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May 14, 2015

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Office, Mailstop EE-5B
1000 Independence Avenue SW
Washington, DC 20585

Re: NOPR on Conversion Factor for Uniform Energy Factor Rating
Docket No. EERE-2015-BT-TP-0007

Dear Ms. Edwards:

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) is the trade association representing manufacturers of air conditioning, space heating, water heating and commercial refrigeration equipment. The AHRI member companies which manufacturer residential water heaters account for essentially all such equipment sold and installed in the U.S. We submit the following comments in response to the DOE's April 14, 2015 notice of proposed rulemaking (NOPR) regarding a mathematical conversion factor to translate the current efficiency ratings for water heaters to the Uniform Energy Factor (UEF) and capacity ratings determined by the amended test method issued by DOE on July 11, 2014.

AHRI has been conducting comparative energy factor (EF) and uniform energy factor (UEF) tests on residential water heaters tested in its efficiency certification program for the past several months. Our water heater manufacturers also have been conducting their own comparative tests.

Attached are spreadsheets that summarize the results of those tests for the following categories of water heaters: Gas Storage; Gas Instantaneous; Electric Storage; and Gas Residential Duty Commercial Storage. In the case of the residential water heaters, separate spreadsheets are provided on the "EF" and FHR or Max or GPM' comparative results.

The general results indicate that the proposed conversion factors and associated converted minimum efficiency standards are inaccurate and that further work is needed to develop correct conversion factors that properly reflect the changes in water heater efficiency and capacity ratings resulting from the Uniform Efficiency Descriptor test procedure.

In reviewing the summary spreadsheets, please note the following:

Values in red indicate that the measured UEF was higher than the measured EF. Values in blue indicate that the converted UEF determined by calculation is higher than the measured UEF.

For gas storage water heaters in the high usage bin, the measured UEF is consistently higher than both the measured EF and the converted minimum UEF standard for those models. In two cases the data indicates (see the yellow highlighted cells) that models which became obsolete on April 15, 2015, would become models complying with the converted minimum UEF standard. Also there is no consistent relationship between the converted UEF value and the measured UEF value. The relative difference between the EF measured and minimum EF standard should be consistently reflected in the difference between the UEF measured and the converted minimum UEF standard. Although, it is not expected that the difference would be the same value, the difference in the converted values should be proportional to the “EF” difference.

The FHR results for gas storage water heaters in the high usage bin are inconsistent. Some FHR values measured to the UED test procedure are higher than the measured FHR using the EF test procedure and others are lower. Yet, the difference between the measured “UED” FHR and the converted FHR shows no consistent trend or basic mathematical relationship.

For gas storage water heaters in the medium usage bin, the measured UEF is consistently lower than the measured EF. However, there appears to be no consistent pattern in the difference between the measured UEF and the converted UEF. In the case of the units in the medium usage bin, nearly all of the “UED” measured FHR values are less than the current FHR measured value. The converted FHR values exhibit a similar inconsistency as described above.

For gas instantaneous water heaters, the differences between the EF measured and UEF measured and the measured and converted UEF values are inconsistent.

For electric storage water heaters which includes some heat pump units, the difference between the measured EF and measured UEF is inconsistent for the heat pumps units. For electric resistance models the measured UEF is always lower than the measured EF, somewhat consistent although the amount of difference varies. Of greater concern is that the test results for many of these units indicate that models meeting the current minimum EF standard would not comply with the new converted minimum UEF standard. The data on units in the low usage bin indicates a very significant miscalculation of the effect of the UED test procedure on those models. Also noteworthy is the fact that the converted UEF value in most cases is higher than the measured UEF value. This suggests that the converted UEF formula is underestimating the effect of the UED test procedure. Taking that possibility to the next level, it suggests that the translated minimum UEF standard for these units is actually more stringent than the current minimum EF standard.

For gas residential duty storage water heaters, all the measured UEF results are higher than the converted UEF calculation. The magnitude of that difference seems to track with the volume and thermal efficiency of the water heater.

These test results clearly indicate a number issues with the NOPR which require additional analysis and ultimately modified conclusions, including amended proposed minimum UEF standards. Furthermore, they cause us to question the validity of the conclusion presented in the NOPR that the conversion factors

DOE NOPR WH Con Factor

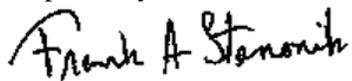
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do not increase the stringency of the current minimum efficiency standards for residential water heaters and residential duty commercial water heaters.

AHRI is continuing to develop information to address this NOPR which will be provided in additional comments. If you have any questions regarding this submission, please do not hesitate to contact me.

Respectively Submitted,

A handwritten signature in black ink that reads "Frank A. Stanonik". The signature is written in a cursive style with a large initial 'F'.

Frank A. Stanonik

Chief Technical Advisor

Attachment