AHRI Standard 1430-2022 (I-P)

2022 Standard for

Demand Flexible Electric Storage Water Heaters

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Intent

This standard sets forth a harmonized specification for demand flexible electric resistance storage and *electric heat pump water heaters (HPWH)s* capable of load management that can be used by policymakers, state government, electric utilities, authorized third parties, manufacturers, designers, installers, contractors, and users. By providing standardized requirements *for Demand Flexible Electric Storage Water Heater (DFWH)*s, utilities and load management program managers can be assured the *DFWHs* are enabled to communicate using standard hardware and software.

Review and Amendment

This standard is subject to review and amendment as technology advances in both water heating equipment and communication protocols.

2022 Edition

This edition of AHRI Standard 1430 (I-P), *Demand Flexible Electric Storage Water Heaters*, was prepared by Water Heater Standards Technical Committee. The standard was published by the Heating Standards Subcommittee in December 2022.

Origin and Development of AHRI Standard 1430

This is the initial publication of AHRI Standard 1430 (I-P), *Demand Flexible Electric Storage Water Heaters*.

This first edition of AHRI Standard 1430-2022 (I-P) was created to develop:

- Demand Flexible Electric Storage Water Heater application definitions
- Methods of testing and verification
- Operating and physical requirements
- Minimum data requirements for published ratings
- Marking and labeling data
- Conformance conditions
- Values of load shifting minimum requirements
- Product literature requirements

The purpose and scope include requirements and conformance conditions to confirm that equipment communicates in standardized messages and communication protocols using CTA-2045-B.

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Water Heater Standards Working Group Scope:

To develop all sections of an ANSI Water Heater Standard for Demand Flexible Electric Storage Water Heater application definitions; test requirements, methods of testing and verification, operating and physical requirements, minimum data requirements for published ratings, marking and labeling, and data and conformance conditions, values of load shifting minimum requirements, and product literature requirements.

The above purpose and scope include requirements and conformance conditions to confirm that equipment is enabled to communicate in standardized messages and communication protocols using CTA-2045-B.

Standards Working Groups (SWG) are temporary and are formed by and report to the Standards Technical Committee (STC). The work of the SWG shall be within the scope of the STC as defined by the Standards Subcommittee (SSC).

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Water Heater Standards Technical Committee Scope:

The Water Heater Standards Technical Committee is responsible for the development and maintenance of AHRI standards and guidelines pertaining to residential and commercial water heaters and pool heaters.

Out of scope for this STC are indirect water heaters which are part of a hydronic system.

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The scope of the Heating Standards Subcommittee is standards and guidelines related to the end products that are part of the AHRI Heating Industry Sector. (The definition of and list of products associated with each sector are found on the AHRI website.)

This list represents the membership at the time the Standards Technical Committee and Standards Subcommittee were balloted on the final text of this edition. Since that time, changes in the membership may have occurred. Membership on these committees shall not in and of itself constitute an endorsement by the committee members or their employers of any document developed by the committee on which the member serves.

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DEMAND FLEXIBLE ELECTRIC STORAGE WATER HEATERS

Section 1. Purpose

1.1 Purpose

This standard establishes specifications for *demand flexible water heaters* (*DFWH*) as defined in Section 3. This standard includes applicable definitions, test requirements, methods of testing and verification, operating and physical requirements, minimum data requirements for published ratings, marking and nameplate data, conformance conditions, values of load shifting minimum requirements, and product literature requirements. The standard provides two pathways for compliance. Both pathways include a *demand response* (*DR*) only compliance pathway and the second additionally includes locally stored *time-of-use* (TOU) compliance pathway.

1.2 Requirements

This standard establishes requirements for *DFWHs* that are capable of supporting *load management strategies* to benefit the electric grid in a predictable manner, and to facilitate end users to participate in *DR*, *TOU scheduling*, price response, or incentive programs offered by electric utilities or *consumer authorized third parties*. The requirements described in this standard include the following:

- Specification for standardized communication pathways and protocols to be utilized by *DFWHs* to communicate with electric utilities or *consumer authorized third parties* operating load management programs.
- Specifications for communication connections to *DFWHs*
- Specifications for standardized communication signals between electric utilities or *consumer authorized third parties* and *DFWHs*
- Specifications for responses taken by *DFWHs* in response to requests from electric utilities or *consumer authorized third parties*, based on instructions pre-configured in the system and entered during the enrollment processor otherwise by the end user
- Specifications for transmittal to and from *DFWHs* to facilitate enrollment in *load management* programs

Section 2. Scope

2.1 Scope

This standard applies to communication, infrastructure, and system functionality as these relate to the implementation of energy management strategies for *DFWHs*, with a nominal storage capacity greater than or equal to forty gallons and less than or equal to 120 gallons, installed in residential and small commercial applications as defined in Section 3.

- Standardized communication required to enable participation in *load management programs* of electric utilities and *consumer authorized third parties*.
- Infrastructure including the physical layer, to enable direct communication between *DFWHs* and electric utilities and *consumer authorized third parties*.
- *DFWH* functionality including the control modes and how the system responds to signals to adjust operation.

2.2 Exclusions

This standard does not apply to any electric storage water heater with an input rate greater than 12 kW or any heat pump water heater with a maximum current rating greater than 24 amps at a voltage not greater than 250 volts. This standard does not apply to any electric storage or heat pump water heater with a nominal storage capacity less than 40 gal or greater than 120 gal, nor to any water heater that uses fuel other than electricity.

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Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the ASHRAE Terminology website unless otherwise defined in this section.

3.1 Expression of Provisions

Terms that provide clear distinctions between requirements, recommendations, permissions, options, and capabilities.

3.1.1 "Can" or "cannot"

Express an option or capability.

3.1.2 "May"

Signifies a permission expressed by the document.

3.1.3 "Must"

Indication of unavoidable situations and does not mean that an external constraint referred to is a requirement of the document.

3.1.4 "Shall" or "shall not"

Indication of mandatory requirements to strictly conform to the standard and where deviation is not permitted.

3.1.5 "Should" or "should not"

Indication of recommendations rather than requirements. In the negative form, a recommendation is the expression of potential choices or courses of action that is not preferred but not prohibited.

3.2 Standard Specific Definitions

3.2.1 Communication Link

The mechanism for bi-directional data transfers between the *DFWH* and one or more external applications, devices, or systems.

3.2.2 Consumer Authorized Third Party

Any entity the consumer has provided explicit permission to access the *DFWH* functionality, in whole or in part, through a *communication link*.

3.2.3 Demand Flexible Water Heater (DFWH)

An *electric resistance storage water heater* or *HPWH* with the capability to reduce, shed, shift, load up, and modulate energy consumption.

3.2.4 Demand Response (DR)

Changes in electricity usage by an end-use device from the consumption pattern in response to short-term electricity price changes, to incentive payments designed to induce lower electricity use at times of high electricity prices, or to improve the reliability of electric distribution systems.

3.2.5 Electric Heat Pump Water Heater (HPWH)

Electric storage water heaters with a maximum current rating of 24 amps at a voltage not greater than 250 volts that are designed to transfer thermal energy from one temperature level to a higher temperature level for the purpose of heating water, including all ancillary equipment such as fans, storage tanks, pumps, or controls necessary for the device to perform. These include split-system heat pump water heaters tested with a specific tank.

3.2.6 Electric Resistance Storage Water Heater

A water heater that uses electricity as the energy source, has a nameplate input rating of 12 kW or less, and contains more than one gallon of water per 4000 Btu per hour of input.

3.2.7 Load Management Programs

Programs that incentivize temporary adjustments in the use of electricity.

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