

# NATIONAL CARGO BUREAU, INC. GRAIN STABILITY CALCULATION FORM GUIDANCE

1. Every vessel loading under the International Grain Code must submit an original copy of stability calculations to the attending National Cargo Bureau (NCB) Surveyor before a Certificate of Readiness can be issued.
2. The calculations shall be drafted on the NCB Grain Stability Calculation Form.
3. The calculations must be legible, but electronic/mechanical completion is not required. The Form (and inserts) can be downloaded in pdf format from the NCB website ([www.natcargo.org](http://www.natcargo.org)).
4. The calculation shall be signed by the Master and by the Surveyor. One copy shall be retained on board the ship; the original shall be retained by the Surveyor.
5. When the grain cargo is discharged at more than one port, it shall be the responsibility of the Master to fully comply with the requirements of the vessel's Grain Loading Document and/or the requirements of local governing authorities at every stage of the voyage. To show compliance, one calculation shall be prepared for each leg of the voyage.
6. Vessels which load part grain cargoes and subsequently load other cargo in the same port should indicate the proposed stowage location of the other cargo on the initial Grain Stability Calculation Form. If other cargo is to be loaded at another port, then additional Stability Calculations shall be prepared showing arrival and departure conditions.
7. If the final stowage arrangement differs significantly from that shown in the original Calculation, a revised Stability Calculation shall be prepared.
8. All tonnage used shall be shown in the same unit as used in the Grain Loading Booklet. Tonnages and moments may be rounded off to the nearest unit.
9. More detailed guidelines and sample calculations can be found in the NCB booklet, "GENERAL INFORMATION FOR GRAIN LOADING", available upon request.
14. If bunkers are to be taken en route, then the worst-case condition, i.e. before or after bunkering, should be shown in the same manner as ballast taken during the voyage. Alternatively, separate conditions for arrival and departure from bunkering port(s) may be shown. Additional insert sheets for Part II should be used as necessary for this purpose.
15. Part II shall include the effect of the free surface of liquids on board. This may be based upon the actual condition of the tanks, but shall not be a lesser effect than is applied in the example conditions in the approved Grain Loading Booklet. In the case of U.S. flag vessels, the calculation with respect to liquid free surface shall comply with U.S. Coast Guard regulations as set forth in 46 CFR §170.285. This mandates that the maximum free surface effect for the largest pair of side tanks in use for each type of consumable (or single center tank if larger than the largest pair of side tanks) be used. This procedure, at minimum, is recommended for all vessels. Alternatively, the maximum free surface for all tanks may be used. This generally simplifies the calculation process in the event that any quantities change.
16. For all vessels while at sea, the free surface of liquids should be kept to a minimum by maintaining all tanks either full or empty with the exception of those in actual use.
17. If the vessel has more tanks than available rows in Part II, some of the minor liquid types can be combined into one entry, such as for L.O. Alternatively, a separate tank breakdown may be prepared and attached and only the totals for each consumable type shown on the form.
18. The vessel shall be upright (no more than 1° list) on completion of loading. Partially filled cargo holds shall be level. With this in mind, liquids should be distributed to achieve the upright condition.
19. If ballast is required at time of departure (to meet stability requirement) and ballasting cannot be accomplished at the loading berth due to draft restrictions, for example, such ballasting must be completed while the vessel is in protected waters. The same condition with respect to protected waters would apply to deballasting at the port of destination.

## Part I

10. In most cases, the conventional Stowage Factor, which allows for broken stowage and compaction, is provided. This is usually based on experience of previous loadings. For full holds, the "full, trimmed" capacities should be used in the calculation, even if no trimming is intended.
11. The Calculation shall include an illustrated cargo plan, using the area at the bottom of Part I of the Form. Annotation tools of pdf software may be used for this purpose. The plan can also be drawn manually by hand.

## Part II

12. The Stability Calculation shall show the departure loadport and arrival disport conditions. It shall also show the conditions on arrival and departure from any intervening ports at which non-grain cargo is loaded or discharged.
13. The Intermediate condition columns in Part II shall be used when there will be significant or immediate change in liquid quantity within the voyage, such as ballasting or deballasting. Entries for liquids that are taken in or pumped out while the vessel is underway in open waters must include the effect of free surface, but not the effect of weight, in order to assess for the worst-case stability.

## Part III

20. The grain surface in a slack hold must be level. If the vessel meets the stability requirements even when using maximum heeling moments for any slack hold, it adds an extra level of security in that even if there are unexpected variations in the Stowage Factor or the exact amount of available cargo, the final loading condition will still comply with the Code. However, the grain surface must still be level.
21. A slack hold heeling moment value must be at least as large as the Grain Loading Booklet value corresponding to the actual level of grain in the slack hold. To verify this requirement, ullages in slack holds will be checked by the attending NCB Surveyor upon completion of loading.
22. If the Grain Loading Booklet does not contain a table of Maximum Allowable Heeling Moments (or the range of this table does not cover the applicable loading condition), Cross Curves of Stability must be utilized to prepare stability diagrams for each loading condition. NCB Form Addendum 1 can be utilized for this purpose. Summary results shall be entered in as part of the Stability Summary at the end of the Grain Stability Calculation Form and Addendum 1 attached.