

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

Procedure Number: H2-4

Revision Date:05/05/00

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## References

- a. 46 CFR Part 93, Stability
  - b. 46 CFR Part 170, Stability Requirements for All Inspected Vessels
  - c. 46 CFR Part 172, Special Rules Pertaining to Bulk Cargoes
  - d. 46 CFR Part 174, Subpart J, Special Rules Pertaining to Dry Cargo Ships
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## Disclaimer

These guidelines were developed by the Marine Safety Center staff as an aid in the preparation and review of vessel plans and submissions. They were developed to supplement existing guidance. They are not intended to substitute or replace laws, regulations, or other official Coast Guard policy guidance. The responsibility to demonstrate compliance with all applicable laws and regulations still rests with the plan submitter. The Coast Guard and the U. S. Department of Transportation expressly disclaim liability resulting from the use of this document.

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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. Please refer to the Procedure Number: H2-4

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## 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.

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, offsets or computer disk with hull model (GHS preferred)
  - Tank Capacity Tables/Plan with Free Surface data
  - Draft mark locations, longitudinal and vertical reference points
  - Stability Test/Lightship results
  - Intact Stability Calculations
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- Trim and Stability Booklet (if necessary)

Ensure that lightship characteristics were (or are to be) determined using one of the following methods:

- 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 loading conditions incorporate liquid free surface in accordance with 46 CFR 170.285.

Ensure that liquid free surface has been accounted for in each condition of loading and operation.

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## Weather Criterion

Ensure calculations demonstrate compliance with the Weather Criterion (46 CFR 170.170) and that GM available meets or exceeds the minimum acceptable value in each condition of loading and operation.

Ensure that the Weather Criterion calculation reflects the correct “P” factor (for service and vessel length), “W” (displacement), and “T” for each condition of loading and operation.

Ensure the Weather Criterion calculation “A” and “H” values correspond to the windage areas and centers shown on the profile plan.

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## Righting Energy

Ensure calculations demonstrate compliance with the Righting Energy Criterion (46 CFR 170.173) as appropriate (all vessels under 328 feet in length) and that the indicated stability characteristics meet the minimum requirements for the appropriate service (protected, partially protected, exposed) in each condition of loading and operation.

Ensure that the Righting Energy calculations correctly reflect submergence of any potential downflooding points.

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## Dry Cargo Vessels

All a 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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## Hull Model

The MSC will generate a hull model from the lines, offsets or provided computer disk using GHS to verify the stability of the vessel.

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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.

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.