

REGISTERED DIMENSIONS UNDER FORMAL SYSTEMS



TONNAGE GUIDE 4

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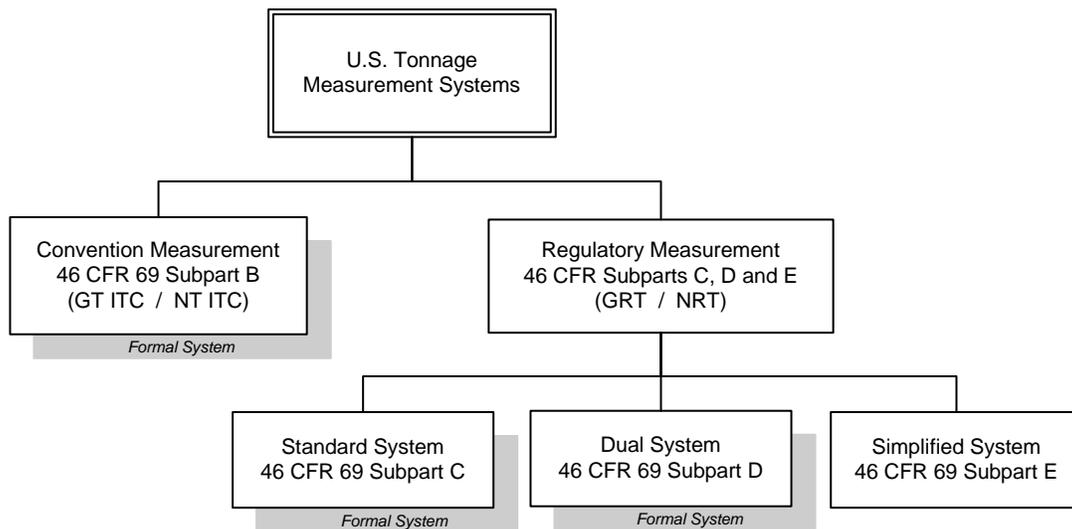
TONNAGE GUIDE 4

1. PURPOSE

This Guide provides a procedure to determine the registered dimensions of monohull vessels using current definitions associated with U.S. formal tonnage 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. This Guide is not a substitute for applicable requirements in statutes and regulations, nor is it a substitute for associated interpretations in Coast Guard policy documents. Refer to Marine Safety Center Technical Note (MTN) 01-99, *Tonnage Technical Policy*, for comprehensive interpretive information on registered dimensions.

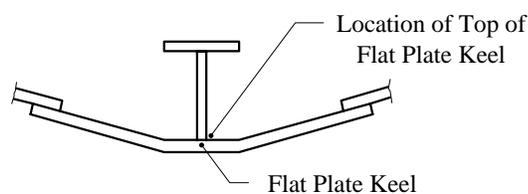
2. OVERVIEW

Registered dimensions (length, breadth, depth) are assigned to vessels under the U.S. tonnage measurement regulations, Title 46, Code of Federal Regulations, Part 69 (46 CFR 69). 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). Under the simplified system, the registered dimensions are overall hull dimensions and are relatively straightforward to determine. Under formal systems, the registered dimension definitions take into account other factors related to hull geometry and involve additional complexity. This Guide only addresses formal system registered dimensions. Refer to Tonnage Guide (TG) 1 for information on simplified system registered dimensions.



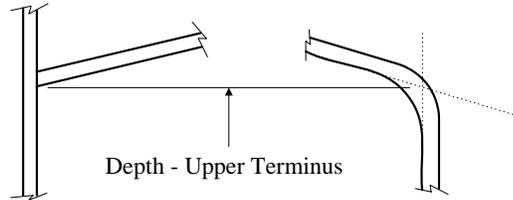
3. DEFINITIONS

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**.

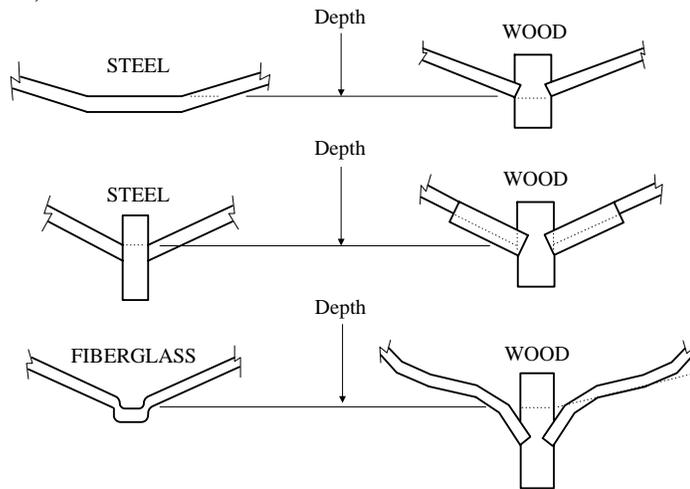


Registered Depth means the vertical distance amidships between the following points:

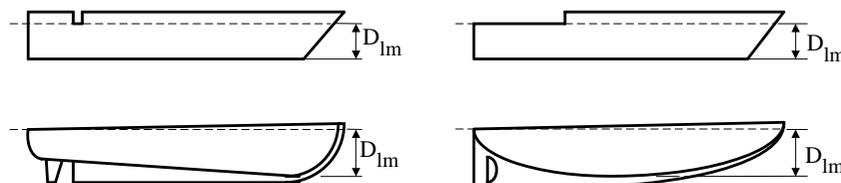
- a) **Upper Terminus** From the **line of the upper deck** at the vessel's side or, if the vessel has rounded gunwales, from the intersection of the **line of the upper deck** extended to the molded line of the shell plating as though the gunwales were of angular design.



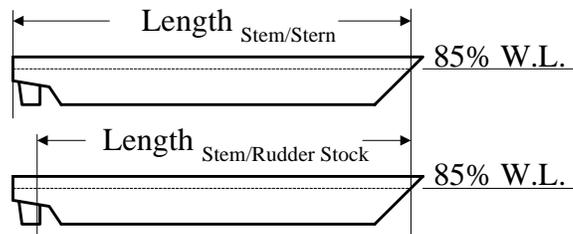
- b) **Lower Terminus** To the top of the **flat plate keel**, or equivalent (i.e., to the lower edge of the keel rabbet if the vessel is of wood or composite structure, or to the point where the line of the flat of the bottom extended inward cuts the side of the keel if the vessel's lower part is hollow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



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.



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.



Registered Length is greater of:

1) $0.96 \text{ Length}_{\text{Stem/Stern}}$

OR

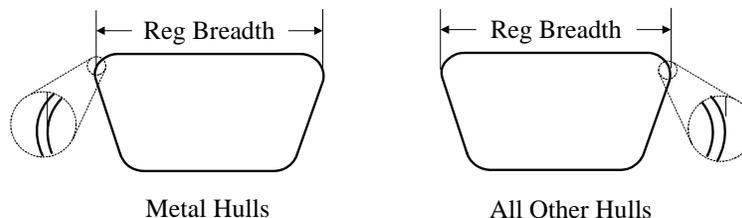
2) $\text{Length}_{\text{Stem/Rudder Stock}}$

- a) 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.

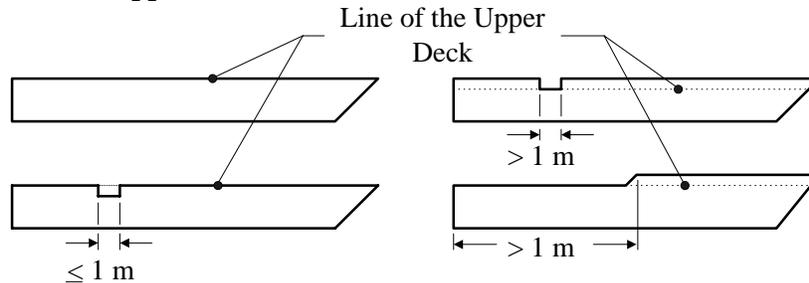


- b) In vessels fitted with an alternate steering device installed in place of the rudder (e.g. trainable propulsion unit, cycloidal propeller, etc.), the centerline of the axis of rotation of the device is considered equivalent to the axis of the rudder stock for purposes of establishing the length measurement. If more than one such device is installed, the axis of rotation of the aftermost device is considered equivalent to the axis of the rudder stock.
- c) In all vessels, the stem and stern define the foremost and aftermost boundaries, respectively, of the buoyant hull envelope. Any attachment to the hull, such as a swim platform that is not part of the hull and does not contain buoyant volume, is ignored from measurements taken to the stem/stern.

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.



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**.



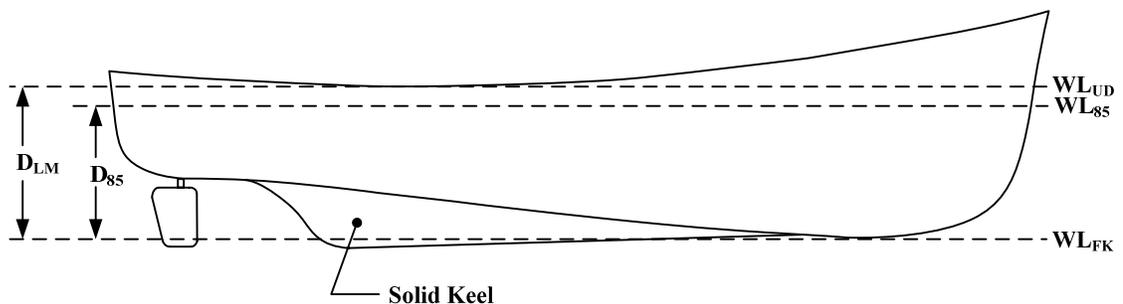
Stem means the foremost boundary of the buoyant hull envelope.

Stern means the aftermost boundary of the buoyant hull envelope.

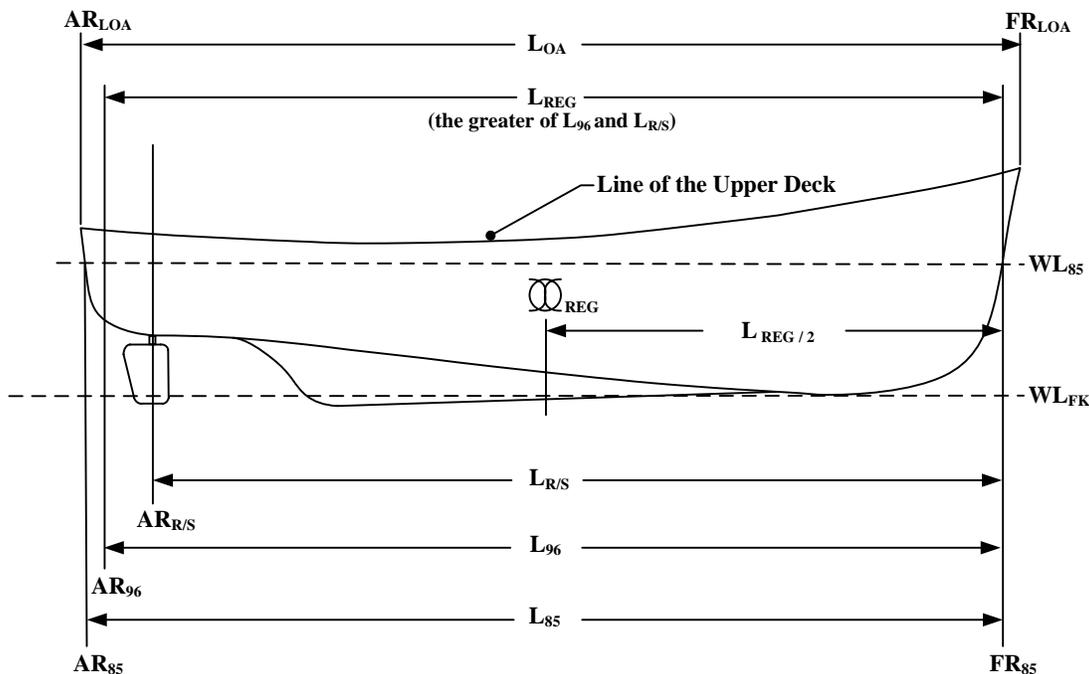
4. PROCEDURE FOR DETERMINING REGISTERED DIMENSIONS

Perform the steps below to determine the principal dimensions of monohull vessels of conventional design. A completed example is provided in the Appendix.

- 1) Using an appropriately scaled inboard or outboard profile of the vessel with the vessel trimmed at its design waterline, 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 (D₈₅)** and draw a waterline at this distance, as measured from **WL_{FK}**. Mark this water line as **WL₈₅**.



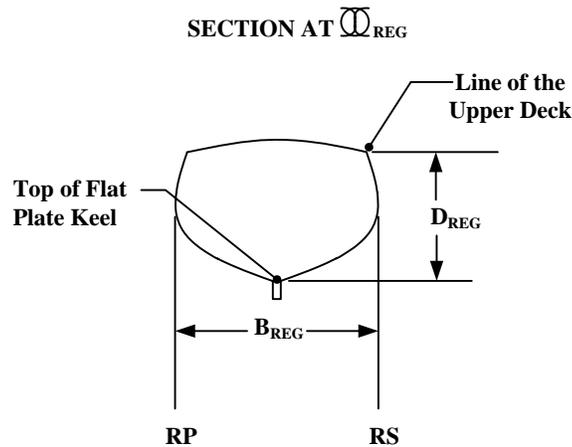
- 5) Draw a vertical reference line where the stem intersects WL_{85} . Mark this line as FR_{85} .
- 6) Draw a vertical reference line where the stern intersects WL_{85} . Mark this line as AR_{85} .
- 7) Draw a vertical line to reference the axis of the rudder stock or other steering device. Mark this line as $AR_{R/S}$.
- 8) Measure the length from FR_{85} to AR_{85} . Refer to this length as L_{85} .
- 9) Calculate 96% of L_{85} . Refer to this length as L_{96} .
- 10) Draw a vertical reference line at a distance of L_{96} aft from FR_{85} . Mark this line as AR_{96} .
- 11) Measure the distance from FR_{85} to $AR_{R/S}$. Refer to this length as $L_{R/S}$.
- 12) Select the greater of L_{96} and $L_{R/S}$ as the **registered length** (L_{REG}).
- 13) Draw vertical reference lines at the foremost part of the stem and the aftermost part of the stern¹. Mark these lines as FR_{LOA} and AR_{LOA} , respectively.
- 14) Measure the distance from FR_{LOA} to AR_{LOA} . This is the overall length of the hull². Refer to this length as L_{LOA} .
- 15) Calculate half the **registered length**. Refer to this length as $L_{REG/2}$.
- 16) 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 \odot_{REG} .
- 17) If not already shown, draw 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.



¹ Refer to Section 69.203 of MTN 01-99 for interpretations regarding treatment of bulwarks and similar structures.

² The overall length is not needed to determine registered dimensions under this procedure. However, the overall length is used to determine applicability of tonnage measurement systems, and is certified by authorized measurement organizations.

- 18) Using an appropriately scaled drawing of a transverse hull section at the $\overline{\text{A}}_{\text{REG}}$, draw a vertical reference line at the starboard side where the breadth is the greatest. Mark this line as **RS**.
- 19) Draw a vertical reference line at the port side where the breadth is the greatest. Mark this line as **RP**.
- 20) Mark the location of the **line of the upper deck**.
- 21) Mark the location of the top of the **flat plate keel** (or equivalent) at $\overline{\text{A}}_{\text{REG}}$.
- 22) Measure the distance between **RS** and **RP**. Record this distance as the **registered breadth** (B_{REG}).
- 23) Measure the distance between the **line of the upper deck** and the top of the **flat plate keel** at $\overline{\text{A}}_{\text{REG}}$. Record this distance as the **registered depth** (D_{REG}).



5. ADDITIONAL ASSISTANCE

If you have questions on principal dimensions, please contact the MSC Tonnage Division for further assistance. Refer to the MSC's web site for contact information.

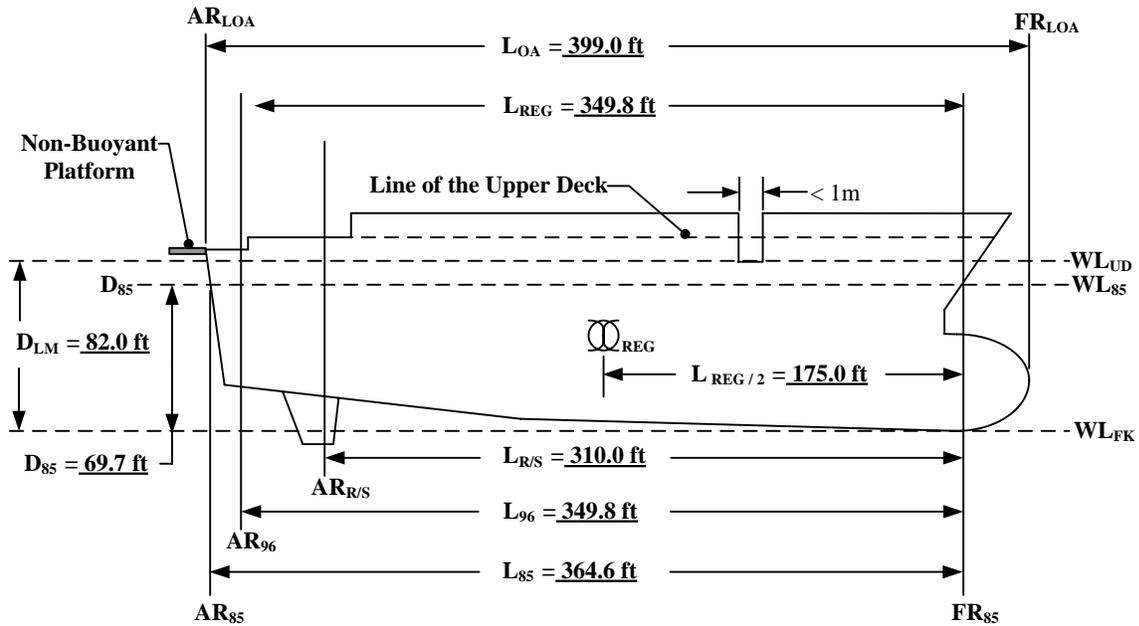
P. D. Eareckson

P. D. EARECKSON
Chief, Tonnage Division
U.S. Coast Guard
By direction

APPENDIX

**EXAMPLE ON ESTABLISHING REGISTERED DIMENSIONS
(46 CFR 69 Subpart B, C and D)**

HULL OUTBOARD PROFILE



SECTION AT \odot_{REG}

