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

REVIEW OF (DISPLACEMENT MODE) IMO HIGH-SPEED CRAFT CODE STABILITY

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Purpose

This Plan Review Guideline (PRG) provides the submitter with general guidance and information for the preparation and submission of plans in accordance with the IMO High-Speed Craft Code stability requirements.

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 H2-19.

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1. Applicability

This Plan Review Guideline (PRG) is applicable to vessels subject to the requirements of the IMO High-Speed Craft Code.

2. References

a. International Code of Safety for High-Speed Craft (IMO HSC), 2000, 2008 Edition.
b. Navigation and Vessel Inspection Circular (NVIC 6-99), "Plan Review, Inspection, and Certification Guidance for Vessels Built to the International Code of Safety For High-Speed Craft and Additional Information Regarding Non-Code High-Speed Vessels."
c. IMO MSC Circular 1102, Interpretations of the 2000 HSC Code and SOLAS Chapter X."
d. International Code on Intact Stability, 2008
e. MSC Plan Review Guideline GEN-05, "Review of Stability Test Procedures."
f. MSC Plan Review Guideline GEN-02, "Submission of Stability Test Results: Deadweight Survey or Inclining Experiment."
g. MSC Plan Review Guideline H2-06, "Trim and Stability Booklets."
h. MSC Plan Review Guideline SOLAS-08, "Openings in Watertight Divisions on High-Speed Craft Code Vessels."
i. Federal Register, Vol. 75, No. 239, "Passenger Weight and Inspected Vessel Stability Requirements; Final Rule," dated December 14, 2010

3. General

Provide the following drawings and calculations:

a. General Arrangements including deck plans, hold plans (indicating compartmentation and watertight doors), inboard and outboard profiles (indicating potential downflooding points such as vent or windows)
b. Lines, offsets
c. Computer disk or file with hull model (optional)
d. Tank Capacity Tables/Plan with Free Surface data
e. Draft mark locations, longitudinal and vertical reference points
f. Stability Test/Lightship results
g. Intact Stability Calculations
h. Trim and Stability Booklet (if applicable)

A lines plan, station offsets, or a computer model hull must be provided by the submitter for the development of a computer stability model of the vessel (including compartmentation).

Ensure the vessel is capable of a maximum speed, in m/s, of $3.7\ V^{0.1667}$, where V is the volume (m^3) of the displacement at the design waterline. [HSC 1.4.30]

Determine whether the vessel will be a passenger vessel or cargo only.

a. If it is a passenger vessel, determine the appropriate category type. [HSC 1.4.12 and 1.4.13]
    (1) Category A craft generally have more restricted routes and fewer passengers.

(2) Category B craft require a higher level of safety.

Determine the vessel's maximum significant wave height in worst intended conditions. [HSC 1.4.54 and 1.4.61]

Determine the appropriate stability annex for the vessel using Table 2.3.4 of the HSC Code and the vessel's intact stability characteristics.

The number of doors and openings in watertight bulkheads shall be minimized. [HSC 2.2.2.1] Watertight doors must be fitted with local indication and be remotely operable. [HSC 2.2.2.4 and 2.2.2.6]

a. As per reference (h), MSC interprets watertight doors as any opening in watertight division, including internal deck hatches.

External weathertight doors and hatches should have door sills and coamings of not less than 100mm for doors located above the datum and 250mm for doors located on or below the datum. [HSC 2.2.7.3 and 2.2.7.1.1] Machinery space openings at or below the datum should have door sills and coamings of not less than 380mm. [HSC 2.2.8.2.2]

Tank vents must meet the height requirements of HSC 2.2.10.

Freeing ports must meet the size and location requirements of HSC 2.2.11.

Verify that liquid free surface has been accounted for in each condition of loading and operation. Each loading condition must include at a minimum the free surface effect of at least one transverse pair of tanks or a single centerline tank having the greatest free surface effect for each type of consumable, as considered in 46 CFR 170.285 and Part B, Chapter 3.1.4 of reference (d). Specific loading conditions that exceed this minimum must apply the true free surface effect.

The effects of icing must be accounted for in the vessel's loading based on the intended area of operation [HSC 2.1.2, Annex 5]

4. Stability Tests

All vessels must be inclined or surveyed following construction to determine the lightship characteristics. [HSC 2.7 and 2.16]

a. Stability test procedures should be submitted following reference (e).
b. Lightship characteristics should be submitted following reference (f).

A deadweight survey must be conducted on existing passenger vessels every five years or when the lightship weight changes by more than 2% or the longitudinal center of gravity deviates by more than 1% of the vessel's length. [HSC 2.14.1]

5. Intact Stability

All Vessels:

a. Review the vessel's intact stability criteria of HSC Annex 7.1 or HSC Annex 8.1 for all conditions of loading and operations. Verify whether consumable (tankage or stores)

loading or passenger distribution are critical to intact stability and identify any associated operating restrictions to be enforced.

b. Heeling levers for multihull craft and other vessels using HSC Annex 7 must be applied in accordance with HSC Annex 7.3.

Passenger Vessels:

a. Passengers are to have the assumed weight and spacing characteristics of HSC 2.10.1-.5.
    (1) In accordance with reference (i), the Assumed Average Weight per Person (AAWPP) may be no less than 185 pounds (83.9 kilograms).
b. The vessel may not exceed 10° of inclination (either heel or trim) in all conditions of operation and loading. [HSC 2.11]
    (1) Using the passenger crowding requirements of HSC 2.10.6-.10, uncontrolled passenger movement must also be examined.

6. Extent of Damage

All Vessels:

a. The permeability of all spaces shall be determined by the table in HSC 2.6.2.
    (1) The MSC does not permit the use of run-off of carried products from compartments in the calculations for damage stability. Following damage, no carried liquids may be assumed to outflow or be replaced with seawater.
b. Side damage [HSC 2.6.7]
c. Bow and stern damage [HSC 2.6.8]
    (1) Not to be applied concurrently.
d. Bottom damage in areas vulnerable to raking. [HSC 2.6.9] Two longitudinal extents must be analyzed separately:
    (1) 55% of L (length of the underwater watertight hull), measured from the forward-most point of the underwater hull.
    (2) (L/2+10)% (for vessels <50m) or 35% of L (for larger vessels), measured anywhere along the craft.
e. Bottom damage in areas not vulnerable to raking. [HSC 2.6.10]
f. Multiple hulls may be damaged if spaced within 7m. [HSC 2.6.11]
g. Any damage of a lesser extent which would result in a more sever conditions may be applied. [HSC 2.6.6]
h. Category B passenger vessels must also analyze a 100% bottom raking damage condition. [HSC 2.13.2]
    (1) Not all damage stability criteria will be applied to this damage condition.

7. Damage Stability

All Vessels:

a. Review the vessel's subdivision and damage stability requirements for all conditions of loading and operation. Verify whether consumable (tankage or stores) loading or passenger distribution are critical to intact stability and identify any associated operating restrictions to be enforced.
b. Following damage, the vessel must meet the following:
    (1) All downflooding points must be at least 50% of the significant wave height above the waterline. [HSC 2.6.12.1]

(2) The deck edge must not be submerged at the survival craft embarkation points. [HSC 2.6.12.3]
(3) Emergency equipment must remain accessible. [HSC 2.6.12.4]
(4) All the damage stability criteria of HSC Annex 7.2 or HSC Annex 8.2 are met.

Passenger Vessels:

a. The vessel may reach up to 15° of inclination (either heel or trim) after damage, provided the vessel can be returned to less than 10° of inclination within 15 minutes through selective ballasting procedures. [HSC 2.13.1]
b. Category B passenger vessels after 100% bottom raking damage must meet the post damage criteria of HSC 2.13.2.1-.5.

Cargo Vessels:

a. Following damage, the vessel must meet the following:
    (1) The downflooding criteria of HSC 2.6.12.
    (2) The vessel may reach up to 20° of inclination (either heel or trim) after damage, provided the vessel can be returned to less than 15° of inclination within 15 minutes through selective ballasting procedures. [HSC 2.13.1]

8. Trim & Stability Booklets

Should a vessel choose to operate using a T&S Booklet rather than a stability letter, the T&S Booklet should be submitted following reference (g).

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.