MSC PLAN REVIEW GUIDELINE (PRG)

REVIEW OF GAS CARRIER CARGO AUTHORITY

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E. J. NEWTON, CDR, Chief, Tank Vessel and Offshore Division

Purpose

To establish the procedures for determining cargo authority for liquefied gas barges and calculating loading constraints for liquefied gas cargoes.

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 C1-41.

E-mail: msc@uscg.mil
Phone: 202-795-6731
Website: www.dco.uscg.mil/msc

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1. Applicability

This Plan Review Guideline (PRG) is applicable to liquefied gas barges.

2. Instructions

Using applicable portions of references (a) through (e), 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 O, Part 151
c. 46 CFR Subchapter O, Part 154
d. International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)
e. MSC PRG C1-28, "Gas Carrier Barge Plan Review Information Sheet"

4. General Guidance

a. If the request for cargo authority involves the construction, alteration, or modification of a new of existing vessel, verify that MSC has received an approved Application for Inspection.

b. Determine vessel route, operating subchapter, and desired cargo authority.

(1) This instruction does not apply to self-propelled gas carriers. Gas ships are subject to references (c) and (d), as appropriate. Refer to Instruction C1-43 for guidance regarding foreign flag gas ships. The Coast Guard has not conducted plan review for US flag gas ship since the 1970s. Any new construction gas ships are expected to be enrolled in the Alternate Compliance Program (ACP). Contact MSC for more information.

(2) Tank barges carrying liquefied gas (LG) cargoes listed in 40 CFR Table 30.25-1 shall be reviewed, inspected and certificated under 46 CFR Subchapter D. The standards of reference (a) apply.

(3) Tank barges carrying any LG cargo listed in 46 CFR Table 151.05 shall be reviewed, inspected and certificated under 46 CFR Subchapter O, Part 151. Carriage of subchapter O liquefied gas cargoes is subject to the minimum requirements listed in the table

(i) If any cargo carried has flammability characteristics (i.e. butadiene), the vessel must also be reviewed, inspected and certificated under 46 CFR Subchapter D.

(ii) If no cargo carried has flammability characteristics (i.e. ammonia, anhydrous), the vessel may be reviewed, inspected and certificated under 46 CFR Subchapter I.

(4) If vessel is oceangoing, carriage of LG cargoes will be restricted to domestic voyages only. There is no established international standard for barges carrying liquefied gasses. Barge owners desiring authority to carry LG cargoes on international routes must contact Commandant (CG-5215) for guidance.

c. If the vessel will also carry any non-LG cargoes, refer to PRG C1-40 or C1-42, based on the vessel's route.

d. Requests for carriage of LG cargoes must be accompanied with calculations reflecting filling densities of 46 CFR 38.15-1 and/or 151.50-30(e), as appropriate. Calculations must contain sufficient information to support the desired loading conditions.

e. If the vessel will carry any cargoes listed in reference (b), the owner must also submit a completed tank group characteristics loading form.

f. NOTE: Liquefied gas cargoes do not require a Cargo Authority Attachment (CAA). The COI will list loading conditions specific to each LG cargo. The loading constraints meet the requirement for the COI endorsement for LG cargoes.

g. Determine the vessel's hull type. In accordance with 46 CFR 38.05-1(f), all LG barges must meet the requirements for Type II. See 46 CFR Table 151.05 for specific hull type requirements for Subchapter O LG cargoes.

h. Determine whether the cargo tanks are designed as pressure vessels or gravity tanks, are lagged (insulated) or unlagged (non-insulated), are refrigerated or non-refrigerated.

i. Determine the vessel's maximum design pressure and minimum service temperature.

j. See 46 CFR 38.05-3, 46 CFR 151.15-3(b)(3), and 46 CFR 151.50-30(e) for more guidance.

k. For new construction vessels, or if no COI or PRIS is available, the minimum service temperature is determined by calculating the service temperature for each desired gas, and selecting the lowest value. Service temperature is typically determined as follows (see 46 CFR 38.05-2 or 151.15-3(b)(3) for additional guidance):

$$Ts = Tw - 0.25(Tw - TB)$$

where:
Ts = Service temperature (°F).
Tw = Boiling temperature in °F of gas at normal working pressure of container (tank) but not higher than 32°F.

TB = Boiling temperature in °F of gas at atmospheric pressure.

5. Review of Filling Calculations

a. For refrigerated tanks, the maximum volume to which a tank may be loaded is typically calculated by:

$$VL = 0.98\ Vt\ (dr / dL)$$

where:
VL = maximum volume to which tank may be loaded.
Vt = volume of tank.
dr = density of cargo at the temperature required for a cargo vapor pressure equal to the relief valve setting.
dL = density of cargo at the loading temperature and pressure.

This calculation allows for an outage of 2% of the tank volume as required by 46 CFR 38.05-25 and 151.45-6(b). Higher filling limits may be authorized by Commandant.

b. Filling limits for non-refrigerated tanks are determined using a quantity referred to as "Filling Density." Filling density is defined as "The ratio, expressed as a percentage, of the weight of cargo that may be loaded into a tank compared to the weight of water that the tank will hold at 60°F" and is used to calculate the maximum weight of each LG cargo that may be carried.

$$Wg = (F * 8.32828\ Vt) / 2000$$

where:
Wg = maximum weight of gas cargo (ST)
Vt = volume of tank(s) (gal)
F = authorized filling density for cargo

(1) In accordance with 46 CFR 151.03-21, the weight of a gallon of water at 60°F in air shall be 8.32828 pounds.

(2) Maximum permitted filling densities for "Subchapter D" and "Subchapter O" LG cargoes are listed in 46 CFR Table 38.15-1(b) and Table 151.50-30(e), respectively.

c. In order to complete the PRIS, loading limits should be calculated for each tank, and for the vessel as a whole.

(1) A vessel that is stability limited will be permitted to carry a lesser total cargo weight than that calculated above. The reduced cargo weight must be distributed among the cargo tanks based on their contribution to the total cargo volume.

d. The PRIS-LFG Template contains physical data for authorized liquefied gas cargoes. If the different values are used in the filling calculations, the submitter must also

provide the source for their data. See reference (e).

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.