UL 1199

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Recreational Boats Less Than 20 Feet in Length

Underwriters Laboratories Inc. (UL)
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UL Standard for Safety for Recreational Boats Less Than 20 Feet in Length, UL 1199

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Revisions: This Standard contains revisions through and including September 30, 2002.

The revisions dated September 30, 2002 include a reprinted title page (page1) for this Standard.

The revisions dated September 30, 2002 were issued to include the missing graphic for Figure 4.1.

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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	September 30, 2002
2-5	July 22, 1999
6-7	September 30, 2002
8	July 22, 1999
9	September 30, 2002
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20	September 30, 2002
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UL 1199

Standard for Recreational Boats Less Than 20 Feet in Length

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July 22, 1999

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 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.

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 These requirements cover maximum weight and persons capacity, maximum power capacity, flotation, level flotation, and flotation materials of monohull-inboard, inboard-outdrive, and outboard boats, and boats intended for manual propulsion. These requirements cover boats that have a length of less than 20 feet.

1.2 These requirements do not cover sailboats canoes, or kayaks; nor do they cover pontoon or inflatable boats with inboard engine or inboard-outdrives or that are intended for use with one or more outboard engines.

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 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 Units of Measurement

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

3 Components

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

3.2 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.

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

3.4 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.

4 Glossary

4.1 For the purposes of these requirements, the following definitions apply.

4.2 APPURTENANCES, PERMANENT – Equipment that is mounted or fastened so that it is not removable without the use of tools. Seats, inboard engines, windshields, helm stations, and hardtops are examples of permanent appurtenances, whereas outboard engines, controls, batteries, and portable fuel tanks are not permanent appurtenances.

4.3 AREA, PASSENGER CARRYING – Each area in a boat in which a person can sit or stand in a normal position while the boat is in operation. See Figure 4.1. For the purposes of this definition:

a) The length of the passenger carrying area is the distance along the centerline of a boat from a vertical line at the forward end of the passenger carrying area to a vertical line at the aft end of the passenger carrying area, measured when the boat is level, as shown in Figure 4.1. For a boat with a curved stem inside the passenger carrying area, the forward vertical line intersects the stem at the point where a line 45 degrees to the horizontal is tangent to the curve of the stem. For a boat with a cabin, the forward vertical line is at the forwardmost point where a minimum distance of 2 feet (0.6 m) is maintained between the inside top of the cabin and the waterline formed when the boat is swamped and loaded with weights in accordance with Section 13.

b) The breadth of the passenger carrying area is the distance between two vertical lines at the midlength, excluding consoles, of the passenger carrying area when the boat is level, as shown in Figure 4.1. For boats with round chines inside the passenger carrying area, the vertical line intersects the chine at the point of tangency of a line 45 degrees to the horizontal and the arc of the chine.

4.4 AREA, REFERENCE, ART – The aftmost 2 feet (0.6 m) of the top surface of the hull or deck of a boat. See Figure 4.2.

4.5 AREA, REFERENCE, FORWARD – The forwardmost 2 feet (0.6 m) of the top surface of the hull or deck of a boat. See Figure 4.2.

4.6 BEAM – The transverse distance between the outer sides of a boat, excluding handles and similar attachments, extensions, and fittings.

4.7 BILGE – The area in a boat, except an engine room, that is less than 4 inches (102 mm) above the lowest point in the boat in which liquid can collect when the boat is in its static-floating position.

4.8 BILGE, ENGINE ROOM – The area in an engine room or connected compartment (See 4.13) that is less than 12 inches (305 mm) above the lowest point in the boat is in its static-floating position.

4.9 BOAT – Any vessel that is manufactured or used primarily for noncommercial use, leased, rented, or chartered to another for the latter's noncommercial use, or engaged in the carrying of six or fewer passenger.

4.10 BOAT, MONOHULL – A boat on which the line of intersection of the water surface and the boat at any operating draft forms a single closed curve. A catamaran, trimaran, or pontoon boat is not a monohull boat.

4.11 COMPARTMENT OPEN TO ATMOSPHERE – A compartment that has at least 15 square inches (97 cm^2) of open area directly exposed to the atmosphere for each cubic foot (0.028 m^3) of net compartment volume.

4.12 COMPARTMENT, SEALED – An enclosure that can resist an exterior 12 inch (305 mm) head of water without seepage of more than 1/4 fluid ounce (7.4 mL) per hour.

4.13 CONNECTED – A condition that allows a flow of water in excess of 1/4 fluid ounce (7.4 mL) per hour from the engine room bilge into any other compartment with a 12 inch (305 mm) head of water on the engine room side of the bulkhead.

4.14 DEPTH, REFERENCE – The minimum distance between the uppermost surface of the submerged reference area of a boat and the surface of the water, as measured from the centerline of the boat. See Figure 4.2. If there is no deck surface at the centerline of the boat from which the measurement can be made, the reference depth is the average of two measurements made on opposite sides of, and at equal distances from, the centerline of the boat.

4.15 DISPLACEMENT, MAXIMUM – The weight of the volume of water displaced by a boat at its maximum level immersion in calm water without water coming aboard [except for, in the case of outboard boats having a marked maximum power capacity of over 2 horsepower, water coming in through one opening in the motor well for motor controls or fuel lines and having a maximum dimension of not more than 3 inches (76 mm)]. For the purposes of this definition, a boat is level when it is transversely level and either of the following two conditions apply:

a) The forward point at which the sheer intersects the vertical centerline plane and the aft point at which the sheer intersects the upper boundary of the transom (stern) are at equal distances above or below the surface of the water.

b) The forwardmost point of the boat is either level with or is above the lowest point of water ingress.

4.16 ENGINE ROOM – A compartment in which a gasoline of diesel engine is permanently installed, including connected compartments.

4.17 LENGTH, BOAT – The straight-line horizontal distance along a boat, measured end-to-end over the deck from the forwardmost to the aftmost part of the boat parallel to the centerline, excluding sheer. Bow sprits, bumpkins, rubbers, outboard engine brackettes, handlers, and similar fittings, attachments, and extensions are not included in the measurement.

4.18 SAILBOAT – A boat that is intended to use sails as the primary means of propulsion.

4.19 SHEER – The topmost line in a boat's side. The sheer intersects the vertical centerline plane of the boat at the forward end and the transom (stern) at the aft end. The sheer is defined by the series of points of contact with the boat structure when straight lines at 45 degrees angles with the horizontal and in a plane normal to the outside edge of the boat (as seen from above) are brought into contact with the outside of the horizontal boat. For the purposes of this definition, a boat is horizontal when it is transversely level and when the lowest points at 40 and 75 percent of the boat length behind the forwardmost point of the boat are level.

4.20 STEERING, REMOTE – Any mechanical assist device that is rigidly attached to, and used in steering, a boat; including, but not limited to, mechanical, hydraulic, and electrical control systems.

Figure 4.1
Passenger carrying areas

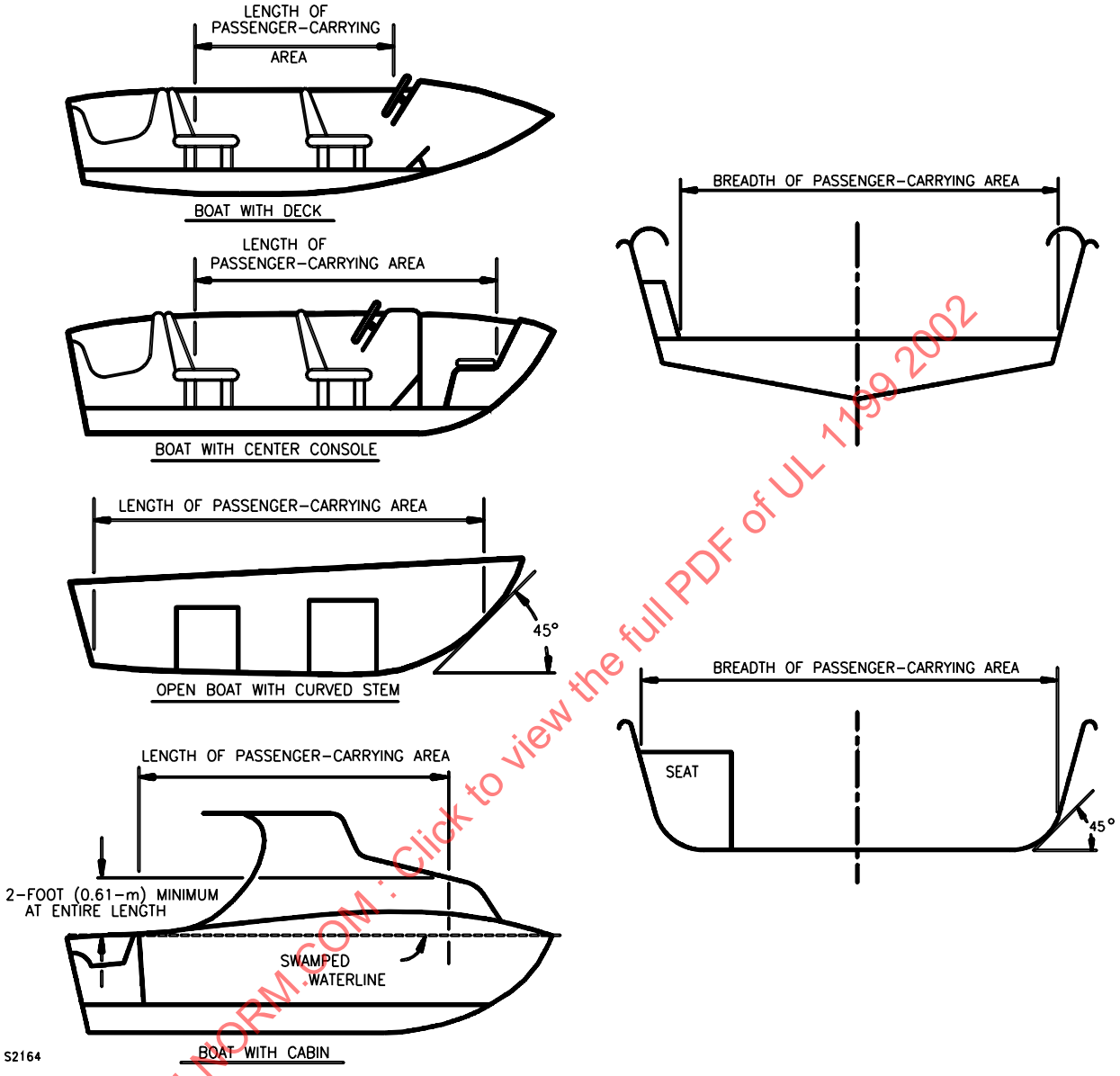
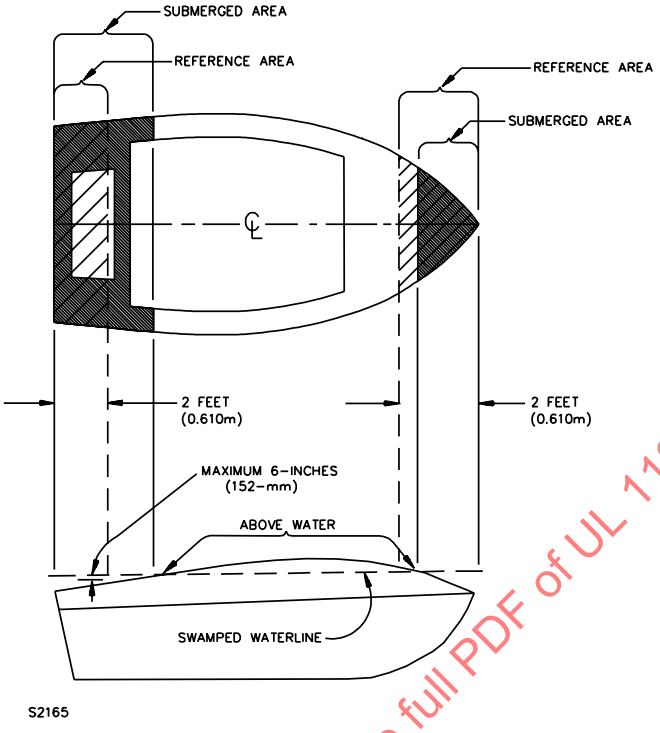


Figure 4.2
Reference areas



4.21 TRANSOM – The surface at the stern of a boat projecting or facing aft. The upper boundary of the transom is defined by the series of point of contact with the boat structure when straight lines at 45 degrees angles with the horizontal and contained in a vertical, longitudinal plane are brought into contact with the stern of the horizontal boat (See 4.19).

4.22 TRANSOM, FULL – A transom having a maximum width that exceeds one-half the maximum beam of the boat.

4.23 WEIGHT, BOAT – The sum of the hull weight, deck and superstructure weight, and weight of permanent appurtenances. For inboard and inboard-outdrive boats and outboard boats having a marked maximum power capacity of more than 2 horsepower, the sum includes the weight of full permanent fuel tanks.

4.24 WEIGHT, DEAD – The marked maximum weight capacity of the boat minus:

a) For outboard boats and boats intended for manual propulsion; sum of:

1) The weight of engines and controls, batteries (dry), and full portable fuel tanks and

2) The marked persons capacity of the boat.

b) For inboard and inboard-outdrive boats; the marked persons capacity of the boat.

4.25 WEIGHT, MACHINERY – The sum of the weights of installed engines or motors, control equipment, drive units, and batteries.

CONSTRUCTION

5 General

5.1 An air chamber that is relied upon the boat to comply with the flotation requirements in Sections 12 – 14 shall not be integral with the hull of the boat.

Exception: This requirement does not apply to a boat having a marked maximum power capacity of 2 horsepower or less.

RATING

6 Maximum Power Capacity Rating of Outboard Boats

6.1 The maximum power capacity of an outboard boat shall be determined in accordance with Table 6.1.

Table 6.1
Maximum power capacity of outboard boats

Factor[a], ft^2	Outboard boat type	Maximum power capacity, horsepower
0 to 35	Any[b]	3
36 to 39	Any[b]	5
40 to 42	Any[b]	7.5
43 to 45	Any[b]	10
46 to 52	Any[b]	15
53 or more	Remote steering and having at least a 20 inch transom height	(2 x factor) - 90[c]
	No remote steering or less than 20 inch transom height:	
	Flat-bottom, hard-chine boat	(0.5 x factor) - 15[c]
	Other	(0.8 x factor) - 25[c]

[a]Factor is equal to the boat length (see 4.17) in feet times the transom width in feet, rounded to the nearest integer. If boat does not have full transom, the transom width is considered to be the width of the broadest beam in the aftmost quarter of the boat.
[b]For flat-bottom, hard-chine boats having factor equal to 52 or less, the maximum power capacity is lowered to the value in the preceding row (for example, if factor is equal to 38, maximum capacity is lowered from 5 horsepower to 3 horsepower).
[c]If calculated value is not an even multiple of 5, the value may be rounded up to the next even multiple of 5.

7 Maximum Weight Capacity Rating

7.1 Inboard and inboard-outdrive boats

7.1.1 The maximum weight capacity of an inboard or inboard-outdrive boat shall be the greater of the two values obtained from the following equations:

$$W = 1/5\ [V_d - B_W - 4(M_W)]$$

and

$$W = 1/7\ (V_d - B_W)$$

in which:

W is the maximum weight capacity in pounds;

V_d is the maximum volume displacement in pounds, determined in accordance with 10.3.1;

B_W is the boat weight in pounds, determined in accordance with 10.2.1; and

M_W is the machinery weight in pounds (see 4.25).

7.2 Outboard boats over 2 horsepower

7.2.1 The maximum weight capacity of an outboard boat having a marked maximum power capacity of more than 2 horsepower shall be determined by the following equation:

$$W = 3/10 (V_d - B_W)$$

in which:

W is the maximum weight capacity in pounds;

V_d is the maximum volume displacement in pounds, determined in accordance with 10.3.1; and

B_W is the boat weight in pounds, determined in accordance with 10.2.1.

7.3 Manual propulsion boats and outboard boats of 2 horsepower or less

7.3.1 The maximum weight capacity of a boat intended for manual propulsion or an outboard boat having a marked maximum power capacity of 2 horsepower or less shall be determined by the following equation:

$$W = 3/10 (V_d - B_W)$$

in which:

W is the maximum weight capacity in pounds;

V_d is the maximum volume displacement in pounds, determined in accordance with 10.3.1; and

B_W is the boat weight in pounds, determined in accordance with 10.2.1.

8 Maximum Persons Capacity Rating

8.1 The maximum persons capacity of a boat in number of persons shall be determined by rounding to the nearest whole integer (rounding down for fractional values less than 0.5 and rounding up for fractional values greater than or equal to 0.5) the value obtained from the following equation:

$$P_c = \frac{(W + 32)}{141}$$

in which:

P_c is the computed persons capacity in number of persons; and

W is the maximum persons capacity in pounds which, in turn, is equal to:

a) For an inboard or inboard-outdrive boat; either the maximum weight capacity, in pounds, determined in accordance with Section 7 or the value determined in accordance with Section 11, whichever is less;

b) For an outboard boat having a marked maximum power capacity of more than 2 horsepower; either maximum weight capacity, in pounds, determined in accordance with Section 7, minus the motor and control, dry battery, and full portable fuel tank weights specified in Table 11.1 or the value determined in accordance with Section 11, whichever is less;

c) For outboard boats having a marked maximum power capacity of 2 horsepower or less; nine-tenths of the maximum weight capacity, in pounds, determined in accordance with Section 7 minus 25 pounds; and

d) For a boat intended for manual propulsion; nine-tenths of the maximum weight capacity determined in accordance with Section 7.

PERFORMANCE

9 General

9.1 A boat shall be subjected to the applicable tests in Sections 10 – 14, as specified in Table 9.1.

Table 9.1
Performance tests

	Applicable tests				
Boat type	**Weight and maximum displacement tests, Section 10**	**Maximum persons capacity test, Section 11**	**Basic flotation tests, Section 12**	**Flooded level flotation and persons capacity test, Section 13**	**Flooded stability test, Section 14**
Inboard or inboard-outdrive	X	X	X	–	–
Outboard, marked maximum power capacity > 2 hp	X	X	–	X	X
Outboard, marked maximum power capacity ≤ 2 hp	X	a	–	X	X
Manual propulsion	X	a	–	X	–

[a]Capacity not determined by test.

10 Weight and Maximum Displacement Tests

10.1 General

10.1.1 The weight and maximum displacement of a boat shall be determined as described in 10.2.1 – 10.3.1.

10.2 Weight determination

10.2.1 The boat is to be drained of all water and, if applicable, permanent fuel tanks are to be filled with the intended fuel (see 4.23). The boat then is to be weighed by means of one or two overhead inline dynamometers or load cells, as necessary. The weight of any lifting apparatus, such as cables, chains, straps, strongbacks, and fittings, on the load side of the measuring equipment is to be subtracted from the measured value to obtain the total dry weight of the boat.

10.2.2 The dynamometers or load cells mentioned in 10.2.1 are to have an accuracy of ±2 pounds (±0.9 kg) and a full scale range of not more than four times the total measured weight.

10.3 Maximum displacement determination

10.3.1 The seam between the hull and deck of the boat is to be taped or sealed to prevent water seepage and, if applicable (see 4.15), the lowest opening in the motor well is to be sealed. The boat is then to be floated in a fresh-water test tank, loaded with nonhygroscopic, calibrated weights, and maintained in a level position until the maximum displacement is achieved. The maximum displacement value is to be the sum of the boat weight and the amount of weight added to achieve maximum displacement.

11 Maximum Persons Capacity Test

11.1 The alternate value of W for use in the equation in 8.1, and as mentioned in 8.1 (a) and (b), for an inboard or inboard-outdrive boat or an outboard boat having a marked maximum power capacity of more than 2 horsepower is to be determined as described in 11.2 – 11.4.

11.2 The boat, with all permanent appurtenances, is to be floated in calm water. An inboard or inboard-outdrive boat is to include installed engines, full fuel systems and tanks, control equipment, drive units, and batteries. An outboard boat is to have weights equivalent to the applicable dry motor and control, battery, and full portable fuel tank, as specified in Table 11.1, placed in the normal operating positions of the equipment on the boat.

Table 11.1
Weight equivalents of outboard motor and related equipment on outboard boats

Marked maximum power capacity of boat, horsepower	Equivalent weight, pounds[a]				
	Motor and controls		Battery		Full portable fuel tank weight
	Dry	Swamped	Dry	Submerged	
Transom intended for single motor					
0.1 to 2	25	20	–	–	–
2.1 to 3.9	40	34	–	–	–
4.0 to 7	60	52	–	–	25
7.1 to 15	90	82	20	11	50
15.1 to 25	125	105	45	25	50
25.1 to 45	170	143	45	25	100
45.1 to 60	235	195	45	25	100
60.1 to 80	280	235	45	25	100
80.1 to 145	405	352	45	25	100
145.1 to 275	430	380	45	25	100
275.1 and up	605	538	45	25	100

Table 11.1 Continued on Next Page

Table 11.1 Continued

Marked maximum power capacity of boat, horsepower	Equivalent weight, pounds[a]				
	Motor and controls		Battery		Full portable fuel tank weight
	Dry	Swamped	Dry	Submerged	
Transom intended for single motor					
Transom intended for twin motor					
50.1 to 90	340	286	90	50	100
90.1 to 120	470	390	90	50	100
120.1 to 160	560	470	90	50	100
160.1 to 290	810	704	90	50	100
290.1 to 550	860	760	90	50	100
550.1 and up	1210	1076	90	50	100

[a]To convert from pounds to kilograms, multiply the weight in pounds by 0.45 kg.

11.3 Weights then are to be gradually added along one outboard extremity of each passenger carrying are until the boat assumes maximum list or trim, or both, without water coming aboard. The weighs are to be added at the height of the seat nearest the center of the passenger carrying area, but not higher than the gunwale, and are to be equally distributed forward and aft of that center in a plane parallel to the floorboards.

11.4 The alternate value of W then is to be computed according to the equation

W = A/0.6

in which:

A is the total weight added during the procedure specified in 11.3.

12 Basic Floatation Tests

12.1 When tested as described in 12.2, an inboard or inboard-outdrive boat shall have sufficient flotation to keep a portion of the boat above the surface of the water.

12.2 The boat is to be submerged for 18 hours in calm, fresh water. The boat then is to be consecutively loaded with the following:

a) A weight that, when submerged, is equal to one-fourth the dead weight (see 4.24); and

b) If air chambers are used for flotation, a weight that, when submerged, is equal to the volume of the two largest air chambers of the boat in cubic feet times 62.4 pounds per cubic foot.

13 Flooded Level Flotation and Persons Capacity Test

13.1 General

13.1.1 When tested as described in 13.2.1 – 13.3.2, an outboard boat or a boat intended for manual propulsion, both before and after the weights are placed in the boat as specified in13.3.1, shall comply with all of the following:

a) The angle of the heel shall not exceed 10 degrees from the horizontal;

b) A portion of either the forward or aft reference area (see 4.4 and 4.5) shall remain above water; and

c) The reference depth (see 4.14) at the reference area opposite to the reference area above the surface of the water shall be not more than 6 inches (150 mm).

13.2 Preparation of boat

13.2.1 All manufacturer-supplied permanent appurtenances, such as windshields, convertible tops, and propellers, are to be attached to the boat. Permanent fuel tanks are to be filled with fuel and all openings to the tanks are to be sealed. The applicable swamped motor and control and submerged battery weights specified in Table 11.1 are to be placed in the intended operating positions of the equipment on the boat.

13.2.2 The reference and passenger carrying areas of the boat are to be marked on the boat. Means are to be provided, such as by drilling of holes, to permit the escape of air from decks, seats, and enclosures where it may otherwise become entrapped. For boats having a marked maximum power capacity of more than 2 horsepower, the two largest air chambers are to be flooded.

13.3 Test procedure

13.3.1 The boat is to be tested in the keel-down position. The boat is to be swamped, allowing water to flow inside, either over the sides or through an opening in the boat, or both, and the boat evaluated for compliance with the requirements in 13.1.1. A passenger carrying area is then to be loaded with weights whose center of gravity is to be within the shaded area illustrated in Figure 13.1. The amount of weight used is to be determined according to the following applicable equation:

a) For boats having a marked maximum power capacity of 2 horsepower or more:

$$W_t = P_f/2 + P_r/8 = T/4$$

or

b) For boats intended for manual propulsion or having a marked maximum power capacity of 2 horsepower or less:

$$W_t = 2P_c/15 + T/4$$

in which:

W_t is the submerged weight of the weighs used to load the boat, in pounds;

P_f is the marked persons capacity, in pounds, up to a maximum of 550 pounds (250 kg);

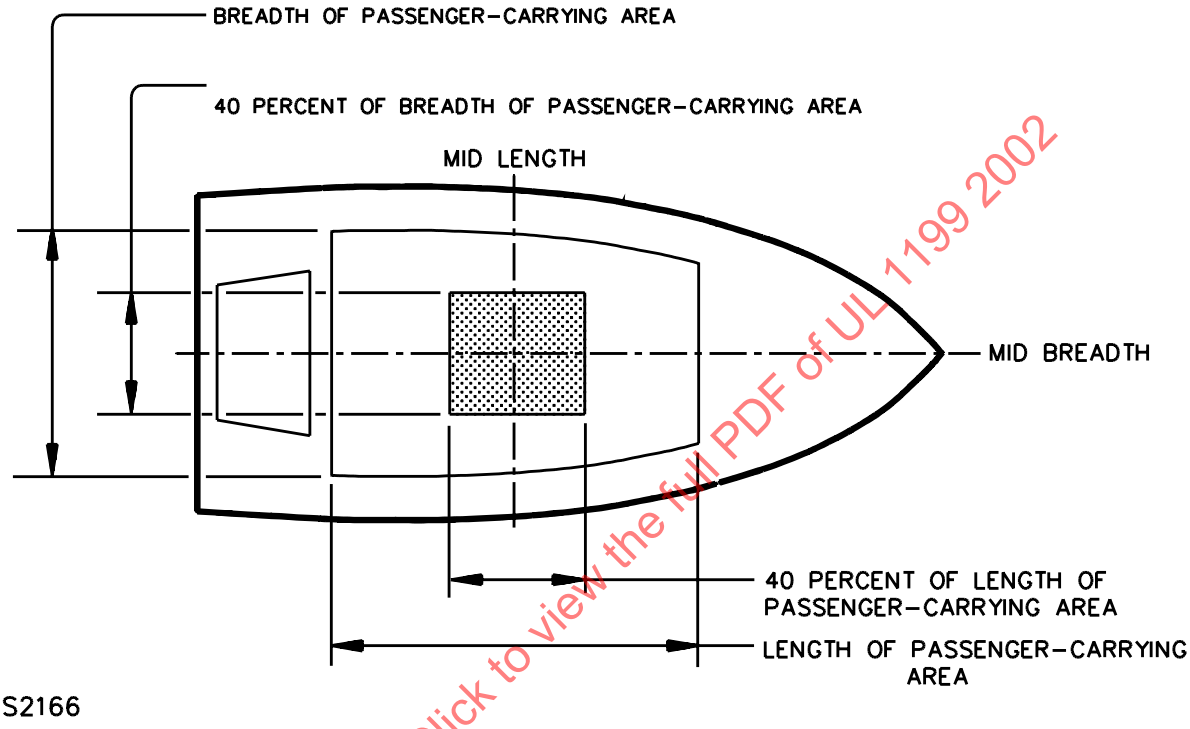
P_r is the amount of the marked persons capacity, in pounds, in excess of 550 pounds (250 kg);

P_c is the total marked persons capacity, in pounds; and

T is The marked maximum weight capacity of the boat minus the sum of the marked persons capacity of the boat and the applicable motor and control, battery, and portable fuel tank weights specified in Table 11.1, in pounds, or zero, whichever is greater.

13.3.2 The boat is to remain loaded for at least 18 hours and is then to be evaluated for compliance with the requirements in 13.1.1.

Figure 13.1
Placement of weights for flooded level flotation and persons capacity test



14 Flooded Stability Test

14.1 General

14.1.1 When tested as specified in 14.2.1 – 14.3.2, an outboard boat shall comply with all of the following:

a) The angle of the heel shall not exceed 30 degrees from the horizontal;

b) A portion of either the forward or aft reference area (see 4.4 and 4.5) shall remain above the surface of the water; and

c) The reference depth (see 4.14) at the reference area opposite the reference area above the surface of the water shall be not more than 12 inches (305 mm).

14.2 Preparation of boat

14.2.1 The boat is to be prepared as described in 13.2.1 and 13.2.2.

14.3 Test procedure

14.3.1 The boat is to be tested in the keel-down position. The boat is to be swamped, allowing water to flow inside, either over the sides or through an opening in the hull of the boat, or both. The boat is then to be loaded with weights, uniformly distributed along the outboard perimeter of the starboard side of the passenger carrying area over a distance equal to at least 30 percent of the length of the passenger carrying area. The center of gravity of the weights is to be within the shaded area illustrated in Figure 14.1. For weights placed on the floor of the boat, the center of gravity of the weights is to be at least 4 inches (100 mm) above the floor. For weights placed on a seat, the center of gravity of the weights is to be at least 4 inches above (see Figure 14.2). The amount of weight is to be determined according to the following applicable equation:

a) For boats having a marked maximum power capacity of more than 2 horsepower:

$$W = P_f/4 + P_r/16 + T/4$$

or

b) For boats having a marked maximum power capacity of 2 horsepower or less:

$$W = P/15 + T/4$$

in which:

W is the submerged weight of the weights used to load the boat, in pounds;

P_f is the marked persons capacity, in pounds, up to a maximum of 550 pounds (250 kg);

P_r is the amount of the marked persons capacity, in pounds, in excess of 550 pounds (250 kg);

P is the total marked persons capacity, in pounds; and

T is the marked maximum weight capacity of the boat minus the sum of the marked persons capacity of the boat and the applicable motor and control, battery, and portable fuel tank weights specified in Table 11.1, in pounds, or zero, whichever is greater.

14.3.2 The test specified in 14.3.1 then is to be repeated under the same conditions, except that the weights are to be placed on the port side of the boat.

15 Flotation Materials Tests

15.1 General

15.1.1 A material that is relied upon to comply with the requirements in Sections 12 – 14 shall comply with the requirements in 15.5.1.1 – 15.6.5.1.

Figure 14.1
Placement of weights for flooded stability test

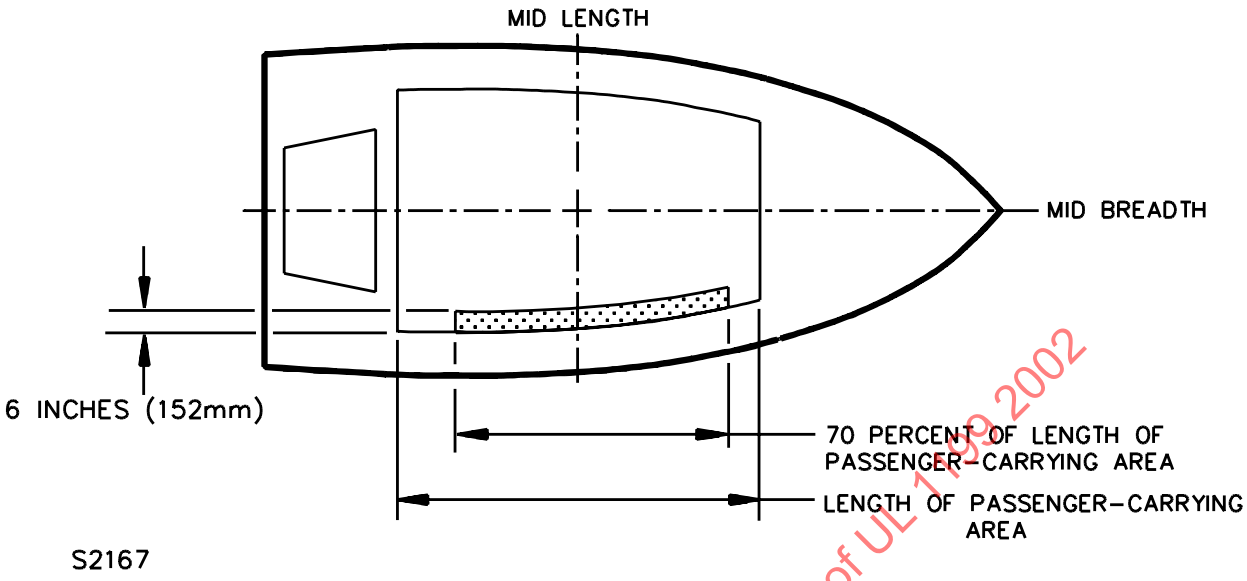
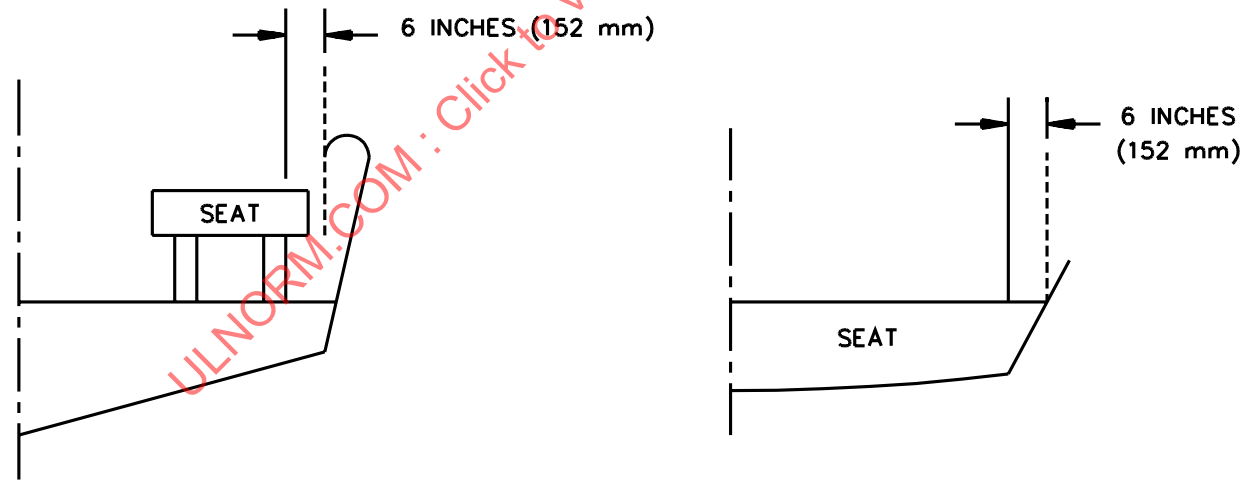


Figure 14.2
Placement of weights on seats for flooded stability test



Exception: These requirements do not apply to a material in a sealed compartment (see 4.12).

15.2 Test samples

15.2.1 A test sample is to comply with all of the following:

a) The sample is to have a volume of not less than 200 cubic inches (3280 cm^3).

Exception: A sample of sheet material that complies with 15.2.1(c) need not comply with this specification;

b) The shape of the test sample is not to permit air to be trapped when the sample is submerged in a vertical position. In general, this requires that the sample have straight sides and straight or convex ends; and

c) The length of a sample of bulk material is to be approximately twice its width, but is not to exceed 15 inches (380 mm), and the width of the sample is not to exceed 6 inches (152 mm). A sample of sheet material is to measure approximately 12 by 12 inches (305 by 305 mm).

15.3 Sample volume determination

15.3.1 General

15.3.1.1 The volume of a test sample shall be determined in accordance with 15.3.2.1 – 15.3.3.4.

15.3.2 Apparatus

15.3.2.1 A rigid volume-displacement tank of a size and shape sufficient to contain each of the test samples is to be used for this determination. The dimensions of the tank are to permit the side of the smallest area of a test sample to be contained horizontally and the side having the longest dimension to be contained vertically. The tank is to be fitted with an overflow spout.

15.3.2.2 The means used to submerge a sample in the tank (1) is not to damage the sample and (2) is to be capable of being positioned to a precise depth within the tank, both with and without the sample in position.

15.3.3 Procedure

15.3.3.1 The tank is to be placed on a rigid, level surface. With the submerging device in position, the tank is to be filled with fresh water until overflow occurs. The tank is then to be allowed to drain until the rate of overflow slows to two drops per minute or less.

15.3.3.2 The submerging device is to be removed from the tank so that all water dripping from the device returns to the tank. A dry glass beaker that has been weighed to the nearest 0.01 gram is to be placed under the spout of the tank to collect all water that overflows from the tank.

15.3.3.3 The sample is to be placed in the submerging mechanism, and the mechanism submerged to the position used during the procedure described in 15.3.3.1. When the rate of overflow from the tank slows to two drops per minute or less, the beaker (with water) is again to be weighed to the nearest 0.01 gram.