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August 29, 2013 (via email)

Ms. Abigail Daken
ENERGY STAR Product Development Team
US Environmental Protection Agency
1200 Pennsylvania Avenue NW (Postal Code 6202J)
Washington DC 20460

Re: Version 3.0, Draft 2 Product Specification for Boilers

Dear Ms. Daken,

In our March 21st comments on the Draft 1 Version 3.0 ENERGY STAR boiler specification, we made the following assertions, all of which were discussed by EPA in the Draft 2 notes:

- 1) The life expectancy of condensing boilers is significantly shorter than that for non-condensing boilers, resulting in a negligible, or even negative, payback for gas condensing boilers.
- 2) The installation cost of condensing boilers is often significantly higher than that for non-condensing boilers
- 3) Latent heat recovery will only occur when the system water temperature is below approximately 130F, a condition which is often not met in existing hot water heating systems. This tends to overstate the energy savings that are possible with condensing boilers.

In Draft 2, EPA rejected these assertions as reasons not to move forward with a 90% gas ENERGY STAR specification. We do not believe that EPA addressed our concerns for the following reasons:

Condensing Boiler Life Expectancy – We agree with EPA that impartial data showing the relative life expectancies of condensing and non-condensing boilers is difficult to find. We strongly disagree, however, with EPA's conclusion that the life expectancy of condensing and non-condensing boilers is the same.

By their very nature, condensing boilers handle flue gas condensate which is acidic. A PH level of 4-5 is often stated as "typical", but the PH level can be much lower, particularly if there are chlorides in the combustion air or the boiler is cycling in and out of condensing mode (as will happen on "high temperature" hot water heating systems widely used in the US). Use of stainless steel or other "corrosion resistant" materials for the heat exchanger mitigate, but do not necessarily eliminate, long term damage caused by these acids.

While condensing boilers have been used in the US for about 40 years, *widespread* use of condensing boilers in residential applications has only started to occur within the past 10 years. We therefore do not believe that the stakeholders who stated that "changing the heat exchanger material" addressed the shorter life expectancy of condensing boilers have any reasonable basis for such a statement.

In the absence of other data, we think the best predictor of boiler life expectancy is manufacturer's warranties. These warranties are based on what the manufacturers themselves think are reasonable life expectancies. The following Tables summarize *current* warranties for both condensing and non-condensing boilers taken from manufacturer's websites:

Table 1: Typical Condensing Heat Exchanger Warranties

Manufacturer	Model/BMG	Heat Exchanger Material	Heat Exchanger Warranty
Buderus	GB	Cast Aluminum	“Limited Lifetime” (Pro-rated to cover 25% after 15 years)
Crown Boiler Co.	Bimini	Cast Aluminum	15 years (Pro-rated after 10 years)
ECR International	VLT	Stainless Steel	15 year (Pro-rated after 10 yr)
Heat Transfer Products	Elite	Stainless Steel	12 year (Pro-rated after 7 yr)
Lochinvar	Knight	Stainless Steel	12 year (Pro-rated after 7 yr)
PB Heat	PureFire	Stainless Steel	12 year (Pro-rated after 7 yr)
Smith	GC160	Stainless Steel	“Limited Lifetime” (Pro-rated to cover 50% after 10 years)
Triangle Tube	Prestige	Stainless Steel	10 years
US Boiler	Alpine	Stainless Steel	12 year (Pro-rated after 7 yr)
Viessmann	All Gas/Oil Condensing	Stainless Steel	10 years
Weil McLain	WM97+	Stainless Steel	12 years
Weil McLain	GV90	Cast Iron/Stainless Steel	Cast iron heat exchanger: 20 years Stainless Secondary HX: 5 years.

Table 2: Typical Non-Condensing Heat Exchanger Warranties

Manufacturer	Model/BMG	Heat Exchanger Material	Heat Exchanger Warranty
Buderus	All Residential Cast Iron/Water	Cast Iron	“Limited Lifetime” (Pro-rated to cover 25% after 25 years)
Crown Boiler Co.	All Residential Cast Iron/Water	Cast Iron	“Limited Lifetime” (Pro-rated to cover 25% after 25 years)
ECR Intl (Dunkirk)	All Residential Cast Iron/Water	Cast Iron	20 years
PB Heat	All Residential Cast Iron/Water	Cast Iron	“Limited Lifetime”
Smith	All Residential Cast Iron/Water	Cast Iron	“Limited Lifetime” (Pro-rated to cover 25% after 25 years)
US Boiler	All Residential Cast Iron/Water	Cast Iron	“Limited Lifetime” (Pro-rated to cover 25% after 25 years)
Weil McLain	CG Series (Gas/Water)	Cast Iron	20 years

The manufacturers shown in the Tables above supply the vast majority of residential boilers sold in the US today. Included on this list are three manufacturers (Buderus, Triangle Tube, and Viessmann) that either are, or are wholly owned by, European boiler manufacturers. Most of the condensing heat exchangers used by the remaining manufacturers are also imported from Europe and the US manufacturer’s warranty can therefore reasonably be expected to reflect their European supplier’s longer experience with condensing boilers.

Some additional support for the validity of using aggregate warranty data to predict service life is provided by the 1995 *ASHRAE Application Handbook* which provides median service life data for various HVAC system components, including cast iron boilers (Chapter 33, Table 3). The median service life shown in this table for cast iron boilers is 35 years, which is reasonably consistent with the warranties shown for cast iron boilers in the Table 2. The warranties shown in Table 1 are also generally consistent with the 15 year life expectancy value provided to us by various European manufactures with whom we have worked.

Equally telling is the fact that the above ASHRAE reference has no data on the expected service life of condensing boilers. This underscores our contention that neither EPA, nor other stakeholders, has data on which to base a statement that condensing boilers have a life expectancy equal to that of cast iron non-condensing boilers.

Installation Cost – In line 63 of the draft specification, EPA states that “in new construction or deep retrofits the cost of [condensing boiler] installation is similar to that for conventional equipment”. The fact is that approximately 90% of residential boilers are installed as replacements. We are not completely sure what EPA means by “deep retrofits”, but we think it is fair to say that the vast majority of replacement boilers are installed with minimal changes to the heating system and, unless required by code or by the boiler manufacturer’s instructions, minimal changes to the venting system. We therefore think that the comparative installation costs we originally provided to EPA (copy attached) remain valid.

Payback Analysis – EPA did not specifically address our assertion that the higher water temperatures found in many US heating systems will result in less savings than the AFUE might predict, other than to make a vague promise to “educate customers about their choices”. In reality, the ENERGY STAR specification is used by consumers, utilities, and government entities as a “bright line” above which significant energy cost savings are expected without consideration of nuances such as system water temperature. Reliance on consumers and their contractors to distinguish between ENERGY STAR qualified condensing boilers installed on high temperature and those installed on low temperature systems is unrealistic.

EPA’s argument that rebates will offset the installed costs of condensing boilers is a circular one since most of these rebates are based on the EPA specification itself and will be present at whatever point EPA sets the specification. That aside, the costs of rebates is ultimately borne by either the taxpayer, or the utility ratepayer and the installation cost should still be justifiable based on the expected payback.

Finally, we believe that EPA should make decisions about setting the specifications based on the relative cost of condensing versus noncondensing equipment at present, not what EPA anticipates they will be in the future. Both condensing and non-condensing boilers have been mass produced for some time and there is little reason to believe that their relative costs will change significantly in the foreseeable future.

In short, we continue to believe that a 90% gas specification will provide little energy savings to most consumers and will be arguably more expensive than the current specification in the long run. This will both damage the credibility of the EPA ENERGY STAR program and also give condensing boilers an unmerited advantage in the marketplace. We agree with EPA that the existing specification cannot be left in place and urge EPA to discontinue the gas specification completely.

Sincerely,

Yale Steingard

Yale Steingard
President