SIMPLIFIED MEASUREMENT

TONNAGE GUIDE 1

CH-3

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TONNAGE GUIDE 1

1. PURPOSE

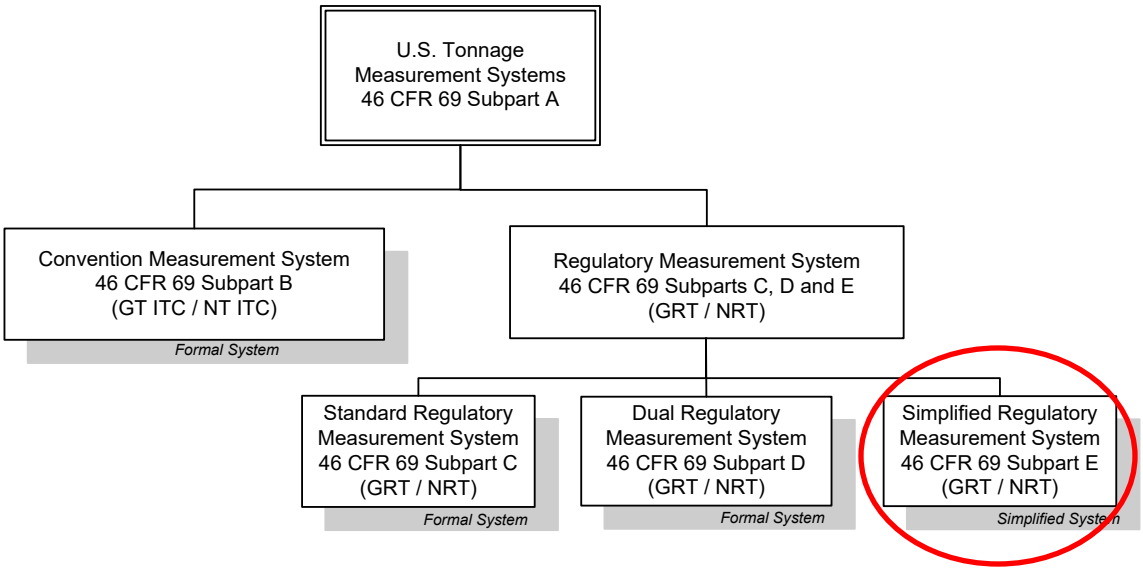
This Tonnage Guide (TG) explains the Simplified Regulatory Measurement System (aka simplified tonnage calculations) with regard to: 1) defining what tonnage is, federal requirements for determining tonnage, and the different tonnage measurement systems; 2) vessel eligibility for Simplified measurement; 3) use of tonnage in the vessel documentation process; 4) the responsible Coast Guard offices; and 5) calculating Simplified tonnage for purposes of completing the Coast Guard's Application for Simplified Measurement (form CG-5397). This Guide uses common terminology and practical explanations to assist the broad public audience in applying the detailed regulatory standards; it is primarily directed to builders of small vessels, owners, and other interested members of the public.

2. GROSS / NET TONNAGE VS. DISPLACEMENT TONNAGE

This Guide addresses gross and net tonnage, which relate to a vessel's internal volume and appear on a documented vessel's Certificate of Documentation (COD). Gross and net tonnage is widely used as the basis for vessel regulation and assessment of taxes and fees. Gross and net tonnage are not to be confused with displacement and deadweight tonnage, which are expressed in "pounds" or "tons" ""(short tons, long tons, metric tons/tonne).

3. TONNAGE MEASUREMENT SYSTEMS

There are two basic tonnage measurement systems presently available in the United States as shown in the graphic below, namely the Convention and Regulatory systems. Statute dictates that the primary system is the Convention or international system (46 USC 143), which is derived from the provisions of the International Convention on Tonnage Measurement of Ships, 1969, to which the United States is a party. The Regulatory or national system has three subset systems, namely Standard, Dual, and Simplified. The Standard is the oldest system, dating back to the 1860's, and is based on the British "Moorsom" system. Dual measurement was developed in the mid 20th century to benefit shelter deck vessels in a developing market segment, by providing alternatives to fitting them with tonnage openings. The Simplified system was initially authorized by Congress in 1966 for recreational vessels to reduce the measurement cost burden for owners and the measurement workload on the government. Later, the applicability of the Simplified system was extended to certain commercial vessels. Convention tonnage is measured in cubic meters, but the final product is dimensionless; the number does not equate to an actual volume, and is expressed as GT ITC (or simply GT) for gross tonnage and NT ITC (or simply NT) for net tonnage. Regulatory tonnage is calculated in units of register tons of 100 cubic feet per ton and expressed as GRT for gross register tonnage and NRT for net register tonnage.



4. FORMAL VS. SIMPLIFIED MEASUREMENT

"Formal" measurement is the process by which a vessel owner employs an Authorized Measurement Organization approved by the Coast Guard under 46 CFR 69.15 and its surveyors to measure the vessel under the Convention, Standard or Dual systems. For "formal" measurement, the measurement organization performs an onboard survey, uses a series of detailed volumetric calculations to determine the tonnage, and issues appropriate tonnage certificates. This work is done for a fee, which is paid by the vessel owner. Fees vary, but generally range from several hundred to several thousand dollars, depending on the vessel's size, complexity and/or other factors. For documented vessels, the measurement organization also sends copies of tonnage certificates to the National Vessel Documentation Center (NVDC), so that tonnage information can be entered into the Coast Guard's Marine Information for Safety and Law Enforcement (MISLE) computer system and printed on the COD. Simplified measurement is the process by which tonnages are based on the vessel's principal dimensions such as length, and other characteristics provided by the vessel owner. For documented vessels, the required information is submitted to the NVDC for entry into MISLE. MISLE calculates the tonnages, which are printed on the COD. For undocumented vessels, Simplified tonnage is calculated on an "as-needed" basis by interested parties, and is not certified on Coast Guard documents.

5. MEASUREMENT SYSTEM APPLICABILITY

A vessel is eligible to be measured under the Simplified measurement system (46 CFR 69 Subpart E) if it is either: 1) under 79 feet in length; or 2) a non-self-propelled or recreational vessel. Some vessels that are 79 feet or over in length may also require measurement under the Convention measurement system. This includes vessels that engage on foreign voyages, as well as recreational vessels that engage on voyages outside the Great Lakes and have keel laid dates after December 31, 1985. The Convention measurement system does not apply to vessels less than 79 feet in length, whereas vessels of any length can be measured under the Standard and Dual systems. For complete requirements on tonnage measurement system applicability, refer to Marine Safety Center Tonnage Guide #5 (TG 5) Documentation and Tonnage of Smaller Commercial Vessels. The Simplified system is often used by operators of small vessels whom do not wish to incur the cost or resource demands of reviewing their vessel under one of the

formal systems. The Application for Simplified Measurement can often be completed by the owner in a couple hours. It can also be used by commercial and recreational operators of very small craft to determine if their vessel is under 5 net tons, and ineligible for documentation.

6. MEASUREMENT SYSTEM HEIRARCHY

For most vessels 79 feet and over in length, the Convention system is the primary tonnage measurement system under the law in the United States. However, law permits vessels to also be measured under the "optional" Regulatory system regardless of length, if requested by the vessel owner, for purposes of applying domestic laws in effect prior to July 19, 1994. For vessels less than 79 feet in length, the Regulatory system is used in all cases.

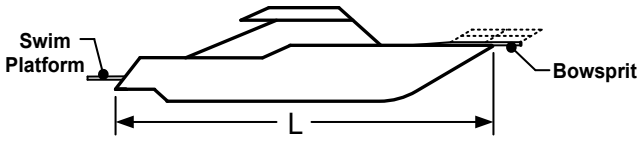
7. REGISTERED DIMENSIONS

Registered dimensions (i.e., registered length, registered breadth and registered depth) are assigned to a vessel as part of the tonnage measurement process; they differ based on the specific characteristics of the vessel and the measurement system used, and appear on tonnage certificates and/or CODs. Registered dimensions are typically used as a basis for regulating a vessel, and/or applying fees. Two different sets of definitions of registered dimensions have been used for vessels that are formally measured, depending on when the vessel was measured. For vessels that are measured only under the Simplified system, the registered dimensions are the 'overall' dimensions of the vessel as defined in this Guide.

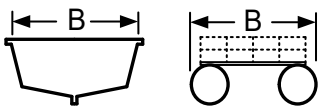
8. DEFINITIONS

The following definitions and figures are excerpted from 46 CFR 69 Subpart E – Simplified Regulatory Measurement System, with additional details provided in Marine Safety Center Technical Note (MTN) 01-99 Tonnage Technical Policy, and also contained in the Application for Simplified Measurement (Form CG-5397).

Overall Length (L) is the horizontal distance of the hull between the outboard side of the foremost part of the stem (bow), and the outboard side of the aftermost part of the stern. It does not include bowsprits, rudders, outboard motor brackets, swim platforms that do not contain buoyant volume, and other similar fittings and attachments that are not part of the buoyant hull envelope; i.e they add no appreciable buoyancy to the vessel if submerged.

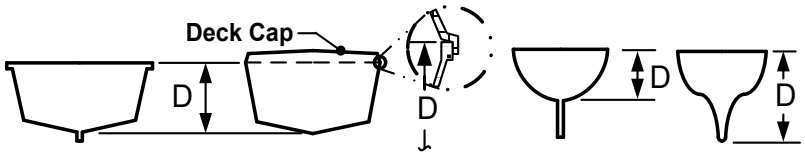


Overall Breadth (B) means the horizontal distance taken at the widest part of the hull, excluding rub rails, from the outboard side of the skin (outside planking or plating) on one side of the hull to the outboard side of the skin on the other side of the hull.



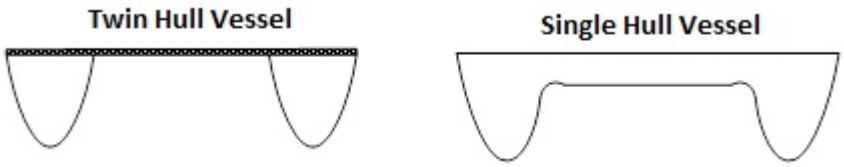
Overall Depth (D) means the vertical distance taken at or near amidships from a line drawn horizontally through the uppermost edges of the skin (outside planking or plating) at the side of

the hull (excluding the cap rail, trunks, cabins and deckhouses, and deck caps) to the outboard face of the bottom skin of the hull, excluding the keel. For a vessel that is designed for sailing and has a keel faired to the hull (the interface between the "keel" and the "bottom skin of the hull" is not clearly defined), the keel is included in "overall depth."

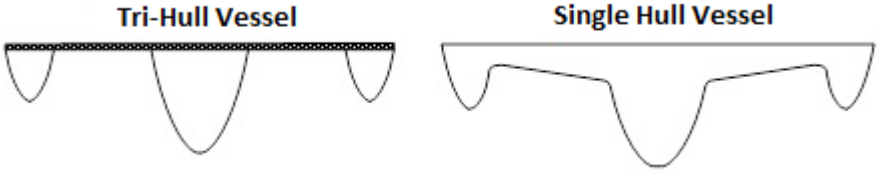


Multi-Hull Vessel means a vessel having more than one distinct hull. To be considered a distinct hull, the hull must connect to another hull only with structure that is not a part of the vessel's buoyant hull envelope. The Simplified application identifies two types of multi-hull vessels; twin hulls (2) and tri-hulls (3), although other configurations do apply under the regulations. Single-hull vessels include traditional monohull designs, as well as catamarans and other vessels with multiple water planes which have a buoyant cross structure, typically evidenced as a continuation of the hull plating or skin from one demi-hull to the other. Contact the Marine Safety Center (MSC) if you have questions concerning the applicability of the vessel's hull shape, or if the vessel has more than 3 hulls.

Twin Hull Vessel means a multi hull vessel having two symmetric hulls connected only with structure that is not part of the vessel's buoyant hull envelope, such as structural tubing or beams. Typical pontoon boat designs and small trampoline-decked sailing catamarans are an example of this configuration. If however, the connecting structure is part of the buoyant hull envelope, the vessel is a single hull vessel, and is treated the same as a traditional monohull for purposes of Simplified tonnage calculations. This includes most catamaran designs where the fiberglass hull is laid up in a single mold, or the metal hull plating is continuous across the overall breadth of the bottom.



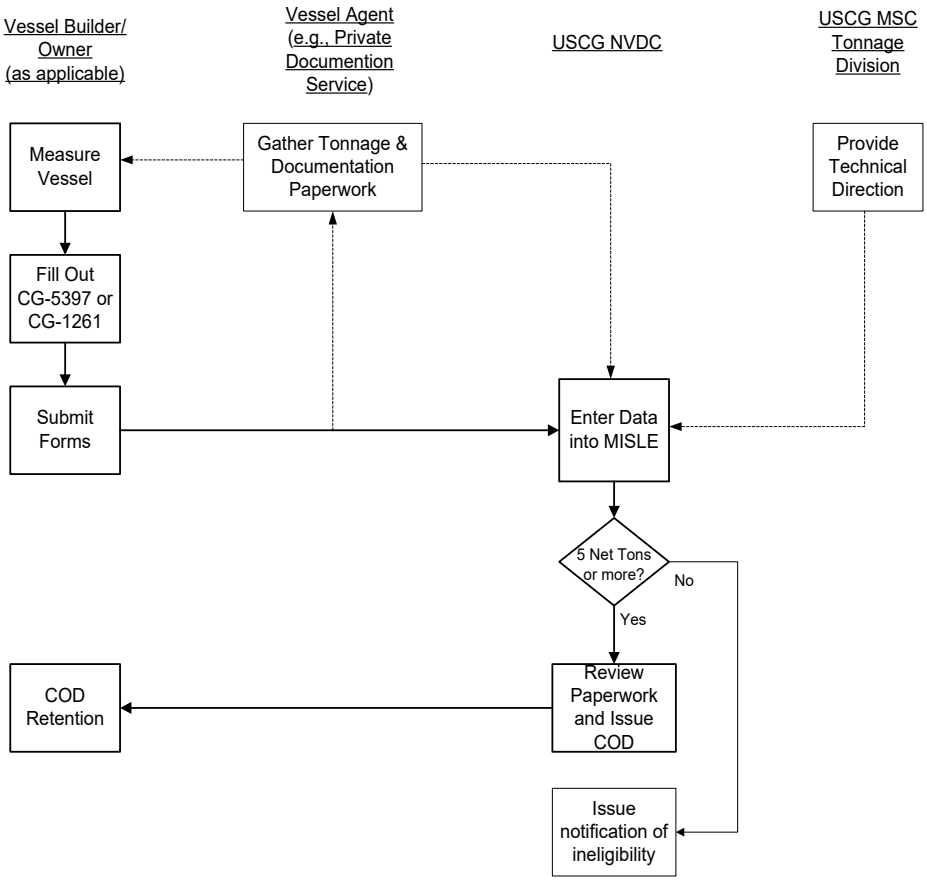
Tri-Hull Vessel means a multi-hull vessel having three hulls, the outboard hulls being symmetrical, and connected only with structure that is not part of the vessel's buoyant hull envelope as noted in the twin hull definition. This design is often seen on high performance sailing vessels, which rely of netting or fabric between the smaller outer hulls in order for people to occasionally move between them.



9. SIMPLIFIED MEASUREMENT PROCESS

For documented vessels, Simplified tonnage is calculated using vessel dimensions and characteristics provided by the owner. This information is obtained from either of the following two forms: Form CG-1261 Builder Certification and First Transfer of Title, Revision 2-92 or later, which is completed by the builder; or Form CG-5397 Application for Simplified Measurement, which is completed by the vessel owner, sometimes with the assistance of an agent such as a private documentation service. In cases where the vessel dimensions and characteristics on Form CG-1261 are found to be in error, or do not agree with information on Form CG-5397, the information on Form CG-5397 will take precedence. Forms are submitted to the NVDC along with appropriate documentation forms and fees. Instructions, forms, and fees for documenting vessels can be found on the NVDC Website or by contacting them directly. Upon receipt of the appropriate forms and fees, the NVDC enters the vessel data from either Form CG-1261 or 5397 into the MISLE computer system, which calculates the tonnage. If the vessel tonnage is 5 net tons or more and other documentation requirements are met, such as CG-1258 Application for Documentation, the NVDC issues a COD showing the gross and net tonnage and registered dimensions, which is mailed to the owner.

Simplified Measurement Process
(Documented Vessels Only)



10. FIVE NET TON THRESHOLD

The significance of the five (5) net ton (5 NRT or 5 NT ITC) threshold is related to and derived from the regulations in Title 46, Code of Federal Regulations (CFR), Part 67 regarding vessel

eligibility and requirements for vessel documentation. Vessels less than 5 net tons are not eligible for documentation in accordance with 46 CFR 67.9, while vessels engaged in certain trades in the U.S. (including the surrounding Exclusive Economic Zone) that are 5 net tons or more must be documented. Recreational vessel owners inquiring as to whether their vessel measures over 5 net tons and is thus eligible for documentation as a "vessel of the United States" should contact the Coast Guard Boating Safety Division. They can provide information on requirements for registration of recreational vessels, including the advantages and disadvantages for documenting such vessels. For commercial vessels, refer to Tonnage Guide #5 (TG 5) Documentation and Tonnage of Smaller Commercial Vessels, which provides an overview of federal documentation and tonnage measurement requirements for owners of U.S. flag commercial vessels less than 79 feet in overall length.

11. SIMPLIFIED TONNAGE CALCULATION

Interested parties who wish to calculate the tonnage of a vessel may do so by applying the regulatory text in 46 CFR 69 Subpart E; using the interactive Form CG-5397 found on the MSC's website (www.dco.uscg.mil/msc) under 'Tonnage Measurement' or manually using the Simplified formulation found below. Preliminary calculations are especially recommended for owners of smaller vessels seeking documentation (e.g., those under 35 feet in length), in order to avoid submitting forms and paying fees if the vessel is found to be ineligible for documentation because it measures under 5 net tons. All dimensions used in Simplified tonnage calculations are in decimal feet to the nearest tenth of a foot (not inches).

12. GROSS TONNAGE FORMULATION (SINGLE-HULL VESSELS)

The basic Simplified tonnage formula for gross register tons of a single-hull vessel (not a multi-hull as defined above) is:

GRT = (Hull Volume + Deckhouse Volume)/100

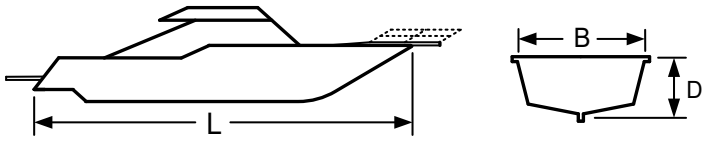
Where:

Hull Volume = **S x K x L x B x D**
Deck Structure Volume = **Ls x Bs x Ds**

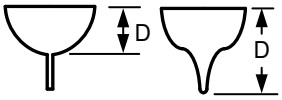
Note: For vessels with small deckhouses and other deck structures, the deck structure volume is ignored (treated as "zero" value). Deck structure volume is accounted for only if the volume of the principal deck structure is equal to or greater than the hull volume.

The overall dimensions of the hull are as follows:

L = Overall Length
B = Overall Breadth
D = Overall Depth

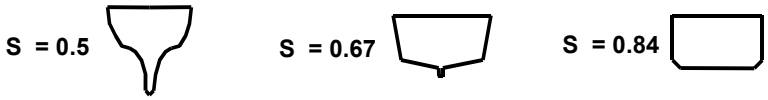


Note: **D** is measured at or near amidships from the uppermost edges of the skin at the side of the hull (excluding the cap rail, trunks, cabins and deckhouses, and deck caps) down to where the hull meets the keel, except for vessels designed for sailing where the interface between the "keel" and the "bottom skin of the hull" is not clearly defined (as is the case with an "integral" or "faired" keel), for which the depth is measured to the bottom of the keel.



The shape factor (**S**) is as follows:

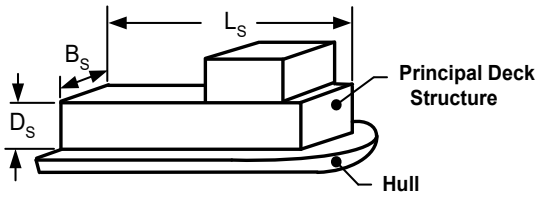
S = 0.5 for vessels designed for sailing, regardless of keel design (finest hull form)
S = 0.67 for non-sailing vessels with ship-shape and circular hulls (typical powerboat)
S = 0.84 for non-sailing vessels with boxed-shaped hulls like a barge (fullest hull form)



The keel factor (**K**) is as follows:

K = 1.0 for all hull configurations except those designed for sailing wherein the Overall Depth used in **D** above includes the keel.
K = 0.75 for hulls designed for sailing wherein the Overall Depth used in **D** above includes the keel.

The deck structure dimensions are defined as:
Ls = The average length of the principal deck structure
Bs = The average breadth of the principal deck structure
Ds = The average depth of the principal deck structure



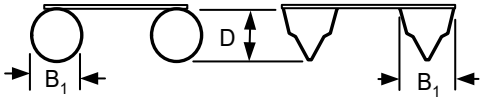
13. GROSS TONNAGE FORMULATION (TWIN HULL VESSELS)

The basic Simplified tonnage formula for gross register tons of a twin hull vessel is:

GRT = [(2 x Hull Volume) + (Deckhouse Volume)]/100

Where all parameters and deckhouse exemptions are the same as monohulls above, except that:

Hull Volume = **S x K x L x B_1 x D**
B_1 = breadth of the individual hulls

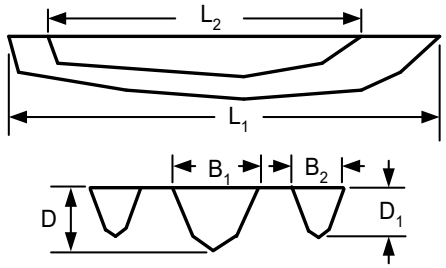


14. GROSS TONNAGE FORMULATION (TRI-HULL VESSELS)

GRT = [(Center Hull Volume) + (2 x Outer Hull Volume) + (Deckhouse Volume)]/100

Where all parameters and deckhouse exemptions are the same as monohulls above, except that:

Center Hull Volume = **S x K x L_1 x B_1 x D**
Outer Hull Volume = **S x K x L_2 x B_2 x D_1**
L_1 = length of the center hull
B_1 = breadth of the center hull
L_2 = length of the outer hulls
B_2 = breadth of the outer hulls
D_1 = depth of the outer hulls



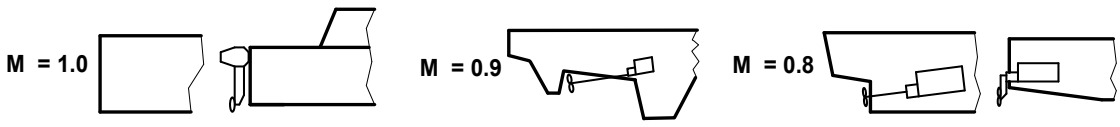
15. NET TONNAGE FORMULATION

The Simplified tonnage formula for net register tonnage for any vessel is:

NRT = M x GRT

The machinery factor (**M**) is as follows:

M = 1.0 for non-self-propelled vessels or propulsion machinery *outside* the hull
M = 0.9 for vessels designed for sailing with propulsion machinery *inside* the hull
M = 0.8 for vessels not designed for sailing with propulsion machinery *inside* the hull



16. GUIDANCE ON DIMENSIONS

Use the following guidance in obtaining dimensions and calculating tonnages.

a. Obtaining Principal Dimensions**.** Measure all lengths and depths in (or projected to) a vertical plane on the vessel centerline axis, and breadths in (or projected to) a vertical plane at right angles to that axis. Measure the principal dimensions in feet and inches to the nearest inch, or in decimal feet to the nearest tenth of a foot.

b. Rounding Dimensions**.** If the measured dimensions are in feet and inches, and/or if more accurate measurements than specified in paragraph a. were obtained, follow the rounding procedures in the Appendix to express all dimensions in decimal feet to the nearest tenth of a foot, before using the dimensions to calculate tonnage.

c. Truncating Tonnage Values**.** Both gross and net tonnage are truncated (not rounded up or down) to the nearest whole number. Truncation means dropping whatever decimals remain to the right of the decimal point, if any, without changing the integer values. In calculating the net tonnage, apply the machinery factor (**M**) to the gross register tonnage before truncation. For example, if the gross tonnage is calculated to be 6.99 (before truncation), and M is 0.8, the net tonnage (before truncation) is 5.592. This gives a gross tonnage of 6 and a net tonnage of 5.

17. TONNAGE MEASUREMENT QUESTIONS

Direct questions regarding interpretation of this Guide or any other questions related to tonnage measurement and certification to the Tonnage Division of the Marine Safety Center in Washington, DC. Before contacting the Marine Safety Center, we encourage you to visit our website (www.dco.uscg.mil/msc), which provides links to various policy documents, answers to frequently asked questions, and other information which may assist you. Coast Guard interpretations of the tonnage regulations are available in MTN 01-99 Tonnage Technical Policy.

18. REFERENCES

The following are useful references related to Simplified Measurement, and are all available on the Marine Safety Center's web site (except as noted):

a. 46 U.S.C. Chapter 145 – Regulatory Measurement, Subchapter III – Simplified System
b. 46 CFR 69 Measurement of Vessels
c. MTN 01-99 Tonnage Technical Policy
d. TG 5 Documentation and Tonnage of Smaller Commercial Vessels
e. CG-5397 Application for Simplified Measurement
f. CG-1261 Builder Certification and First Transfer of Title (available from the NVDC)
g. CG-1258 Application for Documentation (available from the NVDC)

19. 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. It is not to be used as the basis for Coast Guard tonnage decisions in response to questions and appeals from the public or government entities. Such decisions will be deferred to applicable law, regulations, and policy documents such as Marine Safety Center Technical Notes (MTNs).

S. T. BRADY
Chief, Tonnage Division
U.S. Coast Guard
By direction

APPENDIX

English Unit Rounding

1. Fractions of an inch should be rounded to the nearest half inch, and then converted to tenths of a foot from the conversion table.

Example 1: **2' – 5 7/16" = 2' – 5 1/2" = 2.5 ft**
Example 2: **2' – 5 1/2" = 2' – 6" = 2.5 ft**
Example 3: **2' – 0 ¼" = 2' – 0" = 2.0 ft**

2. Decimals given in hundredths and thousandths should be rounded to the nearest tenth as in the following examples:

Example 1: **10.750 ft = 10.8 ft**
Example 2: **10.349 ft = 10.3 ft**

3. Engineering standards should be used for rounding decimals, i.e., 0.05 should be rounded up to 0.1.

English Fraction to Decimal Conversion Table

Inches	Feet
½	0.0
1	0.1
1 ½	0.1
2	0.2
2 ½	0.2
3	0.3
3 ½	0.3
4	0.3
4 ½	0.4
5	0.4
5 ½	0.5
6	0.5
6 ½	0.5
7	0.6
7 ½	0.6
8	0.7
8 ½	0.7
9	0.8
9 ½	0.8
10	0.8
10 ½	0.9
11	0.9
11 ½	1.0

Metric to English Conversion

If dimensions are given in metric units, the factor 0.3048 should be used to convert meters to feet.

METERS/0.3048 = FEET **Example: 4.58 m = 15.0 ft**
CENTIMETERS/30.48 = FEET **Example: 213.56 cm = 7.0 ft**