



Department of Energy's Uniform Energy Factor Test Procedure

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Section 1

Background



Background

- Existing Dept. of Energy (DOE) regulations for water heaters:
 - Residential water heaters – rated using Energy Factor and tested using Appendix E to Subpart B of 10 CFR 430
 - Commercial water heaters – rated using Thermal Efficiency and/or Standby Loss using 10 CFR 431.106 (Subpart G of 10 CFR 431)
- American Energy Manufacturing and Technical Corrections Act (AEMTCA) enacted on 12/18/2012. (Public Law 112-210)
 - Required DOE to establish a uniform efficiency descriptor (UED) and test method for residential and commercial water heaters
 - Allowed DOE to exclude certain water heaters from UED if they:
 - Do not have a residential use
 - Are effectively rated using existing metrics

Background

- EPCA generally requires that test procedures:
 - Reflect energy efficiency during a representative average use cycle
 - Not be overly burdensome to conduct
- On July 11, 2014, DOE published a test procedure final rule in the Federal Register. 79 FR 40541.
 - Addressed AEMTCA requirements for establishing UED
 - Established Uniform Energy Factor (UEF) metric

Section 2

Test Method Coverage



Test Method Coverage

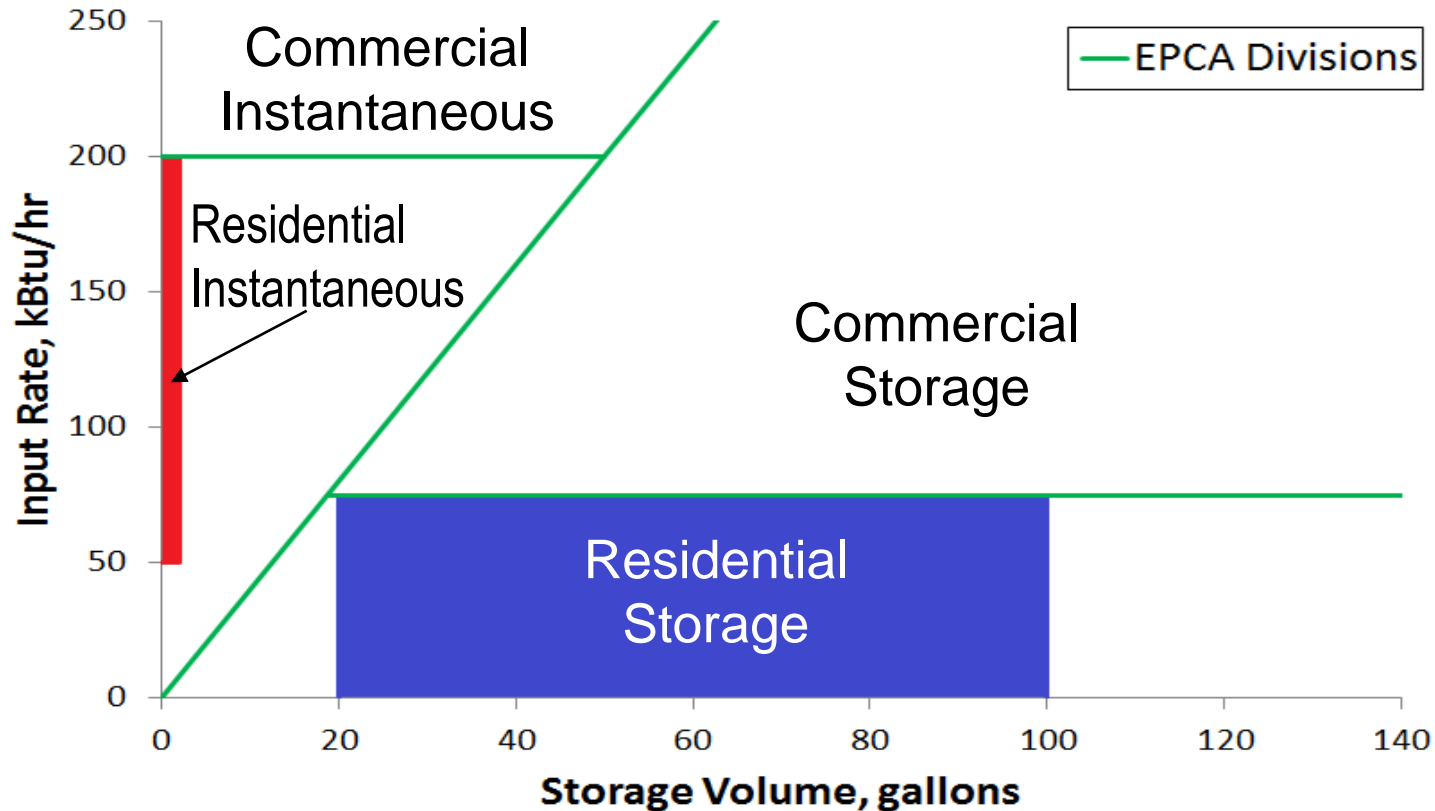
- As required by AEMTCA, UEF covers all residential water heaters and certain commercial water heaters.
- UEF added TP coverage for certain residential water heaters:
 - With storage volumes between 2 and 20 gallons
 - Gas-fired water heaters between 100 and 120 gallons
 - Oil-fired water heaters between 50 and 120 gallons
 - Gas-fired instantaneous water heaters with input capacity below 50,000 Btu/h
- UEF also covers “residential-duty commercial water heaters”

Test Method Coverage

- “Residential-Duty Commercial Water Heater” means a commercial water heater that:
 - Uses single-phase electricity (if electricity is required)
 - Is not designed to provide outlet hot water at temperatures greater than 180 °F
 - Meets certain specified limitations regarding rated input capacity and rated storage volume

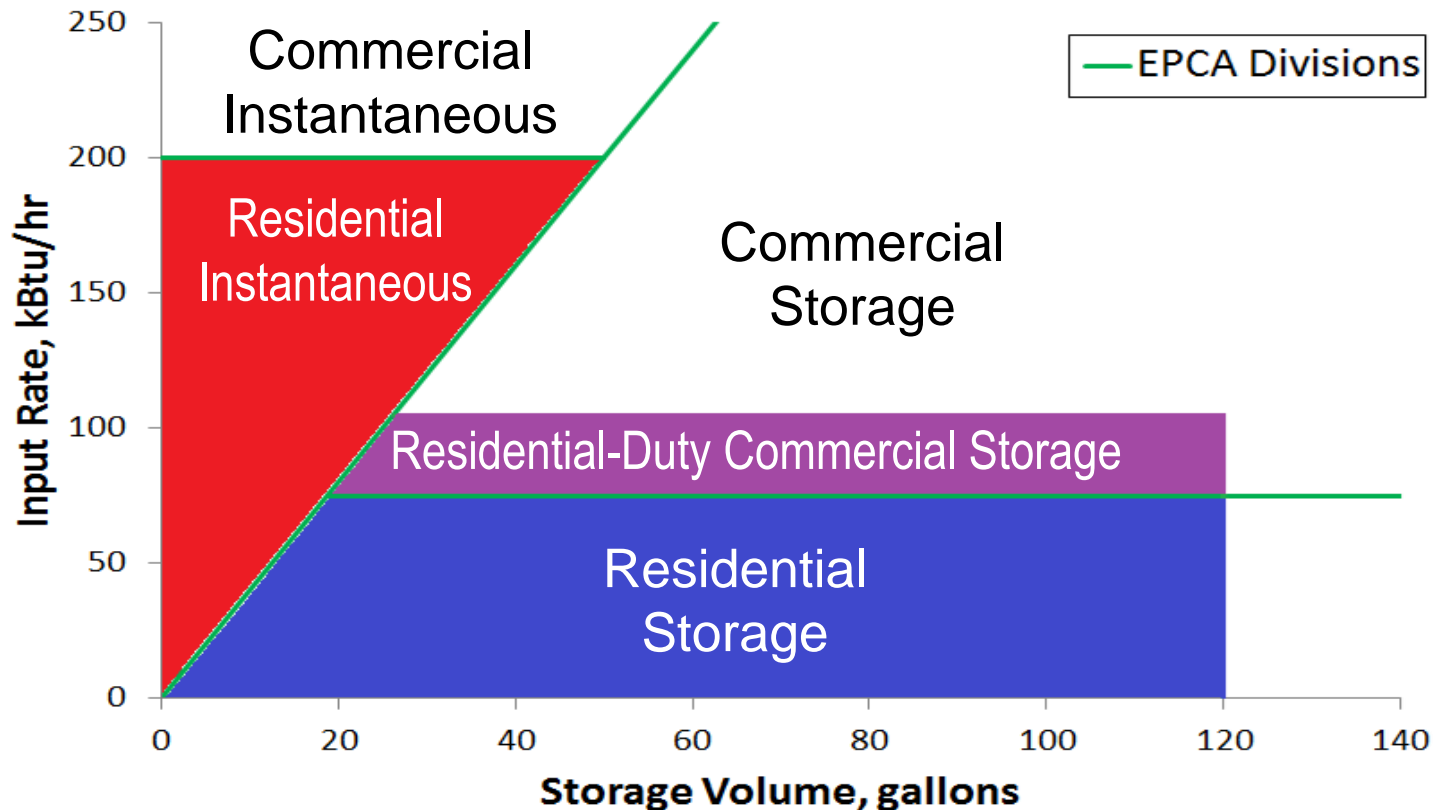
Scope of Current Test Procedures

- Gas Water Heaters



Scope of UEF Test Procedure

- Gas Water Heaters



- Similar updates were made for electric and oil-fired water heaters

Section 3

Test Method Overview



Test Method Overview – Key Points

- Conceptually similar to current residential water heater test method. Consists of:
 - A maximum Gallons Per Minute test (Max GPM) or First-Hour Rating (FHR) test for determining delivery capacity
 - A 24-hour simulated use test (SUT) for determining UEF
- Thermostat is set based on delivery temp. Must be 125 +/- 5 °F
- To determine UEF, water heater is tested to one of four possible draw patterns
 - Draw patterns vary in length, flow rate, number of draws
 - Result of the Max GPM or FHR test is used to determine the appropriate draw pattern for the UEF test

Test Method Overview – Delivery Capacity

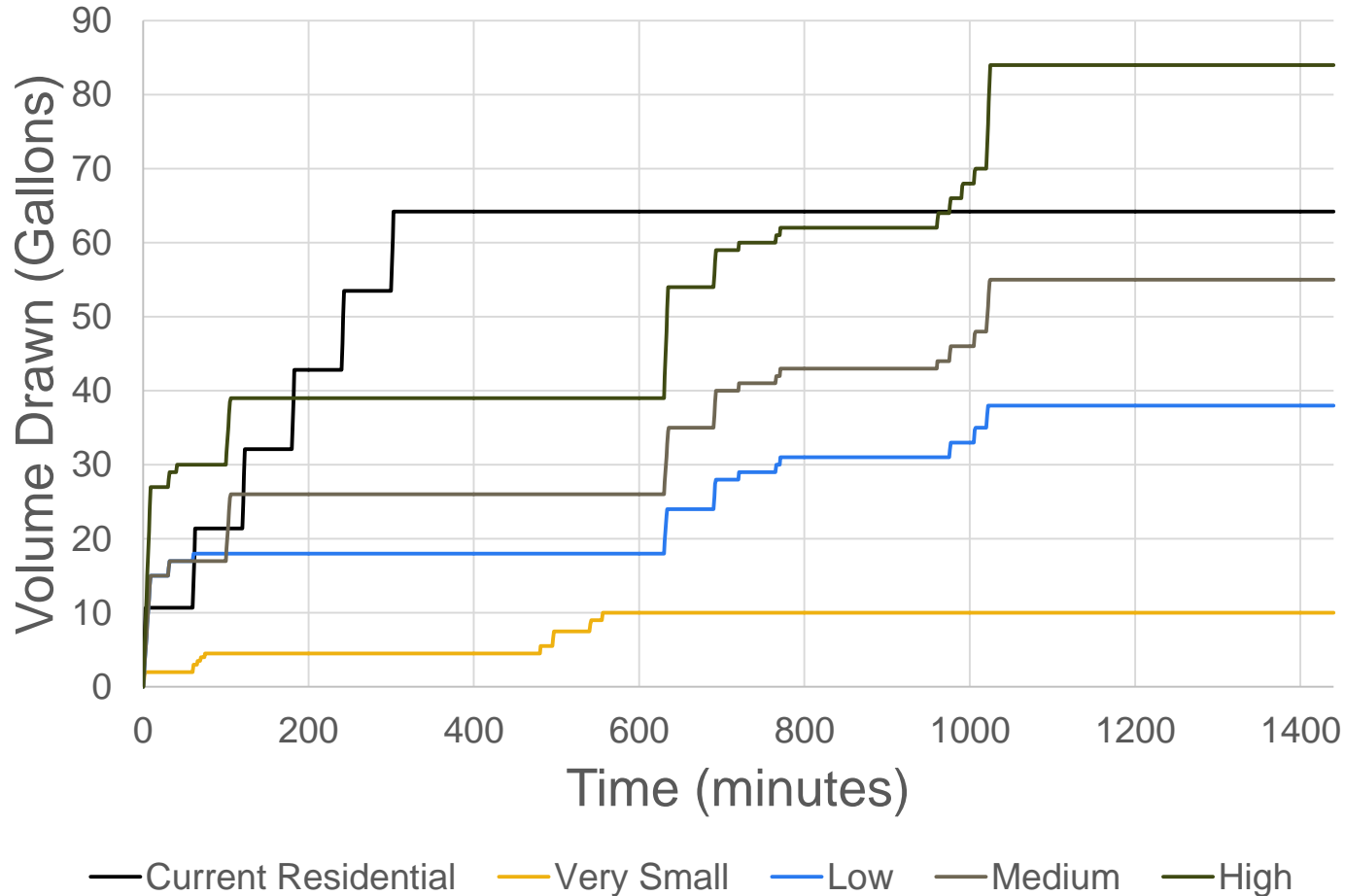
- Max GPM and FHR concepts from residential water heater test were retained
 - Measure of delivery capacity of a water heater (gallons of hot water delivered over a period of time)
- Key differences from current residential WH metrics:
 - Water heater is set to deliver water at 125 +/- 5 °F
 - FHR draws are stopped after a decrease of 15 °F from the max outlet water temperature for that draw
- Result of the Max GPM or FHR test is used to determine the draw pattern for the UEF test

Test Method Overview – UEF

- UEF determined by 24-Hr SUT – conceptually similar to the one currently used for residential water heaters
- Key differences from current residential WH test method:
 - Draw patterns
 - Each model is tested at one of four possible draw patterns depending on delivery capacity
 - Number of draws, length of draws, timing, and flow rates varies between draw patterns
 - Thermostat set based on 125 +/- 5 °F delivery temp rather than 135 +/- 5 °F mean tank (current residential setting)
- Other test conditions (e.g., ambient conditions, supply water temperature) generally very similar to the existing residential WH test method

Test Method Overview - UEF

- Draw Patterns



Test Method Overview - Timing

- Test Procedure Final Rule published in the Federal Register July 11, 2014.
- Effective date is July 13, 2015
 - Voluntary use of UEF test method can begin
- Compliance date is 1 year after the publication of a final rule establishing a mathematical conversion factor from current metrics to UEF
 - Mandatory use of UEF test method begins

NAVIGANT