



UL 1261

STANDARD FOR SAFETY

Electric Water Heaters for Pools and Tubs

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UL Standard for Safety for Electric Water Heaters for Pools and Tubs, UL 1261

Fifth Edition, Dated March 23, 2001

Summary of Topics

This revision of ANSI/UL 1261 is being issued to reaffirm approval as an American National Standard. No changes in requirements are involved.

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 new/revised requirements are substantially in accordance with Proposal(s) on this subject dated June 1, 2012.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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March 23, 2001

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through July 31, 2012.

The most recent designation of ANSI/UL 1261 as a Reaffirmed American National Standard (ANS) occurred on July 31, 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 cover permanently installed electric water heaters, rated 600 volts or less, for heating the water supplied through plumbing to separately heated public or private pools or tubs, in which swimming, wading, bathing, or partial or total immersion of persons, may be involved. Equipment covered may or may not be intended for use with external water circulating equipment, and is intended for installation in accordance with the National Electrical Code, NFPA 70.

1.2 These requirements do not cover household storage tank water heaters or other equipment covered by individual requirements.

1.3 *Deleted June 25, 2004*

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

2.1.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

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

2.1.4 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.

2.2 Units of measurement

2.2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

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

2.3 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 HOT TUB – A tub intended for partial or total immersion of persons in heated water.

3.3 LIMITING CONTROL – A control intended to limit the operation of the heater to a water temperature of 70°C (158°F) under all conditions, including breakdown of any or all operating controls.

3.4 LOW-VOLTAGE CIRCUITS – A low-voltage circuit is one involving a potential of not more than 30 volts rms (42.4 volts peak) supplied by a primary battery, by a standard Class 2 transformer, or by a combination of a transformer and a fixed impedance that, as a unit, complies with all of the performance requirements for a Class 2 transformer. A circuit derived from a source of supply at line voltage by connecting resistance in series with the supply as a means of limiting the voltage and current is not considered to be a low-voltage circuit.

3.5 OPERATING CONTROL – A control, other than a limiting control or interlock, to start or regulate a heater according to load demand or water temperature and to stop or regulate output on satisfaction of demand or attainment of a specified temperature. Such control may be either electrical or mechanical, and may actuate auxiliary devices or equipment to perform the functions specified.

CONSTRUCTION

4 Frame and Enclosure

4.1 General

4.1.1 The frame and enclosure of a heater shall have the strength and rigidity required to resist the abuses to which it will encounter during normal service, thus precluding total or partial collapse of the enclosure 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.

4.1.2 Among the factors to be determined when an enclosure is evaluated for acceptability are its:

- a) Physical strength;
- b) Resistance to impact;
- c) Moisture-absorptive properties;

- d) Combustibility;
- e) Resistance to corrosion; and
- f) Resistance to distortion at temperatures likely to be encountered under normal or abnormal conditions of use.

For a nonmetallic enclosure, these factors are to be determined with due regard for deterioration due to aging or other foreseeable environmental exposures.

4.1.3 Besides the factors listed in 4.1.2, an enclosure of sheet metal shall be evaluated with regard to its size, shape, the thickness of the metal, and its intended application.

4.2 Protection of combustible materials outside the enclosure

4.2.1 The enclosure shall reduce the risk of molten metal, burning insulation, flaming particles, or the like from falling on combustible materials, including the surface upon which the heater is supported.

4.2.2 The requirement in 4.2.1 requires use of a barrier of combustion resistant material under wiring, unless it is of the flame-retardant type. Neoprene-, asbestos-, or thermoplastic-insulated wires are considered to be of this type.

4.2.3 A switch, transformer, relay, solenoid, or the like shall be individually enclosed unless it can be shown that breakdown of the component will not result in a risk of fire, or unless there are no openings in the bottom of the overall heater enclosure. An un baffled opening located directly below field- or factory-made splices or overcurrent-protective devices in the bottom of such a heater enclosure is not to be used.

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

4.3 Ventilating openings

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

Exception: In a compartment other than one that houses an overload or overcurrent protective device, the baffles are not prohibited from being omitted when:

- a) No ventilating opening in a vertical wall other than one associated with the dissipation of heat from the elements during normal operation of the heater is more than 3/8 inch (9.5 mm) in width or*
- b) The heater is constructed so that baffles are not required, as shown by investigation.*

4.3.2 When an opening is provided in the enclosure of a heater or in an externally mounted component intended for permanent connection to the power supply, it shall be located so that it will not vent into concealed spaces of a building structure, such as into hollow spaces in the walls or the like, when the equipment is installed as intended.

Exception: The requirement in this paragraph does not apply to an opening for a mounting screw or nail or for a manufacturing operation such as a paint drainage hole, when such an opening has a dimension not greater than 17/64 inch (6.7 mm), or an area of more than 0.055 square inches (35.5 mm²).

4.4 Thickness of enclosure materials

4.4.1 Cast- and sheet-metal portions of an enclosure shall not be thinner than indicated in Table 4.1 unless the enclosure is determined to be acceptable when evaluated under considerations such as those specified in 4.1.2 and 4.1.3.

Table 4.1
Minimum thickness of enclosure metal

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

^a Thinner sheet metal is not prohibited from being used when the enclosure is evaluated under considerations such as those specified in 4.1.2 and 4.1.3.

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

- a) 0.032 inch (0.81 mm) if uncoated steel;
- b) 0.034 inch (0.86 mm) if galvanized steel; and
- c) 0.045 inch (1.14 mm) if nonferrous.

4.4.3 An enclosure shall have a thickness not less than the following at points where the face of an attachment plug receptacle projects through it:

- a) 0.032 inch (0.81 mm) if the enclosure is of ferrous material;
- b) 0.045 inch (1.14 mm) if the enclosure is of nonferrous material; and
- c) 0.10 inch (2.5 mm) if the enclosure is of insulating material. The insulating material shall be combustion resistant.

Exception: An enclosure of insulating material is not prohibited from being of lesser thickness when it is formed or reinforced so that it provides equivalent physical strength.

4.5 Openings

4.5.1 An opening in the bottom of an appliance shall not be located below an electrical part unless a solid, noncombustible pan complying with Figure 4.1 is interposed between the electrical part and supporting surface. The pan is to have a rim, lip, or other raised edge that is in a horizontal plane and extends all the way around the pan. The bottom of the pan need not be flat or any regular shape and the transition from the bottom to the rim, lip, or the like may have any convenient shape, but at every point directly below the electrical part, the floor of the pan is to be 1/8 inch (3.2 mm) or more below the plane of the rim, lip, or the like.

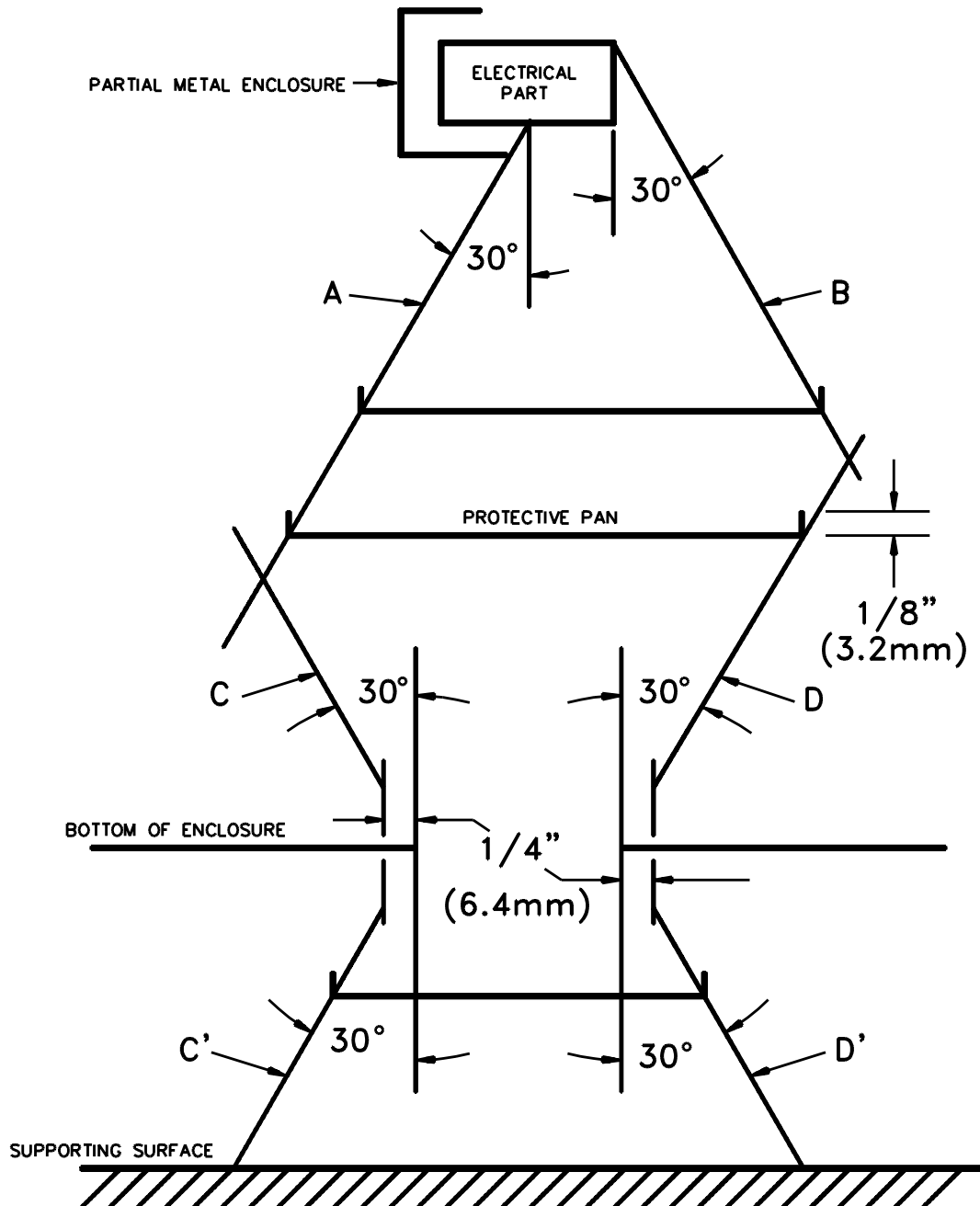
4.5.2 The structure of the part or of the appliance may provide the equivalent of the pan described in 4.5.1 when it complies with Figure 4.1. The raised edge may be incorporated in the opening.

4.6 Accessibility of uninsulated live parts

4.6.1 To reduce the risk of unintentional contact that may involve a risk of electric shock from an uninsulated live part or injury to a person, an opening in an enclosure shall comply with (a) or (b).

- a) For an opening that has a minor dimension (see 4.6.4) less than 1 inch (25.4 mm), such a part or wire shall not be contacted by the probe illustrated in Figure 4.2. If the minor dimension is less than 3/4 inch (19.1 mm), the articulate probe without the web stop may be used.
- b) For an opening that has a minor dimension of 1 inch or more, such a part or wire shall be spaced from the opening as specified in Table 4.2.

Figure 4.1
Minimum extent of baffle for opening in bottom of enclosure



SB0714

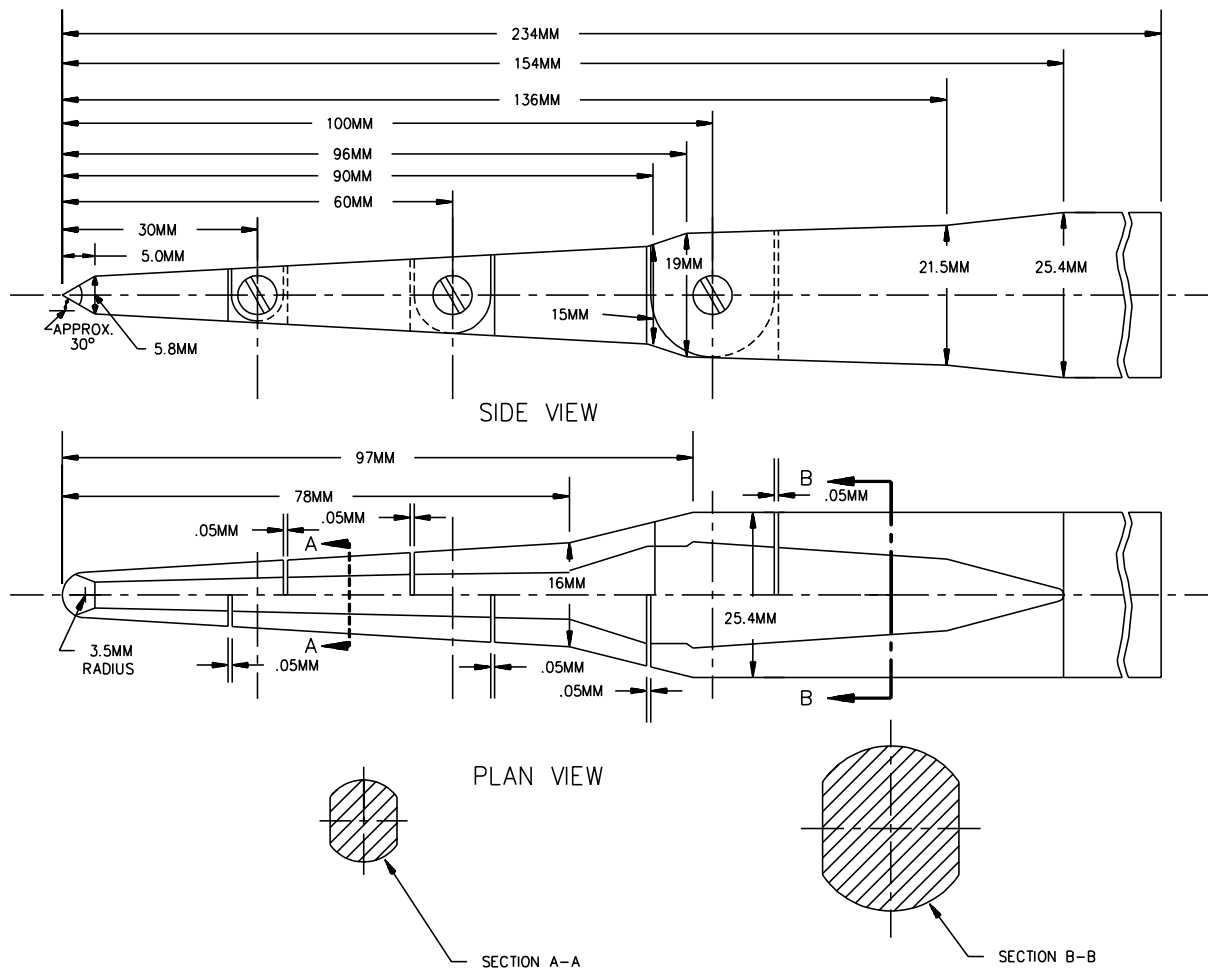
A, B, C, and D are projections that define a volume between an electrical part and an opening; C' and D' are projections that define a volume between an opening and the supporting surface. A protective pan in any horizontal plane between the part and the opening in the supporting surface must be larger than the area defined by projections A, B, C, and D, or projections C' and D', respectively. Three examples of protective pans are illustrated in the figure, two are above the opening and one is below it.

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Figure 4.2
Articulate probe with web stop



PA100

Table 4.2
Minimum distance from an opening to a part that may involve a risk of electric shock or injury to persons

Minor dimension of opening ^a , inches ^b (mm) ^b		Minimum distance from opening to part, inches ^b (mm) ^b	
1	25.4	6-1/2	165
1-1/4	31.8	7-1/2	190
1-1/2	38.1	12-1/2	318
1-7/8	47.6	15-1/2	394
2-1/8	54.0	17-1/2	444
c		30	762
^a See 4.6.4. ^b Between 1 inch and 2-1/8 inches, interpolation is to be used to determine a value between values specified in the table. ^c More than 2-1/8 inches, but not more than 6 inches (152 mm).			

4.6.2 The probe specified in 4.6.1 and 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 required to examine the enclosure. The probe illustrated in Figure 4.2 shall be applied in any possible configuration and, if required, the configuration shall be changed after insertion through the opening.

4.6.3 The probe specified in 4.6.1 and 4.6.2 shall be used as a measuring instrument to evaluate the accessibility provided by an opening, and not as an instrument to evaluate the strength of a material. The probe shall be applied with the minimum force required to determine accessibility.

4.6.4 With reference to the requirements in 4.6.1, the minor dimension of an opening is the diameter of the largest cylindrical probe having a hemispherical tip that can be inserted through the opening.

4.6.5 During the examination of equipment in connection with the requirements in this section, a part of the outer enclosure that may be removed without the use of a tool by the user of the heater (to permit the attachment of accessories, to allow access to means for making operating adjustments, or for other reasons) is to be removed. Such a part shall not be assumed to provide protection against electric shock or personal injury.

4.6.6 A door or cover of an enclosure shall be provided with a means for holding it securely in place in the closed position.

4.6.7 The door or cover of an enclosure shall be hinged if it gives access to any fuse, circuit breaker, or manually-resettable limiting control in other than a low-voltage circuit, and if any uninsulated live part is exposed during the normal replacement of the fuse. Such a door or cover shall also be provided with an automatic latch or the equivalent and, if any live part other than the screw shell of a plug fuseholder is exposed inside the enclosure, a captive screw (or similar means requiring the use of a tool to open) shall be provided to secure the door or cover in place, and the cover shall be legibly and permanently marked in accordance with 38.1.6.

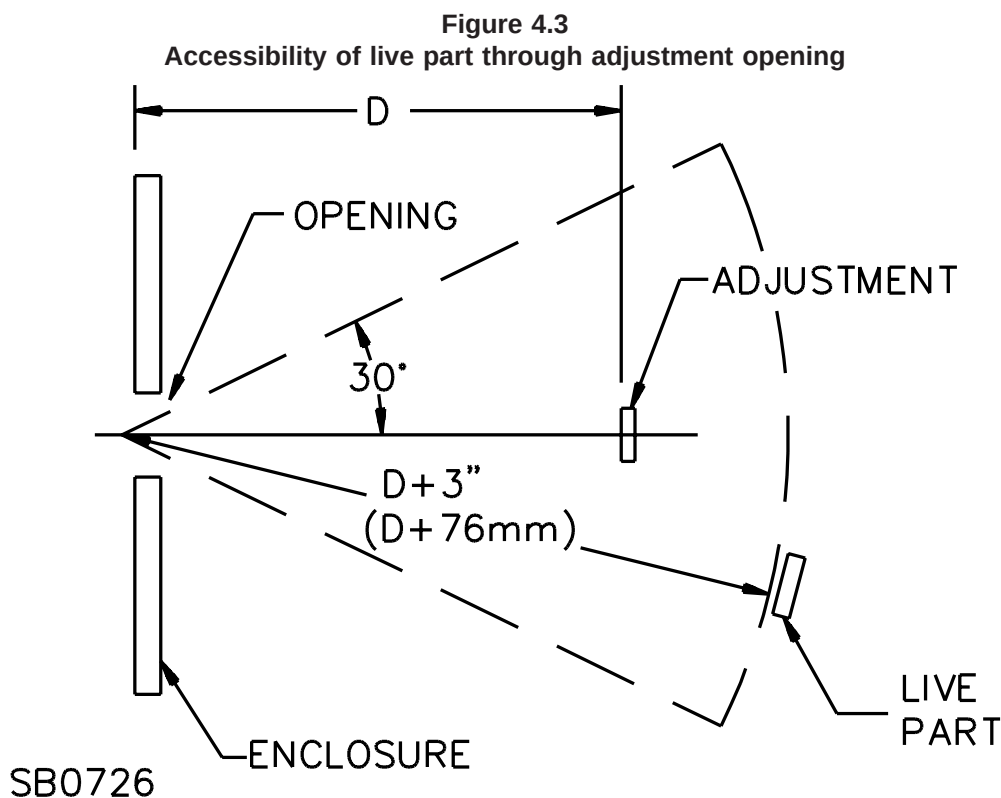
4.6.8 A protective device shall be wholly inaccessible from outside the heater without opening a door or cover; however, the operating handle of a circuit breaker, the operating button of a manually-resettable limiting control, or a similar part may project outside the enclosure.

4.6.9 A door or cover giving access to any overload protective device in other than a low-voltage circuit shall be tight-fitting and shall overlap the surface of the enclosure around the opening.

4.6.10 A spring latch, a magnetic latch, a dimple, or any other mechanical arrangement that will hold the door in place and would require some effort on the user's part to open is determined to be an acceptable means for holding the door in place as required in 4.6.6.

4.6.11 A component that is likely to need inspection, replacement, cleaning, or other servicing shall be as accessible as is practicable, and shall be readily accessible without the use of special tools, if it is intended to be manually-operated or adjusted, or if it will require periodic servicing.

4.6.12 If an opening is provided to gain access to a control that is intended to be reset, adjusted, or otherwise manipulated by the user or service personnel, it shall not be possible to contact a live uninsulated or enamel insulated part with a 1/16 inch (1.6 mm) diameter rod applied as described in 4.6.13 and as illustrated in Figure 4.3.



4.6.13 With reference to the requirement in 4.6.12, the rod is to be inserted through the opening to its maximum depth and positioned in all possible directions without producing an angle of more than 30 degrees between the rod and a line connecting the center of the opening with the center of the face of the adjusting mechanism. The length of the rod beyond the opening is not to exceed the distance between the opening and the face of the adjusting mechanism by more than 3 inches (76 mm).

5 Metal in Contact With Water

5.1 A metal tank and associated metal pipe fittings that are in contact with pool water shall be of:

- a) Copper, copper alloy, or stainless steel, any of which is at least 0.036 inch (0.91 mm) thick. If a copper alloy has a zinc content, such content shall not exceed 15 percent;
- b) Cast iron at least 1/4 inch (6.4 mm) thick;
- c) Steel at least 0.067 inch (1.7 mm) thick, if the surface of the steel in contact with water is galvanized or glass lined. The zinc coating shall be a minimum of 0.0017 inches (0.043 mm) thick as determined by the method specified in 32.1, and the minimum average thickness of the glass lining shall be 0.005 inches (0.13 mm). The minimum average thickness of the glass lining is to be calculated from six thickness measurements, all taken at different locations. Each measurement is to be made by first measuring the thickness of the metal with the glass lining, then subtracting the measured thickness of the metal after breaking off the glass; or
- d) Aluminum or aluminum alloy at least 0.093 inch (2.36 mm) thick if the surface in contact with water is glass lined. The minimum average thickness of the glass lining shall be 0.005 inches (0.13 mm) as measured by the method described in (c).

As an alternative to the specifications in 5.1 (a) – (d), a tank that bears the symbol of the Boiler and Pressure Vessel Code, ANSI/ASME BPVC, consisting of the Code H, S, M, U, UM, or HLW in a clover leaf may be used.

5.2 Any pipe or fitting of iron or steel in contact with water shall be protected against corrosion by galvanizing or plating. Zinc coating used for corrosion protection shall be a minimum 0.0017 inches (0.043 mm) thick as determined by the method specified in 32.1.