UL 896

STANDARD FOR SAFETY

Oil-Burning Stoves

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UL Standard for Safety for Oil-Burning Stoves, UL 896

Fifth Edition, Dated July 29, 1993

Summary of Topics

This revision to UL 896 is being issued to remove the reference to the withdrawal date of UL 873.

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. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

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July 29, 1993

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The most recent designation of ANSI/UL 896 as a Reaffirmed American National Standard (ANS) occurred on August 22, 2012 ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

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 http://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements apply to oil-burning flue-connected room heaters and ranges as defined herein. They may be used where a competent attendant will not be constantly on duty in the room where the appliance is located, while the appliance is in operation. They are required to be equipped with automatic primary safety controls to prevent abnormal discharge of oil at the burner in case of ignition failure or flame failure. They are not intended for use in spaces in which flammable vapors or gases may be present.

1.2 Requirements for the installation and use of oil-burning equipment are included in the Standard of the National Fire Projection Association for the Installation of Oil-Burning Equipment, NFPA No. 31.

1.3 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, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements to determine that the level of safety as originally anticipated by the intent of this Standard is maintained. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this Standard shall not be judged to comply with this Standard. Where appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this Standard.

1.3 revised November 17, 1999

2 Components

2.1 Components of an oil burner, except as specified herein, or a gas burner as well as burner and stove accessories such as constant-level oil valves, metering valves, fire pots, etc.; electrical components and materials such as attachment plugs, industrial control equipment, switches, transformers, electrically operated valves, wires, etc.; and other components or parts shall comply with the requirements for those components, except that such requirements may be modified if appropriate for the particular application.

3 Units of Measurement

3.1 If a value for measurement is followed by a value in other units in parentheses, the second value may be only approximate. The first stated value is the requirement.

4 Glossary

4.1 AIR SHUTTER – An adjustable device for varying the size of the air inlet or inlets regulating primary or secondary air.

4.2 ANTIFLOODING DEVICE – A primary safety control which causes the fuel flow to be shut off upon a rise in fuel level or upon receiving excess fuel, and which operates before the hazardous discharge of fuel can occur.

4.3 APPLIANCE FLUE – The flue passages within the appliance.

4.4 AUTOMATICALLY LIGHTED APPLIANCE – An appliance in which fuel to the main burner is normally turned on and ignited automatically.

4.5 BAFFLE – An object placed in an appliance to direct or to retard the flow of air of flue gases.

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4.6 BASE – The main supporting frame or structure of an assembly.

4.7 BURNER – A device for the final conveyance of fuel or a mixture of fuel and air to the combustion zone.

4.8 BURNER, MECHANICAL-ATOMIZING TYPE – A power-operated burner which prepares and delivers the oil and all or part of the air by mechanical process in controllable quantities for combustion. Some examples are air atomizing, high- and low-pressure atomizing, horizontal rotary, vertical rotary atomizing, and vertical rotary wall-frame burners.

4.9 BURNER, MECHANICAL-DRAFT TYPE – A burner which includes a power-driven fan, blower, or other mechanism as the principal means for supplying air for combustion.

4.10 BURNER, NATURAL-DRAFT TYPE – A burner which depends principally upon the natural draft created in the flue to induce into the burner the air required for combustion.

4.11 BURNER, VAPORIZING TYPE – A burner consisting of an oil-vaporizing bowl or other receptacle to which liquid fuel may be fed in controllable quantities; the heat of combustion being used to vaporize the fuel, with provision for admitting air and mixing it with the oil vapor in combustible proportions.

4.12 CASING – An enclosure forming the outside of the appliance, no parts of which are likely to be subjected to intense heat.

4.13 COMBUSTIBLE CONSTRUCTION – As pertaining to materials adjacent to or in contact with heat producing appliances and flue pipes, steam pipes, and warm air ducts connected thereto, combustible construction shall mean structures made of or surfaced with wood, compressed paper and plant fibers, or other material that will ignite and burn, whether plastered or unplastered. Plastered construction having combustible supports, regardless of the type of lath employed, and gypsum or other wallboard surfaced with combustible material, are classified as combustible construction.

4.14 COMBUSTION – As used herein, the rapid oxidation of fuel accompanied by the production of heat, or heat and light. Complete combustion of a fuel is possible only in the presence of an adequate supply of oxygen.

4.15 COMBUSTION CHAMBER – The portion of an appliance within which combustion occurs and which is usually part of the heat exchanger.

4.16 CONSTANT-LEVEL VALVE – A device for maintaining within a reservoir a constant level of fuel for delivery to the burner.

4.17 CONTROL – A device designed to regulate the fuel, air, water, or electrical supply to the controlled equipment. It may be automatic, semi-automatic, or manual.

4.18 CONTROL, LIMIT – An automatic safety control responsive to changes in liquid level, pressure, or temperature; for limiting the operation of the controlled equipment.

4.19 CONTROL, PRIMARY SAFETY – The automatic safety control intended to prevent abnormal discharge of oil at the burner in case of ignition failure or flame failure.

4.20 CONTROL, SAFETY – See Safety Control.

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4.21 CONTROL, SAFETY COMBUSTION – A primary safety control responsive directly to flame properties; sensing the presence of flame and causing fuel to be shut off in event of flame failure.

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4.22 DAMPER – A valve or plate for regulating draft or flow of flue gases. A damper is generally considered as being located on the downstream side of the combustion chamber, usually in a flue passage of the appliance or in the flue pipe.

4.23 DAMPER, AUTOMATICALLY OPERATED – A damper operated by an automatic control.

4.24 DAMPER, MANUALLY OPERATED – An adjustable damper manually set and locked in the desired position.

4.25 DRAFT REGULATOR – A device which functions to maintain a desired draft in the appliance by automatically reducing the chimney draft to the desired value.

4.26 ELECTRICAL CIRCUITS –

a) HIGH-VOLTAGE CIRCUIT – A circuit involving a potential of not more than 600 volts and having circuit characteristics in excess of those of a low-voltage circuit.

b) LOW-VOLTAGE CIRCUIT – A circuit involving a potential of not more than 30 volts and supplied by a primary battery or by a standard Class 2 transformer or other suitable transforming device, or by a suitable combination of transformer and fixed impedance having output characteristics in compliance with what is required for a Class 2 transformer.

c) A circuit derived from a source of supply classified as a high-voltage circuit, by connecting resistance in series with the supply circuit as a means of limiting the voltage and current, is not considered to be a low-voltage circuit as described in item (b).

d) SAFETY CONTROL CIRCUIT – A circuit involving one or more safety controls, in which failure due to grounding, opening, or shorting of any part of the circuit can cause unsafe operation of the controlled equipment or can introduce a direct fire or life hazard.

4.27 EXCESS AIR – Air which passes through the combustion area and the appliance flues in excess of that which is theoretically required for complete combustion.

4.28 FLUE COLLAR – That portion of an appliance designed for attachment of the flue pipe.

4.29 FLUE GASES – Combustion products and excess air.

4.30 FLUE PIPE – The conduit connecting the heating appliance with the vertical flue or chimney.

4.31 FUEL OIL – Any hydrocarbon oil as defined by Commercial Standard CS12 or ASTM D396.

4.32 FULL DRAIN – As applied to tanks, means the tank is emptied through its normal feed outlet at the bottom of the tank.

4.33 HEATER, CIRCULATING – A room heater designed to convert energy in the fuel to convected heat by the circulation of air heated by contact with the heating surfaces. Stoves with openings in the outer jacket to permit direct radiation from the heating surface are classified as radiant type from a safety point of view.

4.34 HEATER, RADIANT – A room heater designed primarily to convert energy in the fuel to radiant heat.

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4.35 HEATER, ROOM – A stove for the direct heating of the space in and adjacent to that in which the device is located.

4.36 HEATING SURFACES – All surfaces which transmit heat directly from flame or flue gases to the medium to be heated.

4.37 INDIRECT-FIRED APPLIANCE – An appliance designed so that combustion products or flue gases are not mixed in the appliance with the medium (i.e., air) to be heated; hence is provided with a flue collar.

4.38 LIMIT CONTROL – See Control, Limit.

4.39 LINER – See Radiation Shield.

4.40 MANUALLY LIGHTED APPLIANCE – An appliance in which fuel to the main burner is turned on only by hand and ignited under supervision.

4.41 OIL-BURNING STOVE – A self-contained, free standing, above-the-floor flue-connected appliance equipped with one or more oil burners. It may be equipped with an integral oil tank or may be designed for connection to a separate oil supply tank.

4.42 PILOT – A flame which is utilized to ignite the fuel at the main burner or burners.

4.43 PRIMARY AIR – The air introduced into a burner and which mixes with the fuel before it reaches the ignition zone.

4.44 RADIATION SHIELD – A separate panel or panels interposed between heating surfaces and adjacent objects to reduce heat transmission by radiation.

4.45 RADIATOR – Auxiliary heat transfer surfaces within the casing, connected between the combustion chamber and the flue collar.

4.46 RANGE – A stove intended primarily for cooking.

4.47 READILY ACCESSIBLE – Capable of being reached easily and quickly for operation, adjustment, and inspection.

4.48 SAFETY CONTROL – Automatic controls, including relays, switches, and other auxiliary equipment used in conjunction therewith to form a safety control system, which are intended to prevent unsafe operation of the controlled equipment.

4.49 SECONDARY AIR – The air externally supplied to the flame at or beyond the point of ignition.

4.50 SMOKE PIPE – See Flue Pipe.

4.51 STOVE – See Oil-Burning Stove.

4.52 SUMP – The receptacle employed with a vacuum tank.

4.53 TANK, GRAVITY – A fuel tank from which the oil is delivered directly to the burner by gravity.

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4.54 TANK, VACUUM – A fuel tank which maintains a definite level of oil in a sump or similar receptacle by barometric feed. Fuel is delivered from the sump to the burner by gravity.

4.55 THERMOSTAT – An automatic control actuated by temperature change to maintain temperatures between predetermined limits.

4.56 TOOLS, SPECIAL – Those tools that are not available on the open market.

4.57 VALVE, MANUAL OIL SHUT-OFF – A manually operated valve in the oil line for the purpose of completely turning on or shutting off the oil supply to the burner.

4.58 VALVE, OIL CONTROL – An automatically or manually operated device consisting essentially of an oil valve for controlling the fuel supply to a burner.

a) METERING (REGULATING) VALVE – An oil control valve for regulating burner input.

b) SAFETY VALVE – A normally closed valve of the on and off type, without any bypass to the burner, that is actuated by a safety control or by an emergency device.

5 Installation and Operating Instructions

5.1 A copy of the installation and operating instructions intended to accompany each oil-burning stove or component, or equivalent information, is to be used as a guide in the examination and test of the oil-burning stove or component. For this purpose a printed edition is not required.

5.2 The instructions should include such directions and information as deemed by the manufacturer to be adequate for attaining proper and safe installation, maintenance, and use of the appliance.

5.3 Lighting instructions shall be provided on all stoves. The following wording shall be included as a part of the lighting instructions or on a separate plate which will be readily noted when reading the lighting instructions:

"Due to High Surface Temperatures, Keep Children, Clothing, And Furniture Away."

CONSTRUCTION

6 Assembly

6.1 Each stove shall include all the essential components necessary for its normal function when installed as intended. The components shall be planned for assembly as a unit.

6.2 The various parts shall be constructed and assembled in accordance with these requirements in a manner to ensure strength, rigidity, and durability.

6.3 The various parts of a stove shall be properly assembled or jointed. Soft solder shall not be used on any fuel-handling parts if melting of the solder may allow unsafe leakage of fuel. Soft-soldered joints, where permitted, shall be made mechanically secure before soldering, except as permitted by 27.11.

6.4 The stove should be completely assembled by the manufacturer before shipment from the factory.

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6.5 A stove, if not assembled by the manufacturer as a unit, shall be arranged in as few subassemblies as practicable, capable of being incorporated readily into the final assembly without requiring alteration, cutting, drilling, threading, welding, or similar tasks by the installer. Two or more subassemblies, which must bear a definite relationship to each other for the proper and safe installation or operation of the stove, shall be factory assembled in such a manner that this relationship will be maintained securely and permanently, except that the valve, sump, or tank assembly may be furnished as a separate subassembly provided each is arranged and constructed to allow it to be securely joined to the stove, without need for alteration or adjustment, and only in the correct predetermined position. Adequate and specific instructions for assembly shall be furnished with each stove not shipped as a single unit.

6.6 A constant-level valve assembly shall be rigidly and substantially mounted independently of the fuel piping. A constant-level valve or sump assembly, not enclosed within the stove casing nor otherwise adequately protected, shall withstand a load of 100 pounds when tested as prescribed in 6.7.

6.7 The valve or sump assembly is to be joined to the stove as intended and fuel lines integral with the stove attached. A 100 pound weight or load is to be applied uniformly without impact to the main body of the assembly. Successive applications of the load are to be made vertically and horizontally in any direction. Upon removal of the load after each application, the position of the assembly with respect to the stove is to be checked. The position of the assembly is not to be altered by more than 3 degrees in any horizontal or vertical plane.

6.8 When the stove is level, the minimum distance between the designed maximum normal oil level maintained by the oil control device and the level of the lowest point at which overflow may occur shall be not less than 3/4 inch.

6.9 Each stove shall afford convenient operation by the user.

7 Enclosure

7.1 A stove shall be constructed of suitable materials of sufficient strength and durability to ensure safe and reliable service of the parts and the assembly for an extended period of service. Parts shall not sag, distort, melt, oxidize, or show leakage of fuel during any of the tests specified herein.

7.2 Fuel-confining or operating parts of a stove, except as indicated in 7.3, if failure of the part will allow unsafe leakage of fuel, or unsafe operation, or prevent a safety device from functioning, shall be made of material having a melting point (solidus temperature) of not less than 950°F (510°C) and a tensile strength of not less than 10,000 pounds per square inch (psi) at 400°F (204°C).

7.3 Fuel-confining parts not conforming to 7.3 may be employed if suitable means, such as a fusible link valve, is included in the assembly of the stove so as to shut off the fuel supply in the event of excessive temperature or fire in the vicinity of such parts.

7.4 A stove shall be built to allow cleaning of parts such as interior surfaces of vaporizing burners, heating surfaces in contact with combustion products, oil inlet pipes, and oil strainers without major dismantling of the stove or removal of parts specified in 6.5 to be factory assembled.

7.5 The removal of access panels, burners, caps, plugs, etc., specifically designed to permit ready removal and replacement for servicing, and the detachment of the flue pipe are not be considered major dismantling as defined by 7.4.

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7.6 Sufficient and reasonable accessibility shall be afforded for cleaning, inspection, repair, and replacement of all burners, controls, and safety devices.

7.7 The disposition of removable parts in the assembly shall be such that their restoration, following removal for cleaning, will not necessitate realignment to secure their proper relationship with other parts of the assembly.

7.8 Any exposed parts of edges which might reasonably be brought in contact with the hand during normal adjustment or usage shall be smooth and rounded.

8 Baffles

8.1 A baffle in a flue-gas passage or otherwise exposed to combustion products shall be constructed and disposed in a manner to provide for reasonable life and shall be fixed in position. It shall be made of material not lighter than that required for the combustion chamber. See 12.1 and Table 12.1.

8.2 A baffle in flue-gas passage or otherwise exposed to combustion products, the failure of which would not cause unsafe operation, which is readily observable and readily replaceable without dismantling of the appliance, need not have the durability required for extended service as required by 8.1.

8.3 A flue baffle shall be accessible for cleaning. A flue baffle which is removable for cleaning shall be of such design as will facilitate its removal and permit replacement only in a safe position.

9 Base

9.1 A base or frame on which burner and stove parts are mounted shall consist of noncombustible material and be strong and durable.

9.2 A stove intended for use with a separate fuel tank shall be provided with facilities to permit ready attachment of the stove securely to the floor. When special bolts, screws, or other parts are needed for that purpose, they shall be furnished with each stove.

9.3 Each base or frame shall incorporate suitable provision for installing the stove in a secure manner. Adjusting means for leveling and alignment shall be included for stoves employing sleeve-type burners.

9.4 It is recommended that oil-burning stoves employing pot-type burners also be supplied with a leveling provision.

10 Burners

10.1 When sheet metal is used in the construction of vaporizing burners for stoves, the thickness shall be such as to assure strength, rigidity, durability, resistance to corrosion, and other physical properties equivalent to No. 20 gage (0.032 in.) carbon steel.

10.2 A burner shall be secured so that it will not twist, slide, or drop out of position.

10.3 A vaporizing burner shall be designed and installed so that the oil-inlet piping to the burner may be readily cleaned. A stuffing box for a cleaning rod, if used, shall conform to Section 25, Stuffing Boxes.

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11 Casing

11.1 The outer casing or jacket shall be made of steel or other material of equivalent strength and durability so that it is not likely to be damaged by handling in shipment, installation, and use.

12 Combustion Chamber

12.1 A combustion chamber and a radiator shall be constructed of cast-iron, sheet steel, or other suitable material. Carbon sheet steel, if used, shall be not lighter than indicated in Table 12.1.

Table 12.1
Gage requirements for carbon steel combustion chambers

Maximum rated input, gallons per 24 hours	Minimum gage
8	24
11	22
over 11	20

12.2 A combustion chamber shall be constructed to provide accessibility for servicing and cleaning within the chamber and the burner.

12.3 Refractory material, when used, shall be secured in place and shall be accessible for replacement.

13 Safety Control

13.1 A stove shall be equipped to prevent abnormal discharge of oil at the burner in case of ignition failure or premature flame extinguishment.

13.2 A stove equipped with a vaporizing burner may be provided with a constant-level valve and antiflooding device or with a barometric tank and sump assembly arranged to maintain a level of oil conforming to 6.8.

13.3 A stove not equipped to provide safe automatic relighting shall be arranged to require manual restart after any control functions to extinguish the burner flame, and following restoration of an interrupted power supply when interruption of the power supply causes flame extinguishment.

14 Damper

14.1 A damper located in a passage for combustion products shall not close off more than 80 percent of the internal cross-sectional area of such passage.

15 Disposal of Combustion Products

15.1 The design of a stove shall not permit the products of combustion to discharge into the room during normal operation.

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16 Draft Regulator

16.1 A stove equipped with a natural-draft burner shall be provided with a draft regulator designed to maintain the draft value for which the stove is intended to operate.

17 Fan Housing and Air Ducts

17.1 A fan housing and an air duct shall be made of noncombustible material and be strong and durable. Sheet metal shall be acceptably protected to resist corrosion.

18 Fittings and Piping

18.1 Pipe shall be standard full weight wrought iron or steel, or iron-pipe-size brass or copper pipe. Substantial malleable iron, steel, brass, or copper pipe fittings shall be used with pipe. Unions, if used, shall be the ground-joint type or the equivalent.

18.2 Tubing incorporated in the assembly of the stove at the factory shall be arranged to avoid being mechanically injured, such as by closely following the contour of the assembly. Seamless drawn aluminum or copper tubing employed in the fabrication of factory assembled equipment shall have a wall thickness in accordance with Table 18.1.

Table 18.1
Aluminum and copper tubing

Outside diameter, inches	Wall thickness, inches	Wall tolerance, plus or minus, inches
1/4	0.030	0.0035
5/16	0.030	0.0035
3/8	0.030	0.0035
1/2	0.035	0.0035
5/8	0.040	0.0035
3/4	0.042	0.0035

18.3 Steel tubing of the seamless, brazed, or welded type employed in the fabrication of factory assembled equipment shall have a wall thickness of not less than that shown in Table 18.2.

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