U.S. COAST GUARD MARINE SAFETY CENTER PLAN REVIEW GUIDELINE

REVIEW OF STABILITY FOR UNINSPECTED OCEANOGRAPHIC RESEARCH VESSELS (C)

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J. B. Bybee, LCDR, Chief, Hull Division

Purpose

This Plan Review Guideline provides guidance and information to the marine industry regarding the submission of stability calculations and plans to the Marine Safety Center for Uninspected Oceanographic Research Vessels seeking certification under 46 CFR Subchapter C.

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 H1-14.

E-mail: msc@uscg.mil
Phone: 202-795-6729
Website: www.dco.uscg.mil/msc

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1. Applicability

This Plan Review Guideline is applicable to stability calculations reviewed by the Marine Safety Center (MSC) for Uninspected Oceanographic Research Vessels certificated under 46 CFR Subchapter C. If the vessel's stability is being reviewed under Navigation and Vessel Inspection Circular (NVIC) No. 3-97, "Stability Related Review Performed by the American Bureau of Shipping for U.S. Flag Vessels," then MSC review of stability items is not required.

If the vessel is less than 79 feet and under 300 GRT, the stability standards of Subchapter S do not apply and a load line is not required.

In accordance with section 6.E.10 of reference (g), if the vessel is equal to or over 79 feet in length and operates beyond the boundary line, a Load Line assignment is required; therefore the intact stability criteria of Subchapter S apply.

If the Oceanographic Research Vessel is equal to or greater than 300 GRT, Subchapter U applies, and if the vessel is over 500 ITC, SOLAS also applies. Oceanographic Research Vessel submissions for vessels over 300 gross tons should be directed to the MSC Major Vessel Branch.

In accordance with 6.E.10 of reference (g) and the General Requirements section of Chapter I of reference (i), Uninspected Oceanographic Research Vessels (Subchapter C) are not required to comply with collision bulkhead, subdivision, or damage stability requirements, with one exception: damage stability requirements apply for Type B vessels over 328 feet in length with reduced freeboard. See reference (i) for additional details.

2. References

a. 46 CFR Subchapter S, Parts 170 and 173
b. 46 CFR Subchapter E
c. Federal Register, Vol. 54, No.18, page 4422 "Notice of Proposed Rule Making, Section 170.170," dated January 30, 1989
d. Navigation and Inspection Circular No. 14-81, CH 1, "Stability Tests; Waiving of for 'Sister Vessels'," dated December 2, 1981
e. MSC Guidelines for Submission of Stability Test Procedures, PRG GEN-05
f. MSC Guidelines for the Submission of Stability Test (Deadweight Survey or Inclining Experiment) Results, PRG GEN-02
g. Marine Safety Manual (MSM), Vol. IV
h. PFM 10-85, Policy File Memorandum on Watertight and Weathertight Closure Devices
i. U.S. Coast Guard, "Load Line Technical Manual," annotated February 3, 2006

3. Definitions

a. Downflooding:
The entry of seawater through any opening into the hull or superstructure of a vessel (or portion of a vessel) due to heel, trim, or submergence of the vessel.

b. Downflooding Point:
Any opening in the hull or superstructure of the vessel that cannot be closed watertight and through which downflooding can occur. Common downflooding points include windows, compartment vents, and non-watertight deck hatches.

For intact stability calculations, weathertight closures are not normally considered downflooding points. See discussion in reference (h) for further information.

Tank vents with ball check valves are generally accepted as weathertight closures (and therefore are generally not considered downflooding points).

c. Weathertight:
Water will not penetrate in any sea condition. This also means being able to resist boarding seas.

d. Watertight:
Designed and constructed to withstand a static head of water without any leakage.

4. Submittal Checklist

In general, the following items should be included in the stability submission:

a. Letter of intent identifying what is included in the submittal and requested actions to be taken by MSC

b. Copy of the Application for Inspection

c. Description of the vessel operating envelope, including but not limited to:

(1) Route designation and classification
(2) Number of passengers
(3) Total persons carried
(4) Operating limits and/or restrictions (such as maximum draft, trim, wave height, speed, geographical boundaries)
(5) All plausible loading conditions for each particular operation of the vessel

d. Lines plan of the hull to at least the bulkhead deck. See reference (g), Section 6.B.1.a regarding possible inclusion of deck houses and superstructure in buoyant volume.

e. Computerized hull model (recommended, but not required)

f. Hydrostatics or Curves of Form and Righting Arm Curves (tabulated data may be accepted)

g. Tank Capacity Tables including liquid volume or weight, center of gravity location, and free surface moment for relevant tank filling levels

h. General Arrangement and relevant plans showing:
   (1) Outboard Profile
   (2) Compartmentation (at least plan and profile views)
   (3) Location and extent of bulkhead deck
   (4) Location and extent of watertight bulkheads, including collision bulkhead
   (5) Watertight and weathertight doors, hatches, scuttles, and similar closures
   (6) Weather deck freeing port and/or scupper sizes and locations (as applicable)
   (7) Downflooding points and other openings into the hull such as vents or windows
   (8) Locations and reference points of any draft or loading marks

i. Fixed ballast plan, or written ballast description (if applicable)

j. Approved lightship values or stability test lightship calculations

k. Intact stability calculations

l. Foam flotation material information (if applicable)

5. Lightship Characteristics

a. Determination:
Lightship characteristics are to be determined using one of the following methods:

   (1) Sister to a vessel with known lightship characteristics (reference (g), Section 6.D.2 and reference (d)).

   (2) Deadweight survey combined with an indisputably conservative assumed vertical center of gravity (VCG) (references (e) and (f)).

   (3) Inclining experiment (full stability test) (references (e) and (f)).

b. Stability Test or Deadweight Survey:

   (1) In accordance with 46 CFR 170.085, a written deadweight survey or stability test procedure must be submitted to MSC at least two weeks before the survey or test. References (e) and (g) provide guidance on the required elements for the procedure. In addition, if completing a

deadweight survey, the conservative VCG should be provided with the procedure and approved before the survey. In all cases, the procedure shall be approved by MSC prior conducting the test or survey.

(2) In accordance with 46 CFR 170.175(b), vessel owners and/or representatives shall make arrangements with the Officer in Charge, Marine Inspection (OCMI) for a Coast Guard representative to witness the stability test.

(3) Please see reference (f) for guidance on the submission of deadweight survey or inclining results. The results should ensure that any transverse center of gravity (TCG) and associated heel / list is included in the lightship characteristics.

6. Loading Conditions

a. General:
The stability analysis should include loading conditions that cover the entire range of operations. This includes, but is not limited to, the following conditions:

(1) Departure (Full Load) with 100% consumables
(2) Mid Voyage with 50% consumables
(3) Arrival (Burned Out) with 10% consumables

b. Crew Weight:
The assumed average weight per person (AAWP) shall be in accordance with 46 CFR 170.090(d)(1). As of the date of this publication, the AAWP is 185 pounds.

c. Crew Distribution:
Crew should be loaded on the vessel to represent actual operating conditions based on seating, deck space, operating stations, etc. with a VCG of 39 inches above the deck. Crew may not be used to counter balance the vessel's natural heel/trim or liquid loading conditions.

Attention should be given to the vertical distribution of crew. Specifically, consideration should also be given to conditions where crew are on the upper deck(s) only, as this may be the most restrictive.

d. Free Surface:
The loading conditions shall incorporate liquid free surfaces in accordance with 46 CFR 170.285.

7. Intact Stability

a. Requirements:
If applicable (see discussion in Section 1), the following requirements of 46 CFR Subchapter S apply in each condition of loading and operation:

(1) 170.170 (Weather Criteria)

(2) 170.173 (Righting Energy Criteria)

Based upon the service of the vessel, the following requirements may also apply:

(3) 173.095 (Towline Pull Criteria)

(4) 173 Subpart B (Lifting Criteria)

b. Calculations:
The above criteria are generally applicable to flush deck vessels of usual proportion and form. If the vessel is a well, cockpit, or other non-flush deck configuration, please contact MSC. All calculations computing the righting arm shall be with the vessel free to trim.

(1) Weather Criteria: 46 CFR 170.170:
The projected lateral area consists of the portion of the vessel and deck cargo above the waterline. Per the regulatory intent discussed in reference (c), the portion of the vessel above the waterline should include boxed off areas under railings, awnings, and canopies.

(2) Righting Energy Criteria: 46 CFR 170.173:
i) The applicable standards, based on the intended route, are as follows:
1. Exposed Route: 46 CFR 170.173(b) or (c);
2. Partially Protected Route: 46 CFR 170.173(e)(1);
3. Protected Route: 46 CFR 170.173(e)(2).
ii) These calculations shall reflect the submergence of any potential downflooding points.
iii) Some catamaran vessels have a maximum righting arm that occurs at a heel angle of less than 15 degrees. In such cases, it may be appropriate to request an equivalent level of safety to the requirements of 46 CFR 170.173(c)(2). Please contact MSC for additional guidance.

(3) Towline Pull Criteria: 46 CFR 173.095:
Applicable only if the vessel engages in towing operations.

(4) Lifting Criteria: 46 CFR Part 173, Subpart B:
i) Determine applicability in accordance with 46 CFR 173.005: If the vessel is equipped to lift cargo or other objects, submit calculations comparing maximum heeling moment due to hook load to (0.67)(W)(GM)(F/B). In accordance with 46 CFR 173.007, the hook load must be considered to be located at the head of the crane.

ii) If the crane heeling moment is greater than (0.67)(W)(GM)(F/B), submit lifting calculations in accordance with 46 CFR 173.020 and 173.025, as applicable.

8. Right of appeal

In accordance with 46 CFR 24.01-7, any person directly affected by a decision or action taken under 46 CFR Subchapter C may appeal therefrom in accordance with 46 CFR 1.03.

9. 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.