

Steven Davidson

From: Rick Martin [rmartin@martinthermal.com]
Sent: Tuesday, October 19, 2010 4:15 PM
To: Steven Davidson
Subject: Comments on proposed rulemaking for Thermal Fluid Heaters

Mr. Steven Davidson,

Please consider my comments on your proposed development of Best Performance Standards for thermal fluid heater.

1. My qualifications:

- a. I am an independent engineering consultant with place of business in California.
- b. I am a registered Professional Engineer in California.
- c. I am Secretary of the National Fire Protection Association's Technical Committee on Fluid Heaters.
 1. **NOTE:** This is a volunteer position and I am neither a representative of nor a spokesperson for NFPA.
- d. I am a part-time lecturer in the Aerospace and Mechanical Engineering Department at the University of Southern California. I teach undergraduate Heat Transfer and undergraduate Thermal Systems Design.
 1. **NOTE:** My opinions are independent of the University and I am neither a representative of nor a spokesperson for USC.

2. My opinions:

- A. It is inappropriate to apply a thermal efficiency standard to thermal fluid heaters that is based on the Higher Heating Value (HHV) of fuels.
 - a. The HHV of a fuel includes the exothermic energy available from the conversion of fuel to gaseous combustion products plus the latent heat from condensation of the combustion-generated water vapor to liquid water at ambient pressure.
 - b. Thermal fluid heaters are frequently operated with heat transfer fluids flowing in a continuous loop, and where the fluid temperature is maintained well above 212°F (the boiling point of water) at all points in the loop.
 - c. It is therefore impossible for such fluid heaters to utilize an "economizer" to condense the water vapor generated from fuel combustion and therefore, the combustion-generated H₂O will not be able to exit the system as a liquid.
 - d. Since the energy from the latent heat of condensation is unavailable to these fluid heaters, it is inappropriate to base the thermal efficiency of a fluid heater on the HHV of the fuel.
 - e. The thermal efficiency of a fluid heater should be based upon its ability to extract heat from the hot combustion gases (as computed by the Lower Heating Value or LHV), down to whatever is the minimum operating temperature of the thermal fluid.
- B. Fluid heater thermal efficiency is process dependent and should not be regulated generically.
 - a. The minimum operating temperature of the fluid in a thermal fluid heater is process-dependent, and the exit temperature of the combustion exhaust is largely dependent on the minimum fluid temperature.
 - b. Hot presses, tenter-frame ovens, desulfurization processes, and other operations that rely on thermal fluid heat transfer, require their fluids to operate at widely divergent temperatures (roughly from 200°F to 600°F).

- c. Attempting to require a generic thermal efficiency rating for all fluid heaters as a single technology class (i.e., one that is independent of the process to which the devices are providing heat) would likely be problematic and could have the unintended consequence of making it impossible to operate certain categories of thermal processes within the regulated jurisdiction.

Thank you for considering my comments.

Rick

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