

# NATIONAL CARGO BUREAU, INC. GRAIN STABILITY CALCULATION FORM

\* (Required for vessels loading bulk grain in the United States of America)

|                           |                   |  |
|---------------------------|-------------------|--|
| M.V. / S.S. _____         |                   | KEEL LAID<br>(month/year)<br>AT CITY _____ |
| COUNTRY OF REGISTRY _____ | NET TONNAGE _____ | IMMO NO. _____<br><br>IN COUNTRY _____     |
| AGENT _____               |                   |  |

GRAIN LOADING BOOKLET APPROVED BY \_\_\_\_\_

ON BEHALF OF (FLAG STATE) \_\_\_\_\_

DRAWING NO. \_\_\_\_\_ DATE OF APPROVAL \_\_\_\_\_

APPLICABLE REGULATIONS \_\_\_\_\_

ADDENDUM FOR UNTRIMMED ENDS APPROVED BY \_\_\_\_\_

DRAWING NO. \_\_\_\_\_ DATE OF APPROVAL \_\_\_\_\_

LOADING PORT(S) \_\_\_\_\_

BUNKERING PORT(S) \_\_\_\_\_

DISCHARGE PORT(S) \_\_\_\_\_

STEAMING DISTANCE \_\_\_\_\_ MILES MILES PER DAY \_\_\_\_\_ TIME \_\_\_\_\_

DAILY CONSUMPTION: FUEL \_\_\_\_\_ DIESEL \_\_\_\_\_ WATER \_\_\_\_\_

DISPLACEMENT      DEADWEIGHT      DRAFT      FREEBOARD

\*\*WINTER      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

SUMMER      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

\*\*TROPICAL      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

FRESH WATER ALLOWANCE \_\_\_\_\_ TPC/~~TPI~~ (AT SUMMER DRAFT) \_\_\_\_\_

\* EXCEPT FOR EXEMPTED VOYAGES

\*\* IF APPLICABLE

THIS IS TO CERTIFY THAT:

1. THIS CALCULATION IS PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE VESSEL'S GRAIN LOADING BOOKLET AND THE APPLICABLE GRAIN REGULATIONS.
2. THE STABILITY OF THE VESSEL WILL BE MAINTAINED THROUGHOUT THE VOYAGE IN ACCORDANCE WITH THIS CALCULATION.

**CALCULATION PREPARED BY:**  
(TO BE COMPLETED IF THE FORM IS PREPARED BY OTHER THAN SHIP'S PERSONNEL)

NAME (PRINT) \_\_\_\_\_

COMPANY \_\_\_\_\_

SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

\_\_\_\_\_  
MASTER'S SIGNATURE

\_\_\_\_\_  
MASTER'S NAME (PRINTED)

EXAMINED BY: \_\_\_\_\_

\_\_\_\_\_  
N.C.B. SURVEYOR'S SIGNATURE

\_\_\_\_\_  
N.C.B. SURVEYOR'S NAME (PRINTED)

DATE: \_\_\_\_\_

NOTE: ORIGINAL STABILITY CALCULATION AND GRAIN ARRANGEMENT PLAN TO BE SUBMITTED TO THE N.C.B. SURVEYOR. ALL TONNAGES USED IN THIS CALCULATION SHALL BE SHOWN IN THE SAME UNITS AS USED IN THE GRAIN LOADING BOOKLET.

# SHIP AND CARGO CALCULATION

## PART I

TYPE OF GRAIN \_\_\_\_\_ STOWAGE FACTOR \_\_\_\_\_ M<sup>3</sup>/MT \_\_\_\_\_ FT<sup>3</sup>/LT \_\_\_\_\_

| COMPT. NO. | CARGO (1) | S.F. (1) | GRAIN CUBICS (2) |      | WEIGHT (3) | V.C.G. | MOMENT (3) |
|------------|-----------|----------|------------------|------|------------|--------|------------|
|            |           |          | TOTAL            | USED |            |        |            |
|            |           |          |                  |      |            |        |            |
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| S.F.             | S.F.              | DEN              |
|------------------|-------------------|------------------|
| $\frac{M^3}{MT}$ | $\frac{FT^3}{LT}$ | $\frac{MT}{M^3}$ |
| 1.171            | 42                | 0.854            |
| 1.184            | 42.5              | 0.844            |
| 1.198            | 43                | 0.834            |
| 1.212            | 43.5              | 0.825            |
| 1.226            | 44                | 0.816            |
| 1.240            | 44.5              | 0.806            |
| 1.254            | 45                | 0.797            |
| 1.268            | 45.5              | 0.789            |
| 1.282            | 46                | 0.780            |
| 1.296            | 46.5              | 0.772            |
| 1.310            | 47                | 0.763            |
| 1.324            | 47.5              | 0.755            |
| 1.338            | 48                | 0.747            |
| 1.352            | 48.5              | 0.740            |
| 1.366            | 49                | 0.732            |
| 1.380            | 49.5              | 0.725            |
| 1.393            | 50                | 0.718            |
| 1.407            | 50.5              | 0.711            |
| 1.421            | 51                | 0.704            |
| 1.435            | 51.5              | 0.697            |
| 1.449            | 52                | 0.690            |
| 1.477            | 53                | 0.677            |
| 1.505            | 54                | 0.664            |
| 1.533            | 55                | 0.652            |
| 1.561            | 56                | 0.641            |
| 1.589            | 57                | 0.629            |
| 1.616            | 58                | 0.619            |
| 1.644            | 59                | 0.608            |
| 1.672            | 60                | 0.598            |
| 1.700            | 61                | 0.588            |
| 1.728            | 62                | 0.579            |

THIS CALCULATION IS PREPARED IN:

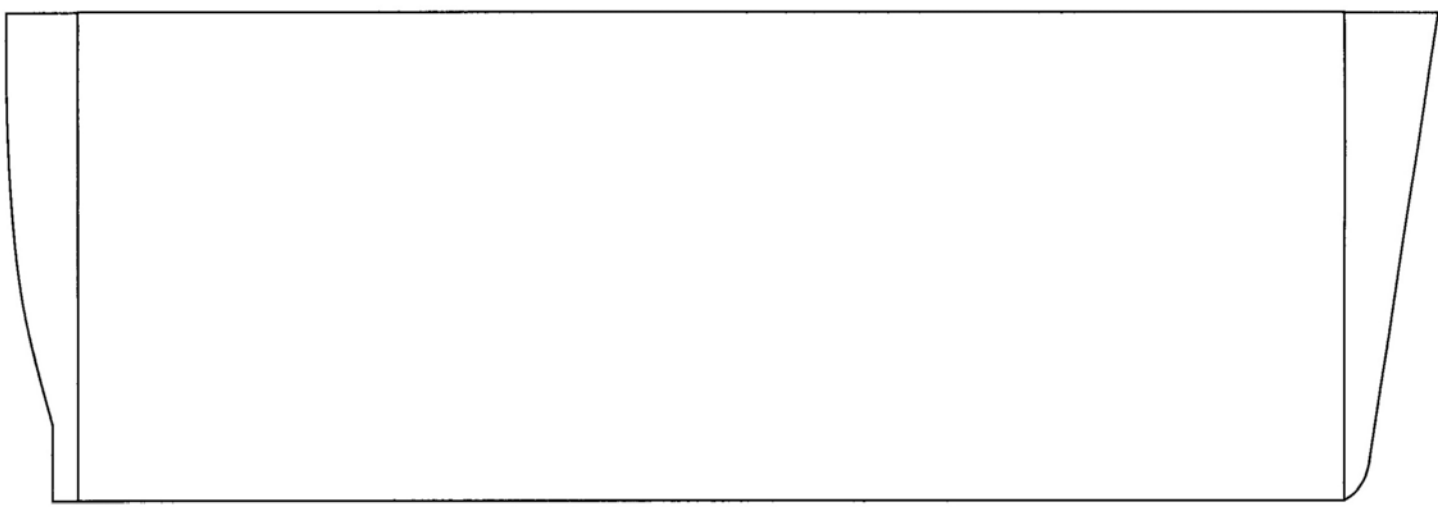
- METRIC UNITS
- ENGLISH UNITS

|              |  |  |  |
|--------------|--|--|--|
| CARGO TOTALS |  |  |  |
| LIGHT SHIP   |  |  |  |
| CONSTANT     |  |  |  |

|                       |  |  |  |
|-----------------------|--|--|--|
| SHIP AND CARGO TOTALS |  |  |  |
|-----------------------|--|--|--|

- (1) COMPLETE THESE COLUMNS IF MORE THAN ONE TYPE OF CARGO IS LOADED.
- (2) FOR PARTLY FILLED COMPARTMENTS, SHOW THE CUBICS USED IN ADDITION TO THE TOTAL CUBICS.
- (3) WEIGHTS AND MOMENTS SHOULD BE SHOWN TO THE NEAREST WHOLE UNIT.

**CARGO PLAN: INDICATE HOLDS, TWEEN DECKS, ENGINE SPACES, FITTINGS, STOWAGE, TONNAGES, ETC.**



### FUEL AND WATER CALCULATION

#### PART II

THE **INTERMEDIATE** SECTION MUST BE COMPLETED IF THE **ARRIVAL** SECTION SHOWS BALLAST THAT IS NOT LISTED IN THE **DEPARTURE** SECTION. THE **INTERMEDIATE** CONDITION IS IMMEDIATELY BEFORE BALLASTING AND MUST INCLUDE THE EFFECT OF FREE SURFACE, BUT **NOT** THE EFFECT OF ADDED WEIGHT. ADDITIONAL FUEL TAKEN AFTER DEPARTURE MUST BE SHOWN IN THE **INTERMEDIATE** SECTION IN THE SAME MANNER AS BALLAST.

| TANK | TYPE LIQUID | DEPARTURE: |        |        |           | INTERMEDIATE: |        |        |           | ARRIVAL: |        |        |           |
|------|-------------|------------|--------|--------|-----------|---------------|--------|--------|-----------|----------|--------|--------|-----------|
|      |             | WEIGHT     | V.C.G. | MOMENT | F.S. MOM. | WEIGHT        | V.C.G. | MOMENT | F.S. MOM. | WEIGHT   | V.C.G. | MOMENT | F.S. MOM. |
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**TOTALS**

LIQUIDS \_\_\_\_\_

SHIP AND CARGO \_\_\_\_\_

DISPLACEMENT \_\_\_\_\_

SAILING DRAFT \_\_\_\_\_ AT DENSITY \_\_\_\_\_

|                                  |                                    |                                  |
|----------------------------------|------------------------------------|----------------------------------|
| DEPARTURE KG _____               | INTERMEDIATE KG _____              | ARRIVAL KG _____                 |
| (1) FREE SURFACE CORR. (+) _____ | (1) FREE SURFACE CORR. (+) _____   | (1) FREE SURFACE CORR. (+) _____ |
| (2) VERT. S.M. CORR. (+) _____   | (2) VERT. S.M. CORR. (+) _____     | (2) VERT. S.M. CORR. (+) _____   |
| DEPARTURE KG <sub>v</sub> _____  | INTERMEDIATE KG <sub>v</sub> _____ | ARRIVAL KG <sub>v</sub> _____    |
| DEPARTURE KM _____               | INTERMEDIATE KM _____              | ARRIVAL KM _____                 |
| DEPARTURE KG <sub>v</sub> _____  | INTERMEDIATE KG <sub>v</sub> _____ | ARRIVAL KG <sub>v</sub> _____    |
| DEPARTURE GM _____               | INTERMEDIATE GM _____              | ARRIVAL GM _____                 |
| (3) REQUIRED MINIMUM GM _____    | (3) REQUIRED MINIMUM GM _____      | (3) REQUIRED MINIMUM GM _____    |

(1) FREE SURFACE CORR. = SUM OF FREE SURFACE MOMENTS / DISPLACEMENT (THIS CORRECTION MUST BE APPLIED TO ALL SHIPS).

(2) VERT. S.M. CORR. = SUM OF VERTICAL SHIFTING MOMENTS / DISPLACEMENT (THIS CORRECTION APPLIES WHEN THE VOLUMETRIC HEELING MOMENT CURVES OR TABLES DO NOT SPECIFICALLY STATE THAT THE CORRECTION FOR THE RISE IN VERTICAL CENTER OF GRAVITY HAS BEEN INCLUDED, AND THE MANUAL PROVIDES VERTICAL SHIFTING MOMENTS.)

(3) REQUIRED MINIMUM GM = THE GREATER OF 0.30 M, THE REQUIRED MINIMUM FOR INTACT STABILITY PURPOSES, AND THE REQUIRED MINIMUM FOR DAMAGE STABILITY PURPOSES

## HEELING MOMENT CALCULATION

### PART III

| COMPT. NO     | STOWAGE (1) | GRAIN ULLAGE OR DEPTH | VOLUMETRIC HEELING MOMENT               | S.F. OR DENSITY (2) | GRAIN HEELING MOMENT   | VERTICAL SHIFTING MOMENT (IF PROVIDED) SEE NOTE 2 IN PART II |                        |
|---------------|-------------|-----------------------|---|---------------------|------------------------|--|------------------------|
|               |             | <del>M/FT</del>       | <del>M<sup>3</sup>/FT<sup>3</sup></del> |                     | <del>MT- M/FT-LT</del> | <del>M<sup>3</sup>/FT<sup>3</sup></del>                      | <del>MT- M/FT-LT</del> |
|               |             |                       |   |                     |                        |  |                        |
|               |             |                       |   |                     |                        |  |                        |
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|               |             |                       |   |                     |                        |  |                        |
| <b>TOTALS</b> |             |                       |   |                     |                        |  |                        |

- (1) UNDER STOWAGE INDICATE "F-T" FOR FILLED COMPARTMENTS TRIMMED, "F-UT" FOR FILLED COMPARTMENTS UNTRIMMED, "PF" FOR PARTLY FILLED COMPARTMENTS, AND "SEC" FOR SECURED OR OVER-STOWED COMPARTMENTS.
- (2) THE STOWAGE FACTOR USED IN PART III SHALL NOT EXCEED THE ONE BASED ON THE WEIGHT PER UNIT OF VOLUME (TEST WEIGHT) OF THE GRAIN. IF THE STOWAGE FACTOR IS THE SAME IN ALL COMPARTMENTS, DIVIDE THE TOTAL VOLUMETRIC HEELING MOMENT BY THE STOWAGE FACTOR OR MULTIPLY BY THE DENSITY TO OBTAIN THE GRAIN HEELING MOMENT. IF THE STOWAGE FACTOR VARIES, OBTAIN THE GRAIN HEELING MOMENT FOR EACH COMPARTMENT.

INTERNATIONAL GRAIN CODE, Part A, 7.1  
 REGULATION 4, CHAPTER VI, SOLAS 1974 or  
 REGULATION 4, IMCO RESOLUTION A.264(VIII), NEW CHAPTER VI, SOLAS 1960  
 REGULATION 4, IMCO RESOLUTION A.184 AN EQUIVALENT TO CHAPTER VI, SOLAS 1960

**A . FOR VESSELS APPROVED UNDER**

### STABILITY SUMMARY

|   | DEPARTURE | INTERMEDIATE | ARRIVAL |
|---|-----------|--------------|---------|
| DISPLACEMENT  |           |              |         |
| KG <sub>v</sub> or GM   |           |              |         |
| TOTAL GRAIN HEELING MOMENT  |           |              |         |
| MAXIMUM ALLOWABLE HEELING MOMENT  |           |              |         |
| * ANGLE OF HEEL (12° MAX.)  |           |              |         |
| * RESIDUAL AREA<br>0.075 METER-RADIANS<br>(14.1 FT <sup>2</sup> OR 4.3 M <sup>2</sup> ) MINIMUM |           |              |         |
| * GM (0.3M OR 1 FT MINIMUM)   |           |              |         |

\* TO BE COMPLETED IF VESSEL'S GRAIN LOADING BOOKLET DOES NOT INCLUDE A TABLE OF ALLOWABLE HEELING MOMENTS. IN SUCH CASE, STATICAL STABILITY DIAGRAMS DEMONSTRATING THIS INFORMATION SHALL BE ATTACHED HERETO.

**B. FOR SPECIALLY SUITABLE SHIPS APPROVED UNDER**

INTERNATIONAL GRAIN CODE, PART A, 8. 2  
 SECTION V (B) , PART B, CHAPTER VI, SOLAS 1974  
 SECTION V (B) , PART B, IMCO RESOLUTION A.264 (VIII), NEW CHAPTER VI, SOLAS 1960  
 REGULATION 12, CHAPTER VI, SOLAS 1960

**ANGLE OF HEEL =  $\frac{\text{GRAIN HEELING MOMENT} \times 57.3}{\text{DISPLACEMENT} \times \text{GM}}$**

|                            | DEPARTURE | INTERMEDIATE | ARRIVAL |
|----------------------------|-----------|--------------|---------|
| TOTAL GRAIN HEELING MOMENT |           |              |         |
| DISPLACEMENT               |           |              |         |
| GM                         |           |              |         |
| ANGLE OF HEEL ( 5° MAX.)   |           |              |         |