UL 1100

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Alcohol and Kerosene Cooking Appliances for Marine Use

Underwriters Laboratories Inc. (UL)
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UL Standard for Safety for Alcohol and Kerosene Cooking Appliances for Marine Use, UL 1100

Second Edition, Dated April 5, 1999

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New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

This Standard consists of pages dated as shown in the following checklist:

Page	Date
1-18	April 5, 1999

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An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction which conflict with specific requirements of the Standard cannot be judged to comply with the Standard. A product employing materials or having forms of construction not addressed by this Standard may be examined and tested according to the intent of the requirements and, if found to meet the intent of this Standard, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

1.1 The requirements in this standard apply to the construction and performance characteristics of solidified fuel cooking appliances for use on boats, including counter-top assemblies, insert surface assemblies, insert ovens, and ranges (surface cooking units and ovens included in the one appliance).

1.2 Alcohol and kerosene fueled cooking appliances covered in this standard are intended to be installed in accordance with the applicable standards of the American Boat and Yacht Council, and with the Fire Protection Standard for Pleasure and Commercial Motor Craft, NFPA 302, and with the Code of Federal Regulations (CFR), Title 33.

1.3 Alcohol and kerosene fueled cooking appliances covered in the Standard are for connection to gravity feed fuel tanks, integral fuel tanks, and remote fuel tanks that are pressurized.

1.4 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 as determined necessary to maintain the acceptable 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 cannot be judged to comply with this standard. Where considered appropriate, 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 Units of measurement

2.1.1 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.

2.2 Terminology

2.2.1 The term ″cooking appliance″ refers to all solidified fuel cooking appliances.

3 Components

3.1 Except as indicated in 3.2, a component of a cooking appliance covered by this standard shall comply with the requirements for that component.

3.2 A component need not comply with a specific requirement that:

a) Involves a feature or characteristic not needed in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

3.3 A component shall be used in accordance with its recognized rating established for the intended conditions of use.

3.4 Specific components are recognized as being 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 for which they have been recognized.

CONSTRUCTION

4 General

4.1 The maximum designed operating pressure of a cooking appliance shall not exceed 50 psig (344 kPa).

4.2 Means shall be provided for securely mounting a cooking appliance. The mounting means shall be of a type and located so that proper installation can be made using normal hand tools (any standard wrench or screwdriver) without dismantling any major part of the cooking appliance.

4.3 All cooking surfaces shall be enclosed by a guard rail, a lip, or have equivalent means of holding cooking utensils in place during conditions of pitch and roll.

4.4 A removable or accessible liquid-tight metal drip pan(s), at least 3/4 inch (19.1 mm) deep and of adequate area to contain spillage, shall be provided under all burner assemblies.

4.5 Ventilating and air supply openings shall be provided in only those surfaces which will be open to the free circulation of air after the cooking appliance is installed.

4.6 Heat-insulating material shall be noncombustible and shall not make direct contact with uninsulated electrical parts.

4.7 A visual examination of the cooking appliance shall be made to determine whether any defect in the construction materials in the assembly could impair the intended use of the cooking appliance.

4.8 Ovens shall be provided with a means of preventing opening due to force from sliding food and utensils during conditions of pitch and roll, as described in 16.1(g).

4.9 Automatic glow plugs or continuously lighted pilot lights are not acceptable for use in stoves.

Exception No. 1: A glow plug that operates only when the stove control is operated is acceptable.

Exception No. 2: Automatic glow plugs and continuously lighted pilot lights are acceptable for use in stoves using sealed combustion chambers.

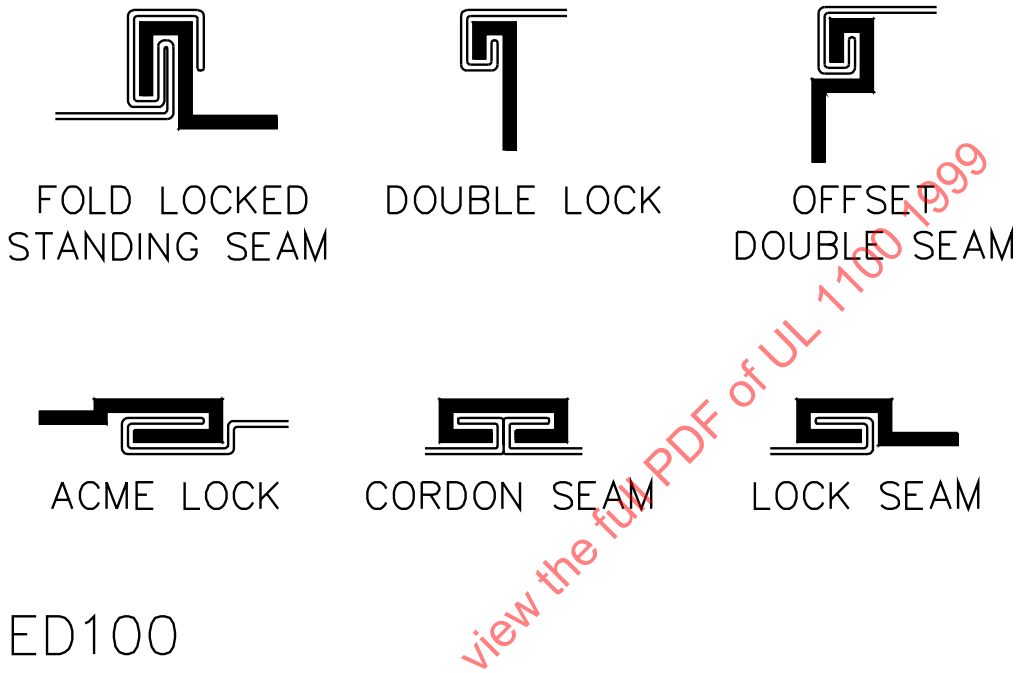
5 Frame and Enclosure

5.1 An external edge, projection, and corner shall be smooth, rounded, and not sufficiently sharp to cause a laceration injury in intended use and maintenance of the cooking appliance.

5.2 The frame and its components shall be rigidly constructed of noncombustible materials acceptable for the maximum temperatures, stresses, and operating conditions likely to be encountered in service. The material weights and the methods of mounting components and joints shall be such that all parts will maintain a fixed relationship during the normal service life of the cooking appliance.

5.3 All joints of heating surfaces shall be reasonably tight and substantial, by being bolted, welded, lock-seamed, riveted, etc. A joint shall not depend primarily on cement for tightness. A slip or lap joint shall not depend solely upon friction of the joint itself for strength. Examples of acceptable lock-seamed joints are shown in Figure 5.1.

Figure 5.1
Types of acceptable lock seams



5.4 A cooking appliance shall be constructed to provide access to all operating parts for normal servicing.

6 Operating Controls

6.1 An operating control, including service handle, shall be readily accessible from the front face and shall be made of a material that will not be adversely affected when subjected to increased temperatures, as indicated in Table 18.1.

6.2 An operating control valvefor a burner shall:

a) Rotate in a clockwise direction to close;

b) Be secured so as not to back out due to vibration and shock conditions and other conditions likely to occur; and

c) Be provided with a positive means to prevent control and knob removal.

7 Burner Assembly

7.1 A burner and burner generator manifold shall be positioned in the stove frame so that the burner flame cannot be extinguished by cooking utensils placed over the burner.

7.2 An oven burner or other normally concealed burner shall have a convenient means for visually sighting the flame from outside the cooking appliance while in operation.

7.3 A priming trough, if used, shall be secured so that it will maintain a fixed relationship with the burner. The proper liquid level for priming shall be made obvious by the construction of or the marking of the priming trough and shall be specifically covered in the operating instructions. The construction of the priming trough shall be such that the surface area of fuel, the fuel quantity and the positioning of the trough will reduce the likelihood of flare-up during the priming operation. Clearance or other means shall be provided to permit lighting the burner with a 1-1/2 inch (38.1 mm) long match.

7.4 The burner and fuel supply arrangement shall not be affected by pitch or roll conditions so as to twist, slide, or drop out of position while in service. Bubble and wick type burners shall not be used.

8 Fuel Tank Assembly

8.1 All tanks shall be metallic.

8.2 Fuel lines and fittings shall be of the type acceptable for the fuel intended. The fittings shall comply with the Standard for Tube Fittings for Flammable and Combustible Fluids, Refrigeration Service and Marine Use, UL 109, and flexible fuel lines shall comply with the Standard for Marine Flexible Fuel Line Hose, UL 1114.

8.3 All fuel tanks shall be capable of withstanding an internal hydrostatic pressure of 3 psig (21 kPa), as determined in 15.4, and shall be limited to a capacity of 2 gallons (7.5 L) of fuel.

8.4 A shut-off valve shall comply with the Standard for Marine Manually Operated Shut-Off Valves for Flamable Liquids, UL 1106. Valves not directly connected to the tank spud shall be provided with means for mounting.

8.5 An integral or separate fuel tank shall be constructed of metal or metal alloy resistant to corrosion, (see Section 11). Tank seams and connections shall be welded or brazed.

8.6 An integral or remote tank shall be so located or shielded from the heat generated by the cooking appliance so the internal pressure of the tank will not be adversely affected. A tank shall comply with the Hydrostatic Pressure Test, Section 15.

8.7 A fill opening of a pressure tank shall be provided with a seal tube which limits the liquid capacity of the tank and provides adequate air space. The fill opening shall be at least 1/2 inch (12.7 mm) in diameter. The location of the fill opening shall permit filling with a funnel from a 1 gallon (3.8 L) fuel can without spillage.

8.8 A fill cap shall be constructed so that the pressure in the tank will be released before the cap can be completely removed.

8.9 A pressure tank shall be provided with an acceptable pressure gage and/or relief valve. The relief valve shall be set to operate under a pressure no higher than 60 psi (413 kPa), and be constructed and located so as to not create a risk of injury to persons by the relief of pressure during operation.

9 Gimbaled Units

9.1 Gimbals, if provided, shall comply with the following:

a) The relationship of the vertical center of gravity and the gimbal pivot points shall be such that the cooking surface will remain substantially level under any likely conditions of loading and operation in service. If free swing of the appliance is limited, an acceptable means shall be provided to preclude sudden impact against stops.

b) The fuel system of gimbaled units shall allow the cooking appliance to swing freely within the limits of the gimbals without imposing undue strain on flexible fuel lines and used with the tanks.

c) Means shall be provided to prevent movement of the cooking appliance within the gimbals when the unit is not in use. A lock pin or similar means is acceptable for this purpose.

10 Electrical Components

10.1 Electric wiring and accessories which are integral parts of a cooking appliance shall comply with the requirements in the Standard for Commercial Electric Cooking Appliances, UL 197.

10.2 If electrical connections are made to gimbaled cooking appliances, these connections shall be made in such a manner as to prevent shorting, chafing, or breaking of electrical conductors. These electrical connections shall not interfere with the movement of the appliance within the gimbals.

11 Protection Against Corrosion

11.1 Iron and steel parts shall be protected against corrosion by enameling, galvanizing, zinc or cadmium plating, or other equivalent means. The composition of metallic alloys for structural parts shall provide corrosion resistance at least equivalent to stainless steel alloy 410.

11.2 Metal combinations shall be galvanically compatible.

11.3 A material not known to provide acceptable resistance to corrosion, dezincification resistance, and galvanic compatibility between parts shall be subjected to the Salt Spray Corrosion Test, Section 21.

11.4 A brass fitting of a fuel system shall have less than 15 percent zinc content. If the zinc-content exceeds 15 percent, the fitting shall comply with the 10-Day Moist Ammonia Air Stress Cracking Test, Section 20.

PERFORMANCE

12 General

12.1 The same sample of a cooking appliance shall be used for each test specified in Sections 13 – 21 and shall comply with the requirements therein.

12.2 If non-integral tanks and valves are supplied as part of the cooking appliance, they shall be subjected to all of the applicable tests.

13 Vibration Test

13.1 A cooking appliance shall function as intended without increasing the risk of uncontrolled flame or injury to persons following the vibration conditioning specified in 13.2 and 13.3. Also the burner controls shall not vibrate to an open position.

Exception: A cooking appliance marked in accordance with the requirement in 23.4 need not be subjected to the Vibration Test.

13.2 The sample specified in 13.1, including all necessary hardware specified in the manufacturer's instructions, is to be rigidly mounted directly to the surface of a vibration machine in its normal operating position.

13.3 The assembly specified in 13.2 is then to be subjected to variable frequency vibration along each of three rectilinear orientation axes (horizontal, lateral, and vertical) for 4 hours in each plane (12 hours total) at a peak-to-peak amplitude of 0.015 ±0.001 inches (0.38 ±0.025 mm). The frequency of vibration is to be continuously varied, at a uniform rate, from 10 to 60 to 10 Hz every 4 minutes.

13.4 The cooking appliance is to be operated as intended for the last 10 minutes in each plane of vibration.

14 Shock Test

14.1 The same cooking appliance used for the Vibration Test, Section 13, shall function as intended without increasing the risk of uncontrolled flame or injury to persons following the conditioning specified in 14.2 – 14.4.

Exception: A cooking appliance marked in accordance with the requirement in 23.4 need not be subjected to the Shock Test.

14.2 The cooking appliance is to be mounted on a shock machine in the same manner as described in 13.2. The sample is to be subjected to 1000 shock impacts of 10 g acceleration (98 m/s^2) and having a shock duration of 20 – 25 milliseconds as measured at the base of the half-sine shock envelope.

14.3 The machine used for this conditioning is to be of the automatic cycling type capable of producing a half-sine shock pulse at the acceleration level and duration specified in 14.2. The acceleration and shock pulse duration is to be measured by a piezoelectric accelerometer, or other measuring device with equivalent accuracy, mounted on the test machine platform on an axis parallel to the axis of motion.

14.4 The test sample is to be mounted so that the center of gravity of the sample is as close as possible to the geometric center of the machine platform.

15 Hydrostatic Pressure Test

15.1 Integral or remote pressure tanks and fuel systems or gravity tanks shall withstand a hydrostatic pressure in accordance with 15.2 – 15.4, as applicable, without increasing the risk of explosion. The tank and system shall show no signs of leakage or permanent deformation

15.2 An integral pressure fuel tank is to be subjected to an internal pressure of four times the relief valve setting or 200 psi (1380 kPa), whichever is greater, for five minutes.

15.3 A remote pressure fuel tank that is provided with the cooking appliance is to be subjected to an internal pressure of four times the relief valve setting or 100 psi (690 kPa), whichever is greater, for five minutes.

15.4 A gravity tank is to be subjected to an internal hydrostatic pressure of 3 psig (21 kPa) for five minutes.

15.5 While pressurized, soap or detergent water shall be brush-applied to all tank seams and fittings, and the tank is to be examined for leakage.

16 Operation Test

16.1 General

16.1.1 A cooking appliance is to be subjected to the following operation tests:

a) With the tanks filled, the burners primed and set in operation in accordance with the manufacturer's operating instructions, the controls are to be checked:

1) For proper operation by adjusting the flame from the lowest position to maximum output; and

2) For verification that the controls can not be backed out inadvertently.

The cooking appliance is then to be allowed to cool.

b) The priming cups are then to be filled to capacity or marked capacity and ignited to simulate over priming. There shall be no physical damage to the cooking appliance.

c) With the cooking appliance operating at capacity, 2 quart and 5 quart pots of water, uncovered and filled to the brim, are to be placed on the surface burners, and a 5 quart uncovered pot of water is to be placed in the oven, if applicable. The water is to boil over for a period of five minutes. There shall be no physical damage to the cooking appliance or an increase in the risk of injury to persons.

d) For ovens, a noncombustible, heat-absorbing test mass of the largest size that will fit is to be placed in the oven operated at 350°F (177°C) or hotter for the duration of one filling of the recommended fuel tank. There shall be no physical damage to the cooking appliance.

e) The effectiveness of the guard rails, or equivalent provisions for utensil retention, is to be checked by the following. The guard rails, or equivalent means, shall confine the cooking utensils within the guard rails.

1) A smooth bottom, specially weighted cooking utensil is to be placed on each burner. These utensils are to have a two quart (1.9 L) capacity and be 6 pounds (2.7 kg) in total weight. See 18.2.1.2 for more details on the utensil configuration.

2) The cooking appliance is to be rocked through an arc of 60 degrees (30 degrees each side of the vertical) at a rate of approximately one cycle every 3 to 4 seconds for 30 seconds. For gimbal mounted appliances, the arc is to be increased to 90 degrees (45 degrees each side of the vertical).

3) This procedure is to be repeated for the horizontal plane.

f) When subjected to maximum operating conditions for 1 hour, heat transfer from the burners to an appliance provided with integral or remote tanks shall not cause the internal pressure in the fuel tank to exceed 60 psi (415 kPa) with the relief valve made inoperable.

g) The effectiveness of the oven door closure required in 4.8 is to be checked during the pitch and roll test of (e). The oven door shall remain closed during the test.

16.2 Relief Valve

16.2.1 The pressure relief valve of a fuel tank shall operate at the pressure for which it was designed, regardless of the operating temperature of the cooking appliance when tested in accordance with 16.2.2. Also, the relief of pressure shall not increase the risk of injury to persons or cause damage to the cooking appliance and associated equipment.

16.2.2 A pressure tank is to be filled with fuel to 3/4 capacity and connected to a controllable external source of pressure. The cooking appliance is to be operated at full output for 15 minutes. At the end of this period, the pressure is to be gradually increased until the relief valve is activated. The external pressure source is to be cut off immediately to prevent further pressure build up. The relief valve and all burners are to continue operating to determine any increased risk of fire or injury.

17 Abnormal Operation Test

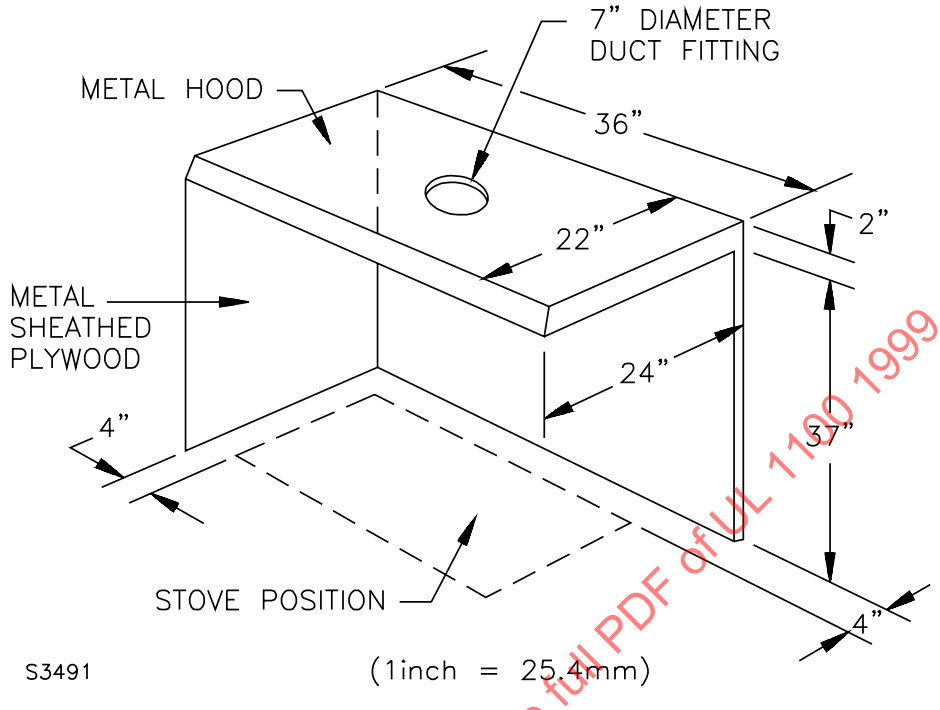
17.1 For top mounted or surface insert assemblies, a cast iron grill which fits within the guard rail and covers at least two surface burners is to be positioned accordingly. A grill temperature of approximately 235°C (455°F) is to be maintained for 1 hour. The tank pressure shall not exceed 60 psi (413 kPa) and there shall be no increased risk of fire. Also, the pressure relief valve can operate, as long as it does so without increasing the risk of fire or injury to persons.

18 Temperature Test

18.1 General

18.1.1 A cooking appliance is to be installed according to the manufacturer's installation instructions in a hooded enclosure constructed as illustrated in Figure 18.1. The cooking appliance is to be subjected to the tests specified in 18.1.2 – 18.2.4.1 and shall comply with the requirements therein.

Figure 18.1
Test enclosure for temperature tests



18.1.2 All vertical surfaces are to be metal sheathed plywood, adjusted to conform with the clearance indicated in Figure 18.1. The forward edge of the side panel is to be adjusted to project at least 1/2 inch (12.7 mm) beyond the appliance face plate. The lower edge of the sheet metal hood is to be 37 inches (940 mm) above and parallel to the counter top.

18.2 Temperature

18.2.1 General

18.2.1.1 With the cooking appliance operating with all burners at maximum setting, 2 specially weighted stainless steel pots (described in 18.2.1.2) filled with water are to be put on the burners. The appliance is to be operated until the temperatures are stabilized or until the fuel is exhausted, whichever comes first.

18.2.1.2 Each pot specified in 18.2.1.3 and 16.1.1(e) is to consist of an enclosed pot, a venting pipe, and a metal weight. The pot is to have a two-quart capacity, a 7-1/2- inch (190 mm) diameter, and be 6 inches (152 mm) tall. A 1-inch (25 mm) diameter venting pipe is to be attached to the top surface of the pot, 2 inches (51 mm) from the edge and extend 24 inches (610 mm) above the top of the pot, through the opening in the test enclosure hood. A 6-1/4-inch (158 mm) diameter metal weight is to have a 1-inch diameter hole in the center. The weight, used to achieve the 6-pound weight requirement, is to be placed over the venting pipe and is to rest on the top surface of the pot.

18.2.1.3 The thermocouples are to be of the type specified in 18.2.1.4 and 18.2.1.5.