manufactures, as defined by the SBA's size threshold, of VRF multi-split systems that distribute products in the United States. In addition, DOE requests comment on any other manufacturer subgroups that could be disproportionately impacted by amended energy conservation standards for VRF multi-split systems. DOE requests feedback on any potential approaches that could be considered to address impacts on manufacturers, including small businesses.*

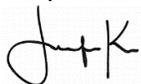
AHRI did not identify any small business manufactures distributing VRF equipment in the United States and has no additional comments regarding other manufacture subgroups that could be disproportionately impacted by amended energy conservation standards.

*Issue 8: To the extent feasible, DOE seeks to identify all VRF multi-split system manufacturers that currently distribute equipment in the United States. Currently, DOE has identified Daikin, Fujitsu, GD Midea, Gree, Hitachi, LG, Mitsubishi, Panasonic, Samsung, and Toshiba as VRF multi-split system manufacturers. DOE seeks comment on the comprehensiveness of this list of manufacturers and requests the names and contact information for any other domestic or foreign-based manufacturers that sell or otherwise market their VRF multi-split systems in the United States.*

Members did not identify manufacturers of VRF equipment selling within the United States other than those listed by DOE.

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

Respectfully,



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