UL 875

STANDARD FOR SAFETY

Electric Dry-Bath Heaters

UL Standard for Safety for Electric Dry-Bath Heaters, UL 875

Ninth Edition, Dated May 21, 2009

Summary of Topics

This revision to ANSI/UL 875 dated January 4, 2021 includes the withdrawal and replacement of UL 508C with UL 61800-5-1; 16.1.1

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated October 9, 2020.

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UL 875

Standard for Electric Dry-Bath Heaters

Prior to the first edition, the requirements for the products covered by this standard were included in the Standard for Electric Heating Appliances, UL 499.

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Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover electric dry-bath heating equipment and other equipment rated 600 volts or less that is intended to produce a dry-heat environment to be installed in accordance with the National Electrical Code, ANSI/NFPA 70. The relative humidity in the heated environment is in the region of 10 – 25 percent and the purpose of the heated environment (for air temperatures, see Sections 25 and 26) is to promote perspiration in a short time by means of a relatively warm and dry atmosphere. The completed equipment is to be provided with an automatic temperature-regulating control that may be integral with the heater or wall-mounted, with an integral manual-reset limit control, a timer, and any other necessary associated equipment. Electric dry-bath heating equipment and other equipment intended to produce a dry-heat environment may consist of:

a) A heater unit intended for fixed installation in a special room that is built or assembled in the field to comply to the manufacturer's size specifications;

b) A combination of a heater unit and a prefabricated, factory-built rigid room in which the assembled combination may be specified for field installation, or that may be supplied with a power-supply cord and intended to be fastened in place or located in a dedicated space. The room may be arranged so that it can be taken apart for shipment; or

c) A combination of a heater and a rigid cabinet that is constructed to enclose all but the user's head. The unit is provided with a power supply cord and is intended to be fastened in place or located in a dedicated space.

1.2 These requirements do not cover steam-bath heaters, or cable-type radiant-heating equipment, nor any other electric heating equipment or appliances that are covered in separate, individual requirements.

1.3 Throughout these requirements, the term "heater" is used broadly to refer to any heater unit, including its associated control assembly.

1.4 A heater shall employ materials and components throughout that are intended for the particular use and shall be made and finished with the degree of uniformity and grade of workmanship practicable in a well-equipped factory.

1.5 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 General

2.1 Components

Section 2.1 revised and relocated as Section 3A.1.1

2.2 Units of measurement

2.2 or

2.2.2 Unless otherwise indicated, all voltage and current values mentioned in this standard are root-mean-square (rms).

2.3 Undated references

2.3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

3 Glossary

3.1 For the purpose of this standard the following definitions apply.

3.2 CONTROL, AUTOMATIC ACTION – A device in which the transmission and operation of at least one function are produced by initiation which is not the result of manual actuation.

3.3 CONTROL, LIMIT – A protective control, see 3.6

3.4 CONTROL, MANUAL – A device that requires direct human interaction to activate or rest the control.

3.5 CONTROL, OPERATING – A device where the operation of which starts or regulates the appliance during normal operation. A regulating control is an operating control.

3.6 CONTROL, PROTECTIVE – A device where the operation of which is intended to prevent the risk of electric shock, fire, or injury (including thermal burns and hypothermia) to persons during abnormal operation of the appliance. A limit thermostat is a protective control.

3.7 CONTROL, REGULATING – An operating control, see 3.5

3.8 CONTROL, SINGLE OPERATION DEVICE – A Type 1.H manual control, see 3.4 and 3.10.

3.9 CONTROL, TYPE 1.D ACTION – The actuation of a manual control designed so that disconnection can neither be prevented nor inhibited, by any reset mechanism and so that after disconnection, it is not possible to re-close the circuit even momentarily while the excess or fault condition persists.

3.10 CONTROL, TYPE 1.H ACTION – The actuation of a manual control that shall be so designed that the contacts cannot be prevented from opening and which may automatically reset to the closed position if the reset means is held in the reset position. The control shall not reset automatically at any temperature above -35°C (-31°F) with the reset mechanism in the normal position.

3.11 CONTROL, TYPE 2 ACTION – The actuation of an automatic action control for which the manufacturing deviation and the drift of its operating value, operating time, or operating sequence have been declared and tested under this standard.

3.12 CONTROL, TYPE M2 – A manual control that cannot function as an automatically reset device if the reset means is held in the reset or on position.

3.13 SAFETY CRITICAL FUNCTION (SCF) – Control, protection and monitoring functions which are being relied upon to reduce the risk of fire, electric shock, or casualty hazards.

CONSTRUCTION

3A Component Specifications

Section 3A is revised and relocated as Section 3B

3B Component Specifications

3B.1 General

3B.1.1 A component of a product covered by this standard shall:

a) Comply with the requirements for that component as specified in this standard;

b) Be used in accordance with its rating(s) established for the intended conditions of use;

c) Be used within its established use limitations or conditions of acceptability; and

d) Additionally comply with the applicable requirements of this end product standard.

3B.1.2 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

Exception No. 1: A component of a product covered by this standard is not required to comply with a specific component requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product,

b) Is superseded by a requirement in this standard, or

c) Is separately investigated when forming part of another component, provided the component is used within its established ratings and limitations.

Exception No. 2: A component complying with a component standard other than those cited in this standard is acceptable if:

a) The component also complies with the applicable component standard indicated in this standard; or

b) The component standard:

1) Is compatible with the ampacity and overcurrent protection requirements in the National Electrical Code, NFPA 70, where appropriate;

2) Considers long-term thermal properties of polymeric insulating materials in accordance with the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B, and

3) Any use limitations of the other component standard is identified and appropriately accommodated in the end use application. For example, a component used in a household application, but intended for industrial use and complying with the relevant component standard may assume user expertise not common in household applications.

thereof, shall comply additionally with the requirements of the applicable standard(s) that cover devices that provide those functions.

3B.1.4 A component not anticipated by the requirements of this standard, not specifically covered by the component standards of this standard, and that involves a potential risk of electric shock, fire, or personal injury, shall be additionally investigated in accordance with the applicable standard, and shall comply with 3B.1.1 (b) – (d).

3B.1.5 With regard to a component being additionally investigated, reference to construction and performance requirements in another end product standard is appropriate where that standard anticipates normal and abnormal use conditions consistent with the application of this standard.

3B.2 Button or coin cell batteries of lithium technologies

Section 3B.2 deleted

3C Safety Critical Functions

3C.1 Any function involved in the control, protection, and monitoring of safety-related attributes of a unit whereby a loss/malfunction of its functionality would represent an unacceptable risk of fire, electric shock, or casualty hazards would be considered a safety critical function.

3C.2 Electronic circuits that manage a safety critical function (SCF) shall be:

a) Reliable as defined as being able to maintain the SCF in the event of single defined component faults; and

b) Not susceptible to electromagnetic environmental stresses encountered in the anticipated environments of the appliance.

3C.3 Electronic circuits managing safety critical functions shall comply with:

a) Supplement SA, Requirements for the Evaluation of Electronic Circuits; or

b) The Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1, and its Part 2's as specified in this standard. The function shall be considered Class B.

3C.4 Functions specified in Table 3c.1 represent the common safety critical circuit functions of units. It is not intended to represent all possible safety critical functions.

Table 3c.1
Safety critical functions

Function (see 3C.1)	Hazard	Location of parameters and tests
Motor running overload protection	Risk of fire or electric shock	Section 16, Motor-Running Overcurrent Protection
Manual reset temperature limit control, Liquid level controls, Pressure controls	Risk of fire or electric shock	21.1.3
Liquid level controls	Risk of fire or electric shock	Section 21A, Liquid Level Controls
Pressure controls	Risk of fire or electric shock	Section 21B, Pressure Controls

4 Frame and Enclosure

4.1 The frame and enclosure of a heater shall have the strength and rigidity necessary to resist the abuses likely to be encountered during intended service. The degree of resistance inherent in the appliance shall preclude total or partial collapse with the attendant reduction of spacings, loosening or displacement of parts, and other defects that, alone or in combination, constitute an increase in the risk of fire, electric shock, or injury to persons.

4.2 Among the factors taken into consideration when an enclosure is being evaluated for compliance are its:

a) Physical strength;

b) Resistance to impact;

c) Moisture-absorptive properties;

d) Combustibility;

e) Resistance to corrosion;

f) Resistance to distortion at temperatures to which the enclosure may be subjected under conditions of use; and

g) Resistance to ultraviolet light, where applicable.

For a nonmetallic enclosure or part of an enclosure, all these factors are considered with regard to thermal aging.

4.3 A heater shall have provisions for mounting it to the floor, wall, or ceiling. Any fittings, such as brackets, hangers, bolts, or the like, necessary for proper mounting, shall be furnished with the heater together with instructions in accordance with 40.1(d).

4.4 An opening in the bottom of a heater shall not be located below:

a) An electrical part,

b) Wiring, or

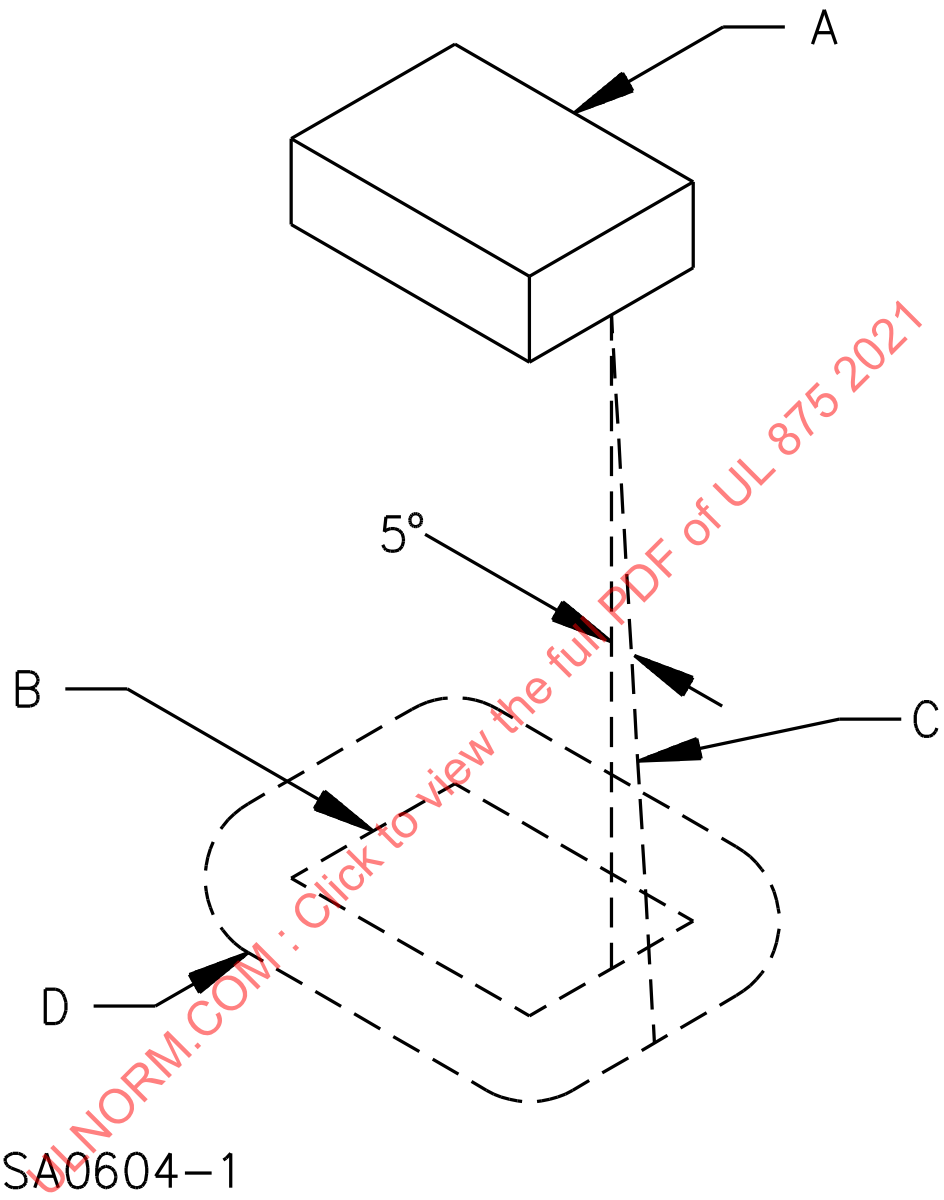
c) A sheath-type heating element

unless a solid, noncombustible protective barrier complying with Figure 4.1 is located between such part, wiring, or element and the supporting surface.

Exception: A barrier is not required under wiring that is provided with insulation having a flame-retardant rating (FR-1).

Figure 4.1

Location and extent of barrier



A – Region to be shielded by barrier. This will consist of the entire component when it is not otherwise shielded, and will consist of the unshielded portion of a component that is partially shielded by the component enclosure or equivalent.

B – Projection of outline of component on horizontal plane.

C – Inclined line that traces out minimum area of barrier. When moving, the line is always:

1) Tangent to the component;

2) 5 degrees from the vertical; and

3) Oriented so that the area traced out on a horizontal plane is maximum.

D – Location (horizontal) and minimum area for barrier. The area is that included inside the line of intersection traced out by the inclined line C and the horizontal plane of the barrier.

4.5 The barrier mentioned in 4.4 shall:

a) Be horizontal,

b) Be located as indicated in Figure 4.1, and

c) Not have an area less than that described in the illustration.

Openings provided in the barrier for drainage, ventilation, and similar purposes shall not permit molten metal, burning insulation, or equivalent parts to fall on combustible material or persons (for ceiling-mounted heaters).

4.6 The structure of the part or of the heater may provide the equivalent of the barrier mentioned in 4.4 when it complies with Figure 4.1.

4.7 The requirement in 4.4 requires use of a barrier of noncombustible material:

a) Under a motor unless one of the following four items applies:

1) The structural parts of the motor or of the heater provide the equivalent of such a barrier;

2) The protection provided with the motor is such that no burning insulation or molten material falls to the surface that supports the heater when the motor is energized under each of the following fault conditions:

i) Main winding opened,

ii) Starting winding opened,

iii) Starting switch short-circuited, and

iv) For a permanent-split-capacitor motor, the capacitor short-circuited (the short circuit is to be applied before the motor is energized, and the rotor is to be locked);

3) The motor is provided with a thermal motor protector (a protective device that is sensitive to both temperature and current) that will restrict the temperature of the motor windings from becoming more than 125°C (257°F) under the maximum load under which the motor will run without causing the protector to cycle and from becoming more than 150°C (302°F) with the rotor of the motor locked; or

4) The motor complies with the requirements for impedance-protected motors.

b) Under wiring, unless it is of the flame-retardant type. Neoprene-, and thermoplastic-insulated wires have been determined to be of this type.

4.8 The requirement in 4.4 also necessitates that a switch, transformer, relay, solenoid, or the like be completely enclosed, unless it can be shown that malfunction of the component is not likely to result in a fire, or unless there are no openings in the bottom of the heater enclosure. An unbaffled opening in the bottom of the heater enclosure is not to be used when it is located directly below field- or factory-made splices or overcurrent protective devices.

Exception: Terminals of a switch, transformer, relay, solenoid, or the like need not be completely enclosed.

4.9 An opening for ventilation provided in the enclosure of a heater or in an externally-mounted co se-

4.10 An opening for ventilation in the enclosure (other than in the bottom) of a heater and an opening associated with the dissipation of heater air from the element shall be provided with one or more baffles that will restrict the emission of flame, molten metal, burning insulation, or the like from the heater.

Exception: In a compartment other than one that houses an overcurrent protective device (such as fuses, circuit breakers, and the like), the baffles are not prohibited from being omitted when:

a) No ventilation opening in a vertical wall, other than one associated with the dissipation of heated air from the elements during intended operation of the heater, is more than 3/8 inch (9.5 mm) wide or

b) The heater is constructed so that it complies with the intent of these requirements, as shown by investigation.

4.11 The minimum thickness of cast- and sheet-metal portions of the enclosure shall be as indicated in Table 4.1.

Table 4.1
Minimum thicknesses of enclosure metal

Metal	At small, flat unreinforced surfaces and at surfaces that are reinforced by curving, ribbing, and similar reinforcement (or are otherwise of a shape or size) to ensure adequate physical strength,		At relatively large, flat unreinforced surfaces,	
	mm	(inch)	mm	(inch)
Die-cast	1.2	3/64	2.0	5/64
Cast malleable iron	1.6	1/16	2.4	3/32
Other cast	2.4	3/32	3.2	1/8
Uncoated sheet steel	0.66[a]	0.026[a]	–	–
Galvanized sheet steel	0.74[a]	0.029[a]	–	–
Nonferrous sheet	0.91[a]	0.036[a]	–	–

[a] Thinner sheet metal is not prohibited from being used when determined to be equivalent after evaluation under considerations such as those mentioned in 4.2 and 4.12.

4.12 In addition to being considered with reference to the factors mentioned in 4.2, an enclosure of sheet metal is to be evaluated with regard to its size and shape, the thickness of the metal, and its compliance for the particular application, considering the intended use of the heater.

4.13 Sheet metal to which a wiring system is to be connected in the field shall have a thickness not less than:

a) 0.81 mm (0.032 inch) for uncoated steel;

b) 0.86 mm (0.034 inch) for galvanized steel; and

c) 1.14 mm (0.045 inch) when nonferrous.

4.14 A tapped hole for the attachment of threaded rigid conduit shall be provided with:

a) An end stop, or shall be located so that a standard bushing may be attached to the end of conduit and

at

same as the internal diameter of a standard bushing to provide resistance for the conductors equivalent to that provided by such a bushing.

4.15 An electrical part of a heater shall be located or enclosed so that resistance to unintentional contact with live parts will be provided.

4.16 In determining when an opening in an enclosure is to be used, consideration is to be given to the proximity of live parts and the possibility of the emission of burning insulation, molten metal, and the like through the opening.

4.17 The probe illustrated in Figure 4.2 shall be applied to any depth that the opening will permit and shall be rotated or angled before, during, and after insertion through the opening to any position that is necessary to try to contact an uninsulated live part or film-coated wire. The probe shall be applied in the above-described manner and in any possible configuration; and, when necessary, the configuration shall be changed after insertion through the opening. Configuration refers to positioning of the jointed portions of the probe.