

The Current Test Procedure and How We Got Here

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- The GAMA Water Heater Efficiency Certification program has been conducting the DOE tests since 1982.
- I have been involved in water heater safety, test procedure and efficiency issues for over 30 years.

- Federal Energy Administration issued first water heater test procedure in 1977
- Two mode method; measured recovery efficiency (E_r) and standby loss (S)
- Key test parameters
 - $U = 64.3 \text{ gal/d}$
 - $T_{in} = 70 \pm 2 \text{ F}$
 - $T_m = 160 \pm 5 \text{ F}$
 - $T_r = 75 \pm 10 \text{ F}$

- Daily Energy Consumption calculated from E_r and S

$$C_x = kU\Delta T_1 / E_r + SkV\Delta T_2 (24 - (kU\Delta T_1 / E_r P))$$

- Energy Factor is

$$EF = kU\Delta T_1 / C_x$$

- In 1990 DOE revises test procedure to:
 - include gas instantaneous and heat pump water heaters, and
 - change to 24 hour simulated use method
 - 6 equal draws over 6 hours
 - Unit in standby the rest of the 24 hours
 - Daily consumption (Q_d) measured, not calculated

- Key test parameters

$$U = 64.3 \text{ gal/d} \quad (64.3)$$

$$T_{in} = 58 \pm 2 \text{ F} \quad (70)$$

$$T_m = 135 \pm 5 \text{ F} \quad (160)$$

$$T_r = 67.5 \pm 2.5 \text{ F} \quad (75)$$

- Energy Factor is

$$EF = \Sigma MC_p (77) / Q_d$$

(concept is the same as $kU\Delta T_1 / C_x$)

- Current test procedures issued in 1998, revisions involved measure of hot water delivery, not efficiency
- Because U is a constant in both procedures, EF decreases as storage volume or input increases,
- Assumes comparison of water heaters of equal “capacities”
- Intended to represent typical family of 4

Thank you!

WHERE ARE WE GOING?