JUNE 23, 2017

UNDERSTANDING THE UNIFORM ENERGY FACTOR (UEF) 2017

BACKGROUND

- **In 2012, U.S. Congress passed the *"American Energy Manufacturing Technical Corrections Act"***
  - The Act required the Department of Energy (DOE) to revise the Energy Factor (EF) efficiency metric or create a new metric to cover more home-installed water heaters
  - The Act required the new metric to not increase the stringency of NAECA-3 efficiency standards
- **DOE used the mandate to develop a new efficiency metric ("UEF") and test procedure manufacturers must follow**

PURPOSE

Three Objectives of UEF:

I. **Cover more water heater models than EF (any model that can be installed in a home)**

II. **Convert all water heater models that are installed in homes from EF, Standby Loss, and Thermal Efficiency rating to ONE, new UEF rating**

III. **Use a test procedure that better reflects how a water heater is used to determine hot water delivery and efficiency of a model**

IMPLEMENTATION

- **In 2014-2016, DOE developed the UEF test procedure and UEF minimum standards**
- **UEF to be used on tank and tankless models**
- **UEF is required to replace EF**
- **UEF will go to market on all databases, labeling, literature, and marketing on June 12, 2017**
  - To help the transition, most models will be able to use a conversion factor for 6 months to convert EF to UEF
  - Beginning in 2018, all converted models must have a tested UEF rating

** THE UEF FACTS**

- June 12, 2017: Implementation date for United States models to meet new UEF by test data OR conversion factor
- DOE introduced USAGE bins based on tested, first-hour hot water delivery
  - Requires a minimum UEF for each usage bin (i.e., "Very Small," "Low," "Medium," and "High")
  - Created four times the number of EF standards

Category	Scope
Gas Storage	Models with rated storage volume ≥ 20 gallons and ≤ 100 gallons
Electric Storage	Models with rated storage volume ≥ 20 gallons and ≤ 120 gallons
Gas Tankless	Models with rated storage volume < 2 gallons, Input rate > 50,000 Btu/hr and < 200,000 Btu/hr
Electric Tankless	Models with rated storage volume < 2 gallons
Res-Duty (Gas Storage)	Models rated inputs > 75 kBtu/hr, but ≤ 105 kBtu/hr; AND rated storage volume ≤ 120 gallons
Res-Duty (Electric Tankless)	Models rated input >12 kW, but ≤ 58.6 kW
Grid-Enabled Electric Storage	Models with rated storage volume > 75 gallons, has grid connection capability, activation lock and key, and proper labeling

** UEF REGULATIONS **

FIRST-HOUR DELIVERY AND USAGE BINS (TANK MODELS)

TABLE I: DRAW PATTERN TO BE USED BASED ON FIRST-HOUR RATING

First-hour rating greater than or equal to:	...and first-hour rating less than:	Draw pattern to be used in simulated-use test
0 gallons	18 gallons	Very Small Usage
18 gallons	51 gallons	Low Usage
51 gallons	75 gallons	Medium Usage
75 gallons	No upper limit	High Usage

FIRST-HOUR DELIVERY AND USAGE BINS (TANKLESS MODELS)

TABLE II: DRAW PATTERN TO BE USED BASED ON MAXIMUM GPM RATING

Maximum GPM rating greater than or equal to:	and maximum GPM rating less than:	Draw pattern to be used in simulated-use test
0 gallons/minute	1.7 gallons/minute	Very Small Usage
1.7 gallons/minute	2.8 gallons/minute	Low Usage
2.8 gallons/minute	4 gallons/minute	Medium Usage
4 gallons/minute	No upper limit	High Usage

** NOMINAL CAPACITY/VOLUME VERSUS RATED CAPACITY/VOLUME **

NOMINAL CAPACITY/VOLUME

- **Description of the capacity of the product as the industry accepts (based on industry standards) to compare with products of like size; not meant to be an exact value of the volume of the tank or vessel**
  - UL[1]/ANSI[2] allow +/- 10% tolerance for electric storage tanks and +/- 5% tolerance for gas storage tanks
  - **UL/ELECTRIC EXAMPLE:** For a 40-gallon electric water heater, the UL allows for 36- to 44-gallon capacities
  - **ANSI/GAS EXAMPLE:** For a 40-gallon gas water heater, ANSI allows for 38- to 42-gallon capacities

[1]Underwriters Laboratories [2]American National Standards Institute

RATED CAPACITY/VOLUME

- **Volume of the tank, or vessel, as defined by the Department of Energy (DOE) within allowable tolerances**
  - DOE allows +/- 3% tolerance to the rated capacity for all water heaters
  - **EXAMPLE:** With a 40-gallon water heater, the DOE allows 38.8 to 42.1 gallon capacities

** FREQUENTLY ASKED QUESTIONS **

1 Q: How should manufacturers represent rated storage volume?

A: The rated storage volume[1] should be determined according to approved Federal statutes and regulations. Any represented value of the rated storage volume must be equal to the mean (i.e., arithmetic average) of the measured storage volumes of all the units with the sample.

2 Q: Does the rated storage volume need to be the same value in all representations, including the certification report to the U.S. Department of Energy (DOE), nameplates, cartons, and literature?

A: Yes. For all representations of rated storage volume, manufacturers must follow the procedure in approved Federal statutes and regulations to determine the appropriate value.

3 Q: Can manufacturers represent any other storage volume values to consumers for the same water heater model?

A: Yes, manufacturers may also make representations of a nominal volume, as long as the following guidance is followed:

Any representation of a nominal volume must be within the tolerances provided in the applicable safety standard, when compared to the rated storage volume.

[1]This value must be what is measured and certified with DOE.

4 Q: Can a manufacturer choose only to represent nominal volume to the consumer and not the rated storage volume?

A: No. Generally speaking, the Federal Trade Commission (FTC) is responsible for consumer disclosures for water heaters. The required disclosures for the FTC EnergyGuide label can be found in the applicable Federal regulation.

Additionally, the FTC currently does not require disclosure of storage volume; however, DOE notes that FTC recently finalized updates to its water heater EnergyGuide label, and the updated label includes a disclosure for "Tank Size (Storage Capacity)."

Furthermore, the governing rule specifies the capacity shall be rated storage volume and first-hour rating (for storage-type models) and gallons per minute (for instantaneous-type models).

5 Q: What electric tank-type models meet the Uniform Plumbing Code (UPC) for first-hour rating (FHR) with conversion?

A: All current electric tank-type models that meet the UPC requirement will continue to meet the UPC requirement. Those models undergoing a dip tube change and thermostat setting adjustment will pass the testing after June 12, 2017.

6 Q: For verification and enforcement, will DOE use the rated storage volume or a nominal volume to determine compliance with standards?

A: The storage volume of the basic model will be measured pursuant to the test requirements of the governing rule for each unit tested. The mean (i.e., arithmetic average) of the measured values will be compared to the rated storage volume as certified by the manufacturer.

* **IF VALID:** The rated storage volume will be considered valid only if the measurement is within 3 percent of the certified rating, which means this certified rated value will be used as the basis for calculation of the Federal energy conservation standard expressed as the Uniform Energy Factor for the basic model.
* **IF NOT VALID:** Once the rated storage volume is found to vary more than 3 percent from the mean of the measured values, the certified rated storage volume is determined to be invalid and the mean of the measured values will be used as the basis for calculation of the Federal energy conservation standard for the basic model.

7 Q: How does UEF affect Rheem's current ENERGY STAR products?

A: Products meeting the ENERGY STAR standard prior to June 12, 2017, with EF ratings will continue to be considered ENERGY STAR products with the transition to UEF, regardless of whether their UEF ratings are below the new UEF ENERGY STAR standard.

8 Q: With regard to tankless gas water heaters, what temperature rise was used to calculate the gallons per minute rating?

A: 67 degrees Fahrenheit (19 degrees Celsius). Currently, the Air-Conditioning, Heating, & Refrigeration Institute (AHRI) typically bases the temperature rise on 77 degrees Fahrenheit (25 degrees Celsius). As of June 12, 2017, AHRI will use 67 degrees Fahrenheit.

9 Q: What is the difference between nominal capacity and rated capacity?

A: NOMINAL CAPACITY is the description of the product capacity as the industry accepts (based on industry standards) to compare with products of like size, i.e., not meant to be the exact value of the volume of the tank or vessel. For example, UL[1]/ANSI[2] allow a ± 10% tolerance for electric storage tanks and ± 5% tolerance for gas storage tanks.

A: RATED CAPACITY is the volume of the tank, or vessel, as defined by the U.S. Department of Energy (DOE) within allowable tolerances. For example, the DOE allows ± 3% tolerance to the rated capacity for **ALL** water heaters.

[1]Underwriters Laboratories

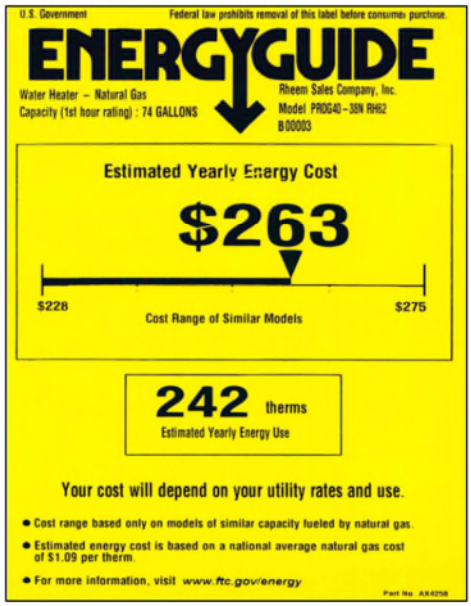
[2]American National Standards Institute

** FEDERAL TRADE COMMISSION (FTC) LABEL EXAMPLES **

** *1 OF 3: TANK-TYPE GAS WATER HEATER* **

RHEEM GAS PROG40-38N RH62

OLD



RHEEM GAS PROG40-38N RH62

NEW

UEF

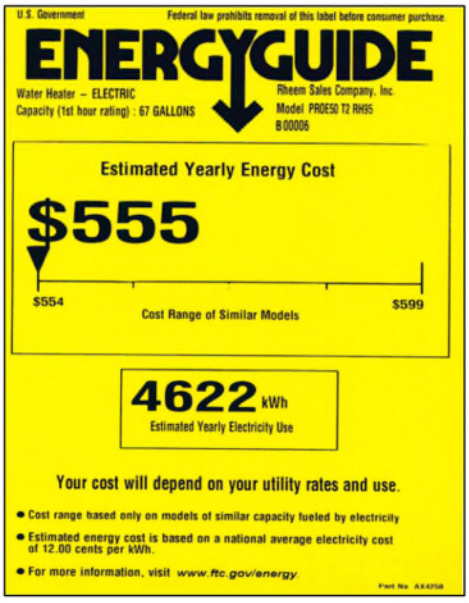
EnergyGuide label will show:

- Rated Storage Capacity
- Estimated Yearly Energy Cost
- First-Hour Rating
- Usage Bin

** *2 OF 3: TANK-TYPE ELECTRIC WATER HEATER* **

RHEEM ELECTRIC PROE50-T2 RH95

OLD



RHEEM ELECTRIC PROE50-T2 RH95

NEW

UEF

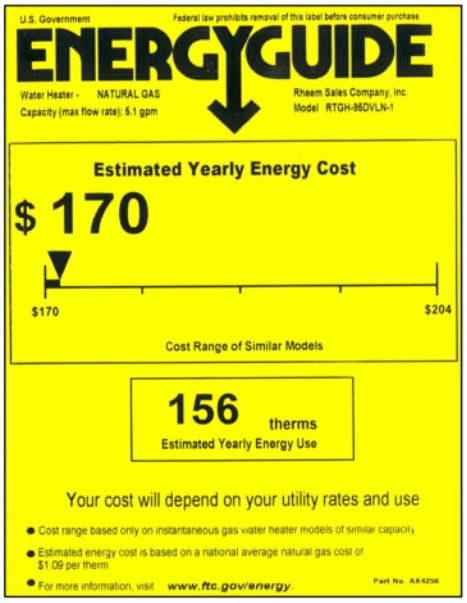
EnergyGuide label will show:

- Rated Storage Capacity
- Estimated Yearly Energy Cost
- First-Hour Rating
- Usage Bin

** *3 OF 3: TANKLESS GAS WATER HEATER* **

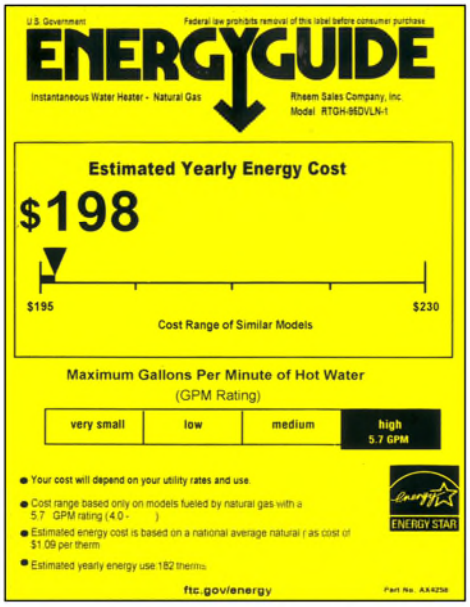
RHEEM TANKLESS GAS RTGH-95DVLN-1

O L D



RHEEM TANKLESS GAS RTGH-95DVLN-1

N E W U E F



NOTE: **UEF converted values are based on a model's recovery efficiency and a conversion factor based on a model's usage bin. Once those values are plugged into the template equation, a converted UEF rating is obtained.**

EnergyGuide label will show:

- **Estimated Yearly Energy Cost**
- **GPM Rating**
- **Usage Bin**