



## HEATING AND COOLING EQUIPMENT

This product category description is to be used in conjunction with the “Overview of ARL’s Listing, Labeling and Follow-Up Inspection Services” (LSc001) which details ARL’s system requirements for obtaining a listed product certification.

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### **Heating and Cooling Equipment (HVAC Related)**

The requirements for this category of products include stationary equipment for use in non-hazardous locations, rated 600 volts or less, single or three phase, and remote control assemblies for such equipment:

- a) Heat pumps, for heating and cooling with or without factory or field installed electric resistance heaters, or hot water or steam heating coils.
- b) Air conditioners for cooling with or without factory or field installed electric resistance heaters, or hot water or steam heating coils.
- c) Cooling portion and associated components of combination heating and cooling equipment employing gas, oil, or gas/oil fired heating means. However, the requirement for the construction and performance of the gas, oil, or gas/oil fired heating means, and their associated components, shall conform to the particular standards covering such heating equipment and components.
- d) Liquid chillers and compressor/evaporator or liquid chiller assemblies intended for use with remote condensers.
- e) Condensing units intended for connection to a remote non-specified evaporator and compressor units intended for connection to a remote non-specified evaporator and condenser.

- f) Add-on heat pumps for comfort heating or heating and cooling.
- g) Heat pump water heaters and refrigerant desuperheaters, and packaged heat pump water heaters consisting of a heat pump water heater and an associated storage tank.
- h) Fan units and fan coil units for comfort heating and/or comfort cooling.
- i) Room fan heater units, central heating furnaces, and similar fixed electric space heating for comfort heating.

The units referenced in item (g) may be cord connected if they:

- a) are for indoor use only;
- b) are rated 250 volts or less, single phase, with a marked rating of 24 amperes or less; and
- c) comply with Clause 1.11 of ANSI/UL 1995.

A fan unit includes a motor operated fan or blower, and is intended to be connected to a duct system that supplies conditioned air for environmental heating and/or cooling. Such a unit may have air controlled dampers, but does not include a factory installed heat exchanger or any other integral heating or cooling means.

A fan coil unit includes a motor operated fan or blower together with a cooling coil, a heating coil, or both. The fan or blower is intended to recirculate air, and may introduce air from outside of the heated or cooled space. The coil may be used for refrigerant cooling, for chilled water cooling, for hot water heating, for steam heating, or for combinations of these functions.

A fan coil unit is intended to be piped to a remote source of the heating and/or cooling mediums. A unit that includes an electric resistance heater is considered to be a fan coil unit if a water or refrigerant coil for comfort cooling and/or a water or steam coil for comfort heating is provided in the unit.

A room fan heater unit is intended for heating only, includes a motor operated fan or blower, employs electric resistance heat as the only heat source, and is intended to serve only one room or space.

A fan coil unit or electric space heating equipment, as covered by these requirements, may be designed for free discharge of air to the room or may be provided with means for duct connection.

A central warm air furnace is a heating appliance that consists of an electric heating element or elements with an air circulating fan or blower, is provided with appropriate integral operating and temperature limiting controls, and is housed in an enclosure designed to be connected to duct work for the distribution of the heated air remote from the unit.

The units referenced in the paragraph 1 may consist of one or more factory made assemblies. If provided in more than one assembly, the separate assemblies are to be used together, and the requirements are based on the use of matched assemblies. These requirements apply to assemblies designed for free discharge of air into the conditioned space as well as those which may be provided with means for duct connection.

The requirements for this category **do not** apply to add-on heat pump systems designed to utilize the indoor fan motor assembly of an installed furnace where:

- a) the heat pump and furnace are intended to operate simultaneously during heating operation except as noted in the Exception to Clause 26.14 of ANSI/UL 1995; or
- b) the refrigerant coil is intended to be mounted upstream (return air side) of the furnace.

The requirements for this category **do not** cover panel or cable type radiant heating equipment, electric boilers, baseboard heaters, air heaters, duct heaters, and unit coolers for refrigeration purposes, nor any other electric heating equipment or appliances which are covered in or as a part of separate, individual standards.

Each product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, electrical ratings, electrical hazard warnings, wiring diagram, type and amount of refrigerant employed, factory test pressures for suction and discharge sides, and other markings and cautionary or hazard warnings as required for individual types of products.

These products comply with ARL requirements which include pertinent sections of the **Standard for Safety, ANSI/UL 1995, Heating and Cooling Equipment**. The listings apply to equipment designed to be used in non-hazardous locations in accordance with the requirements of the National Electrical Code, ANSI/NFPA No. 70; the Mechanical Refrigeration Code, , and the Safety Code for Mechanical Refrigeration, ANSI/ASHRAE 15; and the Standard for the Installation of Air Conditioning and Ventilating Systems, NFPA 90A; and the Standard for the Installation of Warm Air Heating and Air Conditioning Systems, NFPA 90B. In addition, requirements for the installation of units designed to be connected to air duct systems are also included in codes such as the BOCA Basic National Mechanical Code, the Standard Mechanical Code, and the Uniform Mechanical Code.

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### **Fixed and Location Dedicated Electric Room Heaters**

The products listed here are fixed and location dedicated electric room heating equipment rated 600 volts or less to be employed in ordinary locations in accordance with the National Electrical Code, NFPA 70.

The requirements for this category **do not** cover movable heaters, wall or ceiling hung heaters, baseboard heaters, duct heaters, central heating furnaces, fan coil units, panel or cable type radiant heating equipment, electric boilers, or any other electric heating equipment or appliances that are covered in or as a part of separate, individual requirements.

A location dedicated heater that is considered likely to be operated as a movable heater has also complied with the requirements for movable heaters.

If the operation of a heater involves the generation and confining under pressure of steam or other gas, consideration has been given to the possibility of risk of explosion incident to such operation. This applies in the case of an appliance having immersed electrodes, if the electrolysis of water may result in the accumulation of oxygen and hydrogen. The appliance is not acceptable unless its strength is such that it will withstand any risk of explosion that may be involved.

Each product is permanently marked, in such location that the marking is plainly visible (after installation in the case of a permanently connected appliance), with (1) (manufacturer)'s name, trade name or trademark, (2) the catalog number or the equivalent (3) the date or other dating period of manufacture not exceeding any three consecutive months, (4) the electrical ratings of each circuit to which a supply connection is made and (5) hazard and other warnings as required by the standard. A heater intended for use on alternating current only or direct current only is marked to so indicate. If a (manufacturer) produces or assembles heaters at more than one factory, each finished heater has a distinctive marking - which may be in code - to identify it as the product of a particular factory. A heater whose acceptable performance depends upon its proper location or position is marked (such as "Top" or "Bottom") to indicate the way in which it is to be installed or used, unless such position is obvious from the external appearance of the heater.

These products comply with ARL requirements which include pertinent sections of the **Standard for Safety, ANSI/UL 2021, Fixed And Location Dedicated Electric Room Heaters.**

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### **Tankless Hot Water Heaters**

The products listed here are tankless (instantaneous) type electric hot water heaters intended to supply heated potable water in residential and commercial locations. The products are rated 600 volts or less and are intended to be employed in ordinary locations in accordance with the National Electrical Code.

Each product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, electrical specifications and wiring diagram, the appropriate ASME code symbol (if required), maximum working pressure, maximum water temperature, minimum spacing to combustible materials, electrical hazard warnings and other cautionary labels as applicable.

These products comply with ARL requirements which include pertinent sections of the Standards for Safety, **ANSI/UL 499, Electric Heating Appliances and the temperature-regulating and temperature-limiting control sections of ANSI/UL 174, Household Electric Storage Tank Water Heaters.** The products are intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70.

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### **Electric Heating, Water Supply and Power Boilers**

The products listed here are electric heating, water supply and power boilers rated 600 volts or less and are intended for commercial, industrial or residential use or for space heating applications.

These products consist of sheathed resistance type heating elements and a vessel or tank constructed, inspected, and stamped in accordance with the applicable sections of the American Society of Engineers (ASME) Boiler and Pressure Vessel Code. Each boiler is provided with one or more safety valves conforming to ASME requirements with all necessary temperature or pressure regulating controls, including an integral limit control, wiring, and auxiliary equipment assembled as a unit.

The requirements for this category **do not** cover water supply boilers and hot water and steam generating equipment employing constructions which are outside the scope of, or not covered by, the ASME codes, nor commercial cooking or medical and dental equipment, nor other electric heating equipment or appliances which are covered in, or as part of, separate, individual requirements. Electrode-type boilers also are not covered by this category.

Each product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, wiring diagram, the appropriate ASME code symbol, maximum working pressure, maximum water temperature, minimum spacing to combustible materials, electrical hazard warnings and other cautionary labels as applicable.

These products comply with ARL requirement which include pertinent sections of the **Standard for Safety, ANSI/UL 834, Heating, Water Supply, and Power Boilers - Electric**, and are intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70, and other applicable codes, such as the BOCA National Mechanical Code, the Standard Mechanical Code, and the Uniform Mechanical Code.

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### **Household and Similar Electrical Appliances, Part 1: General Requirements**

This category includes electrical appliances for household and similar purposes, their rated voltage being not more than 250 V for single-phase appliances and 480 V for other appliances. These products are intended to be installed or used in accordance with NFPA 70, National Electrical Code (NEC), in the United States.

NOTE 1 BATTERY-OPERATED APPLIANCES and other d.c. supplied appliances are within the scope of this standard. Dual supply appliances, either mains-supplied or battery-operated, Household and Similar Electrical Appliances, Part 1: General Requirements

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NOTE 1 BATTERY-OPERATED APPLIANCES and other d.c. supplied appliances are within the scope of this standard. Dual supply appliances, either mains-supplied or battery-operated, are regarded as battery-operated appliances when operated in the battery mode.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are included.

*NOTE 2 Examples of such appliances are catering equipment, cleaning appliances for commercial use, and appliances for hairdressers.*

*NOTE 3 Attention is drawn to the fact that*

- *for appliances intended to be used in vehicles or on-board ships or aircraft, additional requirements may be necessary;*
- *in many jurisdictions, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labor, the national water supply authorities and similar authorities.*

NOTE 4 This category does not include

- appliances intended exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapor or gas);
- audio, video and similar electronic apparatus (IEC 60065);
- appliances for medical purposes (IEC 60601);
- hand-held motor-operated electric tools (IEC 60745);
- personal computers and similar equipment (IEC 60950-1);
- transportable motor-operated electric tools (IEC 61029).

The requirements of this category may be employed for investigation of components and sub-assemblies for the purpose of their pre-selection for use in appliances. If the component or sub-assembly used complies with these requirements, the tests for the component or sub-assembly specified in the particular appliance standard in some cases will not need to be made in the particular appliance or assembly. Additional testing on a component or subassembly may be required. For example, if a control system is associated with the particular appliance control system, additional tests could potentially be necessary on the final appliance.

These products comply with ARL requirements which include applicable sections of the **UL Standard 60335-1, Safety of Household and Similar Electrical Appliances, Part 1: General Requirements**. The products are intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70.

Each listed product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, electrical ratings, electrical hazard warnings, and other markings and cautionary warnings as required for specific types of products.

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These products comply with ARL requirements which include applicable sections of the UL **Standard 60335-1, Safety of Household and Similar Electrical Appliances, Part 1: General Requirements**. The products are intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70.

Each listed product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, electrical ratings, electrical hazard warnings, and other markings and cautionary warnings as required for specific types of products.

A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements of the standard, and that involve a risk of fire, electric shock, or injury to persons, have been evaluated using the appropriate additional

component and end-product requirements as determined necessary to maintain the acceptable level of safety as originally anticipated by the intent of the standard. A product whose features, characteristics, components, materials, or systems conflict with specific provisions of the standard have been judged to be in non-compliance with the standard.

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### **Electrical Heat Pumps, Air-Conditioners and Dehumidifiers**

This category covers electric heat pumps, including sanitary hot water heat pumps, air conditioners, and dehumidifiers incorporating motor-compressors and hydronic fan coils units, their maximum rated voltages being not more than 250 v for single phase appliances and 600 v for all other appliances. Partial units are included.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

The appliances referenced above may consist of one or more factory-made assemblies. If provided in more than one assembly, the separate assemblies are to be used together, and the requirements are based on the use of matched assemblies.

NOTE 1 A definition of 'motor-compressor' is given in IEC 60335-2-34, which includes the statement that the term motor-compressor is used to designate either a hermetic motor-compressor or semi-hermetic motor-compressor.

NOTE 2 Requirements for refrigerating safety are covered by ANSI/ASHRAE 15. Requirements for containers intended for storage of the heated water included in sanitary hot water heat pumps are, in addition, covered by IEC 60335-2-21.

This category does not include products using refrigerants other than group A1, A2L, A2 and A3 as defined by ISO 817 classification. A2L REFRIGERANTS are limited to those of a molar mass of more than or equal to 42 kg/kmol based on WCF as specified in ISO 817.

This category excludes products that use flammable refrigerants.

Supplementary heaters, or a provision for their separate installation, are included, but only heaters which are designed as a part of the appliance package, the controls being incorporated in the appliance.

NOTE 3 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on-board ships or aircraft, additional requirements may be necessary;
- for appliances subjected to pressure, additional requirements may be necessary;
- in many countries, additional requirements are specified, for example, by the national health authorities responsible for the protection of labor and the national authorities responsible for storage, transportation, building constructions and installations.

This category does not include

- humidifiers intended for use with heating and cooling equipment (IEC 60335-2-88);
- appliances designed exclusively for industrial processing;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapor or gas).

This category does not cover products using refrigerants other than refrigerant safety groups as defined by ISO 817 or ASHRAE 34 as follows:

- a) A1; and
- b) B1 (for use in appliances installed in machinery rooms as defined in accordance with ANSI/ASHRAE 15 or outdoors only); and
- c) A2L, A2, and A3, refrigerants with a molar mass not less than 42 kg/kmol based on nominal composition.



All references to ISO 817 also apply to ANSI/ASHRAE 34. ANSI/ASHRAE 34 shall take precedence over ISO 817.

These products comply with ARL requirements which include applicable sections of the **UL 60335 Standard for Household and Similar Electrical Appliances - Safety - Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers.**

The products are intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70.

Each listed product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, electrical ratings, electrical hazard warnings, and other markings and cautionary warnings as required for specific types of products.

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### Room Air Conditioners

This category covers room air conditioners rated not more than 600 volts alternating current (ac) and intended for installation in ordinary locations in accordance with the National Electrical Code, ANSI/NFPA 70.

For the purposes of these requirements, room air conditioners include packaged terminal air conditioners, special purpose air conditioners, and recreational vehicle air conditioners. They are factory-made encased assemblies designed as a unit primarily to provide free delivery of conditioned air to an enclosed space, room, or zone. This equipment is intended for installation in a window, through a wall, or as a console located in or adjacent to the room, zone, or space to be conditioned. These units employ hermetic refrigerant motor-compressors with factory-charged refrigeration systems and include means for circulating air. They may also have provision for heating and ventilation.

A console or in-wall type air conditioner may additionally serve a single adjacent room. Such units employ cabinet or enclosure constructions permitting attachment of an air discharge adapter or duct which extends into the adjacent room. Recreational vehicle air conditioners may also employ a limited amount of ductwork.

These requirements do not cover equipment intended for connection to duct systems for the purpose of providing central cooling, heating, or both.

These products comply with ARL requirements which include applicable sections of the **UL Standard 484 for Room Air Conditioners.** The products are intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70.

Each listed product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, electrical ratings, electrical hazard warnings, and other markings and cautionary warnings as required for specific types of products.

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## Dehumidifiers

This category includes movable, household, self-contained dehumidifiers employing hermetic refrigerant motor-compressors and intended for connection to single-phase, alternating-current (ac) circuits rated not more than 20 amperes, 125 volts or 15 amperes, 208 or 230 volts. The requirements also cover dehumidifiers which incorporate electric air heaters.

These products comply with ARL requirements which include applicable sections of the **UL Standard 474 for Dehumidifiers**. The products are intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70.

Each listed product is marked with the name or trademark of the (manufacturer) or vendor, a distinctive type, style, model or catalog designation, date code, electrical ratings, electrical hazard warnings, and other markings and cautionary warnings as required for specific types of products.

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Only products which properly bear the ARL Listing Mark (Label) are considered Listed by ARL.

A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements of the standard, and that involve a risk of fire, electric shock, or injury to persons, have been evaluated using the appropriate additional component and end-product requirements as determined necessary to maintain the acceptable level of safety as originally anticipated by the intent of the standard. A product whose features, characteristics, components, materials, or systems conflict with specific provisions of the standard have been judged to be in non-compliance with the standard.

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