

# **REGISTERED DIMENSIONS UNDER FORMAL SYSTEMS**



## **TONNAGE GUIDE 4**

**CH-1**

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## 1. Purpose

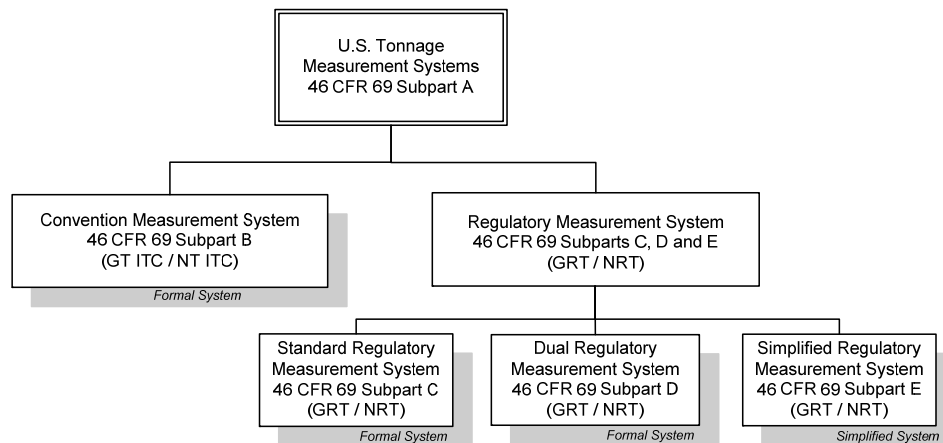
## TONNAGE GUIDE 4

## 1. PURPOSE

This Guide provides a procedure to determine the registered dimensions of monohulls using current definitions associated with U.S. Formal Measurement Systems. While this Guide is directed primarily to employees and contractors of authorized measurement organizations as a job aid for use during the tonnage certification process, it may be useful to other parties interested in how definitions for registered dimensions are applied.

## 2. OVERVIEW

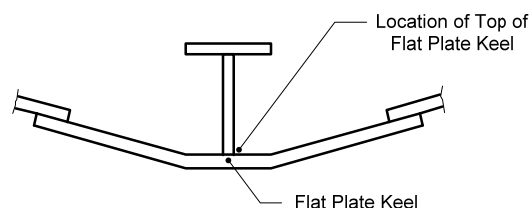
Registered dimensions (length, breadth, depth) are assigned to vessels under the U.S. tonnage measurement regulations, Title 46, Code of Federal Regulations, Part 69, *Measurement of Vessels*, and policy of Marine Safety Center (MSC) Technical Note (MTN) 01-99 as amended, *Tonnage Technical Policy*. These parameters are used as a basis for applying design standards, assigning fees, and for a variety of other regulatory and commercial purposes. The definitions of registered dimensions vary depending on the measurement system used to certify the tonnages (see figure below), and definitions that were in effect at the time of vessel measurement. Under the Simplified Regulatory Measurement System, the registered dimensions are overall hull dimensions and are relatively straightforward to determine. Under Formal Measurement Systems, the registered dimension definitions take into account other factors related to hull geometry and involve additional complexity. This Guide addresses only Formal system registered dimensions assigned under current definitions. Refer to Tonnage Guide 1 as amended, *Simplified Measurement*, for information on Simplified system registered dimensions.



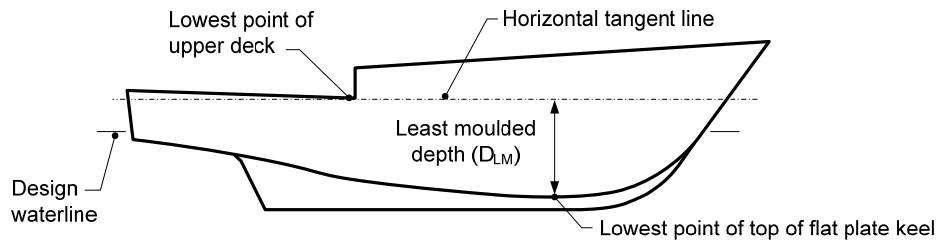
## 3. DEFINITIONS

The following relevant definitions and figures are excerpted from MTN 01-99 as amended.

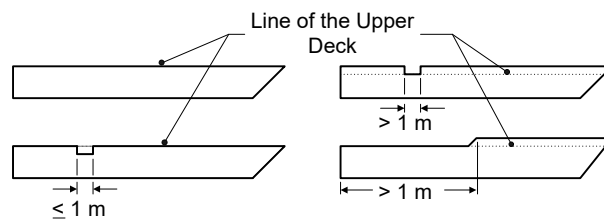
- (a) **Flat Plate Keel** is the horizontal, centerline, bottom shell strake constituting the lower flange of the keel. The “top of the **flat plate keel**” refers to the top of this plate. In vessels that do not have a **flat plate keel**, the equivalent to the “top of the **flat plate keel**” is established as described in the definition for **registered depth**.



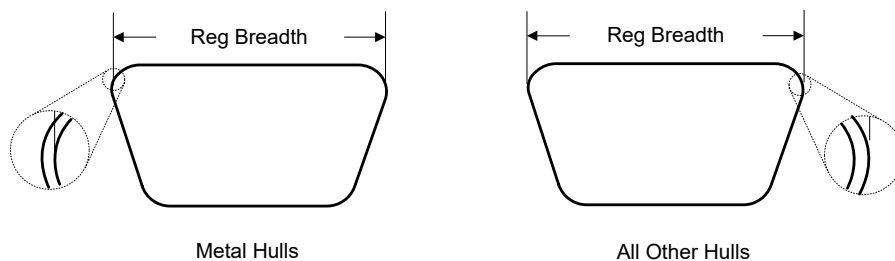
- (b) **Least Molded Depth** means the vertical distance between: 1) the top of the **flat plate keel** (or equivalent) at the lowest point along its length; and 2) the horizontal line that is tangent to the underside of the upper deck at the vessel's side at the lowest point along the upper deck's length. For the purposes of this definition, the vessel is considered to be trimmed on a waterline parallel to the design waterline.



- (c) **Line of the Upper Deck** means a longitudinal line at the underside of the upper deck or, if that deck is stepped, the longitudinal line of the underside of the lowest portion of that deck parallel with the upper portions of that deck. Discontinuities in the upper deck that do not extend from side to side of the vessel, are one meter or less in length, or are outside the boundaries of “**registered length**”, are ignored when establishing the **line of the upper deck**.



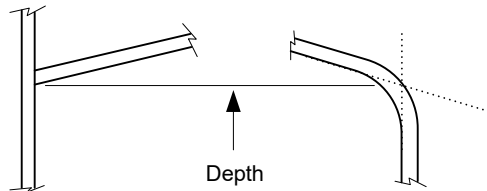
- (d) **Registered Breadth** means the maximum breadth of a vessel measured amidships to the molded line of the frame in a vessel with a metal shell and to the outer surface of the hull in all other vessels.



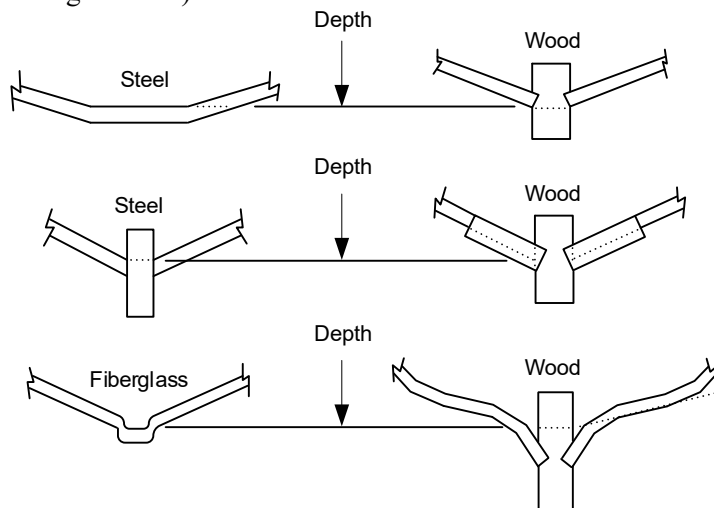
3. Definitions

(e) **Registered Depth** means the vertical distance amidships between the following points:

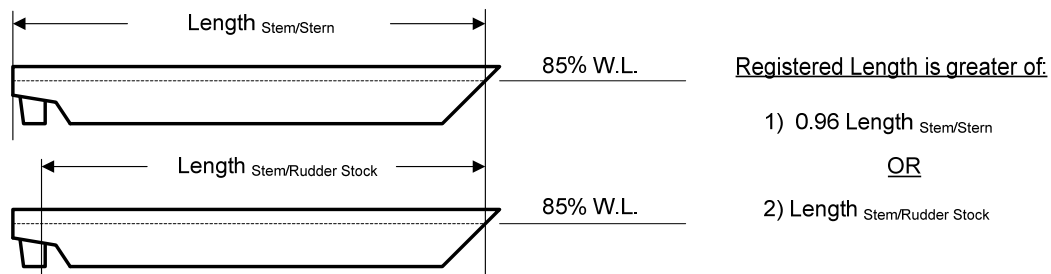
- (1) **Upper Terminus** From the **line of the upper deck** at the vessel's side or, if the vessel has rounded gunwales, from the intersection of the **line of the upper deck** extended to the molded line of the shell plating as though the gunwales were of angular design.



- (2) **Lower Terminus** To the top of the **flat plate keel**, or equivalent (i.e., to the lower edge of the keel rabbet if the vessel is of wood or composite structure, or to the point where the line of the flat of the bottom extended inward cuts the side of the keel if the vessel's lower part is hollow or has thick garboards).



- (f) **Registered Length** means either 1) 96 percent of the length from the fore side of the stem to the aftermost side of the stern on a waterline at 85 percent of the **least molded depth** measured from the top of the **flat plate keel**; or 2) the length from the fore side of the stem to the axis of the rudder stock on that waterline, whichever is greater.



## 4. Procedure

- In vessels designed with a rake of keel, this length is measured on a waterline parallel to the design waterline. For such cases, the reference point used to establish the 85% waterline is taken at the point where the top of the **flat plate keel**, or equivalent, is lowest along the length of the vessel.
- When a vessel does not have a rudder stock, the length should be taken as 96% of the total length on a waterline at 85% of the least molded depth.

(g) **Stem** means the foremost boundary of the buoyant hull envelope.

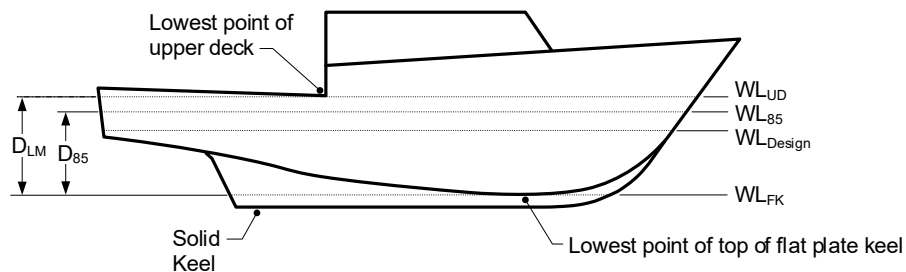
(h) **Stern** means the aftermost boundary of the buoyant hull envelope.

## 4. PROCEDURE

Perform the steps below to determine the registered dimensions of a monohull vessel of conventional design.

## (a) ESTABLISH WATERLINES

- (1) Using an appropriately scaled inboard or outboard profile of the vessel with the vessel trimmed at its design waterline  $WL_{Design}$ , draw a waterline at the lowest point along the underside of the upper deck at the vessel's side. Mark this waterline as  $WL_{UD}$ .
- (2) Draw a waterline at the lowest point along the top of the **flat plate keel** or equivalent. Mark this waterline as  $WL_{FK}$ .
- (3) Measure the **least molded depth** ( $D_{LM}$ ). This is the distance between  $WL_{UD}$  and  $WL_{FK}$ .
- (4) Calculate 85% of the **least molded depth** ( $D_{85}$ ) and draw a waterline at this distance, as measured from  $WL_{FK}$ . Mark this water line as  $WL_{85}$ .



## (b) DETERMINE THE REGISTERED LENGTH

- (1) Draw a vertical reference line where the foremost part of the stem intersects  $WL_{85}$ . Mark this line as  $FR_{85}$ .
- (2) Draw a vertical reference line where the aftermost part of the stern intersects  $WL_{85}$ . Mark this line as  $AR_{85}$ .
- (3) Draw a line extending the axis of the rudder stock to intersect  $WL_{85}$ .
- (4) Draw a vertical line through the intersection, and mark this line as  $AR_{R/S}$ .
- (5) Measure the length from  $FR_{85}$  to  $AR_{85}$ . Refer to this length as  $L_{85}$ .

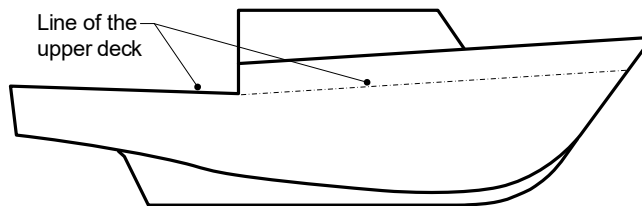
- (6) Calculate 96% of  $L_{85}$ . Refer to this length as  $L_{96}$ .
- (7) Draw a vertical reference line at a distance of  $L_{96}$  aft from  $FR_{85}$ . Mark this line as  $AR_{96}$ .
- (8) Measure the distance from  $FR_{85}$  to  $AR_{R/S}$ . Refer to this length as  $L_{R/S}$ .
- (9) Select the greater of  $L_{96}$  and  $L_{R/S}$ . Record this dimension as the **registered length** ( $L_{REG}$ ).

**(c) DETERMINE THE OVERALL LENGTH<sup>1</sup>**

- (1) Draw vertical reference lines at the foremost part of the stem and the aftermost part of the stern. Mark these lines as  $FR_{LOA}$  and  $AR_{LOA}$ , respectively.
- (2) Measure the distance from  $FR_{LOA}$  to  $AR_{LOA}$ . This is the overall length of the hull. Refer to this length as  $L_{OA}$ .

**(d) DETERMINE THE REGISTERED BREADTH AND DEPTH**

- (1) Calculate half the **registered length**. Refer to this length as  $L_{REG/2}$ .
- (2) Draw a vertical reference line at a distance of  $L_{REG/2}$  from  $FR_{85}$ . This is the amidships location. Mark this line with the symbol  $\overline{\text{M}}_{REG}$ .
- (3) Draw, or identify, the **line of the upper deck** as defined in Section 3 of this Guide. Mark this line as **line of the upper deck**. Refer to the definition of the **line of the upper deck** for details on the treatment of steps and other discontinuities.

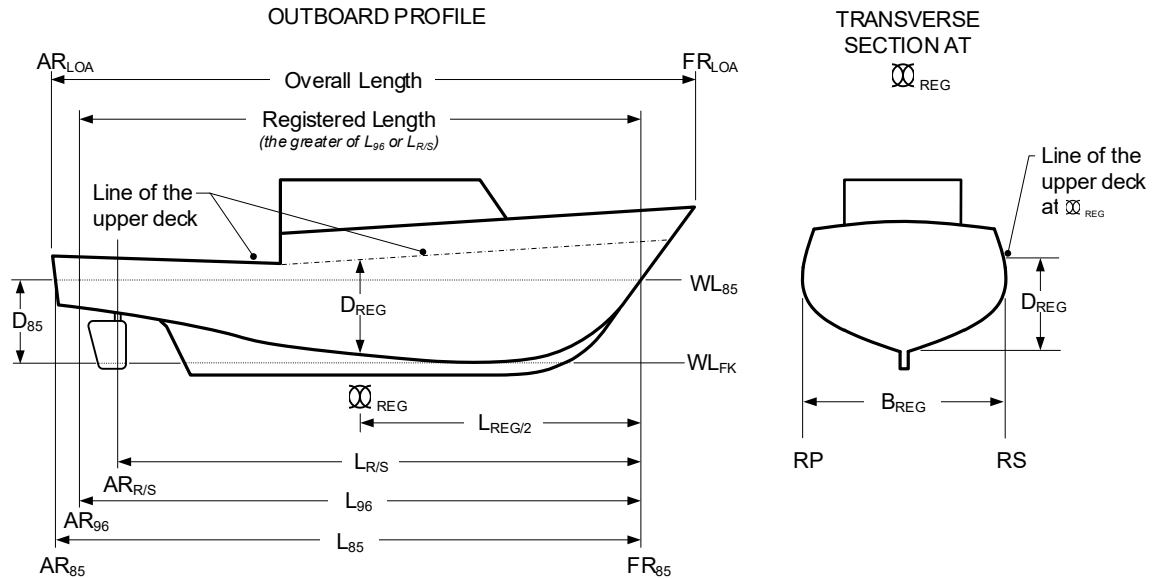


- (4) Using an appropriately scaled drawing of a transverse hull section at the  $\overline{\text{M}}_{REG}$ , draw a vertical reference line at the starboard side where the breadth is the greatest. Mark this line as **RS**.
- (5) On the same drawing, draw a vertical reference line at the port side where the breadth is the greatest. Mark this line as **RP**.
- (6) Mark the location of the **line of the upper deck** at  $\overline{\text{M}}_{REG}$ .
- (7) Mark the location of the top of the **flat plate keel** (or equivalent) at  $\overline{\text{M}}_{REG}$ .

<sup>1</sup> The vessel's overall length is not needed to determine registered dimensions under this procedure. However, overall length is used to determine applicability of tonnage measurement systems, and is also certified by authorized measurement organizations. Refer to Section 69.203 of MTN 01-99 as amended for overall length definitions and interpretations, including those addressing the treatment of bulwarks and similar structures.

5. Disclaimer

- (8) Measure the distance between **RS** and **RP**. Record this distance as the **registered breadth (B<sub>REG</sub>)**.
- (9) Measure the vertical distance between the **line of the upper deck** at the vessel's side and the top of the **flat plate keel** at  $\varnothing_{REG}$ . Record this distance as the **registered depth (D<sub>REG</sub>)**.



5. DISCLAIMER

This Guide is intended to provide information to assist industry, mariners, the general public, and the Coast Guard, as well as other federal and state regulators, in understanding statutory and regulatory requirements. It is not intended as, nor should it be construed to represent, a revision of or substitute for applicable statutes or regulations or established interpretations of either.

6. FURTHER INFORMATION

General information on the U.S. Tonnage Measurement program, including related Coast Guard Marine Safety Center Tonnage publications, is available on the U.S. Tonnage Publications page of our website (<http://www.dco.uscg.mil/msc/>).

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