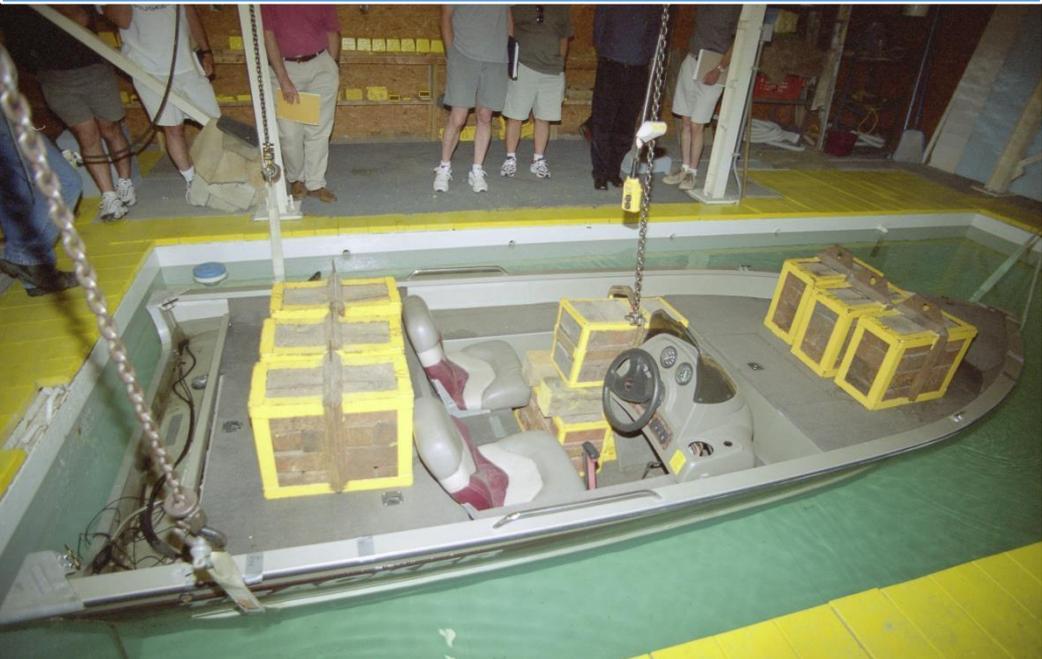


**Contains 2018 updates to Federal  
Regulation weight tables for  
Outboard Engines.**

# 2019

# Capacity and Flotation for Recreational Boats



Peter D. Eikenberry Sr  
newboatbuilders.com  
2nd Rev. 3/10/2019

## FOREWORD

In 2018 The U. S. Coast Guard replaced Table 4 (the table of outboard engine weights) with the ABYC tables from ABYC Standard S30 now in 33 CFR 183.75. The old Table 4 had not been updated since 1983. The ABYC table is updated every five years. The current table in S-30 was last updated in 2017 and is more reflective of the weights of current outboard engines. The following is from the U. S. coast Guard Boatbuilders Handbook.

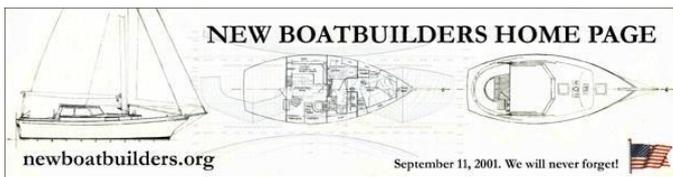
***The following tables are from ABYC standard S-30 dated July, 2017, and have been adopted by the U. S. Coast Guard as of June 1, 2018. Manufacturers must use these tables to calculate flotation requirements. If at some future date ABYC updates this table, you may use the updated table, but calculate amounts of flotation using this table and the updated table. If the updated table provides less flotation then you must use this table to comply with the regulations. If the updated table provides the same or more flotation, then you may use the updated table. SEE US Coast Guard table (pdf format)***

***<http://www.uscgboating.org/regulations/assets/builders-handbook/USCG%20-%20Table%20183.pdf>***

I have updated this course to show the values given in the new tables. If you have any questions concerning this please contact me at [spinnners110722@yahoo.com](mailto:spinnners110722@yahoo.com).

Table 1A gives the values in Horsepower and Pounds. Table 1B gives the values in Kilowatts and Kilograms.

You will notice that some items in the appendices are repeated. That is because this was developed as a series of independent stand-alone lessons. So all information for each lesson was included in that lesson. I simply kept that format so you would not have to refer to another lesson or go to the end of the book to find the information.



# Capacity and Flotation For Recreational Boats

**Peter D. Eikenberry Sr. USCG (ret)**

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unless otherwise noted.

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Second Revision 2019



Table of Contents

Capacity and Flotation .....1

Lesson 1: Introduction to Capacity and Flotation .....1

    Goals: ..... 1

    Introduction: ..... 1

    Capacity Requirements: ..... 4

    Flotation Requirements: ..... 5

    Definitions: ..... 6

Lesson 2: Displacement .....7

    Safe Loading-Capacity:..... 7

    Method 1: Calculating Displacement weight..... 9

    Method 2 Testing:Determining Displacement weight. 19

    Method 3: The bucket method..... 22

    Lesson 2 Questions ..... 23

Lesson 3: Capacities .....24

    Goals ..... 24

    Definitions: ..... 25

    Capacity Rules and Standards.... **Error! Bookmark not defined.**

    Sec. 183.33 Maximum weight capacity: Inboard and inboard-outdrive boats. .... **Error! Bookmark not defined.**

    Inboard and Stern-Drive Boats under 20 feet (6 m). .... **Error! Bookmark not defined.**

    Examples:..... **Error! Bookmark not defined.**

    Testing For Maximum Capacities:.. **Error! Bookmark not defined.**

Lesson 4: Flotation.....**Error! Bookmark not defined.**

    Flotation Introduction. **Error! Bookmark not defined.**

    Goals:..... **Error! Bookmark not defined.**

    Definitions:..... **Error! Bookmark not defined.**

    Basic Flotation..... **Error! Bookmark not defined.**

Requirements:..... **Error! Bookmark not defined.**  
Level Flotation:..... **Error! Bookmark not defined.**  
Requirements:..... **Error! Bookmark not defined.**  
Modified Level Flotation:..... **Error! Bookmark not defined.**  
Appendix A Lesson 4 ..... **Error! Bookmark not defined.**  
Appendix B: Lesson 4... **Error! Bookmark not defined.**  
Appendix C Lesson 4.... **Error! Bookmark not defined.**  
Questions For Lesson 4: **Error! Bookmark not defined.**  
Lesson 5: Level Flotation .....**Error! Bookmark not defined.**  
How to calculate how much flotation you need in your boat..... **Error! Bookmark not defined.**  
What do I use for flotation? .... **Error! Bookmark not defined.**  
Flotation Calculations . **Error! Bookmark not defined.**  
Level Flotation Example **Error! Bookmark not defined.**  
Basic Flotation Problem:**Error! Bookmark not defined.**  
Level Flotation Problem:**Error! Bookmark not defined.**  
Modified Level Flotation Problem:**Error! Bookmark not defined.**  
Flotation Calculation Data Sheets:.. **Error! Bookmark not defined.**  
Where do you put the flotation?.. **Error! Bookmark not defined.**  
Problems that cause the boat to fail flotation requirements..... **Error! Bookmark not defined.**  
Flotation Foam: The Good, the Bad, the Ugly. **Error! Bookmark not defined.**  
Problem solutions..... **Error! Bookmark not defined.**  
Appendix A Lesson 5.... **Error! Bookmark not defined.**  
Appendix B Lesson 5.... **Error! Bookmark not defined.**  
Questions: Lesson 5:... **Error! Bookmark not defined.**  
Lesson 6 Canoes, Kayaks, Pontoon Boats .....**Error! Bookmark not defined.**

Canoes, Kayaks, Pontoon Boats... **Error! Bookmark not defined.**

Definitions:..... **Error! Bookmark not defined.**

Canoes and Kayaks:..... **Error! Bookmark not defined.**

Pontoon Boats:..... **Error! Bookmark not defined.**

Appendix A Lesson 6.... **Error! Bookmark not defined.**

Questions Lesson 6:.... **Error! Bookmark not defined.**

Lesson 7: Inflatable Boats .....**Error! Bookmark not defined.**

Inflatable Boats..... **Error! Bookmark not defined.**

Example: *All Calculations are in Metric for this example.*..... **Error! Bookmark not defined.**

Questions For Lesson 7: Inflatable Boats..... **Error! Bookmark not defined.**

Answers to Lesson Questions.....**Error! Bookmark not defined.**

Lesson 1 no questions:.. **Error! Bookmark not defined.**

Lesson 2 Questions:.... **Error! Bookmark not defined.**

Lesson 3 Questions:.... **Error! Bookmark not defined.**

Lesson 4 Questions:.... **Error! Bookmark not defined.**

Lesson 5 Questions:.... **Error! Bookmark not defined.**

Lesson 6 Questions: Canoes, Kayaks, Pontoon. **Error! Bookmark not defined.**

Lesson 7 Questions:.... **Error! Bookmark not defined.**

ABYC Tables 1A and 1B From S-30 and 33 CFR 183.75  
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# Capacity and Flotation

For Small Craft: A course in determining values .

## Lesson 1: Introduction to Capacity and Flotation

Load Capacity and Flotation for boats

### Goals:

Learn the rules and standards for maximum weight capacity of small boats.

Learn to calculate displacement weight.

Learn to calculate the maximum weight capacity.

Learn how to test a boat to determine the displacement and maximum weight capacity or verify the calculated capacities.

Learn the rules of flotation requirements for different boat types.

Learn to calculate the amounts of flotation needed.

Learn where to install the flotation.

Learn to conduct a flotation test.

Learn about ABYC requirements for other boats.

### Introduction:

For small boats, that is, boats under 20 feet (6m) in length, the amount of load they can carry becomes an important factor in the safety of the boat. Overloading a small boat can result in

capsizing, swamping, and if the boat is not equipped with flotation, sinking. Standards have been developed to determine the maximum capacities, and they are posted on the boat so a boat operator will know how much they can carry. In the United States, Canada, and in European countries, some of these standards are written into the law. These were taken directly from the [American Boat and Yacht Council](#) (ABYC) standards, developed many years ago. ABYC Revises and updates them every five years. Generally they apply to mono-hull rowboats, outboard boats, stern-drive boats, and inboards. Additionally, ABYC has developed safe loading standards for various other types of boats, such as canoes, kayaks, pontoon boats, and inflatable boats and similar standards have been developed by the International Organization for Standardization (ISO) and are incorporated in the Recreational Craft Directive (RCD). These standards have been adopted by many countries.

For this course I will refer to **Rules** and **Standards**. Rules are written into law and when applicable must be followed. Standards are voluntary but in many countries these standards are the accepted industry practice. So even though they are voluntary, a wise boat builder will use them.

When referring to Rules, I will most often cite the US Code of Federal Regulations (CFR). The US Rules for recreational boats can be found at <http://uscgboating.org/regulations/boatbuildershandbook.php> and in:

Title 33 Code of Federal Regulations Part 181  
<https://www.law.cornell.edu/cfr/text/33/part-181>  
Title 33 Code of Federal Regulations Part 183  
<https://www.law.cornell.edu/cfr/text/33/part-183>

Title 33 Code of Federal Regulations Part 183.75  
Table of outboard Engine weights  
[https://ecfr.io/Title-33/se33.2.183\\_175](https://ecfr.io/Title-33/se33.2.183_175)

The Canadian Rules can be found at  
<https://www.tc.gc.ca/eng/marinesafety/tp-tp1332menu-521.htm>

The Recreational Craft Directive for the EU can be found at. <http://www.rcdweb.com/> There is a fee for these documents.

The ISO Standards for recreational boats are at <https://www.iso.org/ics/47.080/x/> There is a fee for these documents.

ABYC standards can be found at <http://www.abycinc.org/>: There is a fee for these documents for non-members. Members can access these documents on-line. H-5 BOAT LOAD CAPACITY  
H-8 BOUYANCY IN THE EVENT OF FLOODING/SWAMPING  
H-28 INFLATABLE BOATS  
H-29 CANOES AND KAYAKS  
H-35 POWERING AND LOAD CAPACITY OF PONTOON BOATS  
S-7 BOAT CAPACITY LABELS  
S-30 OUTBOARD ENGINE& RELATED EQUIPMNET WEIGHTS

Additionally, I will only deal with recreational (pleasure) boats. Boats that carry passengers for hire must meet separate rules and in the US, if they carry more than six passengers, they must be inspected by the US Coast Guard. In the UK they must be certified under the MCA standards. Each country has its own governmental agency that regulates boats carrying passengers for hire.

## **Capacity Requirements:**

The basic principles of determining maximum capacities are the same for all boats under 20 feet (6 m). The maximum capacities are based on the displacement weight of the boat. Displacement weight is the weight of water that a boat would displace if it were pushed down until water started to enter the boat. It is the amount of weight it would take to sink the boat.

The maximum weight capacity is determined from the displacement weight. Depending on the type of boat, that amount will be a percentage of the displacement weight. For manually propelled boats it is one third, for outboard boats it is one fifth, and for inboard or stern-drive boats it is one seventh. Put another way, it would take three times the safe load to sink the boat, or would take five times the safe load to sink the boat, or seven times the load capacity to sink the boat.

The persons capacity measured in weight, and in number of people, is then determined based on the maximum weight capacity. On outboard boats the weight of the engine, the battery, the controls, and a full portable (6 gal) fuel tank (if one is used) is subtracted from the maximum weight capacity to determine the weight of persons. In the US a formula, or in Canada a weight per person, is used to determine the number of people. The important thing to remember is the number that should not be exceeded is the maximum weight of persons.

## **Flotation Requirements:**

One of the most effective means of saving lives when a boat swamps, is simply to keep the boat afloat so the passengers have something to hang onto, or sit in. This keeps them all in one place, may even keep part of their body out of the water preventing hypothermia, and provides a target for rescuers, that is, it is much easier to see a boat than a head sticking out of the water. Countless lives have been saved by this.

Why countless? Because deaths get reported, near misses don't, so we don't know the exact numbers. But, the number of deaths has dropped dramatically since flotation was required so it has to be contributing in a significant way.

The amount of flotation needed is directly determined from three factors:

**The weight of the boat.**

**The weight of the load. The**

**weight of the engine.**

However, since things do not weigh the same underwater as they do in the air some calculations must be done to determine what they do weigh. Then the amount of flotation needed to float them is determined.

A table will be provided that shows a buoyancy factor for each type of material. The weight of the material dry is multiplied times the factor for the material submerged, or in the case of an outboard, partially submerged, to determine the submerged weight. The submerged weight is used to determine the amount of flotation. For materials that are buoyant the factor is negative.

Flotation material is usually foam. Most of the industry uses two pound density foam, which simply means that one cubic foot weighs two pounds. However, it doesn't have to be foam. The rules and standards are performance based, that is, they specify what the boat must do, not how it must be done. The boat must float in such and such an attitude, etc., rather than saying you must put so much foam in the boat. This allows other methods, such as air chambers, to be used. I have seen everything from foam to milk bottles. However, if you are building a very nice classic wooden boat, you may not want to use foam, (ugh, plastic in a wood boat!) so you can use air chambers, or a light wood such as balsa to achieve the same results.

### **Definitions:**

**Displacement weight:** The weight of water that a boat would displace if it were pushed down until water started to enter the boat. It is the amount of weight it would take to sink the boat.

**Displace:** A boat forms a hole in the water, that is, it moves the water aside, or displaces it. The amount, or volume, of water that would fill this hole, is the amount displaced.

**Mono-hull:** A boat that makes a single footprint in the water. If, when sitting at rest with its full load on board, you can draw a single continuous line around the water line of the boat it is a mono-hull. Catamarans, trimarans, pontoon boats, are multi-hulls, not mono-hulls.

## Lesson 2: Displacement

### Safe Loading-Capacity:

**Goal:** Learn to calculate or measure displacement.

Applies to Mono-hull boats under 20' (6m)

The Maximum weight capacity and the persons capacity that a boat can carry is based on the displacement weight of a boat. What is displacement weight?

Displacement weight is the weight of water that a boat would displace if it were pushed down until water started to enter the boat. It is the amount of weight it would take to sink the boat.

The CFR defines displacement weight as:

(1) **Maximum displacement** 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 the purpose of this paragraph, a boat is level when it is transversely level and when either of the two following conditions is met:

(i) The forward point where the sheer intersects the vertical centerline plane and the aft point where the sheer intersects the upper boundary of the transom (stern) are equidistant above the water surface or are equidistant below the water surface.

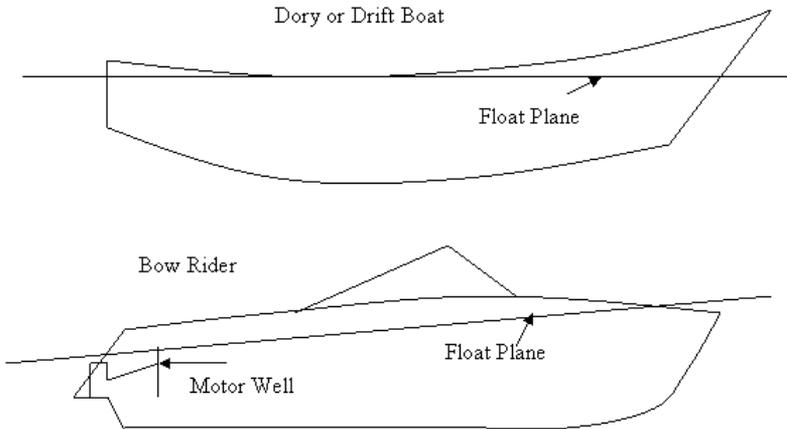
(ii) The most forward point of the boat is level with or above the lowest point of water ingress.

In other words, the volume of the boat below the Static Float Plane determines what the displacement weight is.

Below is the ABYC definition of Static Float Plane, from H-5 Boat Load Capacity. H-5.4 Definitions:

**Static Float Plane:** The plane below the most forward point and through which the maximum displacement of the boat exists without water coming aboard, when all openings such as drains, scuppers, centerboard trunks, hull or transom doors are considered sealed. Or:

(alternate) The float plane as defined above may be located above or below the sheer as long as it is equidistant above or below the most forward point and the stern.



1. You can calculate the volume of water displaced (hence displacement) when the boat is sunk to the point where water starts to come in, also called the static float plane. Multiply this volume times 62.4 lb/cu ft (999.42 kg/cu meter) (The weight of one cubic foot of fresh water, or one cubic meter of fresh water.): or,

2. Put weight in the boat until water starts to come in. This sounds simple but is difficult for the average boat builder because it requires a lot of weight. The amount of weight can be considerable. On a larger boat it can be 10,000 lb. (4536 kg) or more. The amount of weight it takes to sink the boat is the displacement weight.

3. Or, with smaller boats fill the boat with water using a bucket of a known amount. Fill it until the level of the water in the boat and outside the boat is equal, that is, when water starts to flow in and out of the boat. Multiply the number of gallons times 8 lb/gal (1 kg/liter). That gives you the displacement weight. Do not do this on dry land. Put the boat in the water first. The weight of the water will more than likely break the boat if it is not supported by water on the outside.

## **Method 1: Calculating Displacement weight**

In order to find displacement weight, you need to know the volume of the boat below the static float plane. On most boats you can determine the static float plane just by looking at the boat. Where would the lowest point be, where water would come in? Would it be at the transom? On a drift boat would it be at the lowest point of the sheer. On most boats there will be two points, one aft and one forward.

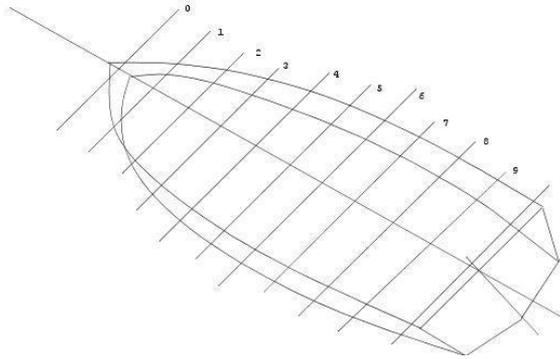
You will be using a formula, called Simpson's Rule. It involves only simple addition, and multiplication, so do not worry about having to do high powered math here. Also, I will show you a table you can use to do the calculation, or if you know how to use Excel or any other spreadsheet, a simple spreadsheet table that calculates volume and displacement. I will not go into the math behind Simpson's Rule because it is rather complex, but if you are interested you can look it up on the internet, or ask a math teacher, or student that knows calculus, at your local high school or college.

### **Working from drawings:**

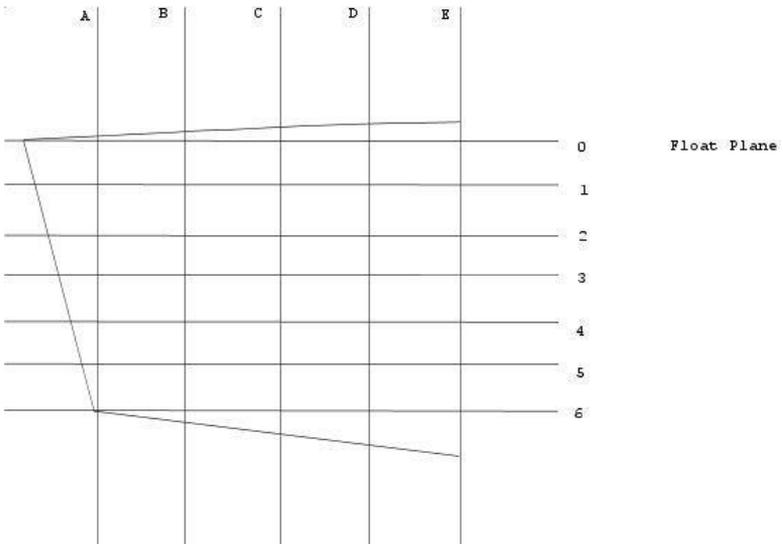
If you are working from drawings of the boat you can draw in what you think would be the static float plane. Everything below this is the volume you are going to calculate. If you have designed the boat using one of the Computer Aided Design (CAD) programs for boat design, this calculation may be built right in. In most of these programs, they will calculate the displacement below a defined waterline, so you can define the static float plane as a waterline and the computer will do the math.

The next step is to divide the boat into an odd number of evenly spaced sections, starting at 0, 1, 2 and so on. I like to use eleven, because that gives me 0 through 10. But, depending on the size of the boat, you can use 9 or 7, or more than eleven. They must be evenly spaced for Simpson's Rule to work. If you have plans for the boat and it has a table of offsets, you may be able to use the table because the designer has already done most of the work for you.

Boat Divided Into Sections



Using the drawings or table of offsets calculate or measure the area of half of each section of the boat.



On a boat that has pretty straight lines this becomes easier because you can divide the area up into boxes and triangles. The area of a box is

the length times the width. The area of a triangle is one half the height times the base. You add up the areas of each box and triangle and that gives you the total area. A close approximation can be done for boats with a lot of curvature.

The half area for each station is measured and then put into the table. Multiply the half area times the Simpson's Factor to get the function. Then add up the functions. Multiply the total by two times 2/3 and either 62.4 lb/cu ft (999.42 kg/cu meter) or 64 (1025.046 kg/cu meter) to get the displacement weight. See the table below.

Section Number		Half Areas	Simpson	Functions
0			1	
1			4	
2			2	
3			4	
4			2	
5			4	
6			2	
7			4	
8			2	
9			4	
10			1	
			Total Simp. Func.=	
2 X	64 X (999.42)	2/3 X	Total Simp. Func.=	Displacement Weight
2 X	62.4 X (1025.046)	2/3 X	Total Simp. Func.=	Displacement Weight

## **Working from the boat or mold, for fiberglass boats.**

Doing this on an existing boat is easier than it sounds. You need to do this with a bare hull, that is, no structure in the boat. If you can't, then it will have to be done by taking offsets off of the outside of the hull of the boat.

You will need a long straight edge. A good straight piece of wood will do. You will need a plumb bob and a measuring tape or one of those folding yard sticks to do the measurements. Also you will need some string and some tacks or small nails. However, if you are doing this in a mold, use tape rather than tacks. Also, if doing this in the mold you will probably need to get into the mold so wear only socks so you don't damage the finish. This is a lot easier if your boat is a hard chine boat, a vee or flat bottom than if it is round bottom with a lot of compound curves.

First establish where your float plane is. Run a string from one end of the boat to the other at the level of the float plane and fasten it in place nice and taut so it is straight and does not sag. You will be measuring from this string down to the inside of the mold or boat so it needs to be tight. Measure the length of the string. Then select some point at or near the bow, or at or near the transom and measure along the string. Divide the distance by the number of sections minus one. That is if you have 11 sections, divide by ten. That will give you the space between the sections. For instance if the distance is 14 feet (4.2672m) the space is 1.4 feet (1 foot 3 3/8 inches approximately) (42.67 cm) See why it is easier to use tenths, or centimeters? But you can add or subtract from the distance along the string to make dividing by ten more convenient. That is the station spacing can be whatever you want it to be as long as each

space is the same and they add up to an even number of spaces. (An odd number of stations means an even number of spaces between the stations.) Mark the location of each section by placing a small piece of tape around the string like a flag, and mark the position on the tape.

Place your straight edge across the boat at the first station (station zero). Now you need to do the same thing for the half breadth (half of the beam) of the boat, only 5 sections will do fine. But again divide it up equally. Mark the position of each division on a piece of tape put on the straight edge. Using the plumb bob measure down from the straight edge to the point the plumb bob contacts the hull.

Here are some photographs that illustrate this.



This is a mold for an approximately 8 foot dinghy. The static float plane on this boat is at the level of amidships. See the diagram for a drift boat. This has a curved sheer which is at its lowest point at a little more than half the length. I have taped a string from the bow to the stern to represent the static float plane. I

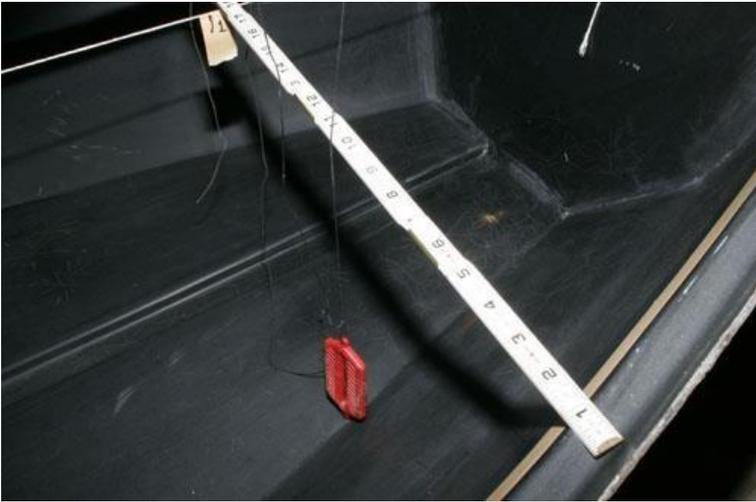
divided the length into equal stations. In this case one (1) foot.



I placed the first station at the intersection of the bow, with the centerline and bottom of the hull. I then measured back from there. The piece of wood at the top is there to hang a plumb bob and rest a rule against. I found this point by using a plumb bob.



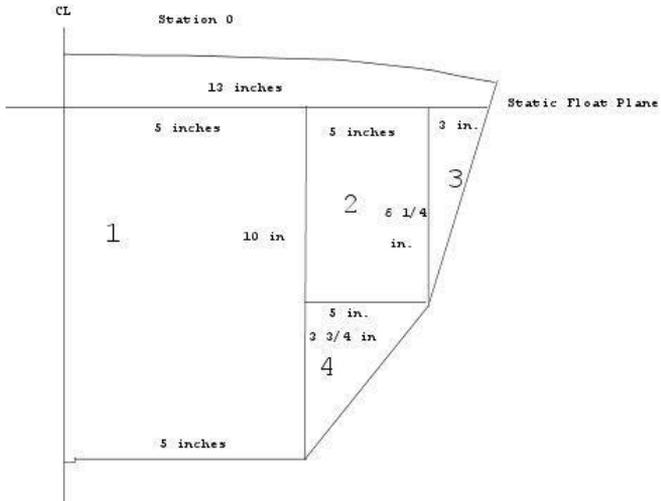
Then I measured and recorded the distance from the string down to the bottom of the hull.



I repeated this at two points, where the bottom intersected the side and in the next photo, where the first strake intersects the next one. You can see in the photo, I used a folding rule laid across the top of the boat to measure the distance off the centerline.



Below is a diagram of what I have measured at this point.



I have divided the station up into areas that are easy to measure and then calculate the area. Remember. This is only half the area of the station.

Area 1: 5 inches by 10 inches = 50 sq. inches

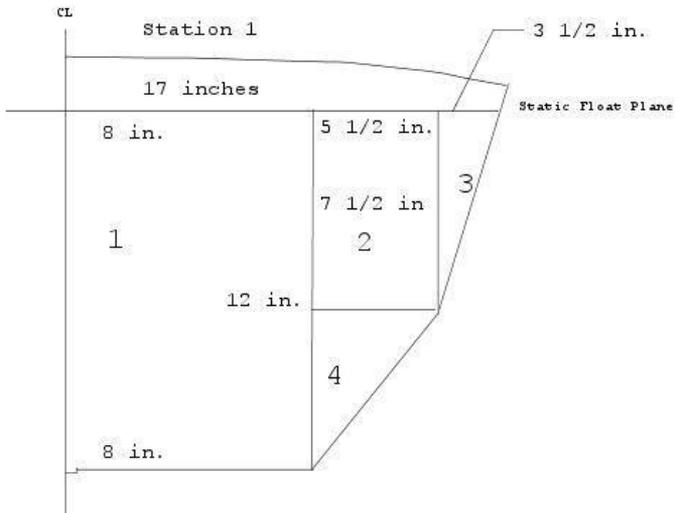
Area 2: 5 inches by 6.25 inches = 31.25 sq inches

Area 3: 3 inches by 6.25 divided by 2 (a triangle) = 9.375 sq. inches

Area 4 5 inches by 3.75 inches divided by 2 = 9.375

The total area of half of station 0 = 100.00 sq inches

Repeat this process for each station.



Area 1: 8 in by 12 in. = **96 sq. inches**

Area 2: 5.5 in by 7.5 in. = 41.25 sq. in.

Area 3: 3.5 in by 7.5 in. / 2 = 13.125 sq. in.

Area 4: 5.5 in by 4.5 in. / 2 = 12.375 sq. in

Total area of half of station 1 = **162.75 sq in**

Repeat for each station.

Now that we have taken the measurements and found the area of each station, what do we do? This is where Simpson's Formula is used. See the table below. In this case there were only 7 stations (0 thru 6)

Section Number	Half Areas(sq ft)	Simpson	Functions
0	0.694 (100 sq in)	1	0.694
1	0.909 (131 sq in)	4	3.636
2	1.042 (150 sq in)	2	2.084

3		1.111 (160 sq in)	4	4.444
4		1.076 (155 sq in)	2	2.152
5		1.007 (145 sq in)	4	4.028
6		0.972 (140 sq in)	1	0.972
			Total Simp.Func.=	18.01
2 X	62.4 X (999.42)	2/3 X	18.01 =	1498 Displ. Wt
2 X	64.0 X (1025.046)	2/3 X	18.01 =	1537 Displ. Wt

The formula in this case is:

$$2 \times ((0.694) + 4 \times (0.909) + 2 \times (1.042) + 4 \times (1.111) + 2 \times (1.076) + 4 \times (1.007) + (0.972)) \times 62.4 \times 2/3 = 1498$$

The first using 62.4 is for fresh water.  
The second using 64.0 is for salt water.

## Method 2 Testing: Determining Displacement weight.

Method two is simpler than doing the calculations, but it requires a place to do the test and enough weights to do the test. It amounts to putting weight into the boat until water starts to come in. The weight of the boat is subtracted from the amount of weights used, and then that number is used to determine displacement weight. If you are building a boat it is best to do this before you have installed any equipment that may be damaged by water because you will have to remove it any way.

You will need a swimming pool, pond, or other shallow, calm body of water where you can easily take the boat into and out of the water, and easily load weights into the boat. The photograph shows the test facility the U. S. Coast Guard uses.



**Weights:** It is best to use iron, lead, or other solid weights. Weights that absorb water will not give you an accurate weight. Things such as concrete blocks, sand bags or bricks absorb water. People do not make good test weights either. Old sash weights, cut up railroad rails, ingots, all work well. The test labs all use 55 pound iron ingots and scrap metal but they may be hard to obtain. Scrap metal yards may have iron rails, and other things that can be used. The photo above shows iron weights in cages, and in the background the yellow weights are 55 lb iron ingots.

The next photograph also displays the types of weights used. It also shows that loading the heavy weights is not easy and may require a

crane, chain lift (used here) or other means to lift and move the weights around.



You will also need a fairly accurate scale. A standard household scale you use to weigh yourself is not accurate. Many businesses have accurate scales for weighing large items. In the back ground of this photograph you can see two industrial scales. You need to weigh and record the amount each weight weighs. Paint or write the amount on the weight, or number them and keep a chart. Each of these weights has the amount to a tenth of a pound marked on them.

**Procedure:**

Prepare the boat: Remove any equipment that might be damaged. If there are any holes below the static float plane, such as the hole for the outboard cables and steering, seal the hole. This can be easily done with duct tape. If this is a boat with a hull and deck joint, seal the joint completely with duct tape. If the boat has a built in fuel tank, seal up the fuel tank vent

and the fuel fill with tape. However, if the boat has side louvers for ventilation you cannot seal these, the static float plane must be below these as they are considered a point of water ingress.

Set the boat in a calm body of water, preferably not more than a few feet deep. If you drop a weight you don't want to have to dive to get it out of the water. If you are doing this in a pool that is more than 2 or 3 feet deep put some ropes or straps under or attached to the boat to stabilize it or prevent it from rolling over or sinking.

Put weights in the boat starting in the middle and working outward toward the ends. Try to evenly distribute the weights. Have someone record the value of each weight as you put it in the boat.

Continue until water starts to come in. Stop. Try moving weights around to achieve an optimum value. For instance, if this is an outboard with a transom cutout and water is coming in at the cutout, but the bow is still out of the water, shift weight forward to lower the bow and raise the stern.

This weight minus the boat weight equals the displacement weight.

### **Method 3: The bucket method.**

It is recommended that you only do this with small boats such as dinghies and rowboats. It is really not very practical for boats larger than 10 to 12 feet, although I know that this has been done on larger boats. Also you will need to do this in a pool or pond like the test method. It is basically the same thing except you are substituting water for solid weights. The boat needs to be supported on the outside by the water

because, if done without support, it will most likely break the boat.

Prepare the boat: Remove equipment that might be damaged. If there are holes below the static float plane, such as the hole for the outboard cables and steering, seal the holes. This can be easily done with duct tape. If this is a boat with a hull and deck joint, seal the joint completely with duct tape. If the boat has a built in fuel tank, seal the fuel tank vent and fill with tape.

If this is a wooden boat you should not do this until the boat is painted or sealed. Otherwise the wood will absorb water and alter the final result. It may also damage the boat.

Get a bucket or container that holds a known amount such as two gallons, five gallons, etc. Fill it with water to the known amount. Empty it into the boat. Count the number it takes to fill the boat until water can flow in and out. Multiply the number times the number of gallons per bucket or container. Multiply the number of gallons times 8 lbs per gallon. The same can be done using liters. 1 liter = 1 kilogram. The number of gallons times 8 equals the displacement weight.

## **Lesson 2 Questions**

**Exercise: Select a boat: determine the displacement weight of the boat. Do it by any method you choose, calculation, test, or computer. Show your work.**

**This can be a real boat, or a virtual boat, that is, using an existing design on a computer or drawn on paper.**

## Lesson 3: Capacities

### Maximum Capacities

The basic principles of determining maximum capacities are the same for all mono-hull boats under 20 feet (6 m). The maximum capacities are based on the displacement weight of the boat. In the first lesson we learned how to calculate displacement weight, or determine it by testing.

Depending on the type of boat, the maximum weight capacity will be a percentage of the displacement weight. For manually propelled boats it is one third, for outboard boats it is one fifth, and for inboard or stern-drive boats it is one seventh. Put another way, it would take three times the safe load to sink the boat, or would take five times the safe load to sink the boat, or seven times the load capacity to sink the boat.

The persons capacity measured in weight, and in number of people, is then determined based on the maximum weight capacity. On outboard boats the weight of the engine, the battery, the controls, and if used, a full portable (6 gal or 22.7 L) fuel tank is subtracted from the maximum weight capacity to determine the weight of persons. In the US a formula, or in Canada a weight per person, is used to determine the number of people. The important thing to remember is the number that should not be exceeded is the maximum weight of persons.

### Goals

**Learn the rules and standards for maximum weight capacity of small mono-hull boats.**

**Learn to calculate the maximum weight capacity.**

Learn how to test a boat to determine the maximum weight capacity and maximum persons capacity or verify the calculated capacities.

**Definitions:**

**Displacement weight:** The weight of water that a boat would displace if it were pushed down until water started to enter the boat. It is the amount of weight it would take to sink the boat.

**Maximum Weight Capacity:** The total amount of weight a boat can safely carry under normal operating conditions.

**ABYC definition: 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, controls, and batteries.

**Maximum Persons Capacity:** The amount of weight in persons that a boat can safely carry under normal operating conditions.

**Maximum Persons:** The maximum number of people a boat can safely carry based on Maximum Persons Capacity.

**ABYC Definition: Persons capacity** - The maximum load of persons expressed in pounds and in number of persons.

**Maximum Safe Horsepower:** The maximum horsepower rating for an outboard powered boat.

**Mono-hull:** US Coast Guard Definition. Mono-hull boat: A boat on which the line of intersection of the water surface and the boat at any operating draft forms a single closed curve. For example, a

catamaran, trimaran, or a pontoon boat is not a mono-hull boat.

**ABYC Definition of Mono-hull Boat:** Mono-hull boat - A boat on which the line of intersection of the water surface and the boat at any operating draft forms a single closed curve.

**Length: ABYC definition.** Calculation length: - The horizontal length from the most forward part of the boat below the static float plane to the vertical midpoint of the transom below the static float plane.

**Transom Width:** The maximum width at the transom including permanent fixtures such as rub rails, but not including handles or other attachments.

**US Coast Guard Definition:** Maximum transom width in feet excluding handles and other similar fittings, attachments, and extensions.

I strongly suggest that to complete this course you obtain the US Coast Guard Boatbuilders Handbook (the URL is below) and the Canadian Rules (also given below). These are free and will give you a lot of additional information. You can purchase the others, but they will only benefit you if you are planning on building boats for the European market. The exception is the ABYC Standards. If you are building boats I can't recommend strongly enough joining ABYC and getting copies of the standards either through on-line access, or on CD, or printed.

The US Rules for recreational boats can be found at <http://uscgboating.org/regulations/boatbuildershandbook.php> and in:

Title 33 Code of Federal Regulations Part 181  
<https://www.law.cornell.edu/cfr/text/33/part-181>

Title 33 Code of Federal Regulations Part 183  
<https://www.law.cornell.edu/cfr/text/33/part-183>

Title 33 Code Of Federal Regulations Part 183.75  
Outboard Engine Weight Table

[https://www.govregs.com/regulations/title33\\_chapterI\\_part183\\_subpartE\\_section183.75](https://www.govregs.com/regulations/title33_chapterI_part183_subpartE_section183.75)

The Canadian Rules can be found at  
<https://www.tc.gc.ca/eng/marinesafety/tp-tp1332menu-521.htm>

The Recreational Craft Directive for the EU can be found at. <http://www.rcdweb.com/> There is a fee for these documents.

The ISO Standards for recreational boats are at <https://www.iso.org/ics/47.080/x/> There is a fee for these documents.

ABYC standards can be found at <http://www.abycinc.org/>: There is a fee for these documents for non-members. Members can access these documents on-line. H-5 BOAT LOAD CAPACITY  
H-8 BOUYANCY IN THE EVENT OF FLOODING/SWAMPING  
H-28 INFLATABLE BOATS  
H-29 CANOES AND KAYAKS  
H-35 POWERING AND LOAD CAPACITY OF PONTOON BOATS  
S-7 BOAT CAPACITY LABELS  
S-30 OUTBOARD ENGINE& RELATED EQUIPMNET WEIGHTS