



REVIEW OF GAS CARRIER STABILITY

Procedure Number: C1-30

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A handwritten signature in blue ink that reads "E. J. Newton".

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Purpose

This Plan Review Guideline (PRG) explains the requirements for seeking plan approval for Gas Carrier Stability from the Marine Safety Center (MSC) for U.S. gas carriers / independent pressure tank barges.

Contact Information

If you have any questions or comments concerning this document, please contact the Marine Safety Center (MSC) by e-mail or phone. Please refer to Procedure Number C1-30.

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1. Applicability

This Plan Review Guideline (PRG) is applicable to gas carriers and independent pressure tank barges.

2. Instructions

Using applicable portions of references (a) through (f), the submitter shall provide sufficient documentation and plans to indicate compliance with the applicable requirements. The submission shall be made electronically to the above email address or, if paper, in triplicate to the MSC's address found on the above website. To facilitate plan review and project management, all plans and information specified in these guidelines should be submitted as one complete package through a single point of contact for the project.

3. References

- a. 46 CFR, Subchapter D, Part 38
- b. 46 CFR, Subchapter I, Part 93
- c. 46 CFR, Subchapter O, Part 154
- d. 46 CFR, Subchapter S, Subparts E & F
- e. [NVIC 17-91, Guidelines for Conducting Stability Tests](#)
- f. [ASTM F 1321 series](#), Standard Guide for Conducting a Stability Test (Inclining and Lightweight Survey) to Determine the Light Ship Displacement and Centers of Gravity of a Vessel

4. Definitions

- a. Downflooding Point: The lowest opening on a vessel that allows the entry of seawater into the hull or superstructure of an undamaged vessel due to heel, trim, or submergence of the vessel.

5. Content

General items:

- a. If the vessel is new and not a sister vessel, has the Application for Inspection been submitted? In general, no plan review will occur until receipt of a copy of the Application.
- b. Is it clear stated what is desired from the MSC? Are all plans requiring Coast Guard review and/or approval submitted via electronic commerce or mail? Plans submitted via mail must be received in triplicate so they can be properly stamped and returned to the submitter. Are there any special/unusual requests or a time critical element involved?
- c. Is the vessel being reviewed under NVIC 3-97? If yes, then MSC review of stability items is not required.

- d. This plan review guideline does not apply to self-propelled gas carriers. Refer to Plan Review Guideline C1-43 for guidance regarding foreign flag gas ships.
- e. The majority of gas carrier reviews involve unmanned tank barges and independent pressure vessel barges regulated under a dual Subchapters O/D certification, for domestic routes only. Determine applicability of regulations per 46 CFR 151.01-10, as follows:
 - (1) For **unmanned** barges only, if cargo is listed in 46 CFR Table 151.05 and **has** flammability or combustibility characteristics as indicated by a fire protection requirement in the table, then Subchapters O and D apply.
 - (2) For **unmanned** barges only, if cargo is listed in 46 CFR Table 151.05 and **does not have** flammability or combustibility characteristics as indicated by a fire protection requirement in the table, then Subchapters O and D or O and I apply. The option for applying D or I, in addition to O, should be indicated by the owner on the Application for Inspection.
 - (3) Per 46 CFR 151.01-10(e), **manned** barges which carry a cargo listed in Table 151.05 will be considered individually by Commandant for applicable regulations and design requirements.
 - (4) If the vessel is an existing tank barge, consult 46 CFR 151.01-25(c) for applicable requirements.
- f. Ensure the following drawings (items) have been received:
 - (1) General Arrangements
 - (2) Lines, offsets, or computer disk with hull model
 - (3) Tank Capacity Tables\Plan
 - (4) Hydrostatic Tables
 - (5) Lightship calculations
 - (6) Intact and Damage Stability calculations
- g. Verify Lightship weight Characteristics utilizing one of the following methods:
 - (1) Does a sister vessel, with known characteristics, exist?
 - (2) Has a detailed estimate of the characteristics been provided by the owner/designer?
 - (3) Has an approved stability procedure and subsequent deadweight/stability test been performed in accordance with references (d), (e), and (f)?

- h. Per 46 CFR 38.05-1 and 46 CFR 151.15-3(d)), a minimum of hull type II is required for gas barges. A type I hull may be required depending on appropriate hazard of cargo.
- i. Per 46 CFR 31.10-32, 42.15-1(a) or 45.105, a loading manual is required if length greater than 300' and oceans service, or if dual certificated Subchapter O/I and carrying a cargo listed in table 151.05, per 151.01-10(c-1).
- j. Use the attached stability matrix to determine applicable intact and damage stability requirements. Note the following comments:
 - (1) Verify that the proper extents of damage are used and applicable survival conditions are met.
 - (2) For these types of vessels with longitudinal cylindrical tanks in the hoppers, longitudinal free surface has a significant effect on trim & stability and must be accounted for.
 - (3) Barges must meet 46 CFR 173, Subpart B if equipped to lift; and 46 CFR 174, Subpart B if cargo is carried above the weather deck (as in most Subchapter O/I barges)
 - (4) Under 46 CFR 172, Subpart E, hull type I damaged stability is a 2 compartment standard, side and bottom damage, while hull type II is a modified 1 compartment standard. The deck edge must not submerge to survive. If the barge has coaming (which most do) then the limit is the minimum of the intersection of the deck and coaming, or the height of the quantity "fa" above the deck edge.
 - (5) Hull type I & II intact requirements are generally the same, from 46 CFR 172, Subpart E (righting energy (5/10/15), GML, and GMT requirements.
 - (6) Note the special requirements of 46 CFR 172.050 and 172.100:
 - (i) Open hopper barges must demonstrate 2 inches of positive GM with the hopper space flooded to the weather deck, in the fully loaded condition
 - (ii) At least 2 inches of positive GM for all specified damaged conditions
- k. If a barge is seeking a onetime voyage Special Loading Authorization (SLA), verify that calculations submitted comply with the applicable requirements.
- l. Verify the location of down flooding and ensure this is taken into account for compliance with the stability criteria.
- m. Verify the permeability of spaces, in accordance with 46 CFR, Table 172.065(b).

- n. Analyze design calculations for the strength of tank securing devices, if credit is given under 46 CFR 172.050(d) or 172.100(c) for buoyancy of the immersed portion of cargo tanks.
- o. The MSC will construct a detailed HECSALV or GHS model from the lines plan, offsets, or electronic model provided, and will verify the stability of the vessel using this model and the criteria specified.

6. Disclaimer

This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is not intended to nor does it impose legally-binding requirements on any party. It represents the Coast Guard's current thinking on this topic and may assist industry, mariners, the general public, and the Coast Guard, as well as other federal and state regulators, in applying statutory and regulatory requirements. You can use an alternative approach for complying with these requirements if the approach satisfies the requirements of the applicable statutes and regulations. If you want to discuss an alternative, you may contact MSC, the unit responsible for implementing this guidance.

Tank Vessel Stability Matrix

Tank Vessel Stability Matrix

	Cargo	Sub	Route	170 Subpart E	172 Subpart C	172 Subpart D	172 Subpart E	172 Subpart F	172 Subpart G
Non-Self Propelled Vessels (Barges)	Cargo in Table 30.25-1, carried in independent tanks, and is a: (1) LFG, or (2) flammable liquid with Reid vapor pressure > 25 psi	D	All	X	X				
	Cargo listed in Table 30.25-1	D	All	X ^{1,2}					
	Oil (as defined by 33 CFR 157 and G-M letter dated 24 FEB 95)	D	Oceans or G.L.	X		X ²			
	Cargo ³ listed in Table 151.05	O	All except Oceans				X		
	Cargo ³ listed in Table 151.05 that is not a NLS ⁴	O	Oceans				X		
	Category A,B, or C NLS listed in Table 1 of Part 153	O	Oceans	X				X ⁵	
Self-Propelled Vessels	Oil (as defined by 33 CFR 157)	D O	All	X		X			
	Cargo listed in Table 30.25-1	D	All	X ²					
	Cargo listed in Table 1 of Part 153	O	All	X				X ⁵	
	LFG listed in Table 4 of Part 154	O	All	X					X

Footnotes:

1. Not required for Rivers or Lakes, Bays & Sounds service unless stability questioned by the OCMI.
2. Not required if vessel < 150 GT, unless stability questioned by the OCMI.
3. Cargo not carried in a portable tank regulated under 46 CFR 98.
4. Category D NLS cargoes listed under 46 CFR 151.12-5 are allowed.
5. Not required for (1) Offshore Supply Vessel carrying cargo under 46 CFR 98.31.
 (2) incinerator vessel regulated under 46 CFR 150
 (3) vessel carrying cargo under 33 CFR 151
 (4) vessel carrying cargo in portable tanks regulated under 46 CFR 98.

Notes:

- (1) Any vessel equipped to lift must demonstrate compliance with 46 CFR 173 Subpart B.
- (2) Any barge which carries cargo above the weather deck must demonstrate compliance with 46 CFR 174 Subpart B.
- (3) Inland route definitions:
 - Rivers: 46 CFR 30.10-61
 - Lakes, Bays, and Sounds: 46 CFR 30.10-41
 - Great Lakes: 46 CFR 30.10-33
 - Ocean: 46 CFR 30.10-45
 - Coastwise: 46 CFR 30.10-11
 - Special service voyages: MSM, Volume IV, Chapter 6, Part F.3.g
 - Fair weather voyages: MSM, Volume IV, Chapter 6, Part F.3.i