Safe Powering, Safe Loading and Flotation

Test Procedure Manual
For
Outboard Powered Boats More Than Two Horsepower

Table of Contents

Introduction

This test procedure manual is intended to be an instructional guide as well as a resource document. It describes how to verify compliance with the requirements specified in selected subparts of 33 CFR Part 183, Boats and Associated Equipment:

Subpart C *Safe Loading*

Subpart D *Safe Powering*

Subpart G *Flotation Requirements for Outboard Boats Rated for Engines of More Than 2 Horsepower*

The test procedures are organized in the order in which such tests are typically performed. Sections dealing with the details of boat preparation for the test procedures have been placed immediately before the sections containing the test procedures. Tables have been included containing information necessary to perform the calculations required by the test procedures.

The manual contains a section of figures intended to assist in the understanding of the information contained in the text and the Test Data Work Sheet. The Test Data Work Sheet provides step by step instruction for the calculations and test procedures to be followed in order to verify compliance with the requirements of 33 CFR 183.

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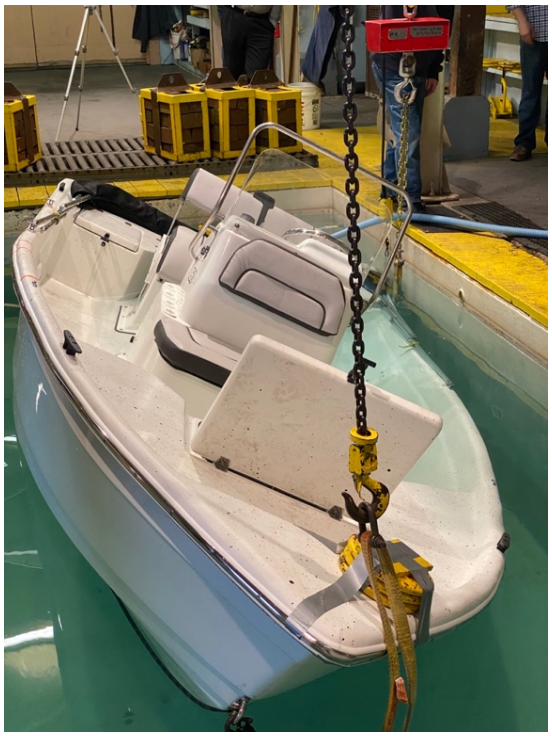

The picture above shows a port stability test as described in Section G

Section A

Receiving Inspection

A receiving inspection should always be performed prior to any testing. This inspection is intended to check for poor workmanship, shipping damage, conformity with the manufacturer's published documentation and the accuracy of the purchase agreement with the dealer, if the boat was purchased.

No special equipment is required for this inspection except a camera, sufficient lighting to produce acceptable photographs, and a copy of the Test Data Work Sheet (Section J).

1. The test boat should be unpacked immediately upon arrival at the test facility to make certain that the boat shipped is complete according to the packing list and the purchase agreement and has sustained no shipping damage.

2. The test boat should be identified immediately upon receipt at the test facility. This identification should include marking the boat with a test boat identification number according to a system approved by the Coast Guard. The material on which the number is printed must be sufficiently durable to withstand multiple and long term swamping in fresh water. The test boat identification number should be recorded on the Test Data Work Sheet. A properly affixed Hull Identification Number (HIN) would be an acceptable marking.

3. Visually and manually inspect the boat for structural soundness and functional characteristics. Note any items of damage. Note particularly areas which might be subject to damage by testing. Record all deficiencies that might affect the test results on the Test Data Work Sheet (Line 8). Photographs of any such defects or imperfections should be taken and included in the test report.

The test boat should consist of one complete boat including all its original and permanent appurtenances and equipment. The equipment does not have to include batteries, portable fuel tanks or outboard engines.

Note: A fuel tank is considered permanently installed if it has a rated capacity greater than 12 gallons and/or requires tools to remove from the boat.

On the Test Data Work Sheet record the following:

Line 1: the name of the test boat manufacturer and contact information;
Line 2: the name of the dealer from whom the boat was purchased and contact information;

Line 3: the manufacturer's model designation for the test boat (or type of boat if the manufacturer does not use model name), model number, and Hull Identification Number (HIN) ; and

Line 4: capacity plate information, including:

a. Maximum Weight capacity;
b. Maximum Persons capacity in pounds and whole numbers; and
c. Maximum Horsepower, if the boat is outboard powered.

After recording the boat data, inspect and note the following on the Test Data Worksheet:

Line 5: If the capacity plate is properly located, has the correct content and display characteristics; and

Line 6: If the boat properly displays the Manufacturer's Certification Label either on the capacity plate or in another location on the boat and if the content and display characteristics of the statement meet USCG requirements.

Finally, make a record on **Line 7** of the Test Data Worksheet of a complete inventory of the boat's machinery, accessories and portable appurtenances.

The test boat's portable accessories and appurtenances should be removed from the boat, identified and stored until after the testing process has been completed.

At least five photographs of the test boat should be taken as part of the receiving inspection as follows:

1. an external bow-on view;
2. an external transom view;
3. an external side view;
4. a close-up view of the manufacturer's capacity plate; and
5. a close-up view of the Hull Identification Number (HIN).

Each photograph, except for the close-up views, should include the boat's identification number of sufficient size and boldness to be readable from a 5x7-inch photograph, and/or a digital resolution of 875 x 1225 pixels. The boat's identification for these photographs need not be permanent, simply able to document that the boat in the picture is in fact the boat referenced.

Following the receiving inspection, the boat should be safely stored until ready for the next phase of the testing process. The test facility should maintain a suitable storage area in which the test boat can be stored during all non-testing periods. The test facility should provide appropriate security measures to protect the test boat and its equipment from damage due to weather and alteration by unauthorized personnel before, during, and after the boat testing process.

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Section B

Boat Measurement

1. Introduction

This section details the required measurements to be taken from the test boat prior to performing the Safe Powering, Safe Loading, and Flotation tests. It also includes instructions for identifying and marking specific areas of the boat required for performing these tests.

Prior to taking the boat measurements described in this section, all boats should have been properly received, identified and the information recorded on the Test Data Work Sheet found in Section J.

A minimum of one photograph should be taken of each test in its final pass/fail condition.

2. Leveling the Boat and Measuring Boat Length

Prior to taking the boat measurements described in this section, it is necessary to level the boat. There are two methods for performing this process:

- Eyeball; and
- 40%/75%.

For both methods the test boat should be placed on a trailer, cradle, or chocks on a flat floor. For this purpose the floor should be flat to within a ¼ inch. Concrete floors are normally flat to this tolerance. This may be verified by the use of a carpenter's level.

2.1 Eyeball Method

This method of leveling the test boat will suffice in most testing situations.

2.1.1 Adjust the boat on the trailer, cradle, or chocks such that it is level fore, aft and transversely using a carpenter's level, angle finder or "eyeball";

2.1.2 Proceed with marking the forward most and after most points on the boat;

2.1.3 Project these points to the floor and mark them;

2.1.4 Measure the distance between the projected points on the floor with a tape measure; and

2.1.5 Record this dimension as boat length in feet and inches on Line 9 of the Test Data Work Sheet.

2.2 40%/75% Method

This method is used only when a very accurate length measurement is required. An example of such a situation would be when the boat length is very close to 20 feet and it is necessary to determine its length exactly. Follow the procedure below (Figure 1) if using the 40%/75% method:

2.2.1 First, determine the "preliminary" length of the boat. Locate the extreme forward most point on the centerline of the boat and mark it. This measurement should include the rubrail, but exclude bolted on bow sprits, bow eyes, handles, bow pulpits and other such fittings, attachments, and extensions. Molded in or welded on bowsprits and other such molded in or welded on extensions are considered a part of the boat and are included in the measurement of boat length.

2.2.2 Next, locate the extreme after most point on the centerline of the boat and mark it. For some boat designs the extreme after most point is not located on the centerline of the boat, but rather on the port and starboard sides. In such situations the location of the after most point can be transferred from the port and/or starboard locations to the centerline of the boat using a straight edge or a string. This measurement should include the continuous rubrail, but exclude bumpkins, handles, rudders, outboard motor brackets, bolted on swim platforms and other such fittings, attachments, and extensions. Molded in or welded on swim platforms and other such molded in or welded on extensions are considered a part of the boat and are included in the measurement of boat length.;

2.2.3 Drop a plumb bob from the marked forward most point and the after most point on the boat to the floor and mark the projected points on the floor;

2.2.4 Using a tape measure, measure the distance between the projected points on the floor parallel to the centerline of the boat;

2.2.5 Calculate 40% and 75% of this "preliminary" length measurement, record the information on **Line 9** of the Test Data Work Sheet and mark these points on the keel of the boat beginning at the forward most point;

2.2.6 Adjust the boat on the trailer, cradle, or chocks such that the 40% and 75% points on the boat's keel are level within ¼ inch (*see* Figure 1);

2.2.7 Next, level the boat transversely using a carpenter's level or angle finder, such that corresponding points on both sides of the boat are equal distances above the floor;

2.2.8 Again, drop a plumb bob from the forward and after most points of the boat, already marked, and mark the floor;

2.2.9 Using a tape measure, measure the distance between these projected points on the floor parallel to the centerline of the boat and record this dimension on as the boat length in feet and inches on **Line 10** of the Test Data Work Sheet.

*For purposes of performing the Safe Powering Test for outboard powered boats over 2 horsepower, the boat length obtained above in feet and inches has to be converted to decimal feet. For example, if the boat length was determined to be 18 feet 3 inches, do nothing with the 18 feet but convert the 3 inches to decimal feet by dividing by 12 inches and express the answer as .25. The boat length in decimal feet would then be expressed as 18.25 feet and recorded on the Test Data Work Sheet (**Line 10b**).*

3. Measuring Maximum Beam

The next measurement to be taken is the boat's maximum beam.

3.1 Locate along the length of the boat, its widest beam. Rubrails are included in this measurement, but handles and other similar fittings, attachments, and extensions are excluded;

3.2 Mark the points on the Port and Starboard sides of the boat where the widest beam is located;

3.3 Drop a plumb bob from these points to the floor and mark the floor;

3.4 Measure the distance between these projected points on the floor; and

3.5 Record this dimension as the boat's maximum beam on **Line 12** of the Test Data Work Sheet.

4. Measuring Transom Width

The next measurement to be taken is the transom width of the boat. Depending on the type and style of the transom, different measuring procedures are used. The three basic types of transoms are:

- full width transoms;
- transoms with widths greater than 50% of the boat's maximum beam; and
- transoms with widths less than or equal to 50% of the boat's maximum beam.

4.1 Full Width Transoms

For boats with full width transoms (*see* Figure 2A), the transom width is the beam of the boat measured at the widest point of the transom.

4.1.1 The measurement is taken between the intersections of the transom and the port and starboard sides of the boat. Rubrails are included in this measurement, but handles and other similar fittings, attachments, and extensions are excluded.

4.1.2 A tape measure is used to measure the distance between these two intersection points.

4.1.3 Record this dimension as the boat's transom width in feet and inches on **Line 14** of the Test Data Work Sheet.

4.2 Transoms with Widths Greater Than 50% of the Boat's Maximum Beam

The next type of transom has a width greater than 50% of the boat's maximum beam, but less than that of a full transom (*see* Figure 2B). The measurement is taken between the intersections of the transom and the port and starboard sides of the boat. Rubrails are included in this measurement, but handles and other similar fittings, attachments, and extensions are excluded.

4.2.1 A tape measure is used to measure the distance between these two intersection points. Record this dimension as the boat's transom width in feet and inches on **Line 14** of the Test Data work Sheet.

Figure 2C shows a special situation for this type of transom. With this style of transom, the transom surface does not intersect with the sides of the boat, as is the case for the transom style shown in Figure 2B. For this style of transom, the transom width is the maximum distance between the intersection of the projection of the outermost surface of the hull sides with the projection of the transom plane. Rubrails are included in this measurement, but handles and other similar fittings, attachments and extensions are excluded. Since these two intersection points are located in "thin air" straight edges will have to be used to locate them. Place one straight edge along the top of the transom and the other along the Port hull side at the same height as the transom top. From the point where the two straight edges intersect drop a plumb bob and mark the point on the floor.

4.2.2 Perform the same procedure for the Starboard side. The distance between these two projected points on the floor can be measured using a tape measure. Record this dimension as the boat's transom width in feet and inches on **Line 14** of the Test Data Work Sheet.

4.3 Transoms with Widths Less Than or Equal to 50% of the Boat's Maximum Beam

The third type of transom has a width less than or equal to 50% of the boat's maximum beam (*see* Figure 2D). With this style of transom, the transom surface does not intersect with the sides of the boat, as is the case for boats with full transoms. The transom width is also less than or equal to 50% of the boat's maximum beam. For this type of transom, the transom width is considered to be the boat's maximum beam located in the aft quarter-length of the boat. Rubrails are included in this measurement, but handles and other similar fittings, attachments, and extensions are excluded.

4.3.1 Calculate ¼ of the boat's length and record the information on **Line 10a** of the Test Data Work Sheet. Measuring from the after most point of the boat, mark the Port and Starboard sides of the boat with this dimension. Locate the boat's maximum beam between these points and the after most point of the boat. At the location of the maximum beam, drop a plumb bob from each side of the boat and mark the floor;

4.3.2 Using a tape measure, determine the distance between the two projected points on the floor. Record this dimension as the boat's transom width on **Line 14** of the Test Data Work Sheet.

5. Measuring Transom Height

For purposes of the Safe Powering test, the standard method of determining the height of the transom (*see* Figure 3) is as follows:

5.1 Place a straightedge along the keel and parallel to the centerline of the boat. This placement of the straightedge should exclude separate welded on keels and separate attached molded keels. The straightedge should extend aft beyond the after most part of the boat;

5.2 Locate the lowest point of possible water ingress along the top of the transom;

5.3 Using a tape measure, determine the distance from this point down to the straightedge, keeping the tape perpendicular to the straight edge; and

5.4 Record this dimension as the boat's transom height on **Line 15** of the Test Data Work Sheet. If the boat has a "stepped keel", the transom height measurement is made from the extension of the boat's actual bottom surface at the centerline and not the bottom of the "step" (*see* Figure 3F).

An alternative method for determining the boat's transom height is as follows:

5.5 Locate the lowest point of possible water ingress along the top of the transom;

5.6 Using a tape measure, determine the vertical distance from this point down to the floor;

5.7 Next, measure the vertical distance from the after most point of the boat's bottom surface, at the boat's centerline, down to the floor. The difference between these two measurements is the boat's transom height; and

5.8 Record this dimension on **Line 15** of the Test Data Work Sheet.

NOTE: a transom is considered to have a transom height of 20 inches if it measures between 19 through and including 21 inches. Herein referred to as nominal 20 inches.

6. Hard Chine/Flat Bottom Determination

For purposes of the Safe Powering test, it must be determined if the test boat is a hard chine/flat bottom boat.

6.1 Examine the boat where the hull bottom joins, or fairs into, the hull sides. This should be done throughout the length of the boat;

6.2 A radius of chamfer of 0.5 inch or less between the side and bottom with an inclusive angle of 110 degrees or less between the side and bottom when measured in the aft quarter then, the boat is classified as a hard chine boat (*see* Figure 4).

6.3 If the boat has a double or multiple chines or if the radius of curvature at the intersection has a radius equal to or greater than .5 inches, the boat is classified as being not a hard chine boat.

6.5 The results of this examination should be entered on **Line 17** of the Test Data Work Sheet.

6.6 If the boat is classified as hard chine, an examination of the boat's bottom must be made.

6.6.1 Observe the boat's deadrise at the midships station. With the boat transversely level, an angle finder can be used to determine the amount of deadrise (*see* Figure 5).

6.6.2 If the deadrise is found to be less than 2 degrees, the boat is classified as a flat bottom boat.

6.6.3 If the deadrise is found to be equal to or greater than 2 degrees, the boat is not classified as a flat bottom boat.

6.6.4 Next, check for compound curvature in the bottom by laying a straightedge across the bottom at the midships station from the lowest chine to the edge of the keel.

6.6.5 If the bottom has curvature, it not classified as a flat bottom boat.

6.6.6 The results of these examinations and measurements should be entered on **Line 18** of the Test Data Work Sheet.

7. Type of Steering

Examine the test boat steering system to determine if it should be classified as remote steering. Some examples of remote steering are:

- Wheel;
- Stick;
- Joystick; and
- Remote electronic steering.

Note: Tiller extensions and power assisted tiller steering are not considered to be remote steering.

7.1 Record the results of this examination on **Line 19** of the Test Data Work Sheet.

8. Reference Areas

For purposes of the Safe Loading and Flotation tests it is necessary to identify specific reference areas on the test boat. There are four such areas referred to as the forward and aft reference areas, the 40% reference area, and the 70% reference area. Each area should be identified with a unique color of highly visible waterproof tape so to easily identify the different areas in photographs. The outside edge of the tape shall be the extent of the marked area.

8.1 Forward and Aft Reference Areas

The forward reference area extends 2 feet aft of the forward most point of the boat and extends from the port to the starboard side of the boat along the top surface of the hull or deck (*see* Figure 6).

8.1.1 Measure 2 feet back from the forward most point of the boat and identify the limits of this area using waterproof tape. Typically, the most convenient way to identify this area is to mark the port and starboard gunwales.

The aft reference area extends 2 feet forward of the aft most point of the boat and extends from the port to the starboard side of the boat along the top surface of the hull or deck (*see* Figure 6).

8.1.2 Measure 2 feet forward of the aft most point of the boat and identify the limits of this area using waterproof tape. Typically, the most convenient way to identify this area is to mark the port and starboard gunwales.

Definition:
Passenger Carrying Area

The passenger carrying area is the area within the recess of a boat in which persons can reasonably occupy in a seated position or stand while the boat is swamped and underway. A boat is underway when it is not at anchor or moored. This may include area other than recommended on plane or designated occupant positions.

The length of the passenger carrying area is the distance along the centerline of the boat between two vertical lines, one at the forward end and one at the aft end of the passenger carrying area when the boat is level. For boats with a curved stem inside the passenger carrying area, the forward vertical line is where a line 45 degrees to the horizontal when the boat is level is tangent to the curve of the stem. For boats with cabins, the forward vertical line is where there is a minimum distance of two feet between the inside top of the cabin and the waterline formed when the boat is swamped and loaded with weights under 183.220.

The breadth of each passenger carrying area is the distance between two vertical lines at the mid-length, excluding consoles, of the passenger carrying area when the boat is level. For boats with round chines inside the passenger carrying area, the vertical line is where a transverse line 45 degrees to the horizontal is tangent to the arc of the chine.

Examples of passenger carrying area are illustrated in Figure 7.

8.2 40% Of Passenger Carrying Area (40% PCA)

The location and size of the 40% PCA or "box" (*see* Figure 8) depends on the length and width of the boat's passenger carrying area.

8.2.1 Using a tape measure, determine the length and width of the passenger carrying area and record these dimensions on **Lines 20a and 20b** of the Test Data Work Sheet;

8.2.2 Calculate 20%, 30%, 35% and 50% of the length of the passenger carrying area and 20 % of the width of the passenger carrying area and record the results on **Lines 20a and 20b** of the Test Data Work Sheet;

8.2.3 Measure back from the forward most point of the passenger carrying area, on the centerline of the boat, a length equal to 50% of the length of passenger carrying area and mark the floor of the boat. This mark locates the center of the 40% box;

8.2.4 Forward and aft of this mark, on the centerline of the boat, layout a length equal to 20% of the length of the passenger carrying area and mark the floor of the boat;

8.2.5 Next, to port and starboard of the 40% box center mark, perpendicular to the centerline of the boat, layout a length equal to 20% of the width of the passenger carrying area and mark the floor of the boat. These four marks define the limits of the 40% box; and

8.2.6 Using these marks, layout on the floor of the boat with waterproof tape, a rectangular box with its Port and Starboard sides parallel to the centerline of the boat and its fore and aft sides perpendicular to the centerline of the boat. The 40% box has now been identified.

8.3 70% Perimeter Passenger Carrying Area (70% PPCA)

The 70% PPCA or "box" is located along the outboard extremes of the passenger carrying area on the port and starboard sides of the boat's interior (*see* Figure 9). The length of the 70% box depends on the length of the passenger carrying area.

8.3.1 Using a straightedge and the location of the center mark for the 40% box, locate the center of the length of the passenger carrying area along the interior starboard side of the boat and mark the floor;

8.3.2 Forward and aft of this mark, parallel to the side of the boat, layout a length equal to 35% of the length of the passenger carrying area and mark the floor 6 inches inboard of the starboard side. These two marks define the limits of the starboard 70% box; and

8.3.3 Connect these two points with waterproof tape along the floor of the boat following the contour of the hull interior. The starboard 70% box has now been identified. Repeat this same process on the port side of the boat to identify the port 70% box .

9. Boat Weight

For determining the boat's weight for testing purposes:

9.1 Outboard powered boats. The boat weight includes full permanent fuel tanks and all factory-supplied, permanently installed, non-portable appurtenances.

9.2 Bow Fishing / Removable Decks:

If a boat has a factory option for an additional deck, then the deck will be considered a permanent appurtenance and included as boat weight for the purpose of capacity and flotation requirements.

10. Simulating Fuel Weight

For safety and environmental reasons, the Coast Guard does not recommend that the test facility fill permanently installed fuel tanks with gasoline for any testing purposes.

10.1 Based on the rated capacity of the fuel tank, calculate the equivalent amount of test weight required to simulate the missing gasoline. This calculation appears on **Line 32** of the Test Data Work Sheet. Place this weight in the boat such that the center of gravity of the weight is over the center of gravity of the fuel tank.

11. Simulating Equipment Weight

When determining boat weight, use equivalent test weights to simulate any missing optional manufacturer offered equipment that is designed to be permanently installed. For optional equipment for which the manufacturer has made design provisions for future permanent installation by the dealer and/or purchaser, use equivalent test weights to simulate missing equipment. The boat weight should be obtained without the outboard engine attached and without portable fuel tanks and batteries installed.

11.1 All simulated weights should be entered on **Line 33c** of the Test Data Work Sheet identifying the component they are replacing. All simulated test weights should be located in the boat such that the center of gravity of the weights is located as close as possible to the center of gravity of the equipment being simulated.

11.2 When obtaining the boat weight, the boat should be properly supported using lifting straps and spreader bars. Once the boat is properly prepared a scale or load cell should be used to determine the boat weight. The result of this process should be entered as the boat's weight on **Line 33d** of the Test Data Work Sheet.

Trolling Motors

If a boat is equipped with a pad or wired for a trolling motor, weights corresponding with the table below will be placed at the normal operating positions of the trolling motor and battery during compliance testing. At least one dedicated battery is assumed for the trolling motor. If the actual weight of the trolling motor is known, or if the boat or trolling motor manufacturer provides the weight of the motor, the lab will use that weight, instead of the weight from the table below.

Trolling Motor Thrust In Pounds	Weight in Pounds (does not include batteries)*
45	12
50	23
60	34
70	50
80	56
90	68
100	79
110	90
120	101
130	112

**For battery weight see 33 CFR 183.75*

Kicker Engines

If a boat is equipped with a pad or wiring for a kicker engine, then the manufacturer should provide flotation for the swamped weight of the engine and controls. If the manufacturer does not provide a label on the boat specifying the horsepower of the kicker engine, then the lab will assume the kicker engine horsepower is 10 percent (10%) of the main engine's horsepower rating. Weights for the kicker engine will be obtained from 33 CFR 183.75, and placed in the location of the engine and battery. The kicker engine weight will not be subtracted from the maximum weight capacity to determine person's capacity.

Portable Generators

If a boat is equipped with a pad or wiring for a generator, then the manufacturer should provide flotation for the swamped weight of the generator. If the manufacturer does not provide a label on the boat specifying the maximum weight of the generator, then the lab will assume the generator has a dry weight of 50 pounds. Weights for the generator will be placed in the location of the mounting provisions. The generator weight will not be subtracted from the maximum weight capacity to determine person's capacity.

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Section C

Safe Powering Test Procedure

1. Introduction

This section details the required procedure for the determination of the maximum allowed horsepower for monohull boats less than 20 feet that are designed or intended to use one or more outboard engines greater than 2 horsepower for propulsion. This discussion does not apply to sailboats, canoes, kayaks and inflatable boats.

2. Factor Calculation

The first step in this procedure is to calculate a "factor" by multiplying the boat's length by its maximum transom width. These dimensions have already been determined during the boat measurement process. Both the boat length (*see* Line 10b) and the maximum transom width (*see* Line 14a) must be expressed in decimal feet for this calculation. If the decimal fraction of the calculated "factor" is less than .5, round the "factor" down to the previous whole number. If it is .5 or greater, round it up to the next whole number;

2.1 Once the "factor" has been calculated, the Outboard Boat Horsepower Capacity Table (*see* Table 1) can be used to determine the maximum allowed horsepower. *Note: This table contains the same information as Table 183.53 of Title 33 CFR.*

2.1.1 If the "factor" is 52 or less, the maximum allowed horsepower can be obtained from the column corresponding to the "factor". However, for flat bottom/hard chine boats the horsepower listed in the table must be reduced one horsepower increment. *For example, if the "factor" is 48, the table indicates a maximum allowed horsepower of 15. However, if the boat is the flat bottom, hard chine type, the maximum allowed horsepower becomes 10. It should be noted that for "factors" of 52 or less, the resulting maximum allowed horsepower may not be raised to the next multiple of 5 horsepower as is the case for "factors" over 52;*

2.1.2 If the "factor" is over 52 and the boat has remote steering and a transom height of at least 20 inches, the maximum allowed horsepower is obtained by multiplying the "factor" by 2 and subtracting 90. This resulting horsepower value may be raised to the next multiple of 5 horsepower;

2.1.3 If the "factor" is over 52 and the boat does not have remote steering, or has a transom height less than nominal 20 inches (as defined in Section 5) , and is the flat bottom, hard chine type, the maximum allowed horsepower is obtained by multiplying the "factor" by 0.5 and subtracting 15. This resulting horsepower value may be raised to the next multiple of 5 horsepower; and

2.1.4 If the “factor” is over 52 and the boat does not have remote steering or has a transom height less than nominal 20 inches, the maximum allowed horsepower is obtained by multiplying the “factor” by 0.8 and subtracting 25. This resulting horsepower value may be raised to the next multiple of 5 horsepower.

2.2 The Safe Powering Test Procedure concludes with a verification of compliance with the regulations involving a comparison of the calculated maximum allowed horsepower with the Maximum Horsepower rating displayed on the boat’s capacity plate.

2.2.1 If the calculated maximum allowed horsepower is equal to or greater than the Maximum Horsepower rating displayed on the boat’s capacity plate, the boat passes the Safe Powering Test Procedure and complies with the regulations. If the calculated maximum horsepower is less than the Maximum Horsepower rating on the boat’s capacity plate, the boat fails the Safe Powering Test Procedure and does not comply with the regulations; and

2.2.2 For a failing powering calculation, the calculated maximum HP figure will be used in determination of the Maximum Persons Capacity in flotation and stability tests.

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The picture above shows a starboard stability test as described in Section G

Section D

Boat Preparation for the Maximum Weight Capacity Tests

1. Introduction

The Maximum Weight Capacity Test is based on knowledge of the maximum displacement of the boat and the boat's weight. The maximum displacement of a boat is the weight of the volume of water displaced by the boat at its maximum level immersion in calm water without water coming aboard. For determination of the maximum displacement of the boat, the boat's interior must be kept dry. To keep the interior of the boat dry when determining its maximum displacement certain hull openings are sealed, including:

- All scuppers or freeing ports with or without flaps or back flow devices and regardless of size;
- Drain holes in the bow;
- Bait, fish and anchorwell fill and drain holes;
- Holes in the motorwell of outboard powered boats with boots in addition to the 3-inch hole allowed by 33 CFR 183.35 b (1); and
- The complete hull to deck joint.

1.1 Transom doors or equivalent are considered to be open during the determination of the boats maximum displacement.

1.2 Drain holes or scuppers that may flood the boat during normal use will be reviewed by the Coast Guard for safety and may be considered points of major down flooding or water ingress.

1.3 Waterproof tape or temporary materials may be used to seal the hull openings. Sealing materials should be selected so the boat is not damaged by the sealing process. All sealing materials should be removed from the boat immediately following testing to make them easier to remove and prevent damage to the boat.

2. Categorizing Boats for Testing

For determining the boat's weight for these tests, the boat is divided into one of three categories:

- outboard powered boats over 2 horsepower;
- inboard/sterndrive powered boats; and
- outboard powered boats 2 horsepower or less, including manually powered boats.

2.1 Outboard Powered Boats over 2 Horsepower

2.1.1 The boat weight includes the weight of full permanently installed fuel tanks and all factory supplied, permanently installed, non-portable equipment. The boat weight does not include the weight of the outboard engine, controls, or batteries.

2.1.2 When determining boat weight, use equivalent test weights to simulate any missing factory supplied, permanently installed, non-portable equipment. The boat weight should be obtained without the outboard engine attached and without portable fuel tanks and batteries installed.

2.1.3 When obtaining the boat weight, the boat should be properly supported using lifting straps and spreader bars as required. Once the boat is properly prepared, a scale(s) or load cell(s) should be used to determine the boat weight;

2.1.4 For safety and environmental reasons the Coast Guard does not want to fill permanently installed fuel tanks with gasoline for any testing purposes. Based on the rated capacity of the fuel tank and the material of the test weights used, the equivalent amount of test weight required to simulate the missing gasoline can be calculated. See **Line 32** of the Test Data Work Sheet for the procedure to be used to calculate this test weight.

*****

The picture above shows an example of a level with persons test as described in Section G

Section E

Maximum Weight and Persons Capacity Test Procedures

1. Introduction

These test procedures apply to all monohull boats less than 20 feet, except sailboats, canoes, kayaks, and inflatable boats.

These test procedures allow verification of the accuracy of the values for Maximum Weight capacity, Maximum Persons capacity in pounds and whole numbers displayed on the manufacturer's capacity plate.

2. Maximum Weight Capacity Tests

A boat's maximum displacement is the weight of the volume of water displaced by the boat at its maximum level immersion, in calm water, without water ingress. A boat is considered level when either of two conditions is satisfied:

- The boat's most forward point and after most point are equidistant above or below the water surface; or
- the most forward point is level with or above the lowest point of water ingress.

2.1 Outboard Powered Boats Over 2 Horsepower

2.1.1 The Maximum Weight capacity marked on boats must not exceed one-fifth of the difference between the boat's maximum displacement and the boat's weight.

2.1.2 For boats, the maximum test weight is calculated to be 5 times the Maximum Weight capacity marked on the capacity plate. Follow the instructions on **Line 30** of the Test Data Work Sheet to make this calculation.

2.1.3 Float the prepared boat (*see* Section D) in the test tank. Add test weights to the boat until one of two conditions is met:

2.1.3.1 Either the amount of weight added equals the maximum test weight calculated with no water ingress; or

2.1.3.2 Water ingress occurs before all the weight can be added.

2.1.4 Test weights should be moved and adjusted in the boat to obtain optimum results and to minimize risk of capsizing. If water ingress occurs before all the

weight can be added, enter the result on **Line 36** of the Test Data Work Sheet and proceed with the verification process.

2.1.5 The resulting weight recorded on **Line 36** is divided by 5 and compared with the Maximum Weight capacity on the capacity plate (*see* Line 4a) to verify compliance. If this calculated weight equals or exceeds the Maximum Weight capacity on the capacity plate, the boat passes. If not, the boat fails.

3. Maximum Persons in Pounds Capacity Tests

3.1 Outboard Powered Boats Over 2 Horsepower

The Maximum Persons in pounds marked on boats designed or intended to be powered by outboard engines greater than two horsepower may require the use of two methods in the verification of compliance process:

- Calculation Method; and
- Test Weight Method.

3.1.1 Calculation Method

The first method involves a calculation and applies to all boats.

3.1.1.1 Subtract the dry weight of motor and controls, battery, and full portable fuel tank (*see* Table 2, Column 9) from the Maximum Weight capacity on the capacity plate and record the result on **Line 38b** of the Test Data Work Sheet.

If the Maximum Persons capacity on the capacity plate is 550 pounds or more, the result of this calculation is the maximum allowed persons capacity for the boat.

Verification of compliance consists of comparing the result of the calculation with the Maximum Persons capacity on the capacity plate. If the calculated persons capacity is equal to or greater than the Maximum Persons capacity on the capacity plate, the boat passes. If not, the boat fails.

3.1.2 Test Weight Method

This second method **must** be performed only if the Maximum Persons capacity on the capacity plate is less than 550 pounds. In such situations the maximum allowed persons capacity will be the lesser of the persons capacity from the calculation method and that resulting from the test weight method.

3.1.2.1 Float the prepared boat in the test tank (*see* section D);

3.1.2.2 Place in the boat, in their normal operating positions, the dry weight of motor and controls, battery, and full Portable fuel tank (*see* Table 2, Column 9) corresponding to the Maximum Horsepower on the capacity plate;

3.1.2.3 For safety and environmental reasons the Coast Guard does not want the test facility to fill fuel tanks with gasoline for any testing purposes. Therefore, if the boat has a permanently installed fuel tank, calculate the weight to simulate the fuel (*see* Line 32) and place the center of gravity of the weight over the center of gravity of the fuel tank;

3.1.2.4 Calculate the test weight to be added to the boat by multiplying 0.60 times the Maximum Persons capacity on the capacity plate (*see* Line 39a).

3.1.3 Compare the results of the calculation method and the test weight method and record the lesser value. This weight is the maximum allowed persons capacity for the boat.

3.1.4 Verification of compliance consists of comparing the maximum allowed persons capacity with the Maximum Persons capacity on the capacity plate. If the maximum allowed persons capacity is equal to or greater than the Maximum Persons capacity on the capacity plate, the boat passes. If not, the boat fails.

If the posted Maximum Person Capacity if found to be too large, the tested figure is the persons load to be used in the flotation and stability tests.

If the posted maximum capacity does not allow for posted persons weight plus the total weight from Table 2 then testing will be conducted with the higher than posted maximum capacity that results from the addition.

4. <u>Maximum Persons Capacity in Whole Numbers for All Boats</u>

4.1 The Maximum Persons capacity in whole numbers marked on any boat must not exceed the result obtained by adding 32 pounds to the Maximum Persons capacity in pounds, dividing the result by 141 and rounding off the result to the nearest whole number.

4.1.1 If the fraction is less than 0.5, round down the result to the next lower whole number. If the fraction is equal to or greater than 0.5, round up the result to the next higher whole number.

4.2 Verification of compliance consists of comparing the result of this calculation with the Maximum Persons capacity in whole numbers on the capacity plate. If the calculated maximum persons capacity is equal to or greater than the Maximum Persons in whole numbers on the capacity plate, the boat passes. If not, the boat fails.

*****

Section F

Boat Preparation for Flotation Test

1. Introduction

The Maximum Weight and Persons Capacity Tests (Section E) require the interior of the boat to remain dry during all tests. Therefore, in Section D, Boat Preparation for Maximum Weight and Persons Tests, all openings in the hull that would allow water ingress were sealed.

The Flotation Test Procedures (Section G) require the swamping of the boat such that the water level inside and outside the boat is equal before test results can be recorded. The Coast Guard allows 15 minutes after all test conditions are met for the boat to stabilize for each test.

Since all flotation tests are "wet" tests, no openings in the hull are sealed. If the flotation tests are being performed following the maximum weight and persons tests, all sealing material must be removed from all hull openings. This includes the complete hull to deck joint.

In order to obtain accurate flotation test results no air can be allowed to be entrapped in the hull, deck or permanently installed equipment during testing. Such entrapped air would add buoyancy to the boat and produce invalid test results.

2. Ensuring the Test Boat is Properly Ventilated

2.1 All compartments and structural areas in the boat that may entrap air when the boat is in a swamped condition must be ventilated. The method of ventilation will depend on the particular compartment or structural area.

2.2 In some cases, bow and stern areas of the deck can be ventilated by removing screws or bolts securing equipment in these areas. Some examples would be bow and stern cleats, bow lights or bow light bases, and windshields. If ventilation of these areas cannot be accomplished by such means, 1/8-inch diameter holes will have to be drilled.

2.3 Gunwales and floors are usually ventilated by drilling 1/8 inch diameter holes in all locations were air could become entrapped during testing.

2.4 Upholstered seats, benches, and other upholstered items must be ventilated. This includes padded gunwale trim and sun platforms. Small holes or slits in the covering material can be used to ventilate such items.

2.5 All storage compartments, bait wells and fish wells must be ventilated and allowed to fill and drain naturally during the flotation tests.

3. Battery(s), Fuel Systems and Propulsion

3.1 Permanently installed fuel systems should be drained and sealed and a weight to simulate the weight of the missing fuel calculated and placed over the fuel tank.

3.2 If an outboard powered boat is received with engine, battery and portable fuel tank installed, these items are to be removed and replaced with substitute weights. The same applies to kicker engines and trolling motors.

4. Measuring Flotation Performance

An angle finder is usually mounted on a flat, horizontal surface of the boat, 90 degrees to the boat centerline so that the boat's angle of heel can be measured during flotation testing.

*****

Section G

Flotation Test Procedures

1. Introduction

These test procedures apply to monohull boats less than 20 feet in length. Excluded from these test procedures are sailboats, canoes, kayaks, inflatable boats, submersibles, surface effect vessels, amphibious vessels and raceboats.

These test procedures allow verification that the flotation material in the boat being tested is adequate to comply with the performance criteria specified in 33 CFR for its boat type. For outboard powered boats it is necessary to test for both the adequacy of the amount of flotation material as well as its proper placement in the boat in order to verify compliance.

Time Allowed to Stabilize between Flotation Tests:

- 15 minutes after all test conditions have been met, and the water levels inside and outside the boat are equal.
- If a boat is still bailing-out or filling with water at the end of 15 minutes, but is within passing parameters, it passes the test.

2. Outboard Powered Boats Over 2 Horsepower

For outboard powered boats over two horsepower the test procedure consists of 3 parts:

- level with persons test;
- port and starboard stability tests, and
- level without persons test.

3. Level With Persons Test

3.1 Float the prepared boat in the test tank in accordance with the procedures in Section F.

3.2 The weight calculated on **Line 45a** of the Test Data Work Sheet to simulate submerged persons is placed in the boat. This is the dry persons weight on **Line 44c** that has been converted to submerged persons weight on **Line 45a** by multiplying by the specific conversion factor for the material being used. The weight is located such that its center of gravity falls within the 40% “box”.

3.3 The weight calculated on **Line 46b** of the Test Data Work Sheet to simulate miscellaneous gear (*i.e.* dead weight) is placed in the boat. This is the dry gear

weight on **Line 46a** that has been converted to submerged gear weight on **Line 47a**. The weight is located such that its center of gravity falls within the 40% "box".

3.4 The swamped weight to simulate engine and controls on **Line 48a** and the submerged weight to simulate the battery on **Line 48b** are placed in the boat in their normal operating positions. These weights are obtained from Table 2 corresponding to the Maximum Horsepower on the capacity plate.

3.5 If a non-integral air chamber is used for flotation and is not punctured, top and bottom, for these tests, then weight must be added to the boat to compensate for the buoyancy of the air chamber on **Line 50a**. This is the dry weight on **Line 49**a that has been converted to submerged weight on **Line 50a**. The weight is placed in the boat such that the center of gravity of the weight is over the center of gravity of the air chamber. It is required that this procedure be followed for the two largest air chambers, if the boat is so equipped. If the two largest air chambers are punctured, top and bottom, it is not necessary to add any weight.

3.6 With the required weights properly located in the boat, the boat is subjected to an 18 to 20-hour conditioning soak. Regardless of the number of times a boat is tested and for whatever reasons, it is only subjected to the 18 to 20-hour conditioning soak once.

3.7 After the conditioning soak, the following is recorded on the Test Data Work Sheet:

3.7.1 Heel angle on **Line 51a**;

3.7.2 Reference area information on **Line 51b**; and

3.7.3 Reference depth are recorded on **Lines 51c**.

Many boats have a tendency to float bow high because of the engine weight. To offset this and still maintain a level attitude the location of the weights used to simulate persons and the miscellaneous gear (dead weight) may be adjusted to obtain optimum test results provided the centers of gravity of the two sets of weights remain within the 40% reference area or "box".

3.8 For compliance, the boat must float with a heel angle of 10 degrees or less with any point on either the forward or aft reference area above the water and the minimum distance between the uppermost surface of the opposite reference area and the water must be 6 inches or less when measured on the centerline of the boat.

3.9 Perform the verification of compliance and record the results on the Test Data Work Sheet.

4. Port and Starboard Stability Tests

This insures that the boat is transversely stable enough to maintain its attitude in rough water and to allow people to climb over the gunwale into the boat, to simulate people moving about in the boat before settling down in the center.

4.1 Port Stability Test

4.1.1 Following the Level with Persons Test leave all the weights in place except for the persons weight. Remove half of the persons weight completely from the boat and move the remaining half of the persons weight to the Port side 70% box. This set of weights must be distributed uniformly over a length equal to at least 30% of the length of the passenger carrying area (Line 20a). This weight must be located such that the center of gravity of the weight is within the 70% box and at least 4 inches above the floor and any seat. This weight may be adjusted to obtain optimum test results provided the centers of gravity of the sets of weights remain within the 70% box.

In many cases, recreational boats have seats along the side of the boat. In that case some of the weights may have to be placed on top of the seats. This simulates a person on a seat helping another climb in over the side of the boat. For this reason, a vertical center of gravity of the weights has been specified to be at least 4 inches above the floor or seats, wherever the weights are placed. There is one additional requirement for weight placement; they must be spread over at least thirty percent of the PPCA length. This is to ensure that the boat would not be tested with all weights concentrated on the floor if only a small floor area were available along the side. Part of the weights, when spread out would have to be on the seat where they would create a larger heeling moment, which requires more flotation. Additionally, if any part of the test weight touches the water then that full weight is considered to be submerged.

4.1.2 For compliance, the boat must float with a heel angle of 30 degrees or less with any point on either the forward or aft reference area above the water. The minimum distance between the uppermost surface of the opposite reference area and the water must be 12 inches or less when measured on the centerline of the boat.

4.1.3 Perform the verification of compliance and record the results on the Test Data Work Sheet.

If the boat is not in compliance, the weights may be moved as long as the center of gravity of the weights for both the persons capacity and the dead weight is with the marked loading area.

4.2 Starboard Stability Test

4.2.1 Following the Port Stability Test move the half of the persons weight from the Port 70% box to the Starboard 70% box. This weight must be distributed as in section 1.2.1, uniformly over a length equal to at least 30% of the length of the passenger carrying area (Line 20a). This weight must be located such that the center of gravity of the weight is within the 70% box and at least 4 inches above the floor and any seat.

4.2.2 For compliance, the boat must float with a heel angle of 30 degrees or less with any point on either the forward or aft reference area above the water. The minimum distance between the uppermost surface of the opposite reference area and the water must be 12 inches or less when measured on the centerline of the boat.

4.2.3 Perform the verification of compliance and record the results on the Test Data Work Sheet.

If the boat is not in compliance, the weights may be moved as long as the center of gravity of the weights for both the persons capacity and the dead weight is within the marked loading area.

5. <u>Level Without Persons Test</u>

5.1 Following the Starboard Stability Test leave all the weights in place except for the half of the persons weight and the weight used to simulate the miscellaneous gear (*i.e.* dead weight). Remove the half of the persons weight and the miscellaneous gear weight (*i.e.* dead weight) completely from the boat.

5.2 For compliance, the boat must float with a heel angle of 10 degrees or less with any point on either the forward or aft reference area above the water. The minimum distance between the uppermost surface of the opposite reference area and the water must be 6 inches or less when measured on the centerline of the boat.

5.3 Perform the verification of compliance and record the results on the Test Data Work Sheet.

*****

Section H

Tables

TABLE 1 Outboard Boat Horsepower Capacity

							Remote Wheel Steering and at least 20 " Transom Height	No Remote Wheel Steering or Transom Height less than 20"	
								Flat Bottom with Hard Chine Boats	Other Boats
Factor	thru 35	36-39	40-42	43-45	46-49	50-52	over 52	over 52	over 52
Power Capacity in horsepower	3 hp	5 hp	7 ½ hp	10 hp	15 hp	20 hp	(2 x factor) - 90 hp	(0.5 x factor) - 15 hp	(0.8 x factor) -25 hp

TABLE 2 33 CFR 183.75 Weights in pounds of gasoline outboard engines and related equipment for various boat horsepower ratings

Single engine installations								
Column number								
1	2	3	4	5	6	7	8	9
Engine power range (Horsepower)	Dry weight[1][2]	Running weight[3]	Swamped weight[4]	Controls & rigging[5]	Battery weight, dry	Battery weight submerged	Full portable fuel tank[6]	Total weight (Sum of columns 3,5,6,8)
0.1-2.0	30	32	27	0	0	0	0	32
2.1-3.9	42	44	37	0	0	0	0	44
4.0-6.9	66	69	59	0	0	0	25	94
7.0-10.9	105	110	94	5	20	11	50	185
11.0-22.9	127	133	113	6	45	25	50	234
23.0-34.9	187	196	167	9	45	25	100	350
35.0-64.9	286	300	255	14	45	25	100	459
65.0-94.9	439	461	392	22	45	25	100	628
95.0-104.9	458	481	409	23	45	25	100	649
105.0-144.9	526	552	469	26	45	25	100	723
145.0-194.9	561	589	501	28	45	25	100	762
195.0-209.9	652	685	582	33	45	25	100	863
210.0-300.0	699	734	624	35	45	25	100	914
300.1-350.0	884	928	789	44	45	25	100	1,117

Notes:

[1]Dry weight is the manufacturer's published weight for the shortest midsection increased by 10 percent to account for longer midsections and additional required hardware usually not included in published weights. This weight is intended to represent the heaviest model in each power category. For boats designed with a transom height of 20 inches or less, the weight in Column 2 may be reduced by 10 percent. Recalculate Columns 3, 4, and 9 as appropriate.

[2]For diesel outboards, replace the value in Column 2 with the manufacturer's published dry weight + 10 percent.

[3]Running weight is the dry weight plus fluids (including 2-stroke oil) and the heaviest recommended propeller. Calculated as 5 percent of dry weight.

[4]Swamped weight is 85 percent of running weight.

[5]Rigging and controls include engine related hardware required to complete the installation (*e.g.,* controls, cables, hydraulic hoses, steering pumps and cylinders). Calculated as 5 percent of dry weight.

[6]If the boat is equipped with a permanent fuel system and is not intended to use a portable tank; the portable fuel tank weight may be omitted.

TABLE 3 Factors for converting various boat materials from dry to submerged weights

MATERIALS	SPECIFIC GRAVITY	FACTOR	POUNDS PER CUBIC FT.
lead	11.38	0.91	710
copper	8.91	0.89	556
monel metal	8.91	0.89	556
bronze	8.88	0.89	554
nickel	8.61	0.88	537
brass	8.56	0.88	534
stainless steel (rolled)	8.00	0.88	500
steel	7.85	0.88	490
cast iron	7.08	0.86	442
zinc (cast alloy)	6.63	0.85	414
aluminum	2.73	0.63	170
glass	2.60	0.62	162
ferrocement	2.40	0.58	150
rubber	1.51	0.34	94
fiberglass laminate	1.50	0.33	94
kevlar laminate	1.30	0.24	81
Plexiglas/Lucite	1.20	0.17	75
A.B.S.	1.12	0.11	70
teak	0.99	-0.01	62
oak (white)	0.85	-0.18	53
oil (diesel)	0.85	-0.18	53
gasoline	0.73	-0.37	45
oak (red)	0.63	-0.56	39
Blandex/particle board	0.58	-0.70	36
mahogany (Philippine)	0.58	-0.72	36
mahogany (Honduras)	0.56	-0.78	35
ash	0.56	-0.78	35
yellow pine	0.55	-0.81	34
fir plywood	0.55	-0.81	34
mahogany plywood	0.54	-0.83	34
Royalex	0.50	-0.95	31
mahogany (African)	0.51	-0.96	32
fir	0.51	-0.96	32
cedar (Port Orford)	0.48	-1.08	30
spruce	0.45	-1.22	28
pine (white)	0.42	-1.38	26
cedar (white)	0.33	-1.95	21
cork	0.24	-3.17	15
balsa	0.16	-5.24	10

Section I

Figures

Figure 1 Location of Supports for 40%/75% Boat Leveling Method

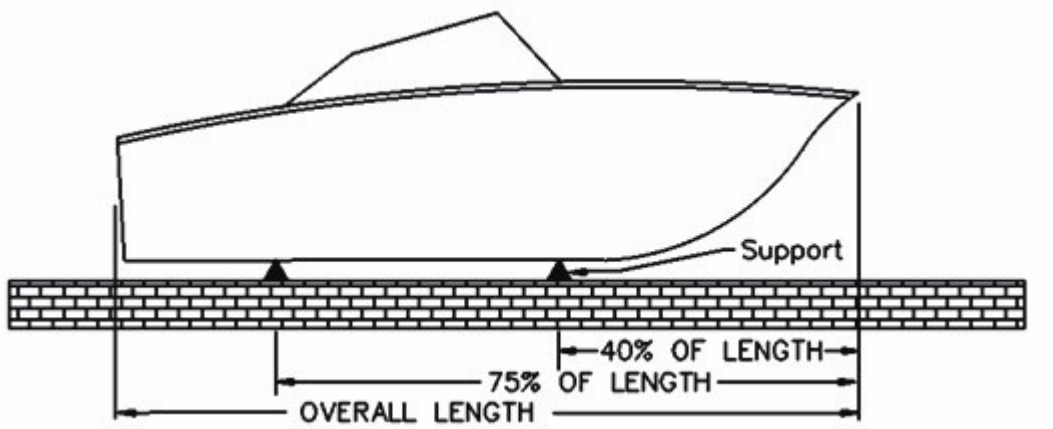


Figure 2: Determination of Transom Type

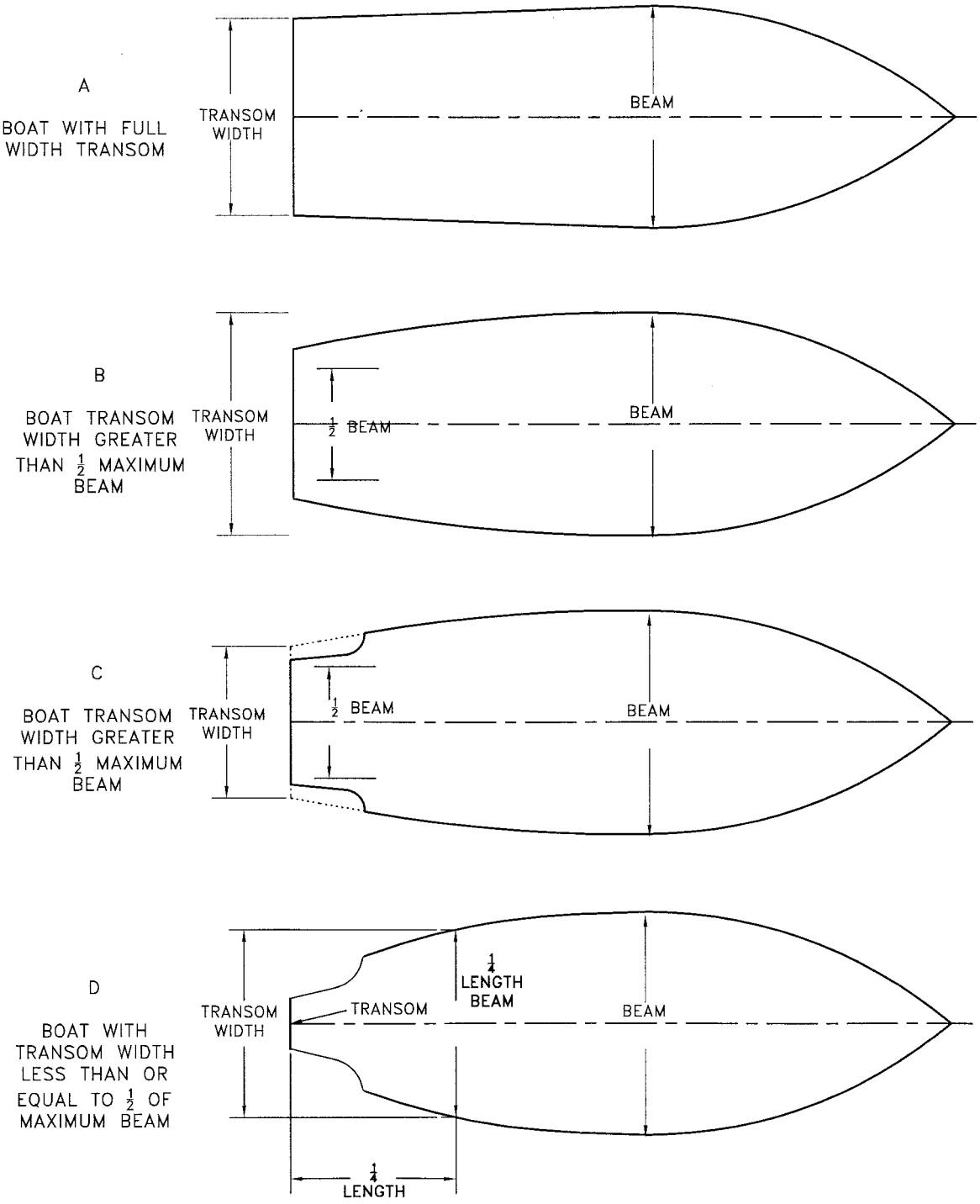


Figure 3: Transom Heights

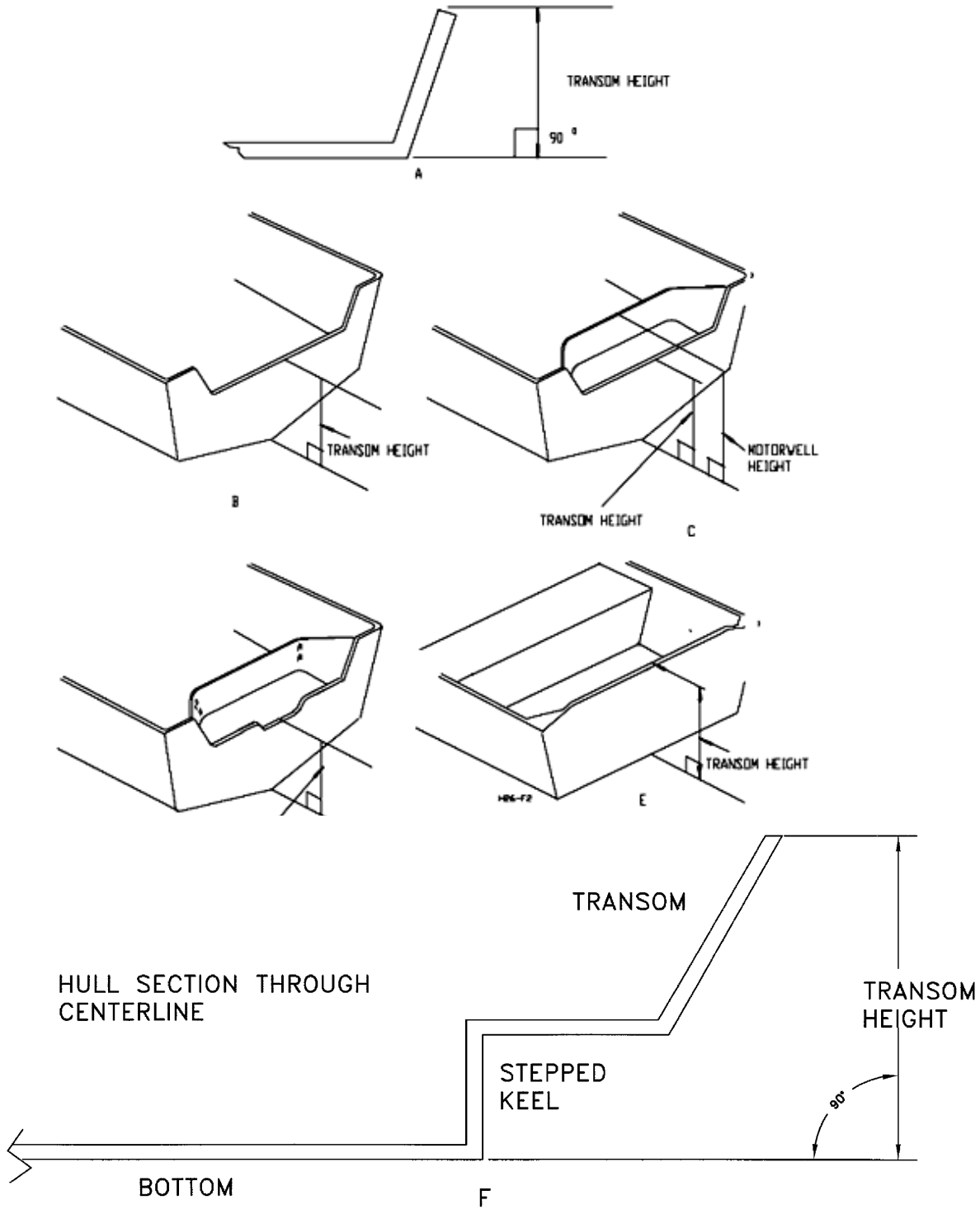


Figure 4 Chine Radius

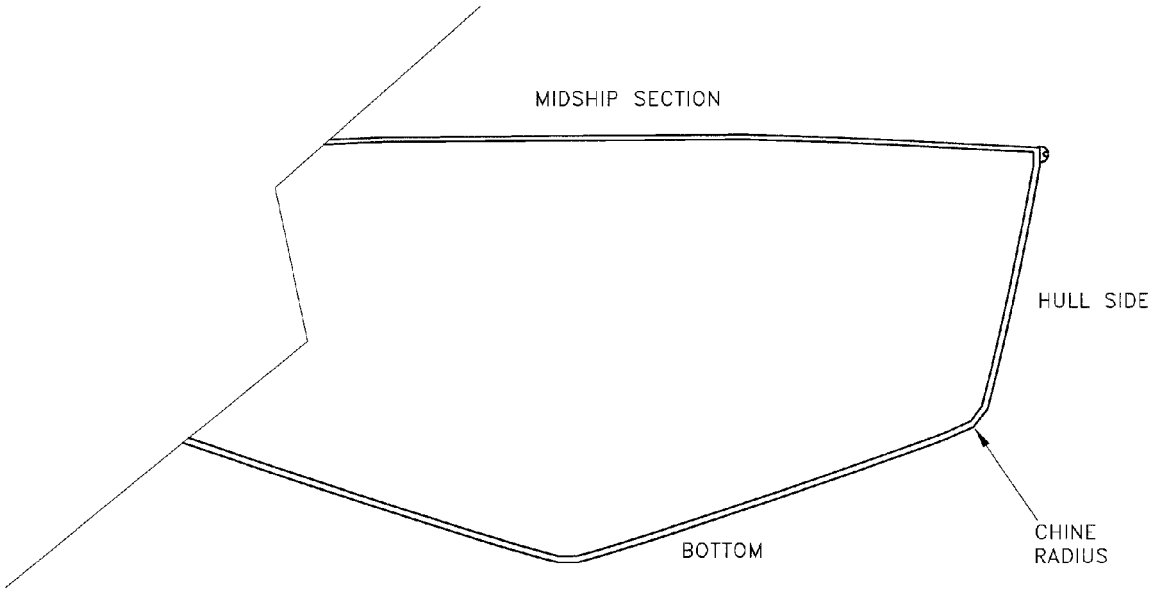


Figure 5: Measuring the Deadrise angle

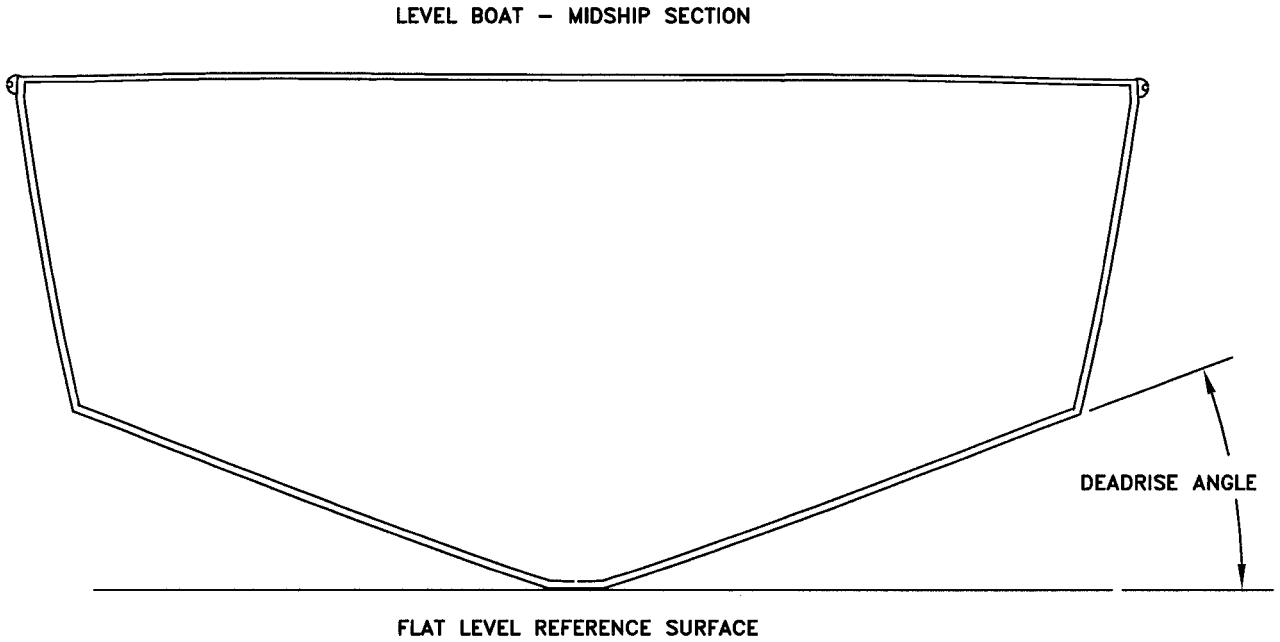


Figure 6: Forward and Aft Reference Areas

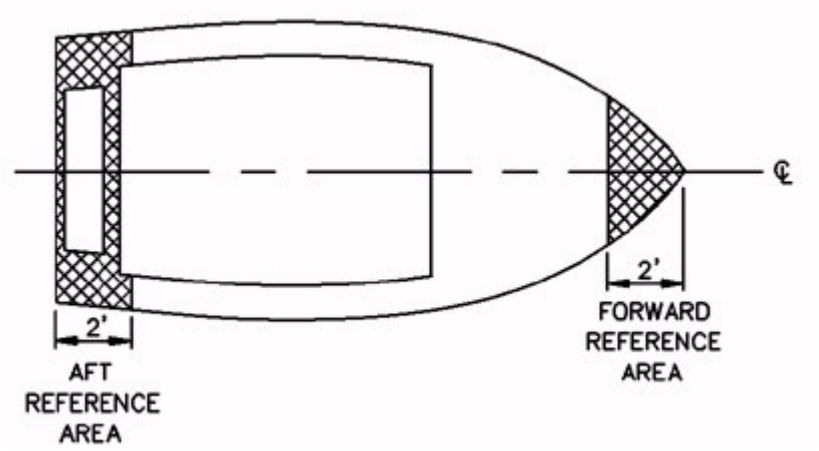


Figure 7: Passenger Carrying Area

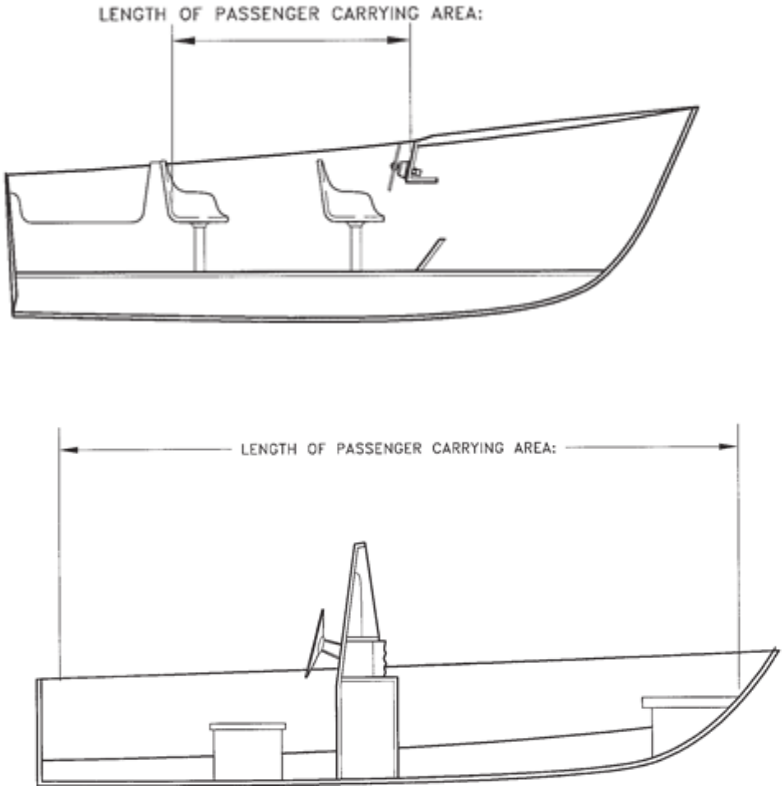


Figure 7: Passenger Carrying Area Cont.

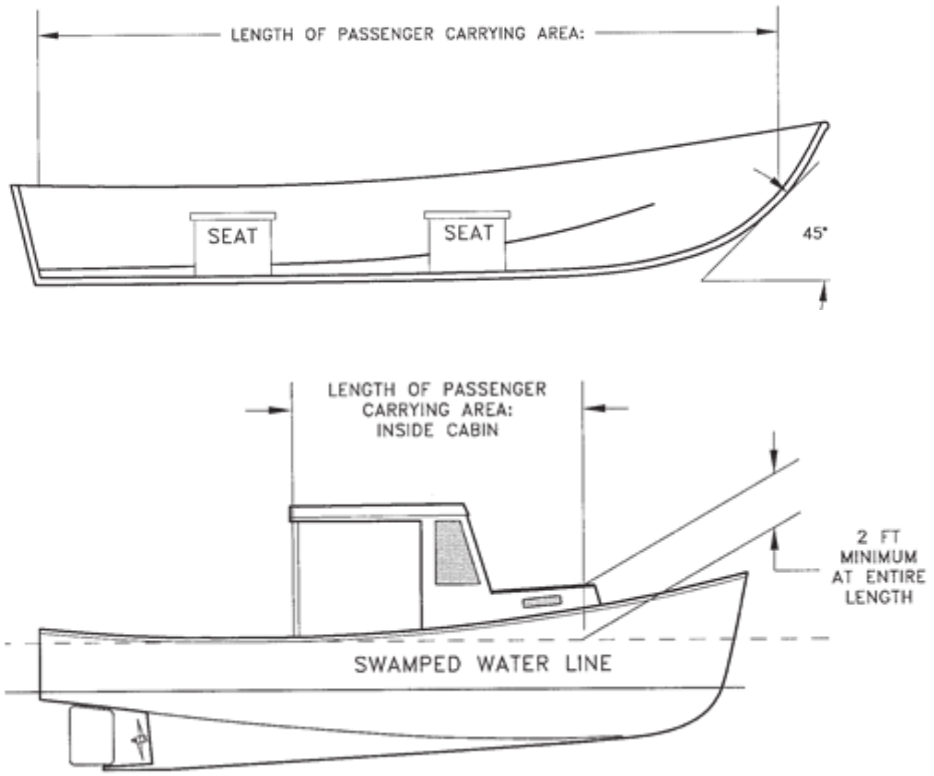


Figure 8: 40% Reference Area or "Box"

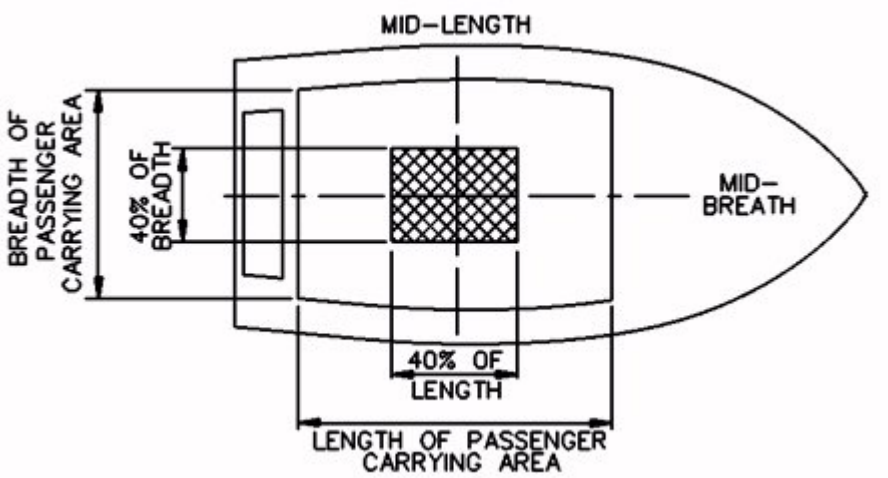


Figure 9: Starboard Side 70% Reference Area

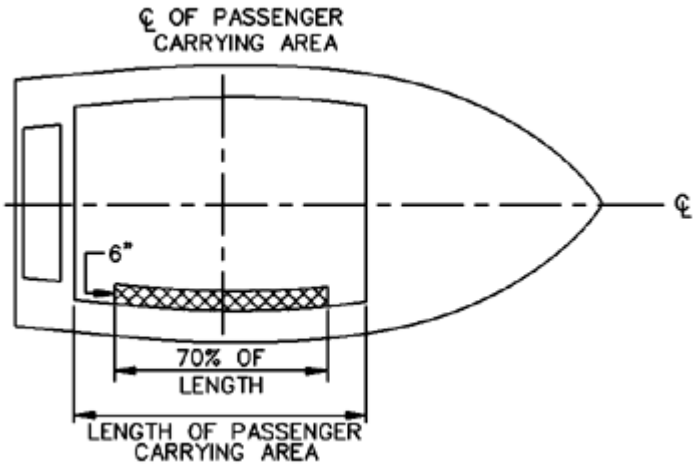


Figure 10: Flotation Test Criteria With and Without Persons

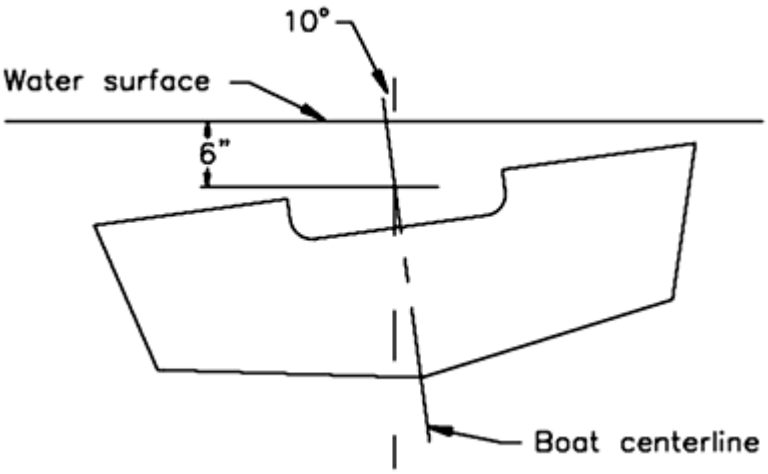


Figure 11: Port and Starboard Stability Test Criteria:

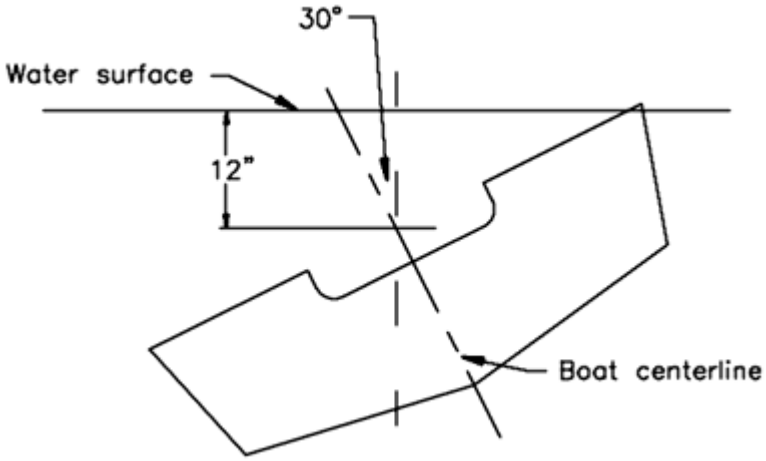
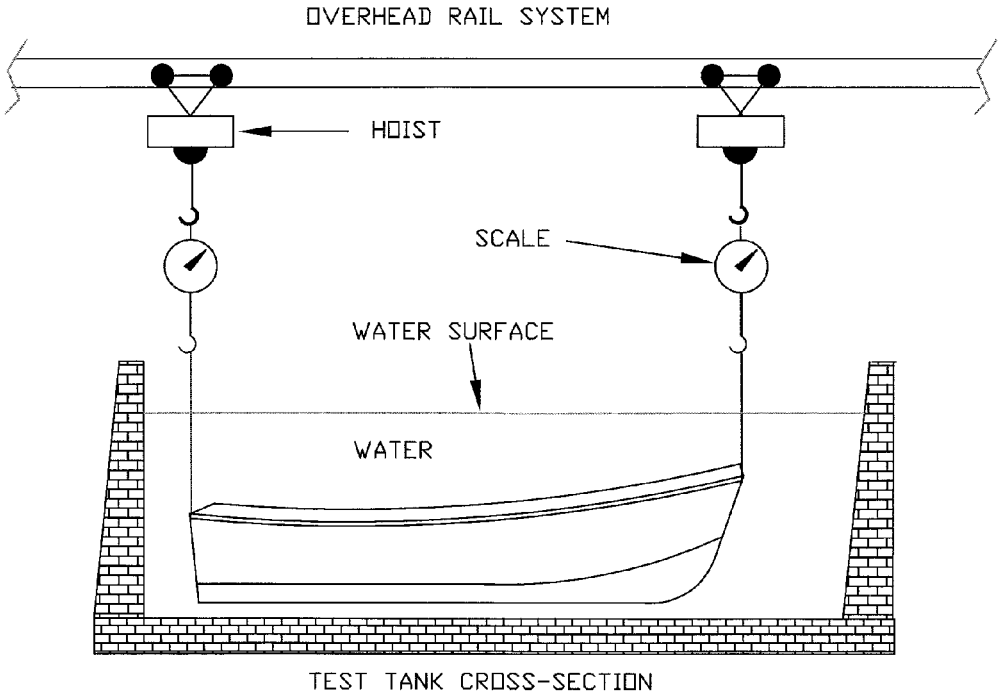


Figure 12: Basic Flotation Test Procedures Setup



Section J – Test Data Work Sheets

Test Boat Number_____

- RECEIVING INSPECTION: BOAT INFORMATION -

For receiving inspection procedures see Section A

1. Manufacturer Contact Information

Name _____
Address _____
Phone _____
Fax _____
Email _____
POC _____

2. Dealer Contact Information

Name _____
Address _____
Phone _____
Fax _____
Email _____
POC _____

3. Boat Information

Model Name _____

Model Number _____

Boat Type _____

Hull Identification Number (HIN) _____

Date Boat Received ___ /___ /___

Date Testing Completed ___ /___ /___

4. Capacity Plate Information

4a. Maximum Weight capacity (pounds) _____

4b. Maximum Persons capacity (pounds) _____

4c. Maximum Persons capacity (whole numbers) _____

4d. Maximum Horsepower (horsepower) _____

5. Capacity Plate Meets Requirements for Content, Display and Location?

   Yes ____

   No ____

   If "no", explain _____
   _____

6. Certification Statement Meets Requirements for Content and Display?

   Yes ____

   No ____

   If "no", explain _____
   _____

7. Inventory of Portable Accessories

   _____
   _____
   _____
   _____
   _____

8. Boat Damage upon Receipt (take photographs as required)

   _____
   _____
   _____
   _____

*****

End of the Receiving Inspection Procedures Test

Boat Number_____

- BOAT MEASUREMENT -

For boat measuring procedures see Section B.

9. "Preliminary" Boat Length (prior to exact leveling) _____

If an exact boat length is required, the following procedure is to be used. If an exact boat length is not required, use the "preliminary" boat length (Line 9) as the "final" boat length (line 10).

40% of "Preliminary" Boat Length _____

75% of "Preliminary" Boat Length _____

Support the boat at its 40% and 75% points and determine the "final" boat length.

10. "Final" Boat Length (after exact leveling) _____ (feet and inches)

10a. 25% of "Final" Boat Length _____ (feet and inches)

10b. "Final" Boat Length (after exact leveling) _____ (decimal feet)

11. Weight of Boat and Lifting Apparatus _____

11a. Weight of Lifting Apparatus _____

11b. Weight of Boat (subtract Line 11a. from Line 11.) _____

12. Maximum Boat Beam _____(feet and inches)

13. Type of Transom (Figure 2)

____ Full Width
____ Width Greater Than 50% of Maximum Beam
____ Width Less Than or Equal to 50% of Maximum Beam

14. Transom Width _____ (feet and inches)

14a. Transom Width _____ (decimal feet)

15. Transom Height _____ (inches)

16. Is the transom a "20 inch" transom (20 inches +/- 1 inch)

Yes ____
No ____

17. Is boat hard chine type?

Yes ____
No ____

18. Is boat flat bottom type?

Yes ____
No ____

19. Does boat have remote steering?

Yes ____
No ____

Identify and mark the Forward and Aft Reference Areas on the boat.

20. Passenger Carrying Area Information

20a. Length _____

20% of Length _____

30% of Length _____

35% of Length _____

50% of Length _____

20b. Width _____

20% of Width _____

20c. Identify and mark the 40% Reference Area (the 40% "box") on the boat.

20d. Identify and mark the Port and Starboard 70% Reference Areas on the boat.

*****

End of the Boat Measuring Procedures

Test Boat Number_____

- Verification of Compliance with the Regulations -
- for Maximum Allowed Horsepower for Outboard -
- Powered Boats Over 2 Horsepower -

Calculation of Maximum Allowed Horsepower

21. Calculation of the "Factor"

"Factor" = Boat Length (decimal feet) X Transom Width (decimal feet)

= Line 10b X Line 14a

= _____ X _____

= _____ (Rounded to nearest whole number)

22. Is "factor" 52 or less?

If yes, go to Line 23.

If no, go to Line 24, 25 or 26.

For "factors" 52 or less the Maximum Allowed Horsepower is obtained directly from Table 1 without any further calculation. If the boat is the hard chine, flat bottom type, the horsepower given by the table is reduced one capacity increment. For "factors" of 52 or less, the resulting maximum allowed horsepower may not be rounded up to the next multiple of 5 horsepower as is allowed for "factors" over 52.

23. For "factors" 52 or less, the maximum allowed horsepower is _____.

24. For "factors" over 52, and the boat has remote steering and a transom height of at least 20 inches

Maximum allowed horsepower = (2 X "factor") – 90

= (2 X _____) – 90

= _____ (Rounded up to next 5 hp)

25. For "factors" over 52, and the boat has no remote steering or has a transom height less than 20 inches and is the hard chine, flat bottom type

Maximum allowed horsepower = (0.5 X "factor") – 15

= (0.5 X _____) – 15

= _____

= _____ (rounded up to next 5 hp)

26. For “factors” over 52, and the boat has no remote steering or has a transom height less than 20 inches and any type of bottom other than hard chine flat bottom

Maximum allowed horsepower = (0.8 X “factor”) – 25

= (0.8 X _____) – 25

= _____

= _____ (rounded up to next 5 hp)

Verification of Compliance

Is the calculated maximum allowed horsepower (Line 23, 24, 25, or 26) greater than or equal to the Maximum Horsepower rating on the capacity plate (Line 4d)?

Yes ____ Boat passes

No ____ Boat fails

NOTE

If the boat fails, the equipment weights from Table 2 corresponding to the maximum allowed horsepower from the above test procedure will be used for all testing to follow. If the boat passes, the equipment weights corresponding to the Maximum Horsepower rating on the capacity plate will be used.

*****

End of Maximum Allowed Horsepower Test

Test Boat Number_____

- Verification of Compliance with the Regulations -
- for Maximum Weight Capacity -

For boat preparation procedures see Section D

27. Weight of Lifting Equipment (between boat and scales) _____ (pounds)

28. Weight of Prepared Boat (Section D) and lifting Equipment _____ (pounds)

29. Boat Weight (Subtract Line 27 from Line 28) _____ (pounds)

30. Calculation of Test Weight for Outboard Powered Boats Over 2 Horsepower

Test Weight = 5 X Maximum Weight capacity from capacity plate (Line 4a)

= 5 X _____

= _____

31. Calculation of Weights to Simulate Equipment

The following information applies to outboard powered boats as required.

From Table 2, obtain the following "dry" equipment weights corresponding to the maximum allowed horsepower rating.

31a. Combined weight of engine, controls, and propeller (Column 3) _____

31b. Battery weight (Column 6) _____

31c. Weight of Full Portable fuel tank (Column 8) _____

31d. Total weight of equipment (Column 9) _____

The following information applies to boats with permanently installed fuel systems.

32. Calculation to simulate Fuel Weight

Substitute Fuel Weight = Total gallons of fuel X 7.1523

= _____ X 7.1523

= _____ (pounds)

NOTE

The above conversion factor (7.1523) is only for cast iron test weights.
See Section D for the procedure to obtain the conversion factors
for other test weight materials.

The following information applies to all boats as required.

33. Other required substitute weights (Section D)

33a. Kicker engine and accessories _____ (pounds) _____No Provisions

33b. Trolling motor and accessories _____ (pounds) _____No Provisions

33c. Missing permanent equipment _____ (pounds) _____No Provisions

33d. Total of other test weights (Sum of Line 33a thru Line 33c) _____
(pounds)

34. Maximum Weight Capacity Test Procedure (Section E)

35. Float the prepared boat (Section D) in the test tank. Add test weights to the boat until just before water ingress. Record the amount of test weight added on Line 36.

36. Total Test Weights Added _____

37. Divide Line 36 by 5 and enter the result here _____.

Verification of Compliance

Is the final resulting test weight divided by 5 (Line 37) greater than or equal to the Maximum Weight capacity from the capacity plate (Line 4a)?

Yes ____ Boat passes

No ____ Boat fails

*****

End of Maximum Weight Capacity Test

Test Boat Number_____

- Verification of Compliance with the Regulations -
- for Maximum Persons Capacity in Pounds-

The Maximum Persons capacity marked on the capacity plate must not exceed the lesser of Line 44b and Line 45c.

38. Calculation Method

38a. Persons capacity is calculated by subtracting the equipment weight (Line 31d) from the Maximum Weight Capacity on the capacity plate (Line 4a).

38b. Persons Capacity = Maximum Weight Capacity – Equipment Weight

= _____ - _____

= _____

If the Maximum Persons capacity marked on the capacity plate is less than 550 pounds, then the following test procedure must also be performed.

39. Test Weight Method

39a. Calculation of Persons Test Weight

Test Weight = 0.60 X Persons capacity in pounds from capacity plate (Line 4b)

= 0.60 X _____

= _____

40. Test Procedure (Section E)

Float the prepared boat (Section D) in the test tank. Add and secure the equipment test weight (Line 31d), the substitute fuel weight (Line 32), and other required substitute weights (Line36d) in their normal operating positions. Add the test weights from Line 44a along the interior Port side of the boat until just before water ingress. If all the test weight from Line 39a can be added before water ingress. Record the amount of test weight added on Line 40a and the amount of any remaining freeboard on Line 40a. Repeat this test procedure for the Starboard side and record the results.

40a. Port Side Test Results

Test weight added_____ Freeboard_____

40b. Starboard Side Test Results

Test weight added_____ Freeboard_____

40c. Compare the weights from Line 40a and Line 40b and enter the smallest value here _____

41. Compare the Maximum Persons capacity from the test method (Line 40c) and the Maximum Persons Capacity from the calculation method (Line 39a) and record the smallest value on Line 42.

42. Maximum Persons Capacity _____

Verification of Compliance

Is the Maximum Persons Capacity on Line 42 greater than or equal to the Maximum Persons Capacity on the capacity plate (Line 4b)?

Yes ____ Boat passes

No ____ Boat fails

*****

End of Maximum Persons Capacity in Pounds Test

Test Boat Number_____

- Verification of Compliance with the Regulations -
- for Maximum Persons Capacity in Whole Numbers-

Maximum Persons Capacity in whole numbers is calculated by adding 32 to the Maximum Persons Capacity in pounds, dividing the result by 141 and rounding up or down to the nearest whole number.

43. Calculation Method

Maximum Persons capacity in Whole Numbers = $\frac{\text{Maximum Persons Capacity in pounds + 32}}{141}$

= $\frac{(\_\_\_\_\_) + 32}{141}$

= _____

= _____ (rounded to nearest whole number)

Verification of Compliance

Is the Maximum Persons capacity in whole numbers on Line 43greater than or equal to the Maximum Persons Capacity in whole numbers on the capacity plate (Line 4c)?

Yes ____ Boat passes

No ____ Boat fails

*****

End of Maximum Persons Capacity in Whole Numbers Test

Test Boat Number_____

- Verification of Compliance with the Regulations -
- for Flotation -

For boat preparation procedures see Section F

44. Calculation of Weight to Simulate Persons

44a. 50% of the first 550 pounds of Persons capacity on the capacity plate (Line 4b)

.50 X _____ = _____

44b. 12.5% of the difference between the Persons Capacity on the plate (Line 4b) and 550 pounds

.125 X _____ = _____

44c. Persons weight = Line 44a + Line 44b

= _____

45. Conversion of Dry Persons Weight to Submerged Persons Weight

45a. Submerged Persons Weight = Dry Persons Weight (Line 44c) X Material Conversion Factor (Table 3)

= _____ X _____

= _____

46. Calculation of Weight to Simulate Miscellaneous Gear (dead weight)

46a. Weight of engine and controls, battery and Portable fuel tank weight from Table 2, Column 9 for the horsepower on the capacity plate _____

46b. Test Weight =.25 (Maximum Weight capacity – Maximum Persons capacity –Weight of engine and controls, battery and Portable fuel tank)

= .25 (Line 4a – Line 4b – Line 46a)

= .25 (_____ - _____ - _____)

= _____

NOTE: If this calculation results in a negative number (a number less than zero), use zero.

47. Conversion of Dry Gear Weight to Submerged Gear Weight

47a. Submerged Test Weight = Dry Test Weight (Line 46b) X Material Conversion Factor (Table 3)

= _____ X _____

= _____

48. Weights to Simulate Motor and Controls and Battery

48a. Swamped weight to simulate engine and controls (Table 2, Column 4) _____

48b. Submerged battery weight (Table 2, Column 7) _____

49. Calculation of the weight to compensate for the two largest flotation air chambers (if they are used and not punctured)

49a. Test weight = Volume of air chambers (cubic feet) X 62.4

= _____ X _____

= _____

50. Conversion of Dry Test Weight to Submerged Test Weight

50a. Submerged Test Weight = Dry Test Weight (Line 49a) X Material Conversion Factor (Table 3)

= _____ X _____

= _____

51. Level Flotation with Persons Test

Test Procedure (Section G)

Float the prepared boat (Section F) in the test tank. After the 18 to 20 hour conditioning soak with the boat loaded with the required weights to simulate persons (Line 45a), motor and controls (Line 48a), battery (Line 48b), gear (Line 47a), and air chambers (if used) (Line 50a), the boat must float with a heel angle of 10 degrees or less, with any point on either the forward or aft reference area above water and the opposite reference area 6 inches or less below the water when measured on the centerline. The location of the weights used to simulate persons and gear may be adjusted to obtain the optimum test results provided the centers of gravity of the two sets of weights remain within the 40% box.

51a. Heel angle in degree _____

51b. Reference area above water

Forward _____

Aft _____

Both _____

Neither _____

51c. Reference depth of opposite reference area _____

Verification of Compliance

Is the heel angle 10 degrees or less, any point on one reference area above the water and the opposite reference area 6 inches or less below the water when measured on the centerline?

Yes ____ Boat passes

No ____ Boat fails

*****

End of Level Flotation with Persons Test

Test Boat Number_____

52. Stability Tests

52a Test Procedure (Section G)

Leave all the simulated weights from the Level with Persons Test in place except for the person's weight. Remove half the persons weight from the boat and move the remaining half of the persons weight to the Port side 70% box according to instructions in Section G. The boat must float with a heel angle of 30 degrees or less, with any point on either the Forward or Aft Reference Area above the water and the opposite reference area 12 inches or less below the water when measured on the centerline.

52aa. Heel angle _____

52ab. Reference area above water

Forward _____

Aft _____

Both _____

Neither _____

52ac. Reference depth of opposite reference area _____

Verification of Compliance

Is the heel angle 30 degrees or less, any point on one reference area above the water and the opposite reference area 12 inches or less below the water when measured on the centerline?

Yes ____ Boat passes

No ____ Boat fails

52b. Test Procedure (Section G)

Move the persons weight from the Port side 70% box to the Starboard side 70% box according to instructions in Section G. The boat must float with a heel angle of 30 degrees or less, with any point on either the Forward or Aft Reference Area above the water and the opposite reference area 12 inches or less below the water when measured on the centerline.

52ba. Heel angle _____

52bb. Reference area above water

Forward _____

Aft _____

Both _____

Neither _____

52bc. Reference depth of opposite reference area _____

Verification of Compliance

Is the heel angle 30 degrees or less, any point on one reference area above the water and the opposite reference area 12 inches or less below the water when measured on the centerline?

Yes ____ Boat passes

No ____ Boat fails

*****

End of Stability Tests

Test Boat Number_____

Level Flotation without Persons Test

Test Procedure (Section G)

Leave all the simulated weights from the Stability Tests in place except for the persons weight and the gear weight. Remove the persons weight and the gear weight from the boat. The boat must float with a heel angle of 10 degrees or less, with any point on either the Forward or Aft Reference Area above the water and the opposite reference area 6 inches or less below the water when measured on the centerline.

53a. Heel angle _____

53b. Reference area above water

Forward _____

Aft _____

Both _____

Neither _____

53c. Reference depth of opposite reference area _____

Verification of Compliance

Is the heel angle 10 degrees or less, any point on one reference area above the water and the opposite reference area 6 inches or less below the water when measured on the centerline?

Yes ____ Boat passes

No ____ Boat fails

*****

End of Level Flotation without Persons Test