

**H-35 POWERING AND LOAD CAPACITY OF PONTOON BOATS**

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## H-35 POWERING AND LOAD CAPACITY OF PONTOON BOATS

Based on ABYC's assessment of the existing technology, and the problems associated with achieving the goals of this standard, ABYC recommends compliance with this standard for all boats, associated equipment, and systems manufactured after July 31, 2006.

### 35.1 PURPOSE

This standard is a guide for determining powering and load capacity of pontoon boats.

### 35.2 SCOPE

This standard applies to all pontoon boats powered by machinery.

**EXCEPTION:** *Boats containing Enclosed Accommodation Compartments.*

### 35.3 REFERENCED ORGANIZATIONS

ABYC - American Boat & Yacht Council, Inc., 3069 Solomons Island Rd., Edgewater, MD 21037-1416.  
Phone: (410)956-1050 Fax: (410)956-2737 Web site: www.abycinc.org

### 35.4 DEFINITIONS

For the purposes of this standard, the following definitions apply.

**Boat Weight** - Includes full permanently installed fuel system, the heaviest production tolerances, and factory supplied, permanently installed optional furnishings and equipment for which the manufacturer has made design provisions. Boat weight does not include weight of propulsion system.

**Designated Occupant Position** - a position designed for occupancy while the vessel is underway at any speed. Seated positions shall have a minimum width of 16 inches measured at the midpoint of the depth of the seat.

**Enclosed Accommodation Compartment** – One contiguous space, surrounded by permanent structure, that contains the following:

- a. designated sleeping accommodations;
- b. a galley area with sink; and
- c. a head compartment.

**Note:** *A compartment intended for gear storage and open passenger cockpits, with or without canvas enclosures, are not considered to be enclosed accommodation compartments.*

**Horsepower (hp)** - The manufacturers advertised or specified power output for a given engine.

**Maximum Weight Capacity** - The maximum load in pounds that a boat may carry. This load includes persons, portable fuel tanks, and all gear not part of the boat's structure, and, if recommended for use with outboard engines, includes outboard engines, throttle and shift controls, and batteries.

**Passenger Carrying Area** - Spaces enclosed or defined by railings, or spaces intended for persons to use while the pontoon boat is underway.

**Pontoon Boat** - A boat consisting of a rigid structure connecting at least two parallel sealed buoyancy chambers. The line of intersection of the buoyancy chambers and water surface produce more than a single closed curve when loaded to the maximum weight capacity.

**Propulsion System Weight** – Includes engine, drive, drive components, mounting hardware, propeller, and controls

### 35.5 GENERAL REQUIREMENTS

35.5.1 **Capacity Information** - Capacity information shall be legible and permanently displayed on a capacity label that is permanently affixed to a pontoon boat in a location where it is clearly visible to the operator when getting the pontoon boat underway. The label shall contain the following information in accordance with ABYC S-7, *Boat Capacity Labels*.

35.5.1.1 Maximum power (see H-35.7);

**EXCEPTION:** *Sterndrive boats and inboard boats.*

35.5.1.2 Maximum weight capacity in pounds, and

35.5.1.3 maximum persons capacity. See (H-35.6).

**NOTE:** *Lesser values than the maximum allowable for the above capacities may be used at the manufacturer's option.*

35.5.2 Outboard engine brackets, motor wells, and transom dimensions shall meet the requirements of ABYC S-12, *Outboard Motor, Transom, And Motor Well Dimensions*.

35.6 **DETERMINATION OF LOAD CAPACITIES**

35.6.1 Maximum Weight Capacity

35.6.1.1 Two Tube Pontoon Boats: The maximum weight capacity of a two tube pontoon boat shall be determined by calculating the pontoons' submerged displacement in pounds, subtracting the boat weight, and dividing by the sum of the following: the square root of the tube diameter in inches, minus 2.35, or

35.6.1.1.1 determined by actual weights required to cause the pontoons to be awash over their entire length. Add this weight to block V of the Pontoon Capacity Worksheet. **When determining Maximum Capacity in this manner, do not subtract the boat weight in block VI as instructed.** (see FIGURE 1 or FIGURE 2).

**NOTE: FIGURE 1 and FIGURE 2 provide a calculation method for determining weight capacity for outboard, inboard and sterndrive.**

35.6.1.2 Three Tube Pontoon Boats: The maximum weight capacity of three tube pontoon boats shall be determined by obtaining the pontoons' submerged displacement in pounds, subtracting the boat weight, and dividing by the sum of the following: the square root of the tube diameter in inches, minus 1.35, or

35.6.1.2.1 determined by actual weights required to cause the pontoons to be awash over their entire length. Add this weight to block V. of the Pontoon Capacity Worksheet. **When determining Maximum Capacity in this manner, do not subtract the boat weight in block VI as instructed.** (See FIGURE 1 or FIGURE 2).

**NOTE: FIGURE 1 and FIGURE 2 provide a calculation method for determining weight capacity for outboard, inboard and sterndrive.**

35.6.2 Persons Capacity

35.6.2.1 Pontoon boats with more than one deck level or with a deck width within railings defining the passenger carrying area that overhangs the pontoon shall use the method for determining persons capacity described in H-35.6.2.3.

35.6.2.2 The maximum persons capacity of pontoon boats shall be determined by either H-35.6.2.2.1, H-36.6.2.2.2 or H-35.6.2.3, and shall not exceed the number of designated occupant positions intended to be occupied when the boat is underway at speeds greater than five mph.

35.6.2.2.1 For outboard powered pontoon boats, the Persons Capacity in pounds is equal to the maximum weight capacity minus the weight from ABYC S-30, *Outboard Engine & Related Equipment Weights*, Table 1, Column 10.

35.6.2.2.2 For sterndrive or inboard powered pontoon boats, the persons capacity in pounds is equal to the maximum weight minus the following: the heaviest applicable published engine, drive, control, battery and propeller weights.

35.6.2.3 Pontoon Boat Persons Capacity Test Procedure

35.6.2.3.1 Place weight for engine, battery, and fuel as indicated in the applicable test procedure for outboard, sterndrive, or inboard boats.

35.6.2.3.2 The transverse stability test shall be conducted on each side of the boat, or on the heavier side of the boat. Conduct this test by adding weight evenly distributed fore and aft on the deck as far outboard as practicable, i.e., within one foot of the edge, until the top of the pontoon on the loaded side becomes awash.

35.6.2.3.3 The longitudinal stability shall be tested by adding weight on the deck with the weight's center of gravity on centerline, and 1/4 of the length of the deck from forward, until the forward edge of the deck becomes immersed. This test shall be repeated by adding weight on the deck with the weight's center of gravity on centerline, and 1/4 of the length of the deck from aft, until the edge of the deck, or the top of the engine mounting bracket, becomes immersed, whichever occurs first.

35.6.2.3.4 In a design having more than one deck level intended for passengers, i.e. having railings and a means of access, the test in .2 and .3 above shall also be conducted by adding weight on the upper deck equal to the maximum capacity specified by the manufacturer for that location at one side against the railings. A weight equal to the total capacity, minus the upper deck weight, shall be placed on the same side of the lower deck as the weight on the upper deck. This weight shall be placed against the railings and distributed equally along the side of the lower deck fore and aft. If the pontoon boat exceeds the limits of immersion specified in .2 or .3 above, either the total persons capacity, or the upper deck persons capacity, shall be reduced to meet these conditions.

35.6.2.3.5 Ninety percent (90%) of the lesser of the weights attained in steps .2, .3, or .4 above shall be the maximum persons capacity.

35.6.2.3.6 The maximum number of persons is determined by the maximum pounds of persons divided by 141, and rounding off the result to the nearest whole number. If the fraction is less than one-half, round down to the next whole integer. If the fraction is equal to, or greater than one-half, round up to the next higher whole integer. (See FIGURE 1 and FIGURE 2)

### 35.7 **DETERMINATION OF HORSEPOWER CAPACITY**

35.7.1 Determine the maximum power capacity for boats less than 20 feet (6.1 m) in length that are recommended for use with outboard engines as follows:  
HP = volume of pontoons (ft.<sup>3</sup>) x the longest pontoon length (ft) ÷ pontoon diameter (inches)

#### **NOTES:**

*1. If pontoons are not circular in cross section, take the cross section area of the pontoon and calculate a circle of the same area. Where tubes vary in geometric shape, add the calculated diameters together and divide by the number of tubes.*

*2. Maximum hp capacity may round up to the next 5 h.p. increment.*

*3. Consideration should be given to trailering loads when determining engine weight.*

35.7.2 If twin engines are used, their total horsepower shall not exceed the horsepower capacity determined in H-35.7.1.

35.7.3 The maximum power capacity for boats 20 feet (6.1m) or more in length, recommended for use with outboard engines, shall be determined by the manufacturer and stated on the power capacity plate.

35.7.4 The maximum power capacity for inboards and sterndrives shall be determined by the manufacturer.

### 35.8 **DETERMINATION OF MANEUVERING SPEED**

35.8.1 A maneuvering speed shall be determined for;

35.8.1.1 pontoon boats that are capable of a top speed of 30 miles per hour (26 knots) or more, using the manufacturer's rated horsepower.

35.8.2 The maneuvering speed shall be determined by the quick turn test. (See H-35.9.)

35.8.3 If a maneuvering speed less than the top speed of the pontoon boat is determined, it shall be posted on the boat, in a location clearly visible and legible to the operator, and contain the following informational elements:

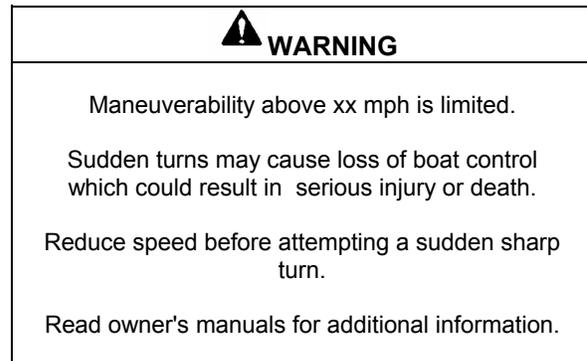
35.8.3.1 the hazard level intensity signal word;

35.8.3.2 nature of the hazard;

35.8.3.3 the consequences that can result if the instructions to avoid the hazard are not followed; and

35.8.3.4 instructions on how to avoid the hazard.

*Note: An example of such a label follows.*



35.8.4 The placarded maneuvering speed shall be the speed obtained with the boat prepared as described in H-35.9.1.

35.8.5 A speedometer shall be provided on pontoon boats when the maneuvering speed is less than the top speed of the pontoon boat.

### 35.9 **MANEUVERING SPEED TEST PROCEDURES**

35.9.1 Boat Preparation

35.9.1.1 The pontoon boat shall be rigged with equipment recommended or provided by the boat manufacturer, and tested with the highest horsepower production powerplant(s) for which the boat is to be rated, i.e., outboard engine(s), or which is to be installed in the boat, i.e., sterndrive(s) and inboard(s). Equipment shall be installed in accordance with manufacturer's instructions.

35.9.1.2 A speed measuring device shall be used. (See H-35.9.2.4.)

35.9.1.3 Install the lowest ratio, i.e., quickest steering system offered on the pontoon boat model being tested.

35.9.1.4 Mount the engine manufacturer's recommended propeller providing maximum speed.

35.9.1.5 Standard permanently installed fuel tanks shall be no more than one-half full. Pontoon boats with outboard engines, and without permanently installed fuel tanks shall be tested beginning with one full portable tank for each engine. Portable tanks shall be in their designated location, or placed as far aft as practicable.

35.9.1.6 Place the outboard engine in the lowest vertical position on the transom, or, if mounting instructions are provided, at the height recommended. If a mounting height above the transom is recommended and tested, then the highest horsepower for which flush transom mounting is recommended shall be tested.

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35.9.1.7 Boat bottom, engine, and propeller shall be clean and in like new condition.

35.9.1.8 The use of the following special equipment shall be considered because of the potential for exceeding the capabilities of the pontoon boat while performing this test;

35.9.1.8.1 racing type PFD,

35.9.1.8.2 helmet, and

35.9.1.8.3 emergency ignition stop switch.

35.9.2 Test Conditions

35.9.2.1 Testing shall be conducted on calm water with the wind speed below ten mph (nine knots).

35.9.2.2 The test shall be conducted with no load other than a driver who shall weigh no more than 200 lbs.

35.9.2.3 The engine trim angle shall be adjusted to provide maximum full throttle speed short of excessive porpoising or propeller ventilation so that there is no loss of directional control.

35.9.2.4 The maximum full throttle speed and the maneuvering speed shall be verified by radar, GPS, or other electronic means, or by the average of not less than two timed passages over a measured course in both directions.

35.9.3 Quick Turn Test Procedure

35.9.3.1 Set throttle at a comfortable maneuvering speed (low) and conduct the quick turn test.

35.9.3.2 To conduct a quick turn test, the driver operates the pontoon boat straight ahead at a given throttle setting. The wheel is turned 180° in both directions in 1/2 second or less and held at that position without changing the throttle or trim settings during or after the wheel change. The pontoon boat completes the maneuver successfully if it is capable of completing a 90° turn without the driver's loss of confidence in maintaining control of the boat.

35.9.3.3 If the pontoon boat successfully completes the quick turn test, increase the boat's turn entry speed incrementally until the boat does not complete the test or successfully completes it at maximum throttle.

35.9.3.4 The highest speed at which the pontoon boat successfully completes the quick turn test is the maneuvering speed.

35.10 ***SAFETY SIGNS AND LABELS***

35.10.1 Safety signs and labels shall comply with ABYC T-5, *Safety Signs and Labels* and shall contain the following informational elements:

35.10.1.1 The signal word for the level of hazard intensity; and

35.10.1.2 Nature of the hazard; and

35.10.1.3 Consequences that can result if the instructions to avoid the hazard are not followed; and

35.10.1.4 Instructions on how to avoid the hazard.

35.10.2 A label that meets the requirements of ABYC T-5

35.10.2.1 covering sitting forward of the front gate, or with legs passing through the front gate, and/or dangling feet over the bow shall be affixed:

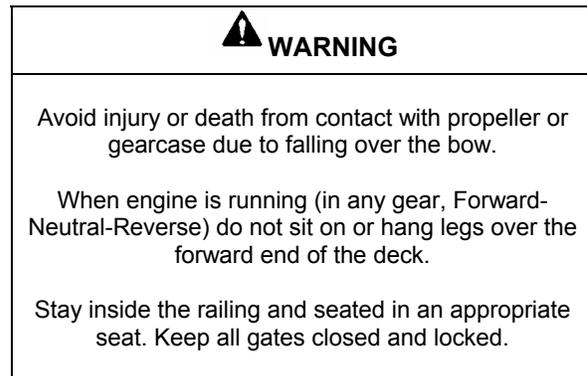
35.10.2.2 in a conspicuous location,

35.10.2.3 in the proximity of the gate, and

35.10.2.4 visible from the forward and aft side of the gate, and

35.10.2.5 visible with the gate opened and closed.

***NOTE: An example of such a label follows.***



35.10.3 A label that meets the requirements of H-35.10.1 covering use of Type B seats behind the front fence shall be affixed to the front fence in a conspicuous location.

***NOTE: An example of such a label follows.***

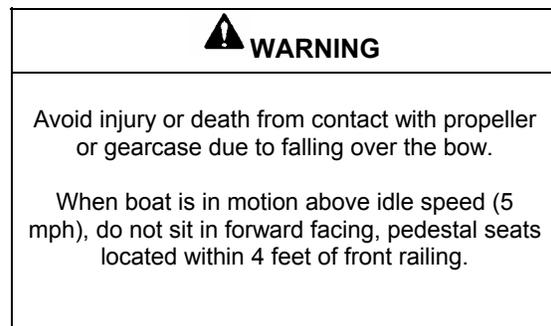




Figure 1 Pontoon Capacities Worksheet- Outboard EXAMPLE

OUTBOARD CAPACITIES WORKSHEET			
DATE		TOTAL PONTOON LENGTH	25.3 Ft.
BOAT MODEL: 2500		PONTOON RADIUS	12.5 In.
NO. OF PONTOONS	2	PONTOON DIAMETER	25 In.
PONTOON SECTION LENGTH	252 In.	BOAT WEIGHT	2100 Lbs.
		ENGINE WEIGHT (Refer to S-30, Table 1 Col. 10)	744Lbs.

TOTAL VOLUME OF ONE PONTOON	

$(3.142 \times R^2 \underline{490}) \times \text{Pontoon Section Length (inches)} \underline{252} / 1728 =$	<b>I 71.6</b>	Cu. Ft.
Volume of Nose Cone (See Note 2)	<b>II 6.5</b>	Cu. Ft.
Total Volume of Pontoon (I <u>71.6</u> + II <u>6.5</u> )	<b>III 78.1</b>	Cu. Ft.

MAXIMUM COMBINED WEIGHT CAPACITY PERSONS & GEAR	
VOLUME OF ALL PONTOONS III <u>78.1</u> X NO. OF PONTOONS <u>2</u> =	<b>IV 156.2</b>
DISPLACED WATER WEIGHT (IV <u>156.2</u> X 62.4 LBS)	<b>V 9746.3</b>
MAX. WEIGHT CAPACITY Displaced Water Weight (V) <u>9746.3</u> - Boat Weight <u>2100.0</u> = <b>7646.3</b> ( $\sqrt{\text{Pontoon Diameter } \underline{5}}$ ) -2.35 (2 pontoon) -1.35 (3 pontoon)	<b>VI 2885.4</b>
Example: Diameter = 25" 2 pontoon formula $\sqrt{\text{ of } 25 = 5 - 2.35 = 2.65}$ (divisor) 3 pontoon formula $\sqrt{\text{ of } 25 = 5 - 1.35 = 3.65}$ (divisor)	DESIRED CAPACITY LBS

MAXIMUM HORSEPOWER RATING	
$\frac{\text{Volume of Pontoons (IV) } \underline{156.2} \times \text{Total Pontoon Length } \underline{25.3}}{\text{Pontoon Diameter } \underline{25}}$	<b>VII 158</b> H.P. (C) Desired hp

PERSONS CAPACITY	
Maximum Weight Capacity (VI) <u>2885.4</u> lbs. – Engine Weight <u>744</u> lbs.	<b>VIII 2141.4</b> (PC)
	DESIRED CAPACITY Lbs.

NUMBER OF PERSONS	
Persons Capacity (VIII) <u>2141.4</u> 141	<b>IX 15.19</b>
	DESIRED CAPACITY Persons

NOTE 1: This worksheet is for ROUND two pontoon and three pontoon boats.

NOTE 2: The volume of a nose or end cap is easily determined by filling it with water. 7.5 gallons is equal to one cubic foot.

NOTE 3: When a permanent fuel tank is installed, the weight of the full fuel system should be included in BOAT WEIGHT.

Figure 2 Pontoon Capacities Worksheet- Sterndrive / Inboard

<b>STERNDRIVE / INBOARD CAPACITIES WORKSHEET</b>			
BOAT MODEL:		DATE:	
NO. OF PONTOONS		PONTOON RADIUS	In.
PONTOON SECTION LENGTH	In	PONTOON DIAMETER	In.
TOTAL PONTOON LENGTH	Ft	BOAT WEIGHT*	Lbs.
		* For calculations, boat weight does not include weight of engine, drive, controls or battery, but does include full fuel system.	
<b>TOTAL VOLUME OF ONE PONTOON</b>			
(3.142 x R <sup>2</sup> ) x Pontoon Section Length (inches) _____ /1728 =		I	Cu. Ft.
Volume of Nose Cone and End Cap (See Note 3)		II	Cu. Ft.
Total Volume of Pontoon (I) _____ + (II) _____		III	Cu. Ft.
<b>MAXIMUM COMBINED WEIGHT CAPACITY PERSONS &amp; GEAR</b>			
VOLUME OF ALL PONTOONS (III) _____ X (NO. OF PONTOONS) _____		IV	
DISPLACED WATER WEIGHT (IV) _____ X 62.4 LBS		V	
MAX. WEIGHT CAPACITY= Displaced Water Weight (V) _____ - Boat Weight _____ (√ Pontoon Diameter) _____ - 2.35 (2 pontoon) - 1.35 (3 pontoon)		VI	
Example: Diameter = 25" 2 pontoon formula √ of 25 = 5 - 2.35 = 2.65 (divisor) 3 pontoon formula √ of 25 = 5 - 1.35 = 3.65 (divisor)		DESIRED CAPACITY LBS	
<b>PERSONS CAPACITY</b>			
Maximum Weight Capacity (VI) _____ lbs. – Propulsion System Weight* _____		VII	(PC)
*See manufacturers published propulsion system weight.		DESIRED CAPACITY LBS	
<b>NUMBER OF PERSONS</b>			
Persons Capacity (VII) _____ 141		VIII	
		DESIRED CAPACITY PERSONS	

**NOTE 1:** This worksheet is for **ROUND** two pontoon and three pontoon boats.

**NOTE 2:** Fuel System includes tank, components and fuel.

**NOTE 3:** The volume of a nose or end cap is easily determined by filling it with water. 7.5 gallons is equal to one cubic foot.



H-35 APPENDIX

Ap.H-35.1 The following information should be considered for inclusion in the boat owner's manual:

Ap.H-35.1.1 Information on anchoring the boat;

Ap.H-35.1.2 Lift generated by superstructure to prevent capsizing when anchored in a cross wind;

Ap.H-35.1.3 Information on the proper distribution of passengers during operation;

Ap.H-35.1.4 A copy of each safety related label and related information and location of each label

\* \* \* \* \*

*Origin and Development of H-35, Powering and Load Capacity of Pontoon Boats*

ABYC published the first edition of H-35 in 1989. Subsequent revisions were published in 1999 and 2003. The 2005 revised edition is the work of the Hull Performance Subproject Technical Committee.

\* \* \* \* \*

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