



**Summary of Substantive Changes
between the updates dated May 19, 2006 and September 21, 2012 of
UL 174, “Household Electric Storage Tank Water Heaters”
(Eleventh edition, dated April 29, 2004)**

Presented to the IAPMO Standards Review Committee on January 12, 2015

General: The changes to this standard will have an impact on currently listed products. The substantive changes are:

- Incorporated requirements of compliance with referenced standards for specific components into the body of the standard and removed the appendix of component standards (see Sections 2, 11, 12, 16, 19, 46 and Former Appendix A).
- Removed the requirement to provide a “metal” field-wiring compartment (see Section 11.2.1).
- Added requirements for compliance with referenced standards for fuse holders and fuses (see Sections 16.4 and 16.5).
- Added a 30,000-cycle performance requirement and requirements of compliance with referenced standards for electro-mechanical temperature-regulating and electronic temperature-regulating controls (see Section 23).
- Added a 6,000-cycle performance requirement for manually-reset electro-mechanical temperature-limiting controls (see Section 24).
- Revised requirements for temperature limiting controls and components that are operated by temperature-limiting controls (see Section 24).
- Added requirements of compliance with referenced standards for electro-mechanical temperature-limiting and electronic temperature-limiting controls (see Section 24).
- Added requirements for smart-enabled household electric storage tank water heaters (see Supplement SB).

Section 2, Components: Incorporated requirements of compliance with referenced standards for specific components into the body of the standard and removed the appendix of component standards as follows:

2.1 Except as indicated in this clause, a component of a product covered by this standard shall comply with the requirements for that component. ~~See the Standards for Components appendix for a list of standards covering components generally used in the products covered by this standard.~~ [See the individual sections of this standard for component requirements.](#)

Section 5 Glossary: Added definitions for frame, operating control, protective control, type 1 action and type 2 action.

Section 11, Electrical Supply Connections – Permanent Connection: Removed the requirement to provide a “metal” field-wiring compartment, and incorporated the requirements of compliance with referenced standards for junction boxes, fittings for conduit, terminal blocks, and electrical quick connect terminals as follows:



11.2 Field-wiring compartment

11.2.1 A heater shall be provided with a ~~metal~~ compartment for connection to the supply (branch circuit) wiring...

[11.2.7 Electrical \(Junction\) boxes shall comply with the Standard for Metallic Outlet Boxes, UL 514A or the Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers, UL 514C, as applicable.](#)

[11.2.8 Fittings for conduit and/or metal clad cable shall comply with the Standard for Conduit, Tubing, and Cable Fittings, UL 514B.](#)

11.3 Field-wiring terminals and leads

[11.3.14 Terminal blocks shall comply with the Standard for Terminal Blocks, UL 1059.](#)

[11.3.15 Electrical Quick Connect Terminals shall comply with the Standard for Electrical Quick Connect Terminals, UL 310.](#)

Section 12, Electrical Supply Connections – Cord Connection: Incorporated the requirements of compliance with referenced standards for attachment plugs provided on small capacity storage tanks, and flexible cords and cables as follows:

12.1 Power supply cords

12.1.2 An attachment plug provided on a small capacity storage tank water heater shall be of the grounding type and shall be rated in accordance with Table 12.1 [and shall comply with the Standard for Attachment Plugs and Receptables, UL 498.](#)

[12.1.4 Flexible cords and cables shall comply with the Standard for Flexible Cords and Cables, UL 62.](#)

Section 16, Overcurrent Protection: Added the requirements of compliance with referenced standards for fuse holders and fuses, and incorporated the requirement of compliance with the referenced standard for circuit breakers as follows:

[16.4 Fuseholders shall comply with one of the following:](#)

[a\) The Standard for Fuseholders – Part 1: General Requirements, UL 4248-1 and the applicable Part 2 \(e.g. UL 4248-9 for Class K\).](#)

[16.5 Fuses shall comply with the Standard for Low-Voltage Fuses – Part 1: General Requirements, UL 248-1, and the applicable UL 248 Part 2 \(e.g. UL 248-5\). Defined use fuses that comply with UL 248-1 and another applicable UL standard for fuses are considered to comply with this requirement.](#)

[16.6 Circuit breakers shall comply with the Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures, UL 489.](#)

Section 19, Internal Wiring: Incorporated the requirements of compliance with referenced standards for wire connectors, and thermoplastic wiring material as follows:

[19.9 Wire connectors shall comply with the Standard for Wire Connectors, UL 486A-486B or the Standard for Splicing Wire Connectors, UL 486C.](#)



[19.10 Thermoplastic wiring material shall comply with the Standard for Thermoplastic-Insulated Wires and Cables, UL 83.](#)

Section 23, Temperature-Regulating Controls: Added a 30,000 cycle performance requirement, and the requirements of compliance with referenced standards, for electro-mechanical temperature-regulating and electronic temperature-regulating controls as follows:

[23.1 A heater having a tank that is not open to the atmosphere shall be provided with a temperature regulating thermostat or control and be subjected to the water temperature test specified in 29.1. The heater complies when the control or thermostat that controls each heating element limits the water temperature to 85°C \(185°F\) or less.](#)

[23.1.1 An electro-mechanical temperature-regulating control shall comply with the Standard for Temperature-Indicating and -Regulating Equipment, UL 873, the Standard for Limit Controls, UL 353, or the requirements for operating electrical controls in the Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9.](#)

[23.1.2 An electro-mechanical temperature-regulating control shall be investigated and found acceptable for continuous operation under rated electrical load for 30,000 cycles of operation without any mechanical or electrical breakdown, impairment of operation, or any apparent damage. Any change in calibration as a result of the continued operation test shall not exceed ±10°F \(±5.6°C\).](#)

[23.1.3 An electronic temperature-regulating control with switched outputs that relies on hardware circuitry only to regulate or maintain the temperature within the limits specified in 23.1 shall comply with the requirements of :](#)

- [a\) The Standard for Limit Controls, UL 353, or the water temperature regulating control requirements of the Standard for Temperature-Indicating and Regulating Equipment, UL 873, and;](#)
- [b\) The Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991, with no single points of failure permitted or the Type 2 Operating Control requirements per the Standard for Automatic Electrical Controls for Household and Similar Use, Part 2, Particular Requirements for Temperature Sensing Controls, UL 60730-2-9.](#)

[The temperature-regulating control shall be found acceptable for continuous operation under rated electrical load for 30,000 cycles of operation without any mechanical or electrical breakdown, impairment of operation, or any apparent damage. Any change in calibration as a result of the continued operation test shall not exceed ±10°F \(±5.6°C\).](#)

[23.1.4 An electronic temperature-regulating control that relies on software to regulate or maintain the temperature within the limits specified in 23.1 shall comply with the requirements for software Class 1 in accordance with the Standard for Software in Programmable Components, UL 1998, or software Class B in accordance with the Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1.](#)

Section 24, Temperature-Limiting Controls: Added a 6,000 cycles performance requirement for manually reset electro-mechanical temperature-limiting controls, revised requirements for temperature limiting



controls and components that are operated by temperature-limiting controls, and added requirements of compliance with referenced standards for electro-mechanical temperature-limiting and electronic temperature-limiting controls as follows:

24.1 A water heater with a tank closed to the atmosphere shall be ~~provided~~ equipped with a factory installed direct or indirect acting manually reset temperature-limiting control that...

24.1.1 An electro-mechanical control shall comply with the Standard for Limit Controls, UL 353, or the water heater limiting control requirements in the Standard for Temperature-Indicating and Regulating Equipment, UL 873, or the requirements for protective electrical controls in the Standard for Automatic Electrical Controls for Household and Similar Use, Part 2, Particular Requirements for Temperature Sensing Controls, UL 60730-2-9.

24.1.2 A manually reset electro-mechanical temperature-limiting control shall be investigated and found acceptable for continuous operation for 6,000 cycles (1,000 under rated electrical load and 5,000 without) of operation without any mechanical or electrical breakdown, impairment of operation, or any apparent damage. Any change in calibration as a result of the continued operation test shall not exceed $\pm 10^{\circ}\text{F}$ ($\pm 5.6^{\circ}\text{C}$).

24.1.3 An electronic temperature-limiting control with switched outputs that only relies on hardware circuitry to limit the temperature within the limits specified in 24.1 shall comply with the requirements of:
a) The Standard for Limit Controls, UL 353, or the water heater limiting control requirements in the Standard for Temperature-Indicating and Regulating Equipment, UL 873, and;
b) The Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991 with no single points of failure permitted, or the Type 2 Protective Control requirements per the Standard for Automatic Electrical Controls for Household and Similar Use, Part 2, Particular Requirements for Temperature Sensing Controls, UL 60730-2-9.

24.1.4 An electronic temperature-limiting control that relies on software to limit the temperature within the limits specified in 24.1 shall comply with the requirements for software Class 2 in accordance with the Standard for Software in Programmable Components, UL 1998 or software Class C in accordance with the Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1.

24.3 The temperature-limiting control circuit shall ~~have no operating part in common with the temperature-regulating thermostat specified in 23.1, and a common mounting bracket or a common enclosure is capable of being employed for bothe types of control~~ be designed such that a malfunction of any component in the temperature-regulating or other operating control circuit will not adversely affect the operation of the safety limit control circuit.

24.5 ~~A control used in combination with a relay or contactor shall be subjected to an investigation~~ Components including contactors and sequence controllers that are operated by the temperature-limiting control shall be rated for 100,000 cycles of operation and shall be arranged to result in the direct opening of that circuit, whether the switching mechanism is integral with the sensing element or remote from the element.



Section 46, Identification: Incorporated the requirement of compliance with the referenced standard for adhesive labels as follows:

[46.5 Adhesive attached labels for use as nameplates and/or markings shall comply with the Standard for Marking and Labeling Systems, UL 969, for their intended use.](#)

New Supplement: Added requirements for smart enabled household electric storage tank water heaters as follows:

[SUPPLEMENT SB - SAFETY OF SMART ENABLED HOUSEHOLD ELECTRIC STORAGE TANK WATER HEATERS](#)

Removed Appendix: Incorporated requirements of compliance with referenced standards for specific components into the body of the standard and removed the appendix of component standards as follows:

~~[Appendix A, Standards for Components](#)~~