

MSC Guidelines for Review of Cargo and Miscellaneous Vessel Stability (Subchapter I)

Procedure Number: H2-04

Revision Date: 3/27/2018

S. E. HEMANN, CDR, Chief, Hull Division

Purpose

The purpose of this Plan Review Guideline is to provide the submitter with general guidance and information for the preparation and submission of stability calculations for vessels certificated under 46 CFR Subchapter I.

References

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- a. 46 CFR 170: "Stability Requirements for all Inspected Vessels"
 - b. 46 CFR 172: "Special Rules pertaining to Bulk Cargos"
 - c. 46 CFR 174, Subpart E: "Special Rules pertaining to Tugboats and Towboats"
 - d. 46 CFR 174, Subpart J: "Special Rules pertaining to Dry Cargo Ships"
 - e. Marine Safety Center Technical Note 04-03, CH-3, "Technical Support and Oversight of Authorized Classification Societies"
 - f. Navigation and Inspection Circular (NVIC) 14-81 "Stability Tests; Waiving of for 'Sister Vessels'"
 - g. NVIC 17-91 "Guidelines for Conducting Stability Tests"
 - h. ASTM F1321(Series) Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment to determine the Light Ship Displacement and Centers of Gravity of a Vessel)
 - i. IMO Intact Stability Code (ISC)
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Contact Information

If you have any questions or comments concerning this document, please contact the Marine Safety Center by e-mail or phone, referring to Procedure Number: **H2-04**.

E-mail: msc@uscg.mil

Phone: 202-795-6730

Website: <http://www.dco.uscg.mil/msc>

General Review Guidance

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. However, stability reviews completed under NVIC 3-97 may be selected for MSC oversight as described in reference (e).

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Submittal checklist

Check that the following items are included in the submittal package:

- General Arrangements including deck plans, hold plans (clearly indicating compartmentation and watertight doors), inboard and outboard profiles (clearly indicating potential downflooding points such as vents or windows)
 - Lines and offsets (MSC generates a hull model in GHS to verify calculations) [Additionally providing a computerized hull model (GHS preferred) should expedite MSC review]
 - Tank Capacity Tables/Plan with Free Surface data
 - Draft mark locations, longitudinal and vertical reference points
 - Stability Test/Lightship results
 - Intact Stability Calculations
 - Subdivision and Damage Stability Calculations (if necessary)
 - Trim and Stability Booklet (if necessary)
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Lightship verification

Ensure that lightship characteristics were (or are to be) determined using one of the following methods in accordance with references (f) through (h) as applicable:

- Acceptance as a sister to a vessel with known characteristics
 - Deadweight survey combined with a conservatively assumed vertical center of gravity (VCG) height
 - Inclining (full stability test)
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Loading conditions

Ensure that vessel loading conditions cover the entire range of operation. This includes, but is not limited to the following conditions:

- Full load
 - Mid voyage
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- Arrival (Burned out)

Ensure that loading conditions incorporate liquid free surface in accordance with:

- For intact stability: 46 CFR 170.285
 - For damage stability: 46 CFR 170.290
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Intact Stability

For each condition of loading, calculations submitted shall demonstrate compliance with the following:

- Weather Criteria (46 CFR 170.170):
 - Ensure correct use of weather criterion equation variables
 - Ensure available GM meets or exceeds the minimum acceptable value
- Righting Energy (46 CFR 170.173) – for vessels under 328 feet in length:
 - Ensure stability characteristics meet the minimum requirements for the appropriate service (protected, partially protected, exposed) and that all criteria are addressed
 - Ensure that these calculations correctly reflect submergence of any potential downflooding points

In accordance with 46 CFR 170.165(b), a vessel not subject to the requirements of 46 CFR 170.165(a) is permitted to comply with reference (i) as an alternative to 46 CFR 170.170 and 46 CFR 170.173.

Dry Cargo Vessels

All new ships over 500 GT (46 CFR 174.355) must include calculations verifying the compliance with subdivision and damage stability requirements in SOLAS Chapter II-1, Part B-1 (46 CFR 174.360).

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Bulk Grain Vessels

Indicate if the National Cargo Bureau has issued a Document of Authorization under 46 CFR 172.015. If no such document has been issued:

- ❑ Ensure the vessel is eligible for an exemption under 46 CFR 172.030(a).
 - ❑ Ensure that the actual GM is greater than GM required (GMR) (46 CFR 172.030(b)(5))
 - ❑ Submit GMR and GMI calculations as per 46 CFR 172.030(b).
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Great Lakes Dry Bulk Vessels

Determine if Great Lakes dry bulk cargo vessel rules are applicable (46 CFR 172.215). If they are:

- ❑ Ensure that side and bottom damage are applied separately and the required damaged dimensions of 46 CFR 172.235 are met.
 - ❑ Ensure the calculations show the vessel can survive damage to the following for all loading conditions (46 CFR 172.230(a) & 46 CFR 172.245):
 - To any location between any adjacent Main Transverse Watertight Bulkheads,
 - To any location between a main transverse bulkhead and a partial transverse bulkhead in way of a side wing tank,
 - To a main or wing tank transverse watertight bulkhead spaced closer than the specified longitudinal extent of collision penetration to another main transverse watertight bulkhead.
 - ❑ Ensure the permeability of each space complies with 46 CFR 172.240.
 - ❑ Ensure the buoyancy of any superstructure directly above the side damage is not considered. The unflooded parts of superstructures beyond the extent of damage may be considered if they are separated from the damaged space by watertight bulkheads and no progressive flooding may occur (46 CFR 172.225(d)).
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Definitions

Downflooding: The entry of seawater through any opening into the hull *or* *superstructure* of an undamaged vessel [or portion of a vessel] due to heel, trim, or submergence of the vessel.

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Downflooding Point: Any opening in the hull or superstructure of the vessel that cannot be closed watertight and through which downflooding can occur. Generally speaking for openings which remain above the static waterline, weathertight closures are sufficient to prevent downflooding and are accepted as such.

Weathertight: Water will not penetrate into the vessel in any sea condition. This also means being able to resist boarding seas. Windows are not accepted as weathertight closures and, without the provision of deadlight covers, must be considered as potential downflooding points. Ball check valves used in tank vent lines are generally accepted as weathertight closures.

Watertight: Capable of preventing the passage of water through the structure in any direction under a head of water for which the surrounding structure was designed.

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 the Marine Safety Center (MSC), the unit responsible for implementing this guidance.