

# M/V KESEN

## TRIM & STABILITY BOOKLET

(INCL.LONGITUDINAL STRENGTH CALCULATION)

ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΧΡΗΣΙΜΟΠΟΙΕΙΤΑΙ ΜΟΝΟ ΓΙΑ ΤΗΝ ΕΠΙΛΥΣΗ  
ΑΣΚΗΣΕΩΝ ΤΟΥ ΜΑΘΗΜΑΤΟΣ «ΕΥΣΤΑΘΕΙΑ ΠΛΟΙΩΝ» ΑΠΟ ΤΟΥΣ  
ΥΠΟΨΗΦΙΟΥΣ Α΄ ΚΑΙ Β΄ ΠΛΟΙΑΡΧΟΥΣ Ε.Ν.



**ΠΕΙΡΑΙΑΣ**

**2011**



## Πρόλογος

Οι παλαιότεροι Πλοίαρχοι Καθηγητές του ΚΕΣΕΝ Πλοιάρχων, που δίδαξαν κατά το παρελθόν το μάθημα «Ευστάθεια Πλοίων», υλοποίησαν την διδασκαλία του μαθήματος σε πραγματικής μορφής πλοίο, υιοθετώντας αρχικά το stability booklet του παλαιού FREEDOM και αργότερα το stability booklet του FREEDOM MKII.

Η πρακτική αυτή που υιοθετήθηκε από τα αρχικά χρόνια λειτουργίας του ΚΕΣΕΝ, ήταν αναμφισβήτητα τεράστιας διδακτικής και πρακτικής αξίας, και άκρως πρωτοποριακή, όταν τότε η διεθνής βιβλιογραφία του μαθήματος της ευστάθειας στηριζόταν στην μελέτη της φορηγίδας για την κατανόηση των εννοιών και την επίλυση σχετικών ασκήσεων υπολογισμών. Η εξέλιξη και στη διεθνή βιβλιογραφία και στη διεθνή εκπαιδευτική πρακτική δικαίωσε απόλυτα την επιλογή των παλαιότερων συναδέλφων.

Εμείς σήμερα συμφωνούμε απόλυτα με τον τρόπο διδασκαλίας του μαθήματος της «Ευστάθειας Πλοίων» που εφάρμοσαν σε πραγματικό πλοίο.

Θεωρούμε επίσης αναγκαίο να αντικαταστήσουμε το FREEDOM MKII με ένα πιο σύγχρονο πλοίο και με το παρόν εγχειρίδιο, υλοποιούμε ακριβώς αυτό. Σαν κύριο «εργαλείο», για τη διδασκαλία του μαθήματος, χρησιμοποιούμε ένα σύγχρονο BULK CARRIER ναυπήγησης 2009 και προσθέσαμε επίσης και ένα CRUDE OIL TANKER ναυπήγησης 2007.

Στο **1<sup>ο</sup> Μέρος** του εγχειριδίου περιέχεται το “**TRIM & STABILITY BOOKLET**” του **M/V Kesen**, το οποίο είναι ένα **SUPRAMAX BULK CARRIER 57.700 DWT** έτους ναυπήγησης 2009. Στο **2<sup>ο</sup> Μέρος** του εγχειριδίου περιέχεται ξεχωριστά το “**GRAIN STABILITY CALCULATION BOOKLET**” του M/V Kesen, στα πραγματικά πρότυπα που πλέον θα συναντήσουν οι μετεκπαιδευόμενοι υποψήφιοι Α΄ και Β΄ Πλοίαρχοι, στην πραγματική τους θαλάσσια υπηρεσία.

Στο **3<sup>ο</sup> Μέρος** συμπεριλάβαμε απόσπασμα του “**TRIM & STABILITY BOOKLET**” του **M/T Kesen** ενός **CRUDE OIL TANKER 115.000 DWT** έτους ναυπήγησης 2007.

Θα θέλαμε να ευχαριστήσουμε ιδιαίτερα τις δύο ναυτιλιακές εταιρείες που πρόθυμα μας παραχώρησαν τα απαιτούμενα εγχειρίδια και σχέδια των πλοίων τους και σεβόμενοι την επιθυμία τους δεν τις αναφέρουμε στο παρόν.

Ελπίζοντας στην όσο το δυνατόν πληρέστερη κατάρτιση των μετεκπαιδευομένων συναδέλφων, και την πρόοδό τους στο επαγγελματικό στίβο, αναμένουμε με χαρά κάθε πρόταση για αλλαγή ή βελτίωση του παρόντος εγχειριδίου.



# PLAN HISTORY

DATE	REV.	PAGE	DESCRIPTION	DWN.	CHKD.	MGR.
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MODEL NO.	D2007/2016		
TYPE	57,700 DWT BULK CARRIER		
MANAGER	<i>C.S. Kim</i>	TITLE  PROVISIONAL  <b>TRIM &amp; STABILITY BOOKLET</b> (INCL. LONGITUDINAL STRENGTH CALC.)	
CHECKED	<i>Drewitt</i>		
DRAWN	C.W. JANG ( 정 차원 )		
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		REV. NO.	△
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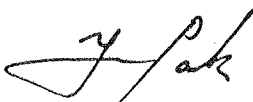
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CHECKED <u>[Signature]</u>			
DRAWN C.W. JANG ( 장 치원 )			
TEL. NO. 055) 548 - 3192	SCALE -	DATE 2009.01.09	DWG. NO. B0112000
DEP'T BASIC RESEARCH TEAM			REV. NO. <span style="float: right;">A</span>
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PRELIMINARY LOADING MANUAL  
STABILITY APPROVAL

	Date	Surveyor / Place
Approved for format and calculations subject to verification of the estimated lightship particulars, see separate letter	22/05/09	 Busan Design Support Office
Results of inclining experiment/lightweight check held ..... accepted		
Authorised for use on board the undernoted ship pending receipt of approved Final Loading Manual		
SHIP NAME:		
LR NO:	BUILDERS' NO:	
Lloyd's Register Asia Marine Division		



PRELIMINARY LOADING MANUAL  
STRENGTH APPROVAL

	Date	Surveyor / Place
Approved for strength (see Note)	22/05/09	 Busan Design Support Office
Authorised for use on board the undernoted ship pending receipt of approved Final Loading Manual		
SHIP NAME:		
LR NO:	BUILDERS' NO:	
<p><u>Note</u> The loading conditions shown in this Preliminary Loading Manual have been examined and approved, except as otherwise noted, in association with the preliminary lightweight and hull form data supplied by the Builders. Final data, consistent with the results of the Lightweight Measurement, should be provided when the Final Loading Manual is submitted for approval as required by the Rules.</p>		
Lloyd's Register Asia Marine Division		



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## 1 General Information

## 1.1 Principal Particulars

## 1.1.1 General

Ship name..... M/V KESEN

Ship number.....

IMO Number.....

Keel laid..... 20081124/20090703

Delivered..... 20090730/20100228

Flag.....

Call sign..... -

Navigation area..... OCEAN-GOING

Owner.....

Builder..... STX SHIPBUILDING CO.,LTD.

Class..... LR  
100A1 BULK CARRIER, CSR, BC-A, {HOLDS 2AND  
4 MAYBE EMPTY}, GRAB [20], ESP, LI, \*IWS,  
SHIPRIGHT (CM), +LMC, UMS WITH DESCRIPTIVE  
NOTES PT.HT., SHIPRIGHT (SCM, BWMP (F))

Complement..... 25 (persons)

## 1.1.2 Principal dimensions

Length Over All (LOA)..... 190.000 (m)

Length Betw. Perpendiculars (LBP)... 183.300 (m)

Breadth (moulded)..... 32.260 (m)

Design draft (moulded)..... 11.100 (m)

Scantling draft (moulded)..... 13.000 (m)

Ship depth (moulded)..... 18.500 (m)

## 1.1.3 Draft(moulded) &amp; Deadweight

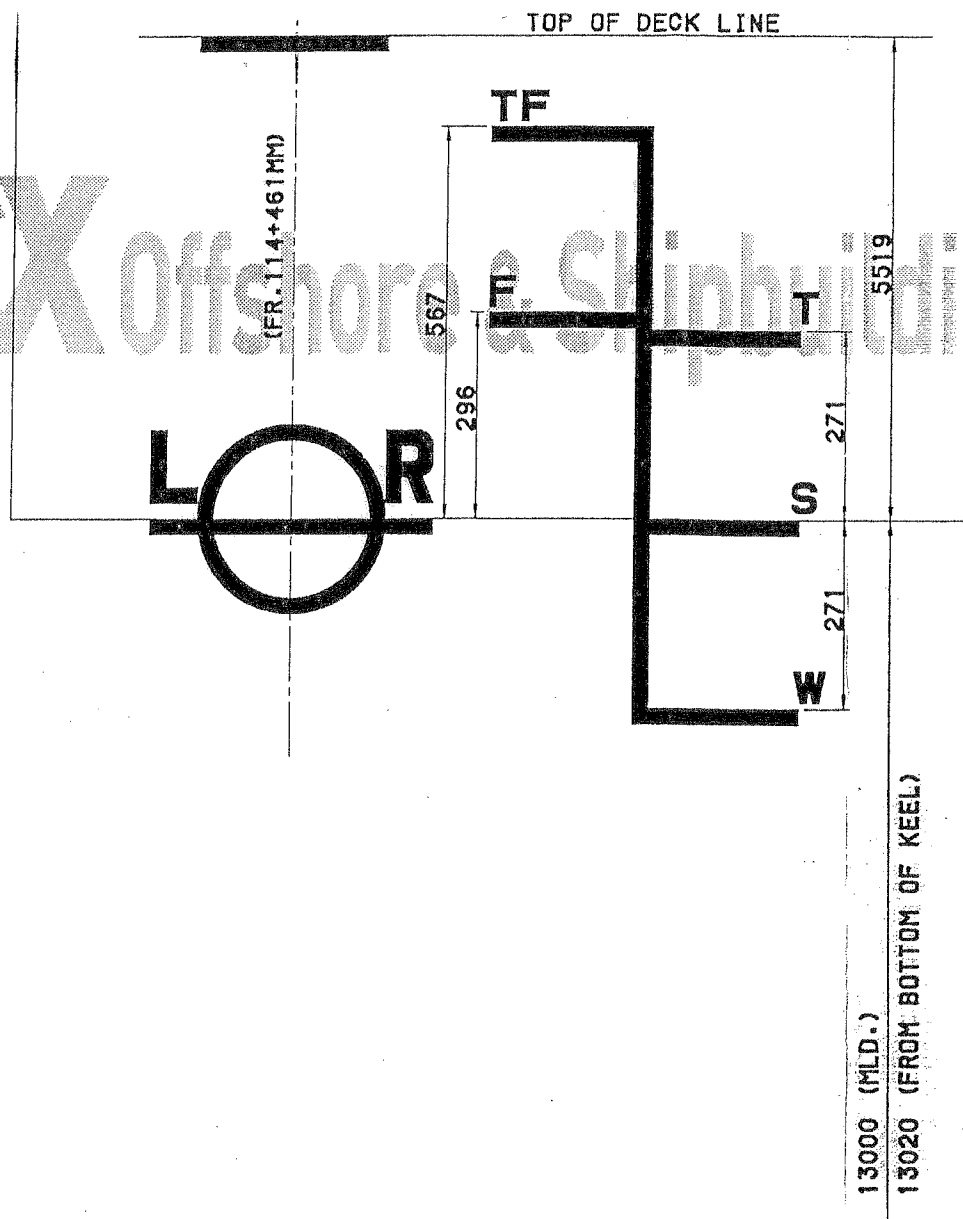
ITEM	DRAFT m	DISPLACEMENT t	DEADWEIGHT t	CB m
Design load	11.100	56978.9	46878.9	0.8445
Scantling load	13.000	67795.5	57695.5	0.8581

## 1.2 General Description

This Booklet is contains various information and data necessary for the ship's safe navigation and adequate stowage of cargo and makes it easy to calculate the trim & stability and longitudinal strength of the ship.

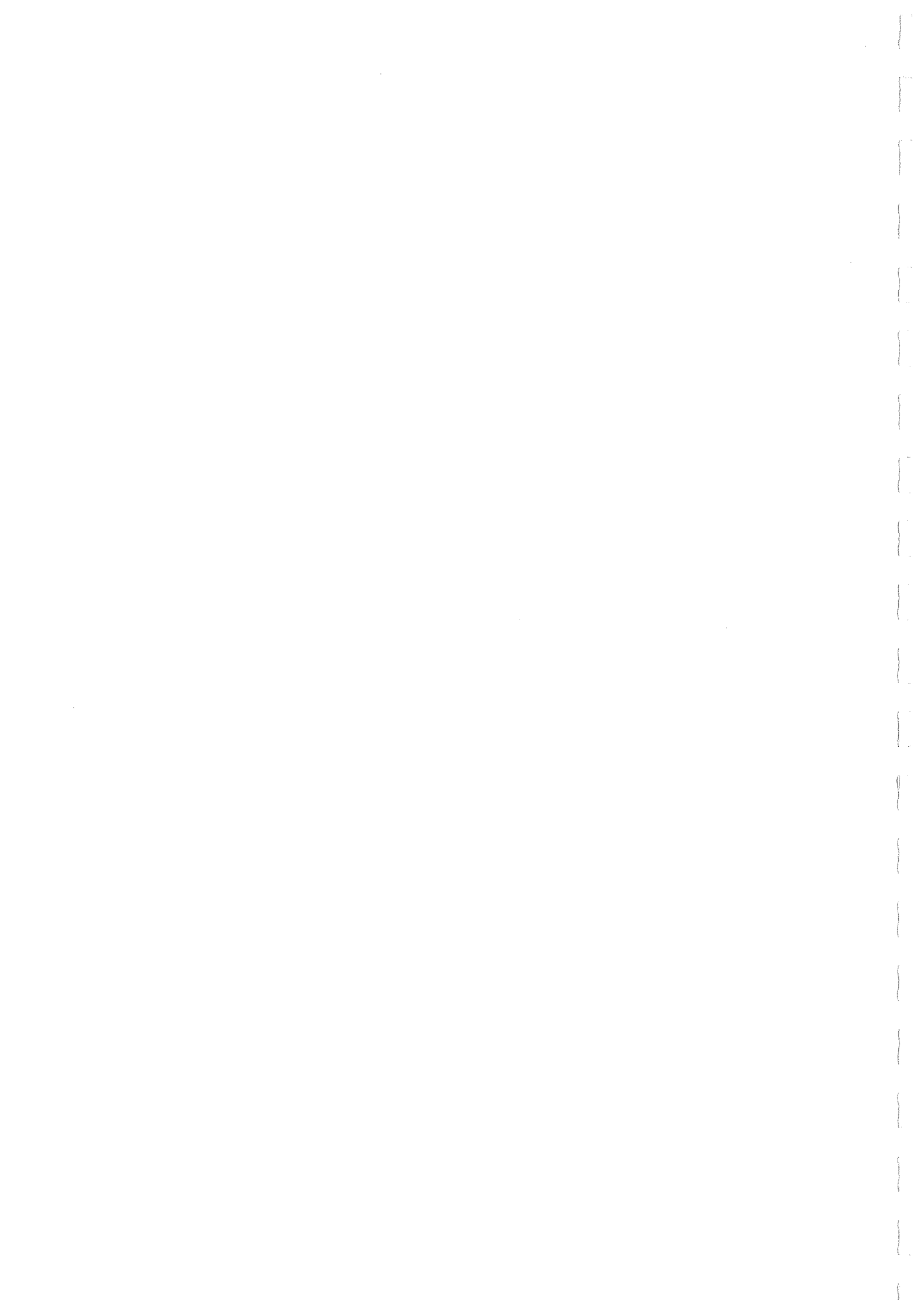
The longitudinal strength calculation is made to check that the bending moments and shearforce are within the allowable limits.

- 1) LCB, LCG, LCF were measured from midship, except special mentioned on. Midship is defined as 91.650 m (LBP/2) from A.P.
- 2) Sagging Bending Moments and deflections are given with a negative sign.
- 3) Negative shear forces imply a buoyancy surplus aft of section.
- 4) Weight and length unit are metric tonnes (of 1000 kg) and meter respectively.
- 5) The meaning of signs in all loading condition are as bellows.
  - a) Trim  
In such case, please be sure that the calculation method and various  
+ positive sign ; Trim by the stem  
- negative sign ; Trim by the stern  
design restriction stated in the booklet should be strictly observed.
  - b) L.C.G, L.C.B, L.C.F and moments  
+ positive sign ; Forward from Midship  
- negative sign ; After from Midship
- 6) When you use this booklet please refer to the plans and drawings mentioned below.
  - a) GENERAL ARRANGEMENT
  - b) CAPACITY PLAN
  - c) TANK SOUNDING TABLE
  - d) MIDSHIP SECTION
  - e) CONSTRUCTION PROFILES AND DECK PLAN
  - f) PUMPING PLAN



ITEM	FREEBOARD	DRAFT (MLD)	DENSITY	DISPLACEMENT	DEADWEIGHT
	m	m	t/m <sup>3</sup>	t	t
TROPICAL FRESH	4.952	13.567	1.000	69316.3	58921.4
FRESH	5.223	13.296		67797.9	57402.9
TROPICAL	5.248	13.271	1.025	69349.3	58954.4
SUMMER	5.519	13.000		67795.5	57400.5
WINTER	5.79	12.729		66244.2	55849.2

LIGHTWEIGHT : 10394.989 Tons



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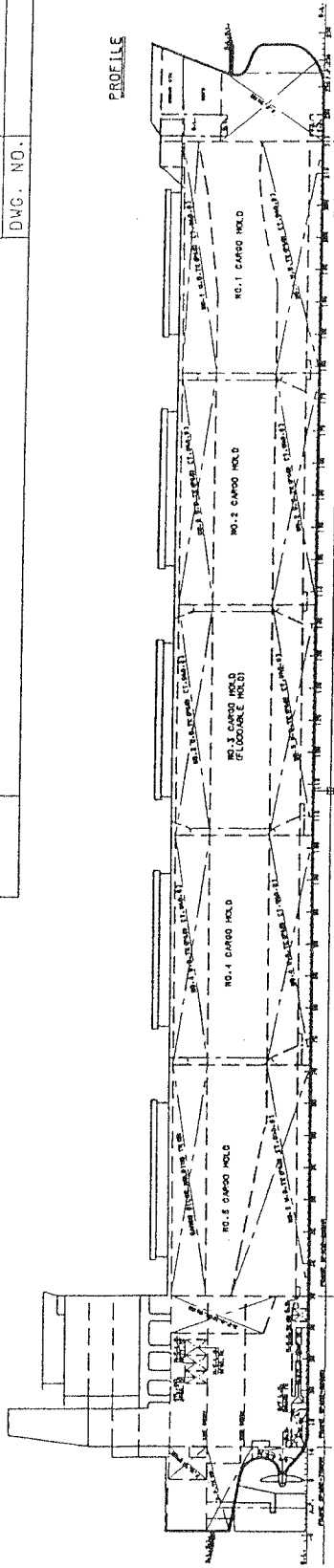
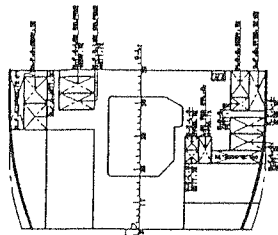
# 3. TANK PLAN

PAGE **3/**

MODEL NO. **D2007/2016**

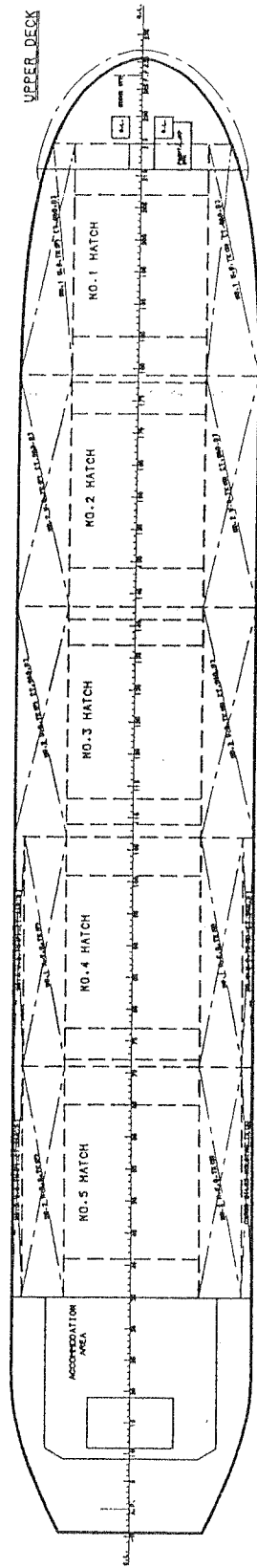
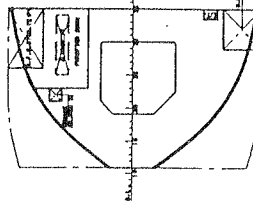
DWG. NO.

1ST DECK



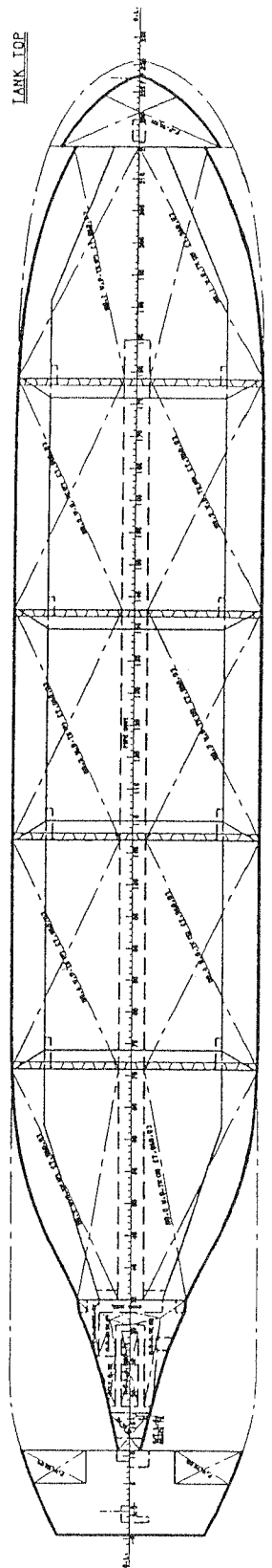
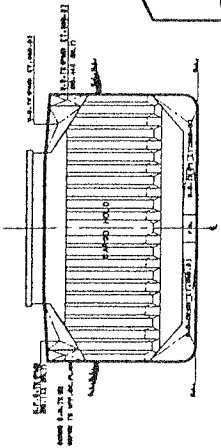
PROFILE

2ND DECK



UPPER DECK

MIDSHIP SECTION



TANK TOP

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STX Shipbuilding Co., Ltd

FORM NAME : PB313 (L) 420 MM X (9) 292 MM

## 1.4 Abbreviations

## \* Hydrostatic Particulars

DRAFT (MLD.)	: Mean Draft Above Base Line (M)
DRAFT (B.O.K)	: Mean Draft Above Bottom of Keel (M)
DIS.(S.W)	: Displacement (TON)-Density 1.025
DIS.(F.W)	: Displacement (TON)-Density 1.000
VOL.(MLD)	: Volume Moulded (M**3)
L.C.F	: Longitudinal Center of Floating (M)
L.C.B	: Longitudinal Center of Buoyancy (M)
V.C.B	: Vertical Center of Buoyancy (M)
T.P.C	: Displacement per 1CM Immersion (TON/CM)
M.T.C	: Moment to Change Trim 1CM (TON*M)
K.M.T	: Transverse Metacenter Above Base (M)
Cb	: Block coefficient
Cp	: Prismatic coefficient
Cw	: Waterplane Area coefficient
Cm	: Midship section Area coefficient
W.P.A	: Water Plane Area Total (M**2)
W.S.A	: Wetted Surface Area (M**2)

## \* Cross Curves

DRAFT (MLD.)	: Mean Draft Above Base Line (M)
K N	: Cross Curve Ordinate (m)
Theta	: Angle of Inclination (degrees)

## \* Loading Calculations

V.C.G	: Vertical Center of Gravity (m)
L.C.G	: Longitudinal Center of Gravity (m)
T.C.G	: Transverse Center of Gravity (m)
FRSM	: Free Surface Moment (ton*m)
EQUIV. DRAFT	: Equivalent Draft from Bottom of Keel
GM	: Transverse Metacentric Height above Vertical Center of Gravity
GGo	: Correction of Free Surface Moment
GoM	: Corrected Metacentric Height

## \* Notes

- 1) for L.C.B, L.C.G AND L.C.G '-' (Minus Sign) means 'After Midship'  
'+' (Plus Sign) means 'Forward Midship'
- 2) for T.C.G and HEEL.ANG. '-' (Minus Sign) means 'Port Side'  
'+' (Plus Sign) means 'Stb'd Side'
- 3) for Trim '-' (Minus Sign) means 'Trim by the Stern'  
'+' (Plus Sign) means 'Trim by the Bow'
- 4) Specific Gravity of Sea Water is assumed to be 1.025.
- 5) All vertical distance related to the baseline except draft.
- 6) All longitudinal distance related to the Midship.
- 7) The Coefficients are based on the proportions of the actual waterline.



## 1.5 Metric Conversion Table

## Metric equivalents

A to B.....A.....	B.....	B to A
0.03937.....	Millimeters.....	Inches.....25.4
0.3937.....	Centimeters.....	Inches.....2.54
3.2808.....	Meters.....	Feet.....0.3048
2.2046.....	Kilogrammes.....	Pounds.....0.45359
0.0009842...	Kilogrammes.....	Tons (2240 lbs).....1016.047
0.9842.....	Metric tons.....	Tons (2240 lbs).....1.016
2.4998.....	Metric tons per 1 cm imm.....	Tons per 1 inch imm.....0.400
8.2014.....	Moment to change trim 1cm.....	Moment to change trim 1 inch...0.1219
187.9767....	Meter radians.....	Feet degrees.....0.0053

## Relation between weight and volume

1000 Cubic millimeters (S.G. 1.0).....	= 1 Cubic centimeter
1 Cubic centimeter of fresh water (S.G. 1.0).....	= 1 Gram
1000 Cubic centimeter of fresh water (S.G. 1.0).....	= 1 Kilogram (1000 grammes)
1 Cubic meter of fresh water (S.G. 1.0).....	= 1 Tonnes (1000 Kilos)
1 Cubic meter of salt water (S.G. 1.025).....	= 1.025 Tonnes
1 Cubic meter.....	= 35.315 Cubic feet
1 Cubic foot.....	= 0.02832 Cubic meters

1.6 Stowage Factor Conversion Table

SG (Ton/M3)	SF (ft3/LT)	SG (Ton/M3)	SF (ft3/LT)	SG (Ton/M3)	SF (ft3/LT)	SG (Ton/M3)	SF (ft3/LT)	SG (Ton/M3)	SF (ft3/LT)
0.55	65.24	1.09	32.92	1.63	22.01	2.17	16.53	2.71	13.24
0.56	64.07	1.10	32.62	1.64	21.88	2.18	16.46	2.72	13.19
0.57	62.95	1.11	32.33	1.65	21.75	2.19	16.38	2.73	13.14
0.58	61.86	1.12	32.04	1.66	21.62	2.20	16.31	2.74	13.10
0.59	60.82	1.13	31.75	1.67	21.49	2.21	16.24	2.75	13.05
0.60	59.80	1.14	31.47	1.68	21.36	2.22	16.16	2.76	13.00
0.61	58.82	1.15	31.20	1.69	21.23	2.23	16.09	2.77	12.95
0.62	57.87	1.16	30.93	1.70	21.11	2.24	16.02	2.78	12.91
0.63	56.95	1.17	30.67	1.71	20.98	2.25	15.95	2.79	12.86
0.64	56.06	1.18	30.41	1.72	20.86	2.26	15.88	2.80	12.81
0.65	55.20	1.19	30.15	1.73	20.74	2.27	15.81	2.81	12.77
0.66	54.37	1.20	29.90	1.74	20.62	2.28	15.74	2.82	12.72
0.67	53.55	1.21	29.65	1.75	20.50	2.29	15.67	2.83	12.68
0.68	52.77	1.22	29.41	1.76	20.39	2.30	15.60	2.84	12.63
0.69	52.00	1.23	29.17	1.77	20.27	2.31	15.53	2.85	12.59
0.70	51.26	1.24	28.94	1.78	20.16	2.32	15.47	2.86	12.55
0.71	50.54	1.25	28.70	1.79	20.05	2.33	15.40	2.87	12.50
0.72	49.83	1.26	28.48	1.80	19.93	2.34	15.33	2.88	12.46
0.73	49.15	1.27	28.25	1.81	19.82	2.35	15.27	2.89	12.42
0.74	48.49	1.28	28.03	1.82	19.71	2.36	15.20	2.90	12.37
0.75	47.84	1.29	27.81	1.83	19.61	2.37	15.14	2.91	12.33
0.76	47.21	1.30	27.60	1.84	19.50	2.38	15.08	2.92	12.29
0.77	46.60	1.31	27.39	1.85	19.40	2.39	15.01	2.93	12.25
0.78	46.00	1.32	27.18	1.86	19.29	2.40	14.95	2.94	12.20
0.79	45.42	1.33	26.98	1.87	19.19	2.41	14.89	2.95	12.16
0.80	44.85	1.34	26.78	1.88	19.09	2.42	14.83	2.96	12.12
0.81	44.30	1.35	26.58	1.89	18.98	2.43	14.77	2.97	12.08
0.82	43.76	1.36	26.38	1.90	18.88	2.44	14.71	2.98	12.04
0.83	43.23	1.37	26.19	1.91	18.79	2.45	14.65	2.99	12.00
0.84	42.72	1.38	26.00	1.92	18.69	2.46	14.59	3.00	11.96
0.85	42.21	1.39	25.81	1.93	18.59	2.47	14.53	3.01	11.92
0.86	41.72	1.40	25.63	1.94	18.50	2.48	14.47	3.02	11.88
0.87	41.24	1.41	25.45	1.95	18.40	2.49	14.41	3.03	11.84
0.88	40.77	1.42	25.27	1.96	18.31	2.50	14.35	3.04	11.80
0.89	40.32	1.43	25.09	1.97	18.21	2.51	14.30	3.05	11.76
0.90	39.87	1.44	24.92	1.98	18.12	2.52	14.24	3.06	11.73
0.91	39.43	1.45	24.75	1.99	18.03	2.53	14.18	3.07	11.69
0.92	39.00	1.46	24.58	2.00	17.94	2.54	14.13	3.08	11.65
0.93	38.58	1.47	24.41	2.01	17.85	2.55	14.07	3.09	11.61
0.94	38.17	1.48	24.24	2.02	17.76	2.56	14.02	3.10	11.57
0.95	37.77	1.49	24.08	2.03	17.68	2.57	13.96	3.11	11.54
0.96	37.38	1.50	23.92	2.04	17.59	2.58	13.91	3.12	11.50
0.97	36.99	1.51	23.76	2.05	17.50	2.59	13.85	3.13	11.46
0.98	36.61	1.52	23.61	2.06	17.42	2.60	13.80	3.14	11.43
0.99	36.24	1.53	23.45	2.07	17.33	2.61	13.75	3.15	11.39
1.00	35.88	1.54	23.30	2.08	17.25	2.62	13.70	3.16	11.35
1.01	35.53	1.55	23.15	2.09	17.17	2.63	13.64	3.17	11.32
1.02	35.18	1.56	23.00	2.10	17.09	2.64	13.59	3.18	11.28
1.03	34.84	1.57	22.85	2.11	17.01	2.65	13.54	3.19	11.25
1.04	34.50	1.58	22.71	2.12	16.92	2.66	13.49	3.20	11.21
1.05	34.17	1.59	22.57	2.13	16.85	2.67	13.44	3.21	11.18
1.06	33.85	1.60	22.43	2.14	16.77	2.68	13.39	3.22	11.14
1.07	33.53	1.61	22.29	2.15	16.69	2.69	13.34	3.23	11.11
1.08	33.22	1.62	22.15	2.16	16.61	2.70	13.29	3.24	11.07

Cubic Feet / Longtons to Specific Gravity

$$SG[\text{Ton/M}^3] = 35.314 / (0.9842 \times \text{SF})$$

SF (ft <sup>3</sup> /LT)	SG (Ton/M <sup>3</sup> )
10	3.5881
11	3.2619
12	2.9901
13	2.7601
14	2.5629
15	2.3921
16	2.2426
17	2.1106
18	1.9934
19	1.8885
20	1.7940
21	1.7086
22	1.6310
23	1.5600
24	1.4950
25	1.4352
26	1.3800
27	1.3289
28	1.2815
29	1.2373
30	1.1960
31	1.1574
32	1.1213
33	1.0873
34	1.0553
35	1.0252
36	0.9967
37	0.9698
38	0.9442
39	0.9200
40	0.8970
41	0.8751
42	0.8543
43	0.8344
44	0.8155
45	0.7974
46	0.7800
47	0.7634
48	0.7475
49	0.7323
50	0.7176
51	0.7035
52	0.6900
53	0.6770
54	0.6645
55	0.6524
56	0.6407
57	0.6295
58	0.6186
59	0.6082
60	0.5980
61	0.5882
62	0.5787
63	0.5695
64	0.5606

## 1.7 Frame Distance Table

FR.NO	F.S	FROM A.P	FROM MIDSHIP	FROM FP	FR.NO	F.S	FROM A.P	FROM MIDSHIP	FROM FP
-5	700	-3500	-95150	-186800	43	820	33460	-58190	-149840
-4	700	-2800	-94450	-186100	44	820	34280	-57370	-149020
-3	700	-2100	-93750	-185400	45	820	35100	-56550	-148200
-2	700	-1400	-93050	-184700	46	820	35920	-55730	-147380
-1	700	-700	-92350	-184000	47	820	36740	-54910	-146560
0	700	-0	-91650	-183300	48	820	37560	-54090	-145740
1	700	700	-90950	-182600	49	820	38380	-53270	-144920
2	700	1400	-90250	-181900	50	820	39200	-52450	-144100
3	700	2100	-89550	-181200	51	820	40020	-51630	-143280
4	700	2800	-88850	-180500	52	820	40840	-50810	-142460
5	700	3500	-88150	-179800	53	820	41660	-49990	-141640
6	700	4200	-87450	-179100	54	820	42480	-49170	-140820
7	700	4900	-86750	-178400	55	820	43300	-48350	-140000
8	700	5600	-86050	-177700	56	820	44120	-47530	-139180
9	700	6300	-85350	-177000	57	820	44940	-46710	-138360
10	700	7000	-84650	-176300	58	820	45760	-45890	-137540
11	800	7700	-83950	-175600	59	820	46580	-45070	-136720
12	800	8500	-83150	-174800	60	820	47400	-44250	-135900
13	800	9300	-82350	-174000	61	820	48220	-43430	-135080
14	800	10100	-81550	-173200	62	820	49040	-42610	-134260
15	800	10900	-80750	-172400	63	820	49860	-41790	-133440
16	800	11700	-79950	-171600	64	820	50680	-40970	-132620
17	800	12500	-79150	-170800	65	820	51500	-40150	-131800
18	800	13300	-78350	-170000	66	820	52320	-39330	-130980
19	800	14100	-77550	-169200	67	820	53140	-38510	-130160
20	800	14900	-76750	-168400	68	820	53960	-37690	-129340
21	800	15700	-75950	-167600	69	820	54780	-36870	-128520
22	800	16500	-75150	-166800	70	820	55600	-36050	-127700
23	800	17300	-74350	-166000	71	820	56420	-35230	-126880
24	800	18100	-73550	-165200	72	820	57240	-34410	-126060
25	800	18900	-72750	-164400	73	820	58060	-33590	-125240
26	800	19700	-71950	-163600	74	820	58880	-32770	-124420
27	800	20500	-71150	-162800	75	820	59700	-31950	-123600
28	800	21300	-70350	-162000	76	820	60520	-31130	-122780
29	800	22100	-69550	-161200	77	820	61340	-30310	-121960
30	800	22900	-68750	-160400	78	820	62160	-29490	-121140
31	800	23700	-67950	-159600	79	820	62980	-28670	-120320
32	800	24500	-67150	-158800	80	820	63800	-27850	-119500
33	800	25300	-66350	-158000	81	820	64620	-27030	-118680
34	800	26100	-65550	-157200	82	820	65440	-26210	-117860
35	820	26900	-64750	-156400	83	820	66260	-25390	-117040
36	820	27720	-63930	-155580	84	820	67080	-24570	-116220
37	820	28540	-63110	-154760	85	820	67900	-23750	-115400
38	820	29360	-62290	-153940	86	820	68720	-22930	-114580
39	820	30180	-61470	-153120	87	820	69540	-22110	-113760
40	820	31000	-60650	-152300	88	820	70360	-21290	-112940
41	820	31820	-59830	-151480	89	820	71180	-20470	-112120
42	820	32640	-59010	-150660	90	820	72000	-19650	-111300

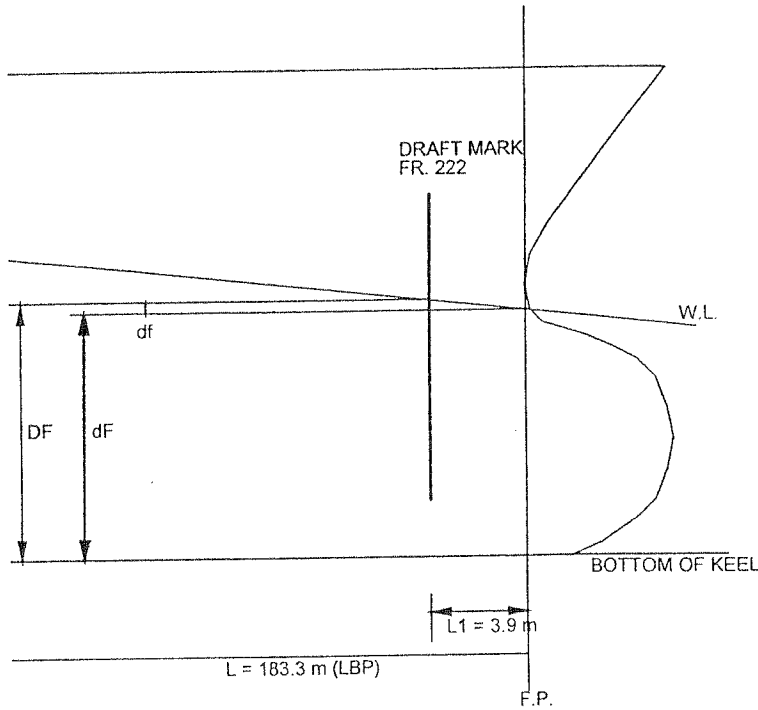
FR.NO	F.S	FROM A.P	FROM MIDSHIP	FROM FP	FR.NO	F.S	FROM A.P	FROM MIDSHIP	FROM FP
91	820	72820	-18830	-110480	139	820	112180	20530	-71120
92	820	73640	-18010	-109660	140	820	113000	21350	-70300
93	820	74460	-17190	-108840	141	820	113820	22170	-69480
94	820	75280	-16370	-108020	142	820	114640	22990	-68660
95	820	76100	-15550	-107200	143	820	115460	23810	-67840
96	820	76920	-14730	-106380	144	820	116280	24630	-67020
97	820	77740	-13910	-105560	145	820	117100	25450	-66200
98	820	78560	-13090	-104740	146	820	117920	26270	-65380
99	820	79380	-12270	-103920	147	820	118740	27090	-64560
100	820	80200	-11450	-103100	148	820	119560	27910	-63740
101	820	81020	-10630	-102280	149	820	120380	28730	-62920
102	820	81840	-9810	-101460	150	820	121200	29550	-62100
103	820	82660	-8990	-100640	151	820	122020	30370	-61280
104	820	83480	-8170	-99820	152	820	122840	31190	-60460
105	820	84300	-7350	-99000	153	820	123660	32010	-59640
106	820	85120	-6530	-98180	154	820	124480	32830	-58820
107	820	85940	-5710	-97360	155	820	125300	33650	-58000
108	820	86760	-4890	-96540	156	820	126120	34470	-57180
109	820	87580	-4070	-95720	157	820	126940	35290	-56360
110	820	88400	-3250	-94900	158	820	127760	36110	-55540
111	820	89220	-2430	-94080	159	820	128580	36930	-54720
112	820	90040	-1610	-93260	160	820	129400	37750	-53900
113	820	90860	-790	-92440	161	820	130220	38570	-53080
114	820	91680	30	-91620	162	820	131040	39390	-52260
115	820	92500	850	-90800	163	820	131860	40210	-51440
116	820	93320	1670	-89980	164	820	132680	41030	-50620
117	820	94140	2490	-89160	165	820	133500	41850	-49800
118	820	94960	3310	-88340	166	820	134320	42670	-48980
119	820	95780	4130	-87520	167	820	135140	43490	-48160
120	820	96600	4950	-86700	168	820	135960	44310	-47340
121	820	97420	5770	-85880	169	820	136780	45130	-46520
122	820	98240	6590	-85060	170	820	137600	45950	-45700
123	820	99060	7410	-84240	171	820	138420	46770	-44880
124	820	99880	8230	-83420	172	820	139240	47590	-44060
125	820	100700	9050	-82600	173	820	140060	48410	-43240
126	820	101520	9870	-81780	174	820	140880	49230	-42420
127	820	102340	10690	-80960	175	820	141700	50050	-41600
128	820	103160	11510	-80140	176	820	142520	50870	-40780
129	820	103980	12330	-79320	177	820	143340	51690	-39960
130	820	104800	13150	-78500	178	820	144160	52510	-39140
131	820	105620	13970	-77680	179	820	144980	53330	-38320
132	820	106440	14790	-76860	180	820	145800	54150	-37500
133	820	107260	15610	-76040	181	820	146620	54970	-36680
134	820	108080	16430	-75220	182	820	147440	55790	-35860
135	820	108900	17250	-74400	183	820	148260	56610	-35040
136	820	109720	18070	-73580	184	820	149080	57430	-34220
137	820	110540	18890	-72760	185	820	149900	58250	-33400
138	820	111360	19710	-71940	186	820	150720	59070	-32580

FR.NO	F.S	FROM A.P	FROM MIDSHIP	FROM FP	FR.NO	F.S	FROM A.P	FROM MIDSHIP	FROM FP
187	820	151540	59890	-31760	212	820	172040	80390	-11260
188	820	152360	60710	-30940	213	820	172860	81210	-10440
189	820	153180	61530	-30120	214	820	173680	82030	-9620
190	820	154000	62350	-29300	215	700	174500	82850	-8800
191	820	154820	63170	-28480	216	700	175200	83550	-8100
192	820	155640	63990	-27660	217	700	175900	84250	-7400
193	820	156460	64810	-26840	218	700	176600	84950	-6700
194	820	157280	65630	-26020	219	700	177300	85650	-6000
195	820	158100	66450	-25200	220	700	178000	86350	-5300
196	820	158920	67270	-24380	221	700	178700	87050	-4600
197	820	159740	68090	-23560	222	700	179400	87750	-3900
198	820	160560	68910	-22740	223	700	180100	88450	-3200
199	820	161380	69730	-21920	224	700	180800	89150	-2500
200	820	162200	70550	-21100	225	700	181500	89850	-1800
201	820	163020	71370	-20280	226	700	182200	90550	-1100
202	820	163840	72190	-19460	227	700	182900	91250	-400
203	820	164660	73010	-18640	228	700	183600	91950	300
204	820	165480	73830	-17820	229	700	184300	92650	1000
205	820	166300	74650	-17000	230	700	185000	93350	1700
206	820	167120	75470	-16180	231	700	185700	94050	2400
207	820	167940	76290	-15360	232	700	186400	94750	3100
208	820	168760	77110	-14540	233	700	187100	95450	3800
209	820	169580	77930	-13720	234	700	187800	96150	4500
210	820	170400	78750	-12900	235	0	188500	96850	5200
211	820	171220	79570	-12080	235	0	188500	96850	5200

1.8 Draft Correction table

STEM DRAFT CORRECTION TABLE

FWD DRAFT MARK  
 BASED ON APPARENT TRIM BETWEEN FWD AND AFT DRAFT MARKS



STEM CORRECTION (df)

DRAFT CORRECTION BETWEEN  
 F.P. AND FWD DRAFT MARK

$$df = (L1 / (L-L1-L2)) \times \text{TRIM}$$

$$L = 183.3 \text{ m}$$

$$L1 = 3.9 \text{ m}$$

$$L2 = 10.1 \text{ m}$$

TRIM BY THE STERN

$$DF = dF - df$$

TRIM BY THE STEM

$$DF = dF + df$$

WHERE,

TRIM : APPARENT TRIM(+)  
 i.e TRIM BETWEEN AFT.  
 AND FWD DRAFT MARKS

DF : DRAFT AT F.P.

dF : DRAFT AT FWD DRAFT MARK

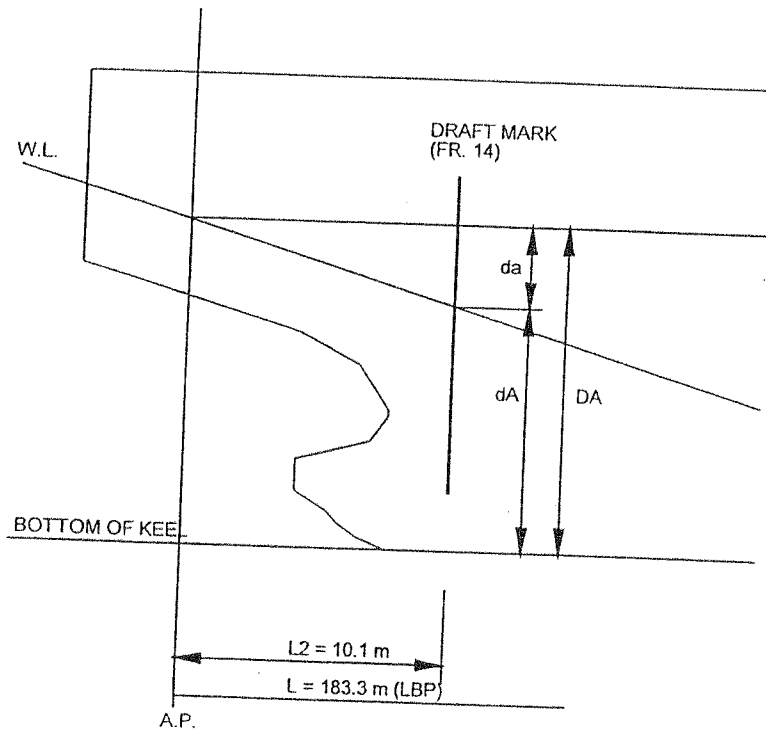
df : STEM CORR. BY TRIM

TABLE OF STEM CORRECTION (df)

Trim (m)	df (mm)	Trim (m)	df (mm)	Trim (m)	df (mm)	Trim (m)	df (mm)	Trim (m)	df (mm)
0.1	2	1.1	25	2.1	48	3.1	71	4.1	94
0.2	5	1.2	28	2.2	51	3.2	74	4.2	97
0.3	7	1.3	30	2.3	53	3.3	76	4.3	99
0.4	9	1.4	32	2.4	55	3.4	78	4.4	101
0.5	12	1.5	35	2.5	58	3.5	81	4.5	104
0.6	14	1.6	37	2.6	60	3.6	83	4.6	106
0.7	16	1.7	39	2.7	62	3.7	85	4.7	108
0.8	18	1.8	41	2.8	65	3.8	88	4.8	111
0.9	21	1.9	44	2.9	67	3.9	90	4.9	113
1.0	23	2.0	46	3.0	69	4.0	92	5.0	115

STERN DRAFT CORRECTION TABLE

AFT DRAFT MARK  
 BASED ON APPARENT TRIM BETWEEN FWD AND AFT DRAFT MARKS



STERN CORRECTION (da)

DRAFT CORRECTION BETWEEN  
 A.P. AND AFT DRAFT MARK

$$da = (L2 / (L-L1-L2)) \times \text{TRIM}$$

L = 183.3 m  
 L1 = 3.9 m  
 L2 = 10.1 m

TRIM BY THE STERN  
 DA = dA + da

TRIM BY THE STEM  
 DA = dA - da

WHERE,

TRIM : APPARENT TRIM(+)  
 i.e TRIM BETWEEN AFT.  
 AND FWD DRAFT MARKS

DA : DRAFT AT A.P.

dA : DRAFT AT AFT DRAFT MARK

da : STERN CORR. BY TRIM

TABLE OF STERN CORRECTION (da)

Trim (m)	da (mm)	Trim (m)	da (mm)	Trim (m)	da (mm)	Trim (m)	da (mm)	Trim (m)	da (mm)
0.1	6	1.1	66	2.1	125	3.1	185	4.1	245
0.2	12	1.2	72	2.2	131	3.2	191	4.2	251
0.3	18	1.3	78	2.3	137	3.3	197	4.3	257
0.4	24	1.4	84	2.4	143	3.4	203	4.4	262
0.5	30	1.5	89	2.5	149	3.5	209	4.5	268
0.6	36	1.6	95	2.6	155	3.6	215	4.6	274
0.7	42	1.7	101	2.7	161	3.7	221	4.7	280
0.8	48	1.8	107	2.8	167	3.8	227	4.8	286
0.9	54	1.9	113	2.9	173	3.9	233	4.9	292
1.0	60	2.0	119	3.0	179	4.0	239	5.0	298



## 1.9 Guidance for calculation of displacement and draft

Loading schedule should be made with due to consideration of the kinds of loaded cargo, loading port, course of navigation in order to obtain the ample stability.

When the loading schedule is different from 'LOADING CONDITIONS' in this booklet, master should be calculate the trim, stability and longitudinal strength of the ship.

In this case this manual makes it easy to calculate the stability by using the procedure describing in this booklet.

### 1.9.1 Procedure to find the real Displacement, LCB, LCF, MTC and LCG from observed drafts

#### Observed Items

df : Draft at fore draft mark (m)  
 dm : Draft at midship draft mark (m)  
 da : Draft at aft draft mark (m)  
 S.G : Specific gravity of sea water (t/m<sup>3</sup>)

#### Correction of measured draft

- a) When displacement is examined with the draft survey, and correction are follows :

DF [fore draft] = df +/- Δdf [ Δdf : fore draft correction (m)]  
 DM [mid draft] = dm +/- Δdm [ Δdm : mid draft correction (m)]  
 DA [aft draft] = da +/- Δda [ Δda : aft draft correction (m)]

Dmid [midship draft due to keel deflection] = (DF + 6DM + DA)/8

. Trim = (DF - DA)

- b) Calculation of equivalent draft (deg. : draft at LCF)

$$\text{. Deg.} = \text{Dmid} \pm \frac{\text{Trim} \times \text{L.C.F}}{\text{LBP}}$$

in case of da > dF, L.C.F. > 0 : - sign  
 in case of da > dF, L.C.F. < 0 : + sign  
 in case of da < dF, L.C.F. > 0 : + sign  
 in case of da < dF, L.C.F. < 0 : - sign

\* Notes : L.C.F find Hydro. Table at Dmid  
 LBP : length between perpendiculars

- c) Find real displacement, LCB, MTC from hydro. Table

$$\text{. Real displacement } (\Delta) = \text{Displacement} \times \frac{\text{S.G.}}{1.025}$$

(Displacement : refer to Hydro. table)

- d) Calculation of L.C.G

$$\text{. BGL} = \frac{100 \times \text{MTC} \times \text{Trim}}{\Delta}$$

\* Notes : BGL = L.C.G - L.C.B

## 1.9.2 Procedure to find GoM from displacement, LCG and VCG

a) Pick up the following values at the draft deq. (refer to Hydro. Table)

- . L.C.B : Longitudinal center of Buoyancy (m)
- . L.C.F : Longitudinal center of floating (m)
- . M.T.C : Moment to change trim 1 cm (ton\*m)
- . K.M.T : Transverse metacenter (m)

b) Calculation of draft and Trim

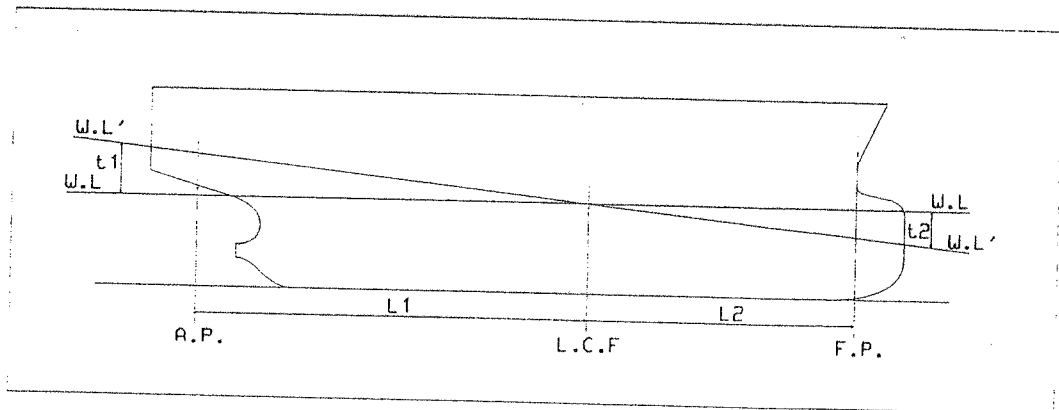
$$\text{Trim} = \frac{\Delta \times \text{BGL}}{\text{M.T.C} \times 100}$$

$$\text{DF} = \text{deq.} + \left( \frac{\text{LBP}/2 - \text{LCF}}{\text{LBP}} \right) \times \text{Trim}$$

$$\text{DA} = \text{deq.} - \left( \frac{\text{LBP}/2 + \text{LCF}}{\text{LBP}} \right) \times \text{Trim}$$

$$\text{DM} = (\text{DA} + \text{DF}) / 2$$

>>> Example : procedure to find DA, DF at trim by the stern <<<



$$\text{DA} = \text{Deq.} + t1 = \text{Deq.} + \frac{/(L1 \times \text{Trim})/}{\text{LBP}}$$

$$\text{DF} = \text{Deq.} - t2 = \text{Deq.} - \frac{/(L2 \times \text{Trim})/}{\text{LBP}}$$

c) Calculation of GoM (corrected metacentric height)

- . GoM = KMT - KG (V.C.G) - GGo
- . GoM = G M - GGo
- . KGo = K G + GGo
- . GoM = KMT - KGo

\* GGo (loss in GM due to free surface effect)

$$= \frac{(\text{transverse moment of inertia} \times \text{S.G. liquid in tank})}{\text{Displacement of vessel in ton}}$$

## 1.9.3 Example : Procedure to find real displacement and L.C.G

		DERIVED FROM	RESULT OF CALCULATION		
		DRAFT(MEASURED)	FORE	MIDSHIP	AFT
1	DRAFT AT DRAFT MARK	PORT	11.000	12.000	13.000
		STARBOARD	11.000	12.000	13.000
2	MEAN DRAFT	$(P + S) / 2$	11.000	12.000	13.000
3	CORRECTION OF DRAFT	REF. TO DRAFT CORRECTION TABLE	-0.046	0.000	0.119
4	DRAFT AT A.P & F.P	$(2) + (3)$	(A) 10.954	(B) 12.000	(C) 13.119
5	MULTIFLY VARIABLE	CONSTANT	1	6	1
6	CORRECTION OF DRAFT DUE TO KEEL DEFLECTION	$(4) \times (5)$	(D) 10.954	(E) 72.000	(F) 13.119
7	MIDSHIP DRAFT DUE TO (6)	$(D+E+F)/8$	12.009		
8	ACTUAL TRIM	$(A) - (C)$	-2.165		
9	L.C.F. AT DRAFT (7)	HYDRO. TABLE	-2.575		
10	CORRECTION DRAFT DUE TO TRIM	$\frac{(9) \times (8)}{\text{LBP}}$	0.030		
11	EQUIVALENT DRAFT (Deq.)	$(7) + (10)$	12.039		
12	DISPLACEMENT AT Deq. (11)	HYDRO. TABLE	62192.2		
13	MEASURED S.G.		1.026		
14	REAL DISPLACEMENT	$(12) \times \frac{(13)}{1.025}$	62252.9		
15	M.T.C AT Deq. (11)	HYDRO. TABLE	782.26		
16	L.C.B AT Deq. (11)	HYDRO. TABLE	4.614		
17	BGL AT DISPLACEMENT (14)	$\frac{100 \times (15) \times (8)}{(14)}$	-2.720		
18	L.C.G AT DISPLACEMENT (14)	$(16) + (17)$	1.894		

2 General DATA

2.1 Propeller Immersion Diagram

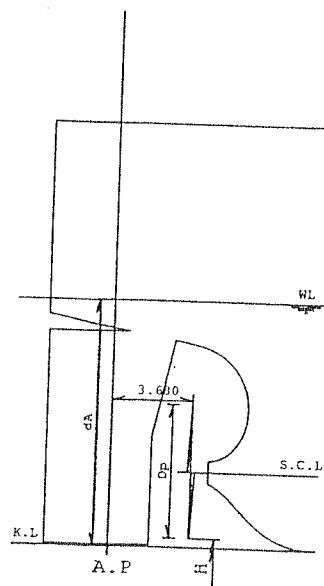
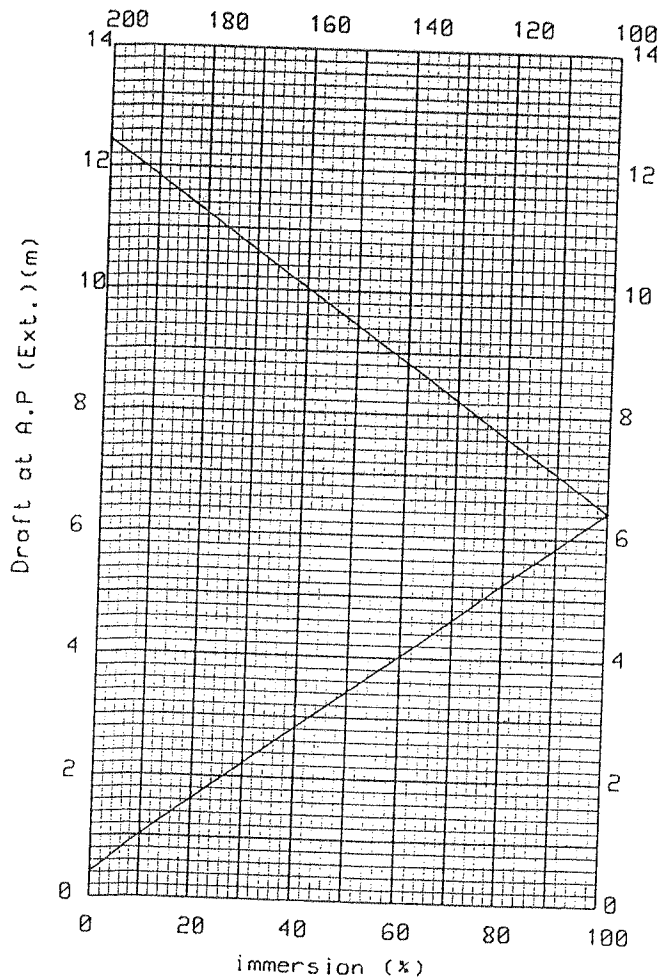
$$\text{Propeller Immersion} : \left( dA + \frac{(3.680 \times \text{Trim})}{\text{LBP}} - H \right) / Dp \times 100 (\text{in } \%)$$

where. dA : Draught at A.P (in m)

H : Height of lowest tip of propeller blade A/K.L ( 0.420 m )

Dp : Propeller Diameter ( 6.000 m )

note : From the definition of propeller immersion, a propeller immersion of 100% means that the upper tip of the propeller blade is immersed just to the level of the waterline.



## 2.2 Trim correction tables

## TRIM TABLE

S.W. : 1.025

CHANGE OF DRAUGHT DUE TO 100 TONNES LOADED TO THE L.C.G. OF EACH TANK

(UNIT : METER)

TANK NAME	DRAUGHT POSITION	DRAUGHT (M)					
		4.00	5.00	6.00	7.00	8.00	9.00
F.P.TK(C)	AFT	-0.057	-0.055	-0.052	-0.050	-0.048	-0.045
	FWD	0.085	0.083	0.082	0.081	0.080	0.079
NO.1 W.B.TK(P)	AFT	-0.038	-0.037	-0.035	-0.034	-0.032	-0.030
NO.1 W.B.TK(S)	FWD	0.069	0.068	0.067	0.066	0.066	0.065
NO.2 W.B.TK(P)	AFT	-0.010	-0.010	-0.010	-0.009	-0.009	-0.009
NO.2 W.B.TK(S)	FWD	0.045	0.045	0.044	0.044	0.044	0.044
NO.3 W.B.TK(P)	AFT	0.018	0.018	0.017	0.015	0.014	0.013
NO.3 W.B.TK(S)	FWD	0.021	0.021	0.022	0.022	0.023	0.023
NO.4 W.B.TK(P)	AFT	0.047	0.045	0.043	0.040	0.038	0.035
NO.4 W.B.TK(S)	FWD	-0.003	-0.002	-0.001	-0.000	0.001	0.002
NO.5 W.B.TK(P)	AFT	0.076	0.073	0.069	0.066	0.062	0.057
	FWD	-0.028	-0.026	-0.025	-0.023	-0.021	-0.019
NO.5 W.B.TK(S)	AFT	0.076	0.073	0.069	0.066	0.062	0.057
	FWD	-0.028	-0.026	-0.025	-0.023	-0.021	-0.019
A.P.TK(C)	AFT	0.113	0.108	0.103	0.097	0.092	0.085
	FWD	-0.059	-0.056	-0.054	-0.051	-0.049	-0.046
NO.3 CARGO HOLD(FLOOD.)	AFT	0.018	0.018	0.017	0.015	0.014	0.013
	FWD	0.021	0.021	0.022	0.022	0.023	0.023
NO.1 CARGO HOLD	AFT	-0.038	-0.036	-0.035	-0.033	-0.032	-0.030
	FWD	0.069	0.067	0.066	0.066	0.065	0.065
NO.2 CARGO HOLD	AFT	-0.010	-0.009	-0.009	-0.009	-0.009	-0.008
	FWD	0.045	0.044	0.044	0.044	0.044	0.044
NO.3 CARGO HOLD	AFT	0.018	0.018	0.017	0.015	0.014	0.013
	FWD	0.021	0.021	0.022	0.022	0.023	0.023
NO.4 CARGO HOLD	AFT	0.047	0.044	0.042	0.040	0.037	0.035
	FWD	-0.003	-0.002	-0.001	0.000	0.001	0.003
NO.5 CARGO HOLD	AFT	0.075	0.072	0.068	0.064	0.061	0.056
	FWD	-0.027	-0.025	-0.024	-0.022	-0.020	-0.018
F.W.TK(P)	AFT	0.111	0.106	0.101	0.095	0.090	0.084
F.W.TK(S)	FWD	-0.057	-0.055	-0.052	-0.050	-0.047	-0.044
NO.1 H.F.O.TK(P)	AFT	0.047	0.045	0.043	0.040	0.038	0.035
NO.1 H.F.O.TK(S)	FWD	-0.003	-0.002	-0.001	-0.000	0.001	0.002
NO.2 H.F.O.TK(P)	AFT	0.076	0.072	0.069	0.065	0.061	0.057
NO.2 H.F.O.TK(S)	FWD	-0.027	-0.026	-0.024	-0.022	-0.021	-0.019
H.F.O.STOR.TK(P)	AFT	0.093	0.089	0.085	0.080	0.076	0.070
	FWD	-0.042	-0.040	-0.038	-0.036	-0.034	-0.031
H.F.O.STOR.TK(S)	AFT	0.092	0.088	0.084	0.079	0.075	0.070
	FWD	-0.042	-0.040	-0.037	-0.035	-0.033	-0.031
CARGO BILGE HOLDING TK(S)	AFT	0.076	0.072	0.069	0.065	0.061	0.057
	FWD	-0.027	-0.026	-0.024	-0.022	-0.021	-0.019

## TRIM TABLE

S.W. : 1.025

CHANGE OF DRAUGHT DUE TO 100 TONNES LOADED TO THE L.C.G. OF EACH TANK  
(UNIT : METER)

TANK NAME	DRAUGHT POSITION	DRAUGHT (M)					
		10.0	11.00	12.00	13.00	14.00	15.00
F.P.TK(C)	AFT	-0.042	-0.039	-0.038	-0.037	-0.036	-0.036
	FWD	0.078	0.077	0.076	0.076	0.075	0.074
NO.1 W.B.TK(P)	AFT	-0.028	-0.027	-0.026	-0.025	-0.025	-0.024
NO.1 W.B.TK(S)	FWD	0.065	0.064	0.064	0.063	0.063	0.062
NO.2 W.B.TK(P)	AFT	-0.009	-0.008	-0.008	-0.008	-0.008	-0.007
NO.2 W.B.TK(S)	FWD	0.045	0.045	0.045	0.044	0.044	0.044
NO.3 W.B.TK(P)	AFT	0.012	0.011	0.010	0.010	0.010	0.010
NO.3 W.B.TK(S)	FWD	0.024	0.025	0.025	0.025	0.025	0.025
NO.4 W.B.TK(P)	AFT	0.032	0.030	0.029	0.028	0.028	0.027
NO.4 W.B.TK(S)	FWD	0.004	0.005	0.006	0.006	0.006	0.006
NO.5 W.B.TK(P)	AFT	0.053	0.049	0.047	0.046	0.046	0.045
	FWD	-0.017	-0.015	-0.014	-0.013	-0.013	-0.013
NO.5 W.B.TK(S)	AFT	0.053	0.049	0.047	0.046	0.046	0.045
	FWD	-0.017	-0.015	-0.014	-0.013	-0.013	-0.013
A.P.TK(C)	AFT	0.079	0.073	0.071	0.069	0.068	0.067
	FWD	-0.043	-0.040	-0.039	-0.038	-0.037	-0.036
NO.3 CARGO HOLD(FLOOD.)	AFT	0.012	0.011	0.010	0.010	0.010	0.010
	FWD	0.024	0.025	0.025	0.025	0.025	0.025
NO.1 CARGO HOLD	AFT	-0.028	-0.026	-0.026	-0.025	-0.025	-0.024
	FWD	0.064	0.064	0.063	0.063	0.062	0.062
NO.2 CARGO HOLD	AFT	-0.008	-0.008	-0.008	-0.008	-0.007	-0.007
	FWD	0.044	0.044	0.044	0.044	0.044	0.043
NO.3 CARGO HOLD	AFT	0.012	0.011	0.010	0.010	0.010	0.010
	FWD	0.024	0.025	0.025	0.025	0.025	0.025
NO.4 CARGO HOLD	AFT	0.032	0.029	0.028	0.028	0.027	0.027
	FWD	0.004	0.006	0.006	0.006	0.007	0.007
NO.5 CARGO HOLD	AFT	0.052	0.048	0.047	0.046	0.045	0.044
	FWD	-0.016	-0.014	-0.013	-0.013	-0.012	-0.012
F.W.TK(P)	AFT	0.077	0.072	0.069	0.068	0.067	0.066
F.W.TK(S)	FWD	-0.041	-0.038	-0.037	-0.036	-0.036	-0.035
NO.1 H.F.O.TK(P)	AFT	0.032	0.030	0.029	0.028	0.028	0.027
NO.1 H.F.O.TK(S)	FWD	0.004	0.005	0.006	0.006	0.006	0.006
NO.2 H.F.O.TK(P)	AFT	0.052	0.049	0.047	0.046	0.045	0.045
NO.2 H.F.O.TK(S)	FWD	-0.016	-0.014	-0.014	-0.013	-0.013	-0.012
H.F.O.STOR.TK(P)	AFT	0.065	0.060	0.058	0.057	0.056	0.055
	FWD	-0.029	-0.027	-0.025	-0.025	-0.024	-0.024
H.F.O.STOR.TK(S)	AFT	0.064	0.060	0.058	0.056	0.055	0.055
	FWD	-0.028	-0.026	-0.025	-0.024	-0.024	-0.023
CARGO BILGE HOLDING TK(S)	AFT	0.052	0.049	0.047	0.046	0.045	0.045
	FWD	-0.016	-0.014	-0.014	-0.013	-0.013	-0.012

- 1) The previous table shows the change of draft in meter due to load at any tank in the ship.
- 2) The previous table is prepared based on loading in each compartment, if unloading in each compartment then the sign of the correction value should be revised.
- 3) The correction have been computed from mean draft.

loading & unloading in F.P.TK(C)

- Fore draft : 9.000 M  
 - Aft. draft : 10.000 M  
 - Mean draft : 9.500 M

a) 100 ton loading in F.P.TK(C)

	Aft Draft	Fwd Draft
Original Draft	10.000 m	9.000 m
Correction Value ( From Table )	$-0.045 + (-0.042 - (-0.045)) \times 0.50$ = -0.043	$0.079 + (0.078 - (0.079)) \times 0.50$ = 0.078
NEW Draft	= 9.957 m	= 9.078 m

b) 200 ton loading in F.P.TK(C)

	Aft Draft	Fwd Draft
Original Draft	10.000 m	9.000 m
Correction Value ( From Table )	$2.0 \times -0.043$ = -0.087	$2.0 \times 0.078$ = 0.157
NEW Draft	= 9.913 m	= 9.157 m

c) 50 ton unloading in F.P.TK(C)

	Aft Draft	Fwd Draft
Original Draft	10.000 m	9.000 m
Correction Value ( From Table )	$(0.5 \times -0.043) \times -1$ = 0.022	$(0.5 \times 0.078) \times -1$ = -0.039
NEW Draft	= 10.022 m	= 8.961 m

## TRIM TABLE

S.W. : 1.025

CHANGE OF DRAUGHT DUE TO 100 TONNES IN EACH LCG (FROM A.P.) POSITION  
(UNIT : METER)

L.C.G POSITION (M)	DRAUGHT POSITION	DRAUGHT (M)					
		4.00	5.00	6.00	7.00	8.00	9.00
10.0	AFT	0.106	0.102	0.097	0.092	0.086	0.080
	FWD	-0.054	-0.051	-0.049	-0.046	-0.044	-0.041
15.0	AFT	0.101	0.097	0.092	0.087	0.082	0.077
	FWD	-0.049	-0.047	-0.045	-0.043	-0.040	-0.038
20.0	AFT	0.097	0.092	0.088	0.083	0.078	0.073
	FWD	-0.045	-0.043	-0.041	-0.039	-0.037	-0.034
25.0	AFT	0.092	0.088	0.084	0.079	0.074	0.069
	FWD	-0.041	-0.039	-0.037	-0.035	-0.033	-0.030
30.0	AFT	0.087	0.083	0.079	0.075	0.071	0.066
	FWD	-0.037	-0.035	-0.033	-0.031	-0.029	-0.027
35.0	AFT	0.082	0.079	0.075	0.071	0.067	0.062
	FWD	-0.033	-0.031	-0.029	-0.027	-0.026	-0.023
40.0	AFT	0.077	0.074	0.070	0.066	0.063	0.058
	FWD	-0.029	-0.027	-0.026	-0.024	-0.022	-0.020
45.0	AFT	0.072	0.069	0.066	0.062	0.059	0.054
	FWD	-0.025	-0.023	-0.022	-0.020	-0.018	-0.016
50.0	AFT	0.068	0.065	0.061	0.058	0.055	0.051
	FWD	-0.021	-0.019	-0.018	-0.016	-0.015	-0.013
55.0	AFT	0.063	0.060	0.057	0.054	0.051	0.047
	FWD	-0.017	-0.015	-0.014	-0.012	-0.011	-0.009
60.0	AFT	0.058	0.055	0.053	0.050	0.047	0.043
	FWD	-0.012	-0.011	-0.010	-0.009	-0.007	-0.006
65.0	AFT	0.053	0.051	0.048	0.045	0.043	0.040
	FWD	-0.008	-0.007	-0.006	-0.005	-0.004	-0.002
70.0	AFT	0.048	0.046	0.044	0.041	0.039	0.036
	FWD	-0.004	-0.003	-0.002	-0.001	0.000	0.002
75.0	AFT	0.043	0.041	0.039	0.037	0.035	0.032
	FWD	-0.000	0.001	0.002	0.003	0.004	0.005
80.0	AFT	0.038	0.037	0.035	0.033	0.031	0.028
	FWD	0.004	0.005	0.005	0.006	0.007	0.009
85.0	AFT	0.034	0.032	0.030	0.029	0.027	0.025
	FWD	0.008	0.009	0.009	0.010	0.011	0.012
90.0	AFT	0.029	0.027	0.026	0.024	0.023	0.021
	FWD	0.012	0.013	0.013	0.014	0.015	0.016
95.0	AFT	0.024	0.023	0.022	0.020	0.019	0.017
	FWD	0.016	0.017	0.017	0.018	0.018	0.019
100.0	AFT	0.019	0.018	0.017	0.016	0.015	0.014
	FWD	0.020	0.021	0.021	0.022	0.022	0.023



## TRIM TABLE

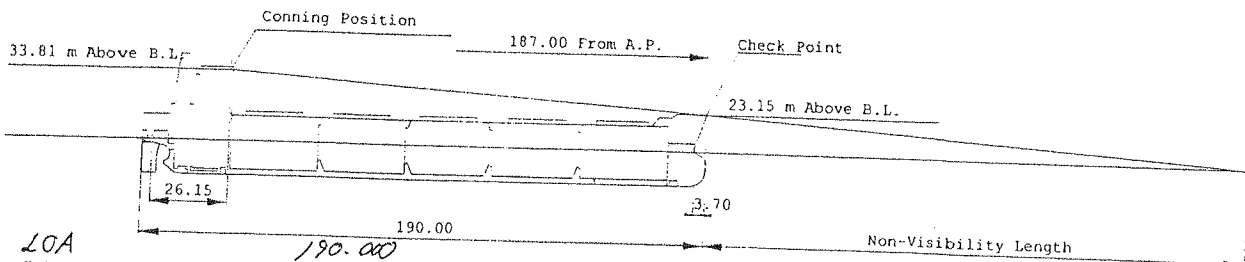
S.W. : 1.025

CHANGE OF DRAUGHT DUE TO 100 TONNES IN EACH LCG (FROM A.P.) POSITION

(UNIT : METER)

L.C.G POSITION (M)	DRAUGHT POSITION	DRAUGHT (M)					
		10.0	11.00	12.00	13.00	14.00	15.00
10.0	AFT	0.074	0.069	0.067	0.065	0.064	0.063
	FWD	-0.038	-0.036	-0.034	-0.034	-0.033	-0.032
15.0	AFT	0.071	0.066	0.064	0.062	0.061	0.060
	FWD	-0.035	-0.032	-0.031	-0.030	-0.030	-0.029
20.0	AFT	0.067	0.063	0.060	0.059	0.058	0.057
	FWD	-0.031	-0.029	-0.028	-0.027	-0.026	-0.026
25.0	AFT	0.064	0.059	0.057	0.056	0.055	0.055
	FWD	-0.028	-0.026	-0.025	-0.024	-0.023	-0.023
30.0	AFT	0.060	0.056	0.054	0.053	0.052	0.052
	FWD	-0.024	-0.022	-0.021	-0.021	-0.020	-0.020
35.0	AFT	0.057	0.053	0.051	0.050	0.049	0.049
	FWD	-0.021	-0.019	-0.018	-0.017	-0.017	-0.016
40.0	AFT	0.053	0.050	0.048	0.047	0.046	0.046
	FWD	-0.017	-0.016	-0.015	-0.014	-0.014	-0.013
45.0	AFT	0.050	0.046	0.045	0.044	0.043	0.043
	FWD	-0.014	-0.012	-0.011	-0.011	-0.010	-0.010
50.0	AFT	0.047	0.043	0.042	0.041	0.040	0.040
	FWD	-0.011	-0.009	-0.008	-0.008	-0.007	-0.007
55.0	AFT	0.043	0.040	0.039	0.038	0.037	0.037
	FWD	-0.007	-0.006	-0.005	-0.004	-0.004	-0.004
60.0	AFT	0.040	0.037	0.036	0.035	0.034	0.034
	FWD	-0.004	-0.002	-0.002	-0.001	-0.001	-0.001
65.0	AFT	0.036	0.034	0.033	0.032	0.031	0.031
	FWD	-0.000	0.001	0.002	0.002	0.002	0.003
70.0	AFT	0.033	0.030	0.029	0.029	0.028	0.028
	FWD	0.003	0.004	0.005	0.005	0.006	0.006
75.0	AFT	0.029	0.027	0.026	0.026	0.025	0.025
	FWD	0.007	0.008	0.008	0.009	0.009	0.009
80.0	AFT	0.026	0.024	0.023	0.023	0.022	0.022
	FWD	0.010	0.011	0.012	0.012	0.012	0.012
85.0	AFT	0.023	0.021	0.020	0.020	0.019	0.019
	FWD	0.013	0.014	0.015	0.015	0.015	0.015
90.0	AFT	0.019	0.018	0.017	0.017	0.016	0.016
	FWD	0.017	0.018	0.018	0.018	0.018	0.018
95.0	AFT	0.016	0.014	0.014	0.014	0.013	0.013
	FWD	0.020	0.021	0.021	0.022	0.022	0.021
100.0	AFT	0.012	0.011	0.011	0.011	0.010	0.010
	FWD	0.024	0.024	0.025	0.025	0.025	0.025

2.3 Visibility table



LOA : 190.00  
 LBP-OF SHIP : 183.300 m  
 VIEW POINT : FROM A.P 26.150 m ABOVE B.L. 33.810 m

NON VISIBILITY LENGTH TABLE

The view of the sea surface from the conning position shall not be obscured by more than two ship lengths(2\*LOA) or 500m, whichever is less, forward of the bow to 10 deg. on either side under all conditons of draft, trim and deck cargo.

Unit: m  
 Trim by Stern: -, by Stem: +

T m	TR-3.5 m	TR-3 m	TR-2.5 m	TR-2 m	TR-1.5 m	TR-1 m	TR-0.5 m	TRO m	TRO.5 m	ALLOW_TR m
6.000	402	375	351	329	309	291	274	259	245	-2.832
6.500	392	365	341	320	300	282	266	251	238	-3.031
7.000	381	355	332	311	291	274	258	244	230	-3.230
7.500	370	345	322	302	283	266	250	236	223	-3.422
8.000	360	335	313	292	274	258	242	229	216	-3.624
8.500	349	325	303	283	266	249	235	221	209	-3.825
9.000	339	315	294	274	257	241	227	213	201	-4.026
9.500	328	305	284	265	248	233	219	206	194	-4.227
10.000	317	295	275	256	240	225	211	198	187	-4.418
10.500	307	285	265	247	231	217	203	191	180	-4.616
11.000	296	275	256	238	223	208	195	183	172	-4.814
11.500	286	265	246	229	214	200	187	176	165	-5.019
12.000	275	255	237	220	205	192	180	168	158	-5.206
12.500	264	245	227	211	197	184	172	161	151	-5.405
13.000	254	235	218	202	188	175	164	153	143	-5.613
13.500	243	225	208	193	180	167	156	146	136	-5.803

## 2.4 Hydrostatics table

\*\*\*\*\*  
 \* HYDROSTATIC TABLE \*  
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SHIP NO. : D2007/2016  
 SHIP TYPE : 57,700 DWT BULK CARRIER  
 REFERENCE POSITION : MIDSHIP (LONGITUDINAL)  
 : BASE LINE (VERTICAL)

Abbreviation & Units  
 =====

DRAFT (MLD.) : Mean Draft Above Base Line (M)  
 DRAFT (B.O.K) : Mean Draft Above Bottom of Keel (M)  
 DIS. (S.W) : Displacement (TON)-Density 1.025  
 DIS. (F.W) : Displacement (TON)-Density 1.000  
 VOL. (MLD) : Volume Moulded (M\*\*3)  
 L.C.F. : Longitudinal Center of Floating (M)  
 L.C.B. : Longitudinal Center of Buoyancy (M)  
 V.C.B. : Vertical Center of Buoyancy (M)  
 T.P.C. : Displacement per 1CM Immersion (TON/CM)  
 M.T.C. : Moment to Change Trim 1CM (TON\*M)  
 K.M.T. : Transverse Metacenter Above Base (M)  
 Cb : Block coefficient  
 Cp : Prismatic coefficient  
 Cw : Waterplane Area coefficient  
 Cm : Midship section Area coefficient  
 W.P.A. : Water Plane Area Total (M\*\*2)  
 W.S.A. : Wetted Surface Area (M\*\*2)

\*\*\*\*\*  
 \* HYDROSTATIC TABLE \*  
 \*\*\*\*\*

DRAFT (MLD.)	2.000	2.050	2.100	2.150	2.200	2.250	2.300
DRAFT (B.O.K)	2.020	2.070	2.120	2.170	2.220	2.270	2.320
DISP. (S.W)	9191.3	9433.5	9676.0	9918.9	10162.2	10405.9	10649.8
DISP. (F.W)	8967.1	9203.4	9440.0	9677.0	9914.3	10152.1	10390.1
VOL. (MLD)	8875.6	9111.6	9347.8	9584.4	9821.3	10058.6	10296.2
L.C.F	8.479	8.461	8.442	8.424	8.355	8.364	8.345
L.C.B	8.894	8.883	8.872	8.862	8.851	8.839	8.828
V.C.B	1.020	1.046	1.072	1.098	1.123	1.149	1.175
T.P.C	48.4	48.5	48.5	48.6	48.7	48.8	48.8
M.T.C	504.06	505.81	507.52	509.19	511.87	512.90	514.52
K.M.T	40.718	39.823	38.970	38.156	37.386	36.641	35.932
CB	0.7505	0.7516	0.7528	0.7539	0.7550	0.7560	0.7570
CP	0.7670	0.7678	0.7686	0.7693	0.7701	0.7708	0.7715
CW	0.7973	0.7984	0.7996	0.8007	0.8018	0.8031	0.8042
CM	0.9784	0.9790	0.9795	0.9799	0.9804	0.9808	0.9812
W.P.A	4722.1	4729.1	4735.8	4742.4	4751.9	4756.5	4762.8
W.S.A	5086.5	5107.8	5129.1	5150.4	5174.6	5197.5	5218.7

DRAFT (MLD.)	2.300	2.350	2.400	2.450	2.500	2.550	2.600
DRAFT (B.O.K)	2.320	2.370	2.420	2.470	2.520	2.570	2.620
DISP. (S.W)	10649.8	10894.1	11138.6	11383.5	11628.7	11874.2	12119.9
DISP. (F.W)	10390.1	10628.4	10867.0	11105.9	11345.1	11584.6	11824.3
VOL. (MLD)	10296.2	10534.1	10772.4	11010.9	11249.7	11488.8	11728.2
L.C.F	8.345	8.328	8.310	8.292	8.275	8.256	8.238
L.C.B	8.828	8.817	8.807	8.796	8.785	8.774	8.764
V.C.B	1.175	1.201	1.226	1.252	1.278	1.304	1.330
T.P.C	48.8	48.9	48.9	49.0	49.1	49.1	49.2
M.T.C	514.52	516.17	517.75	519.29	520.79	522.26	523.71
K.M.T	35.932	35.254	34.605	33.983	33.386	32.813	32.262
CB	0.7570	0.7581	0.7591	0.7600	0.7610	0.7619	0.7628
CP	0.7715	0.7722	0.7730	0.7737	0.7743	0.7750	0.7757
CW	0.8042	0.8052	0.8063	0.8073	0.8083	0.8092	0.8102
CM	0.9812	0.9816	0.9820	0.9824	0.9827	0.9831	0.9834
W.P.A	4762.8	4769.1	4775.2	4781.2	4787.0	4792.7	4798.3
W.S.A	5218.7	5240.0	5261.2	5282.3	5303.4	5324.4	5345.4

\*\*\*\*\*  
 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	2.600	2.650	2.700	2.750	2.800	2.850	2.900
DRAFT (B.O.K)	2.620	2.670	2.720	2.770	2.820	2.870	2.920
DISP. (S.W)	12119.9	12366.0	12612.3	12858.9	13105.8	13352.9	13600.3
DISP. (F.W)	11824.3	12064.4	12304.7	12545.3	12786.1	13027.2	13268.6
VOL. (MLD)	11728.2	11967.9	12207.8	12448.0	12688.5	12929.2	13170.2
L.C.F	8.238	8.219	8.201	8.183	8.165	8.146	8.128
L.C.B	8.764	8.753	8.742	8.732	8.721	8.711	8.700
V.C.B	1.330	1.355	1.381	1.407	1.433	1.458	1.484
T.P.C	49.2	49.2	49.3	49.3	49.4	49.5	49.5
M.T.C	523.71	525.12	526.50	527.85	529.19	530.49	531.78
K.M.T	32.262	31.733	31.223	30.734	30.262	29.807	29.368
CB	0.7628	0.7637	0.7646	0.7655	0.7663	0.7672	0.7680
CP	0.7757	0.7764	0.7770	0.7777	0.7783	0.7790	0.7796
CW	0.8102	0.8111	0.8120	0.8129	0.8138	0.8146	0.8155
CM	0.9834	0.9837	0.9840	0.9843	0.9846	0.9849	0.9851
W.P.A	4798.3	4803.7	4809.1	4814.3	4819.5	4824.6	4829.6
W.S.A	5345.4	5366.3	5387.2	5408.1	5428.9	5449.7	5470.5

DRAFT (MLD.)	2.900	2.950	3.000	3.050	3.100	3.150	3.200
DRAFT (B.O.K)	2.920	2.970	3.020	3.070	3.120	3.170	3.220
DISP. (S.W)	13600.3	13847.9	14095.8	14343.9	14592.3	14840.9	15089.8
DISP. (F.W)	13268.6	13510.2	13752.0	13994.1	14236.4	14478.9	14721.7
VOL. (MLD)	13170.2	13411.4	13652.9	13894.6	14136.5	14378.7	14621.1
L.C.F	8.128	8.110	8.091	8.072	8.053	8.034	8.015
L.C.B	8.700	8.690	8.680	8.669	8.659	8.649	8.639
V.C.B	1.484	1.510	1.536	1.562	1.587	1.613	1.639
T.P.C	49.5	49.6	49.6	49.7	49.7	49.7	49.8
M.T.C	531.78	533.04	534.28	535.51	536.71	537.90	539.07
K.M.T	29.368	28.945	28.537	28.143	27.761	27.393	27.036
CB	0.7680	0.7688	0.7696	0.7704	0.7712	0.7719	0.7727
CP	0.7796	0.7802	0.7809	0.7815	0.7821	0.7827	0.7832
CW	0.8155	0.8163	0.8171	0.8179	0.8187	0.8195	0.8203
CM	0.9851	0.9854	0.9856	0.9859	0.9861	0.9863	0.9865
W.P.A	4829.6	4834.5	4839.3	4844.1	4848.7	4853.3	4857.8
W.S.A	5470.5	5491.2	5512.0	5532.7	5553.4	5574.1	5594.8

\*\*\*\*\*  
 \* HYDROSTATIC TABLE \*  
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	3.200	3.250	3.300	3.350	3.400	3.450	3.500
DRAFT (MLD.)	3.200	3.250	3.300	3.350	3.400	3.450	3.500
DRAFT (B.O.K)	3.220	3.270	3.320	3.370	3.420	3.470	3.520
DISP. (S.W)	15089.8	15338.8	15588.1	15837.7	16087.4	16337.4	16587.6
DISP. (F.W)	14721.7	14964.7	15207.9	15451.4	15695.0	15938.9	16183.0
VOL. (MLD)	14621.1	14863.7	15106.6	15349.7	15593.0	15836.5	16080.2
L.C.F	8.015	7.995	7.975	7.955	7.935	7.914	7.894
L.C.B	8.639	8.628	8.618	8.608	8.598	8.587	8.577
V.C.B	1.639	1.665	1.690	1.716	1.742	1.768	1.793
T.P.C	49.8	49.8	49.9	49.9	50.0	50.0	50.1
M.T.C	539.07	540.23	541.38	542.51	543.63	544.74	545.83
K.M.T	27.036	26.691	26.357	26.033	25.719	25.415	25.120
CB	0.7727	0.7734	0.7742	0.7749	0.7756	0.7763	0.7770
CP	0.7832	0.7838	0.7844	0.7850	0.7855	0.7861	0.7867
CW	0.8203	0.8210	0.8218	0.8225	0.8232	0.8239	0.8246
CM	0.9865	0.9867	0.9869	0.9871	0.9873	0.9875	0.9877
W.P.A	4857.8	4862.3	4866.7	4871.1	4875.4	4879.6	4883.7
W.S.A	5594.8	5615.4	5636.0	5656.7	5677.3	5697.8	5718.4

	3.500	3.550	3.600	3.650	3.700	3.750	3.800
DRAFT (MLD.)	3.500	3.550	3.600	3.650	3.700	3.750	3.800
DRAFT (B.O.K)	3.520	3.570	3.620	3.670	3.720	3.770	3.820
DISP. (S.W)	16587.6	16838.0	17088.6	17339.4	17590.5	17841.7	18093.1
DISP. (F.W)	16183.0	16427.3	16671.8	16916.5	17161.4	17406.5	17651.8
VOL. (MLD)	16080.2	16324.1	16568.2	16812.6	17057.1	17301.8	17546.8
L.C.F	7.894	7.872	7.850	7.827	7.805	7.781	7.758
L.C.B	8.577	8.567	8.557	8.546	8.536	8.525	8.515
V.C.B	1.793	1.819	1.845	1.871	1.896	1.922	1.948
T.P.C	50.1	50.1	50.1	50.2	50.2	50.3	50.3
M.T.C	545.83	546.93	548.02	549.09	550.16	551.23	552.28
K.M.T	25.120	24.835	24.557	24.288	24.026	23.773	23.526
CB	0.7770	0.7776	0.7783	0.7790	0.7796	0.7803	0.7809
CP	0.7867	0.7872	0.7877	0.7883	0.7888	0.7893	0.7899
CW	0.8246	0.8253	0.8260	0.8267	0.8274	0.8281	0.8287
CM	0.9877	0.9878	0.9880	0.9882	0.9883	0.9885	0.9886
W.P.A	4883.7	4887.9	4892.0	4896.1	4900.1	4904.1	4908.0
W.S.A	5718.4	5738.9	5759.5	5779.9	5800.4	5820.9	5841.3

\*\*\*\*\*  
 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	3.800	3.850	3.900	3.950	4.000	4.050	4.100
DRAFT (B.O.K)	3.820	3.870	3.920	3.970	4.020	4.070	4.120
DISP. (S.W)	18093.1	18344.8	18596.7	18848.9	19101.4	19354.0	19606.9
DISP. (F.W)	17651.8	17897.3	18143.1	18389.2	18635.5	18882.0	19128.7
VOL. (MLD)	17546.8	17791.9	18037.2	18283.0	18528.9	18775.0	19021.4
L.C.F	7.758	7.734	7.643	7.617	7.590	7.563	7.535
L.C.B	8.515	8.504	8.494	8.482	8.470	8.459	8.447
V.C.B	1.948	1.974	1.999	2.025	2.051	2.077	2.102
T.P.C	50.3	50.3	50.4	50.5	50.5	50.5	50.6
M.T.C	552.28	553.32	555.80	556.85	557.89	558.93	559.97
K.M.T	23.526	23.286	23.060	22.833	22.613	22.398	22.189
CB	0.7809	0.7815	0.7821	0.7827	0.7834	0.7840	0.7846
CP	0.7899	0.7904	0.7909	0.7914	0.7919	0.7924	0.7929
CW	0.8287	0.8294	0.8308	0.8314	0.8321	0.8327	0.8334
CM	0.9886	0.9888	0.9889	0.9891	0.9892	0.9893	0.9895
W.P.A	4908.0	4911.9	4920.0	4923.9	4927.7	4931.5	4935.3
W.S.A	5841.3	5861.7	5886.4	5906.9	5927.3	5947.7	5968.1

DRAFT (MLD.)	4.100	4.150	4.200	4.250	4.300	4.350	4.400
DRAFT (B.O.K)	4.120	4.170	4.220	4.270	4.320	4.370	4.420
DISP. (S.W)	19606.9	19859.9	20113.2	20366.6	20620.2	20874.0	21128.0
DISP. (F.W)	19128.7	19375.5	19622.6	19869.8	20117.3	20364.9	20612.7
VOL. (MLD)	19021.4	19267.8	19514.5	19761.4	20008.5	20255.7	20503.2
L.C.F	7.535	7.507	7.479	7.449	7.419	7.388	7.356
L.C.B	8.447	8.435	8.423	8.412	8.400	8.387	8.375
V.C.B	2.102	2.128	2.154	2.180	2.206	2.231	2.257
T.P.C	50.6	50.6	50.7	50.7	50.7	50.8	50.8
M.T.C	559.97	561.02	562.06	563.12	564.19	565.26	566.34
K.M.T	22.189	21.986	21.788	21.596	21.408	21.226	21.048
CB	0.7846	0.7852	0.7857	0.7863	0.7869	0.7875	0.7880
CP	0.7929	0.7934	0.7939	0.7944	0.7949	0.7954	0.7958
CW	0.8334	0.8340	0.8347	0.8353	0.8359	0.8366	0.8372
CM	0.9895	0.9896	0.9897	0.9898	0.9900	0.9901	0.9902
W.P.A	4935.3	4939.1	4942.9	4946.7	4950.5	4954.3	4958.0
W.S.A	5968.1	5988.5	6008.9	6029.2	6049.6	6069.8	6090.1

\*\*\*\*\*  
 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	4.400	4.450	4.500	4.550	4.600	4.650	4.700
DRAFT (B.O.K)	4.420	4.470	4.520	4.570	4.620	4.670	4.720
DISP. (S.W)	21128.0	21382.3	21636.7	21891.2	22146.0	22401.0	22656.2
DISP. (F.W)	20612.7	20860.7	21108.9	21357.3	21605.9	21854.6	22103.6
VOL. (MLD)	20503.2	20750.8	20998.7	21246.7	21494.9	21743.3	21991.8
L.C.F	7.356	7.324	7.291	7.259	7.226	7.192	7.158
L.C.B	8.375	8.363	8.351	8.338	8.326	8.313	8.300
V.C.B	2.257	2.283	2.309	2.334	2.360	2.386	2.412
T.P.C	50.8	50.9	50.9	50.9	51.0	51.0	51.0
M.T.C	566.34	567.41	568.48	569.55	570.62	571.69	572.75
K.M.T	21.048	20.874	20.705	20.540	20.379	20.222	20.069
CB	0.7880	0.7886	0.7891	0.7897	0.7902	0.7908	0.7913
CP	0.7958	0.7963	0.7968	0.7972	0.7977	0.7982	0.7986
CW	0.8372	0.8379	0.8385	0.8391	0.8397	0.8404	0.8410
CM	0.9902	0.9903	0.9904	0.9905	0.9906	0.9907	0.9908
W.P.A	4958.0	4961.8	4965.5	4969.2	4972.9	4976.6	4980.2
W.S.A	6090.1	6110.4	6130.6	6150.9	6171.1	6191.3	6211.5

DRAFT (MLD.)	4.700	4.750	4.800	4.850	4.900	4.950	5.000
DRAFT (B.O.K)	4.720	4.770	4.820	4.870	4.920	4.970	5.020
DISP. (S.W)	22656.2	22911.5	23167.1	23422.8	23678.7	23934.8	24191.1
DISP. (F.W)	22103.6	22352.7	22602.0	22851.5	23101.2	23351.0	23601.0
VOL. (MLD)	21991.8	22240.6	22489.5	22738.6	22987.9	23237.4	23487.0
L.C.F	7.158	7.123	7.089	7.054	7.018	6.982	6.944
L.C.B	8.300	8.287	8.274	8.261	8.248	8.235	8.222
V.C.B	2.412	2.437	2.463	2.489	2.515	2.541	2.566
T.P.C	51.0	51.1	51.1	51.2	51.2	51.2	51.3
M.T.C	572.75	573.82	574.88	575.95	577.02	578.09	579.17
K.M.T	20.069	19.919	19.774	19.632	19.493	19.357	19.225
CB	0.7913	0.7918	0.7923	0.7929	0.7934	0.7939	0.7944
CP	0.7986	0.7991	0.7995	0.8000	0.8004	0.8009	0.8013
CW	0.8410	0.8416	0.8422	0.8428	0.8434	0.8440	0.8446
CM	0.9908	0.9909	0.9910	0.9911	0.9912	0.9913	0.9914
W.P.A	4980.2	4983.9	4987.5	4991.1	4994.7	4998.3	5001.9
W.S.A	6211.5	6231.8	6252.0	6272.2	6292.4	6312.6	6332.8



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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	5.000	5.050	5.100	5.150	5.200	5.250	5.300
DRAFT (B.O.K)	5.020	5.070	5.120	5.170	5.220	5.270	5.320
DISP. (S.W)	24191.1	24447.5	24704.2	24961.0	25218.0	25475.3	25732.7
DISP. (F.W)	23601.0	23851.2	24101.6	24352.2	24603.0	24853.9	25105.0
VOL. (MLD)	23487.0	23736.9	23986.9	24237.1	24487.5	24738.1	24988.8
L.C.F	6.944	6.906	6.866	6.827	6.787	6.746	6.705
L.C.B	8.222	8.208	8.194	8.181	8.167	8.153	8.139
V.C.B	2.566	2.592	2.618	2.644	2.670	2.695	2.721
T.P.C	51.3	51.3	51.3	51.4	51.4	51.5	51.5
M.T.C	579.17	580.29	581.40	582.51	583.62	584.74	585.85
K.M.T	19.225	19.095	18.969	18.845	18.724	18.606	18.490
CB	0.7944	0.7949	0.7954	0.7959	0.7964	0.7969	0.7973
CP	0.8013	0.8017	0.8022	0.8026	0.8030	0.8035	0.8039
CW	0.8446	0.8453	0.8459	0.8465	0.8471	0.8477	0.8483
CM	0.9914	0.9915	0.9915	0.9916	0.9917	0.9918	0.9919
W.P.A	5001.9	5005.6	5009.2	5012.8	5016.4	5020.1	5023.6
W.S.A	6332.8	6353.0	6373.3	6393.5	6413.8	6434.0	6454.3

DRAFT (MLD.)	5.300	5.350	5.400	5.450	5.500	5.550	5.600
DRAFT (B.O.K)	5.320	5.370	5.420	5.470	5.520	5.570	5.620
DISP. (S.W)	25732.7	25990.2	26248.0	26506.0	26764.1	27022.4	27280.9
DISP. (F.W)	25105.0	25356.3	25607.8	25859.5	26111.3	26363.3	26615.5
VOL. (MLD)	24988.8	25239.7	25490.8	25742.1	25993.6	26245.2	26497.1
L.C.F	6.705	6.664	6.622	6.579	6.536	6.493	6.449
L.C.B	8.139	8.124	8.110	8.095	8.080	8.066	8.051
V.C.B	2.721	2.747	2.773	2.799	2.824	2.850	2.876
T.P.C	51.5	51.5	51.6	51.6	51.6	51.7	51.7
M.T.C	585.85	586.98	588.10	589.22	590.34	591.46	592.59
K.M.T	18.490	18.377	18.267	18.159	18.054	17.950	17.849
CB	0.7973	0.7978	0.7983	0.7988	0.7992	0.7997	0.8002
CP	0.8039	0.8043	0.8047	0.8051	0.8056	0.8060	0.8064
CW	0.8483	0.8489	0.8495	0.8501	0.8507	0.8513	0.8519
CM	0.9919	0.9919	0.9920	0.9921	0.9922	0.9922	0.9923
W.P.A	5023.6	5027.3	5030.9	5034.4	5038.0	5041.6	5045.2
W.S.A	6454.3	6474.6	6494.9	6515.2	6535.5	6555.7	6576.1

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	5.600	5.650	5.700	5.750	5.800	5.850	5.900
DRAFT (B.O.K)	5.620	5.670	5.720	5.770	5.820	5.870	5.920
DISP. (S.W)	27280.9	27539.6	27798.5	28057.5	28316.7	28576.2	28835.8
DISP. (F.W)	26615.5	26867.9	27120.5	27373.2	27626.1	27879.2	28132.4
VOL. (MLD)	26497.1	26749.1	27001.2	27253.6	27506.1	27758.8	28011.7
L.C.F	6.449	6.405	6.361	6.316	6.270	6.224	6.177
L.C.B	8.051	8.035	8.020	8.005	7.989	7.974	7.958
V.C.B	2.876	2.902	2.928	2.954	2.979	3.005	3.031
T.P.C	51.7	51.7	51.8	51.8	51.9	51.9	51.9
M.T.C	592.59	593.71	594.84	595.97	597.10	598.24	599.39
K.M.T	17.849	17.751	17.654	17.559	17.467	17.376	17.287
CB	0.8002	0.8006	0.8011	0.8015	0.8020	0.8025	0.8029
CP	0.8064	0.8068	0.8072	0.8076	0.8080	0.8084	0.8088
CW	0.8519	0.8525	0.8531	0.8537	0.8543	0.8549	0.8555
CM	0.9923	0.9924	0.9924	0.9925	0.9926	0.9926	0.9927
W.P.A	5045.2	5048.7	5052.3	5055.8	5059.4	5062.9	5066.5
W.S.A	6576.1	6596.4	6616.7	6637.0	6657.4	6677.7	6698.1

DRAFT (MLD.)	5.900	5.950	6.000	6.050	6.100	6.150	6.200
DRAFT (B.O.K)	5.920	5.970	6.020	6.070	6.120	6.170	6.220
DISP. (S.W)	28835.8	29095.5	29355.5	29615.7	29876.0	30136.5	30397.2
DISP. (F.W)	28132.4	28385.9	28639.5	28893.3	29147.3	29401.5	29655.8
VOL. (MLD)	28011.7	28264.8	28518.0	28771.5	29025.1	29278.9	29532.8
L.C.F	6.177	6.130	6.082	6.033	5.984	5.933	5.883
L.C.B	7.958	7.942	7.926	7.909	7.893	7.876	7.860
V.C.B	3.031	3.057	3.083	3.109	3.134	3.160	3.186
T.P.C	51.9	52.0	52.0	52.0	52.1	52.1	52.2
M.T.C	599.39	600.53	601.69	602.86	604.03	605.21	606.40
K.M.T	17.287	17.200	17.115	17.032	16.951	16.871	16.791
CB	0.8029	0.8033	0.8038	0.8042	0.8047	0.8051	0.8055
CP	0.8088	0.8092	0.8096	0.8100	0.8104	0.8108	0.8112
CW	0.8555	0.8561	0.8567	0.8573	0.8580	0.8586	0.8592
CM	0.9927	0.9927	0.9928	0.9929	0.9929	0.9930	0.9930
W.P.A	5066.5	5070.0	5073.6	5077.2	5080.8	5084.4	5088.0
W.S.A	6698.1	6718.5	6738.9	6759.4	6779.9	6800.4	6820.9

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	6.200	6.250	6.300	6.350	6.400	6.450	6.500
DRAFT (B.O.K)	6.220	6.270	6.320	6.370	6.420	6.470	6.520
DISP. (S.W)	30397.2	30658.1	30919.1	31180.3	31441.7	31703.4	31965.2
DISP. (F.W)	29655.8	29910.3	30165.0	30419.8	30674.9	30930.1	31185.5
VOL. (MLD)	29532.8	29787.0	30041.3	30295.8	30550.5	30805.4	31060.5
L.C.F	5.883	5.830	5.777	5.724	5.669	5.613	5.557
L.C.B	7.860	7.842	7.825	7.808	7.790	7.773	7.755
V.C.B	3.186	3.212	3.238	3.264	3.290	3.315	3.341
T.P.C	52.2	52.2	52.2	52.3	52.3	52.3	52.4
M.T.C	606.40	607.61	608.82	610.05	611.29	612.54	613.81
K.M.T	16.791	16.715	16.640	16.567	16.495	16.426	16.357
CB	0.8055	0.8060	0.8064	0.8068	0.8073	0.8077	0.8081
CP	0.8112	0.8116	0.8120	0.8123	0.8127	0.8131	0.8135
CW	0.8592	0.8598	0.8604	0.8610	0.8617	0.8623	0.8629
CM	0.9930	0.9931	0.9932	0.9932	0.9933	0.9933	0.9934
W.P.A	5088.0	5091.7	5095.3	5099.0	5102.8	5106.5	5110.3
W.S.A	6820.9	6841.5	6862.1	6882.7	6903.4	6924.2	6944.9

DRAFT (MLD.)	6.500	6.550	6.600	6.650	6.700	6.750	6.800
DRAFT (B.O.K)	6.520	6.570	6.620	6.670	6.720	6.770	6.820
DISP. (S.W)	31965.2	32227.2	32489.4	32751.7	33014.3	33277.1	33540.1
DISP. (F.W)	31185.5	31441.1	31696.9	31952.9	32209.1	32465.5	32722.1
VOL. (MLD)	31060.5	31315.7	31571.2	31826.9	32082.7	32338.7	32594.9
L.C.F	5.557	5.500	5.442	5.383	5.324	5.264	5.204
L.C.B	7.755	7.737	7.718	7.700	7.681	7.662	7.643
V.C.B	3.341	3.367	3.393	3.419	3.445	3.471	3.497
T.P.C	52.4	52.4	52.5	52.5	52.5	52.6	52.6
M.T.C	613.81	615.08	616.38	617.67	618.98	620.29	621.61
K.M.T	16.357	16.290	16.225	16.161	16.098	16.036	15.976
CB	0.8081	0.8085	0.8089	0.8094	0.8098	0.8102	0.8106
CP	0.8135	0.8139	0.8143	0.8147	0.8150	0.8154	0.8158
CW	0.8629	0.8636	0.8642	0.8649	0.8655	0.8662	0.8668
CM	0.9934	0.9934	0.9935	0.9935	0.9936	0.9936	0.9937
W.P.A	5110.3	5114.1	5117.9	5121.8	5125.6	5129.5	5133.4
W.S.A	6944.9	6965.7	6986.6	7007.5	7028.3	7049.3	7070.2

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	6.800	6.850	6.900	6.950	7.000	7.050	7.100
DRAFT (B.O.K)	6.820	6.870	6.920	6.970	7.020	7.070	7.120
DISP. (S.W)	33540.1	33803.3	34066.7	34330.3	34594.0	34858.0	35122.2
DISP. (F.W)	32722.1	32978.8	33235.8	33492.9	33750.3	34007.8	34265.5
VOL. (MLD)	32594.9	32851.3	33107.9	33364.7	33621.6	33878.8	34136.2
L.C.F	5.204	5.143	5.082	5.021	4.959	4.897	4.835
L.C.B	7.643	7.624	7.605	7.585	7.565	7.545	7.525
V.C.B	3.497	3.523	3.549	3.574	3.600	3.626	3.652
T.P.C	52.6	52.7	52.7	52.7	52.8	52.8	52.9
M.T.C	621.61	622.93	624.25	625.57	626.89	628.22	629.54
K.M.T	15.976	15.918	15.860	15.804	15.748	15.694	15.642
CB	0.8106	0.8110	0.8114	0.8118	0.8123	0.8127	0.8131
CP	0.8158	0.8162	0.8165	0.8169	0.8173	0.8177	0.8180
CW	0.8668	0.8675	0.8682	0.8688	0.8695	0.8701	0.8708
CM	0.9937	0.9937	0.9937	0.9938	0.9938	0.9939	0.9939
W.P.A	5133.4	5137.3	5141.2	5145.0	5148.9	5152.7	5156.6
W.S.A	7070.2	7091.1	7112.1	7133.1	7154.0	7175.0	7196.0

DRAFT (MLD.)	7.100	7.150	7.200	7.250	7.300	7.350	7.400
DRAFT (B.O.K)	7.120	7.170	7.220	7.270	7.320	7.370	7.420
DISP. (S.W)	35122.2	35386.6	35651.1	35915.9	36180.9	36446.0	36711.4
DISP. (F.W)	34265.5	34523.5	34781.6	35039.9	35298.4	35557.1	35816.0
VOL. (MLD)	34136.2	34393.7	34651.5	34909.4	35167.6	35425.9	35684.5
L.C.F	4.835	4.773	4.710	4.647	4.584	4.520	4.456
L.C.B	7.525	7.505	7.484	7.464	7.443	7.422	7.401
V.C.B	3.652	3.678	3.704	3.730	3.756	3.782	3.808
T.P.C	52.9	52.9	52.9	53.0	53.0	53.1	53.1
M.T.C	629.54	630.87	632.19	633.52	634.85	636.18	637.51
K.M.T	15.642	15.590	15.539	15.489	15.441	15.393	15.346
CB	0.8131	0.8135	0.8139	0.8143	0.8147	0.8151	0.8155
CP	0.8180	0.8184	0.8188	0.8192	0.8195	0.8199	0.8203
CW	0.8708	0.8714	0.8721	0.8727	0.8734	0.8740	0.8746
CM	0.9939	0.9940	0.9940	0.9940	0.9941	0.9941	0.9942
W.P.A	5156.6	5160.5	5164.3	5168.1	5172.0	5175.8	5179.6
W.S.A	7196.0	7217.0	7238.0	7259.0	7280.0	7301.1	7322.1

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	7.400	7.450	7.500	7.550	7.600	7.650	7.700
DRAFT (B.O.K)	7.420	7.470	7.520	7.570	7.620	7.670	7.720
DISP. (S.W)	36711.4	36976.9	37242.7	37508.6	37774.8	38041.1	38307.7
DISP. (F.W)	35816.0	36075.1	36334.3	36593.8	36853.4	37113.3	37373.4
VOL. (MLD)	35684.5	35943.2	36202.1	36461.2	36720.5	36980.0	37239.7
L.C.F	4.456	4.392	4.327	4.262	4.196	4.130	4.064
L.C.B	7.401	7.379	7.358	7.336	7.314	7.292	7.270
V.C.B	3.808	3.834	3.860	3.886	3.912	3.938	3.964
T.P.C	53.1	53.1	53.2	53.2	53.2	53.3	53.3
M.T.C	637.51	638.85	640.19	641.54	642.87	644.23	645.57
K.M.T	15.346	15.300	15.255	15.211	15.168	15.126	15.084
CB	0.8155	0.8159	0.8163	0.8167	0.8171	0.8175	0.8179
CP	0.8203	0.8206	0.8210	0.8214	0.8218	0.8221	0.8225
CW	0.8746	0.8753	0.8759	0.8766	0.8772	0.8779	0.8785
CM	0.9942	0.9942	0.9942	0.9943	0.9943	0.9944	0.9944
W.P.A	5179.6	5183.5	5187.3	5191.1	5194.9	5198.8	5202.6
W.S.A	7322.1	7343.2	7364.3	7385.4	7406.5	7427.6	7448.8

DRAFT (MLD.)	7.700	7.750	7.800	7.850	7.900	7.950	8.000
DRAFT (B.O.K)	7.720	7.770	7.820	7.870	7.920	7.970	8.020
DISP. (S.W)	38307.7	38574.4	38841.4	39108.6	39375.9	39643.5	39911.2
DISP. (F.W)	37373.4	37633.6	37894.1	38154.7	38415.5	38676.5	38937.8
VOL. (MLD)	37239.7	37499.5	37759.6	38019.8	38280.2	38540.8	38801.7
L.C.F	4.064	3.996	3.928	3.859	3.789	3.719	3.649
L.C.B	7.270	7.248	7.225	7.202	7.179	7.156	7.133
V.C.B	3.964	3.990	4.016	4.042	4.068	4.094	4.120
T.P.C	53.3	53.4	53.4	53.4	53.5	53.5	53.6
M.T.C	645.57	646.93	648.30	649.67	651.07	652.46	653.87
K.M.T	15.084	15.044	15.004	14.964	14.926	14.889	14.852
CB	0.8179	0.8183	0.8187	0.8191	0.8194	0.8198	0.8202
CP	0.8225	0.8229	0.8232	0.8236	0.8239	0.8243	0.8247
CW	0.8785	0.8791	0.8798	0.8804	0.8811	0.8818	0.8824
CM	0.9944	0.9944	0.9945	0.9945	0.9945	0.9946	0.9946
W.P.A	5202.6	5206.4	5210.2	5214.1	5218.0	5221.9	5225.8
W.S.A	7448.8	7470.0	7491.3	7512.5	7533.9	7555.2	7576.6

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	8.000	8.050	8.100	8.150	8.200	8.250	8.300
DRAFT (B.O.K)	8.020	8.070	8.120	8.170	8.220	8.270	8.320
DISP. (S.W)	39911.2	40179.1	40447.3	40715.6	40984.2	41252.9	41521.2
DISP. (F.W)	38937.8	39199.2	39460.8	39722.6	39984.6	40246.8	40508.5
VOL. (MLD)	38801.7	39062.7	39323.9	39585.3	39846.9	40108.7	40370.7
L.C.F	3.649	3.577	3.506	3.433	3.360	3.287	3.213
L.C.B	7.133	7.110	7.086	7.062	7.038	7.014	6.991
V.C.B	4.120	4.146	4.172	4.198	4.224	4.250	4.276
T.P.C	53.6	53.6	53.6	53.7	53.7	53.8	53.8
M.T.C	653.87	655.29	656.71	658.15	659.59	661.04	662.50
K.M.T	14.852	14.816	14.781	14.747	14.713	14.680	14.648
CB	0.8202	0.8206	0.8210	0.8214	0.8218	0.8222	0.8225
CP	0.8247	0.8250	0.8254	0.8258	0.8261	0.8265	0.8268
CW	0.8824	0.8831	0.8838	0.8844	0.8851	0.8858	0.8864
CM	0.9946	0.9946	0.9947	0.9947	0.9947	0.9948	0.9948
W.P.A	5225.8	5229.7	5233.7	5237.6	5241.6	5245.6	5249.6
W.S.A	7576.6	7598.1	7619.5	7641.0	7662.5	7684.0	7703.8

DRAFT (MLD.)	8.300	8.350	8.400	8.450	8.500	8.550	8.600
DRAFT (B.O.K)	8.320	8.370	8.420	8.470	8.520	8.570	8.620
DISP. (S.W)	41521.2	41790.5	42059.9	42329.5	42599.4	42869.5	43139.8
DISP. (F.W)	40508.5	40771.2	41034.0	41297.1	41560.4	41823.9	42087.6
VOL. (MLD)	40370.7	40632.3	40894.8	41157.4	41420.3	41683.4	41946.7
L.C.F	3.213	3.138	3.062	2.985	2.907	2.828	2.749
L.C.B	6.991	6.967	6.942	6.917	6.891	6.866	6.840
V.C.B	4.276	4.302	4.329	4.355	4.381	4.407	4.433
T.P.C	53.8	53.9	53.9	53.9	54.0	54.0	54.1
M.T.C	662.50	663.99	665.50	667.03	668.56	670.12	671.70
K.M.T	14.648	14.617	14.586	14.556	14.526	14.498	14.470
CB	0.8225	0.8229	0.8233	0.8237	0.8241	0.8245	0.8248
CP	0.8268	0.8272	0.8276	0.8279	0.8283	0.8286	0.8290
CW	0.8864	0.8871	0.8878	0.8885	0.8892	0.8899	0.8907
CM	0.9948	0.9948	0.9949	0.9949	0.9949	0.9950	0.9950
W.P.A	5249.6	5253.7	5257.8	5262.0	5266.1	5270.4	5274.6
W.S.A	7703.8	7725.6	7747.5	7769.5	7791.4	7813.5	7835.6

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	8.600	8.650	8.700	8.750	8.800	8.850	8.900
DRAFT (B.O.K)	8.620	8.670	8.720	8.770	8.820	8.870	8.920
DISP. (S.W)	43139.8	43410.3	43681.0	43952.0	44223.2	44494.7	44766.4
DISP. (F.W)	42087.6	42351.5	42615.6	42880.0	43144.6	43409.5	43674.5
VOL. (MLD)	41946.7	42210.2	42473.9	42737.8	43001.9	43266.3	43531.0
L.C.F	2.749	2.668	2.585	2.499	2.409	2.317	2.222
L.C.B	6.840	6.814	6.788	6.762	6.735	6.708	6.681
V.C.B	4.433	4.459	4.485	4.511	4.537	4.564	4.590
T.P.C	54.1	54.1	54.2	54.2	54.3	54.3	54.4
M.T.C	671.70	673.31	674.97	676.69	678.52	680.39	682.31
K.M.T	14.470	14.442	14.415	14.389	14.364	14.339	14.315
CB	0.8248	0.8252	0.8256	0.8260	0.8264	0.8268	0.8271
CP	0.8290	0.8294	0.8297	0.8301	0.8304	0.8308	0.8312
CW	0.8907	0.8914	0.8921	0.8929	0.8937	0.8945	0.8953
CM	0.9950	0.9950	0.9950	0.9951	0.9951	0.9951	0.9952
W.P.A	5274.6	5278.9	5283.4	5288.0	5292.8	5297.7	5302.7
W.S.A	7835.6	7857.8	7880.1	7902.7	7925.4	7948.3	7971.4

DRAFT (MLD.)	8.900	8.950	9.000	9.050	9.100	9.150	9.200
DRAFT (B.O.K)	8.920	8.970	9.020	9.070	9.120	9.170	9.220
DISP. (S.W)	44766.4	45038.4	45310.5	45582.9	45855.7	46128.7	46401.9
DISP. (F.W)	43674.5	43939.9	44205.4	44471.2	44737.2	45003.6	45270.1
VOL. (MLD)	43531.0	43795.9	44061.1	44326.4	44592.1	44858.1	45124.2
L.C.F	2.222	2.117	2.006	1.899	1.799	1.704	1.572
L.C.B	6.681	6.653	6.626	6.598	6.569	6.541	6.512
V.C.B	4.590	4.616	4.642	4.668	4.695	4.721	4.747
T.P.C	54.4	54.4	54.5	54.5	54.6	54.6	54.7
M.T.C	682.31	684.47	686.81	689.02	691.03	692.90	695.77
K.M.T	14.315	14.291	14.268	14.246	14.224	14.203	14.182
CB	0.8271	0.8275	0.8279	0.8283	0.8287	0.8291	0.8295
CP	0.8312	0.8315	0.8319	0.8323	0.8326	0.8330	0.8334
CW	0.8953	0.8962	0.8972	0.8982	0.8991	0.9000	0.9008
CM	0.9952	0.9952	0.9952	0.9952	0.9953	0.9953	0.9953
W.P.A	5302.7	5308.3	5314.3	5320.0	5325.2	5330.1	5337.2
W.S.A	7971.4	7995.1	8018.9	8042.5	8065.6	8088.4	8112.5

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	9.200	9.250	9.300	9.350	9.400	9.450	9.500
DRAFT (B.O.K)	9.220	9.270	9.320	9.370	9.420	9.470	9.520
DISP. (S.W)	46401.9	46675.4	46949.3	47223.5	47497.9	47772.6	48047.5
DISP. (F.W)	45270.1	45536.9	45804.2	46071.7	46339.4	46607.4	46875.6
VOL. (MLD)	45124.2	45390.6	45657.4	45924.5	46191.8	46459.4	46727.2
L.C.F	1.572	1.463	1.354	1.255	1.160	1.067	0.977
L.C.B	6.512	6.483	6.453	6.423	6.393	6.362	6.331
V.C.B	4.747	4.773	4.800	4.826	4.852	4.878	4.905
T.P.C	54.7	54.8	54.8	54.9	54.9	55.0	55.0
M.T.C	695.77	698.00	700.24	702.20	704.04	705.79	707.46
K.M.T	14.182	14.162	14.142	14.122	14.103	14.085	14.066
CB	0.8295	0.8298	0.8302	0.8306	0.8310	0.8314	0.8318
CP	0.8334	0.8337	0.8341	0.8345	0.8348	0.8352	0.8356
CW	0.9008	0.9021	0.9031	0.9039	0.9048	0.9055	0.9063
CM	0.9953	0.9953	0.9954	0.9954	0.9954	0.9954	0.9955
W.P.A	5337.2	5342.9	5348.6	5353.6	5358.4	5362.9	5367.3
W.S.A	8112.5	8136.2	8160.0	8183.1	8205.9	8228.6	8251.2

DRAFT (MLD.)	9.500	9.550	9.600	9.650	9.700	9.750	9.800
DRAFT (B.O.K)	9.520	9.570	9.620	9.670	9.720	9.770	9.820
DISP. (S.W)	48047.5	48322.6	48598.0	48873.7	49149.7	49424.8	49701.3
DISP. (F.W)	46875.6	47144.0	47412.7	47681.6	47950.9	48219.3	48489.1
VOL. (MLD)	46727.2	46995.2	47263.5	47532.1	47801.0	48070.0	48339.3
L.C.F	0.977	0.869	0.763	0.660	0.559	0.475	0.364
L.C.B	6.331	6.300	6.269	6.238	6.206	6.177	6.145
V.C.B	4.905	4.931	4.957	4.984	5.010	5.036	5.063
T.P.C	55.0	55.1	55.1	55.2	55.2	55.3	55.3
M.T.C	707.46	709.61	711.64	713.54	715.52	717.03	719.29
K.M.T	14.066	14.049	14.032	14.015	13.998	13.983	13.967
CB	0.8318	0.8322	0.8326	0.8330	0.8334	0.8338	0.8342
CP	0.8356	0.8360	0.8363	0.8367	0.8371	0.8375	0.8378
CW	0.9063	0.9071	0.9080	0.9089	0.9093	0.9101	0.9110
CM	0.9955	0.9955	0.9955	0.9955	0.9956	0.9956	0.9956
W.P.A	5367.3	5372.7	5377.8	5382.6	5387.6	5391.7	5397.2
W.S.A	8251.2	8274.7	8298.1	8321.3	8344.6	8369.8	8393.7



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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	9.800	9.850	9.900	9.950	10.000	10.050	10.100
DRAFT (B.O.K)	9.820	9.870	9.920	9.970	10.020	10.070	10.120
DISP. (S.W)	49701.3	49978.1	50255.6	50532.9	50810.5	51088.3	51366.4
DISP. (F.W)	48489.1	48759.2	49029.9	49300.4	49571.2	49842.2	50113.6
VOL. (MLD)	48339.3	48608.8	48878.6	49148.4	49418.6	49689.1	49960.3
L.C.F	0.364	0.256	0.160	0.058	-0.041	-0.141	-0.250
L.C.B	6.145	6.113	6.080	6.048	6.015	5.983	5.950
V.C.B	5.063	5.089	5.115	5.142	5.168	5.195	5.221
T.P.C	55.3	55.4	55.4	55.5	55.5	55.6	55.6
M.T.C	719.29	721.44	723.27	725.21	727.06	728.86	730.78
K.M.T	13.967	13.952	13.937	13.923	13.909	13.896	13.883
CB	0.8342	0.8345	0.8349	0.8353	0.8357	0.8361	0.8365
CP	0.8378	0.8382	0.8386	0.8390	0.8393	0.8397	0.8401
CW	0.9110	0.9119	0.9128	0.9137	0.9145	0.9154	0.9162
CM	0.9956	0.9956	0.9956	0.9957	0.9957	0.9957	0.9957
W.P.A	5397.2	5402.6	5407.2	5412.1	5416.7	5421.3	5426.1
W.S.A	8393.7	8417.4	8441.1	8464.3	8487.5	8510.7	8534.4

DRAFT (MLD.)	10.100	10.150	10.200	10.250	10.300	10.350	10.400
DRAFT (B.O.K)	10.120	10.170	10.220	10.270	10.320	10.370	10.420
DISP. (S.W)	51366.4	51644.7	51923.2	52202.1	52481.1	52760.5	53040.0
DISP. (F.W)	50113.6	50385.1	50656.8	50928.8	51201.1	51473.6	51746.4
VOL. (MLD)	49960.3	50231.5	50503.0	50774.8	51046.8	51319.1	51591.6
L.C.F	-0.250	-0.357	-0.456	-0.550	-0.640	-0.725	-0.807
L.C.B	5.950	5.916	5.882	5.848	5.813	5.779	5.744
V.C.B	5.221	5.248	5.274	5.300	5.327	5.353	5.380
T.P.C	55.6	55.7	55.7	55.8	55.8	55.9	55.9
M.T.C	730.78	732.76	734.79	736.72	738.55	740.29	741.93
K.M.T	13.883	13.870	13.858	13.846	13.834	13.822	13.811
CB	0.8365	0.8369	0.8373	0.8377	0.8381	0.8385	0.8389
CP	0.8401	0.8405	0.8409	0.8413	0.8416	0.8420	0.8424
CW	0.9162	0.9171	0.9181	0.9190	0.9200	0.9209	0.9218
CM	0.9957	0.9957	0.9958	0.9958	0.9958	0.9958	0.9959
W.P.A	5426.1	5431.0	5436.0	5440.8	5445.3	5449.6	5453.8
W.S.A	8534.4	8557.8	8580.7	8603.4	8625.7	8647.9	8669.8

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	10.400	10.450	10.500	10.550	10.600	10.650	10.700
DRAFT (B.O.K)	10.420	10.470	10.520	10.570	10.620	10.670	10.720
DISP. (S.W)	53040.0	53321.2	53601.4	53881.8	54162.4	54443.2	54724.3
DISP. (F.W)	51746.4	52020.6	52294.0	52567.6	52841.4	53115.3	53389.5
VOL. (MLD)	51591.6	51864.3	52137.3	52410.4	52683.8	52957.4	53231.2
L.C.F	-0.807	-0.991	-1.086	-1.174	-1.257	-1.334	-1.408
L.C.B	5.744	5.707	5.672	5.637	5.601	5.565	5.530
V.C.B	5.380	5.406	5.433	5.459	5.486	5.512	5.539
T.P.C	55.9	56.0	56.1	56.1	56.2	56.2	56.2
M.T.C	741.93	746.51	748.60	750.53	752.32	753.98	755.55
K.M.T	13.811	13.801	13.790	13.780	13.770	13.761	13.751
CB	0.8389	0.8393	0.8397	0.8401	0.8405	0.8409	0.8413
CP	0.8424	0.8428	0.8432	0.8436	0.8439	0.8443	0.8447
CW	0.9218	0.9226	0.9235	0.9243	0.9251	0.9258	0.9265
CM	0.9959	0.9959	0.9959	0.9959	0.9959	0.9959	0.9960
W.P.A	5453.8	5464.0	5469.0	5473.7	5478.1	5482.2	5486.1
W.S.A	8669.8	8697.4	8720.1	8742.4	8764.4	8786.1	8807.6

DRAFT (MLD.)	10.700	10.750	10.800	10.850	10.900	10.950	11.000
DRAFT (B.O.K)	10.720	10.770	10.820	10.870	10.920	10.970	11.020
DISP. (S.W)	54724.3	55005.5	55286.9	55568.4	55850.2	56132.1	56414.2
DISP. (F.W)	53389.5	53663.9	53938.4	54213.1	54488.0	54763.1	55038.3
VOL. (MLD)	53231.2	53505.1	53779.3	54053.6	54328.1	54602.8	54877.7
L.C.F	-1.408	-1.478	-1.544	-1.607	-1.668	-1.727	-1.783
L.C.B	5.530	5.494	5.458	5.423	5.387	5.351	5.316
V.C.B	5.539	5.565	5.592	5.618	5.645	5.671	5.698
T.P.C	56.2	56.3	56.3	56.3	56.4	56.4	56.4
M.T.C	755.55	757.04	758.44	759.78	761.07	762.30	763.48
K.M.T	13.751	13.742	13.734	13.725	13.717	13.709	13.701
CB	0.8413	0.8417	0.8421	0.8425	0.8429	0.8433	0.8437
CP	0.8447	0.8451	0.8455	0.8459	0.8462	0.8466	0.8470
CW	0.9265	0.9271	0.9277	0.9283	0.9288	0.9294	0.9299
CM	0.9960	0.9960	0.9960	0.9960	0.9960	0.9961	0.9961
W.P.A	5486.1	5489.8	5493.3	5496.7	5500.0	5503.1	5506.1
W.S.A	8807.6	8828.9	8849.9	8870.9	8891.7	8912.4	8932.9

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	11.000	11.050	11.100	11.150	11.200	11.250	11.300
DRAFT (B.O.K)	11.020	11.070	11.120	11.170	11.220	11.270	11.320
DISP. (S.W)	56414.2	56696.5	56978.9	57261.5	57544.2	57827.0	58110.0
DISP. (F.W)	55038.3	55313.7	55589.2	55864.9	56140.7	56416.6	56692.7
VOL. (MLD)	54877.7	55152.7	55427.9	55703.2	55978.6	56254.2	56529.9
L.C.F	-1.783	-1.838	-1.890	-1.941	-1.990	-2.037	-2.083
L.C.B	5.316	5.280	5.245	5.210	5.174	5.139	5.104
V.C.B	5.698	5.724	5.751	5.777	5.804	5.830	5.857
T.P.C	56.4	56.5	56.5	56.5	56.6	56.6	56.6
M.T.C	763.48	764.63	765.72	766.80	767.82	768.83	769.80
K.M.T	13.701	13.694	13.686	13.679	13.672	13.666	13.660
CB	0.8437	0.8441	0.8445	0.8448	0.8452	0.8456	0.8460
CP	0.8470	0.8474	0.8478	0.8481	0.8485	0.8489	0.8492
CW	0.9299	0.9304	0.9309	0.9314	0.9318	0.9323	0.9327
CM	0.9961	0.9961	0.9961	0.9961	0.9961	0.9962	0.9962
W.P.A	5506.1	5509.1	5511.9	5514.7	5517.3	5519.9	5522.4
W.S.A	8932.9	8953.4	8973.8	8994.1	9014.3	9034.5	9054.5

DRAFT (MLD.)	11.300	11.350	11.400	11.450	11.500	11.550	11.600
DRAFT (B.O.K)	11.320	11.370	11.420	11.470	11.520	11.570	11.620
DISP. (S.W)	58110.0	58393.1	58676.3	58959.6	59243.1	59526.7	59810.4
DISP. (F.W)	56692.7	56968.9	57245.2	57521.6	57798.1	58074.8	58351.6
VOL. (MLD)	56529.9	56805.7	57081.7	57357.7	57633.9	57910.2	58186.6
L.C.F	-2.083	-2.128	-2.171	-2.212	-2.252	-2.289	-2.325
L.C.B	5.104	5.069	5.034	5.000	4.965	4.931	4.896
V.C.B	5.857	5.884	5.910	5.937	5.963	5.990	6.016
T.P.C	56.6	56.6	56.7	56.7	56.7	56.7	56.8
M.T.C	769.80	770.75	771.68	772.59	773.51	774.44	775.35
K.M.T	13.660	13.653	13.648	13.642	13.637	13.631	13.626
CB	0.8460	0.8464	0.8468	0.8471	0.8475	0.8479	0.8483
CP	0.8492	0.8496	0.8500	0.8504	0.8507	0.8511	0.8514
CW	0.9327	0.9331	0.9335	0.9339	0.9343	0.9348	0.9351
CM	0.9962	0.9962	0.9962	0.9962	0.9962	0.9963	0.9963
W.P.A	5522.4	5524.9	5527.3	5529.7	5532.1	5534.5	5536.8
W.S.A	9054.5	9074.5	9094.5	9114.3	9134.1	9153.8	9173.4

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	11.600	11.650	11.700	11.750	11.800	11.850	11.900
DRAFT (B.O.K)	11.620	11.670	11.720	11.770	11.820	11.870	11.920
DISP. (S.W)	59810.4	60094.2	60378.1	60662.2	60946.3	61230.6	61515.0
DISP. (F.W)	58351.6	58628.5	58905.5	59182.6	59459.8	59737.2	60014.6
VOL. (MLD)	58186.6	58463.2	58739.9	59016.6	59293.5	59570.5	59847.6
L.C.F	-2.325	-2.360	-2.394	-2.428	-2.460	-2.492	-2.522
L.C.B	4.896	4.862	4.828	4.794	4.760	4.727	4.693
V.C.B	6.016	6.043	6.069	6.095	6.122	6.148	6.175
T.P.C	56.8	56.8	56.8	56.8	56.8	56.9	56.9
M.T.C	775.35	776.24	777.10	777.96	778.79	779.61	780.41
K.M.T	13.626	13.622	13.617	13.613	13.609	13.605	13.601
CB	0.8483	0.8487	0.8490	0.8494	0.8498	0.8501	0.8505
CP	0.8514	0.8518	0.8522	0.8525	0.8529	0.8532	0.8536
CW	0.9351	0.9355	0.9359	0.9363	0.9367	0.9370	0.9374
CM	0.9963	0.9963	0.9963	0.9963	0.9963	0.9964	0.9964
W.P.A	5536.8	5539.1	5541.4	5543.5	5545.7	5547.8	5549.9
W.S.A	9173.4	9192.9	9212.5	9232.0	9251.4	9270.9	9290.3

DRAFT (MLD.)	11.900	11.950	12.000	12.050	12.100	12.150	12.200
DRAFT (B.O.K)	11.920	11.970	12.020	12.070	12.120	12.170	12.220
DISP. (S.W)	61515.0	61799.5	62084.1	62368.7	62653.5	62938.4	63223.4
DISP. (F.W)	60014.6	60292.2	60569.8	60847.6	61125.4	61403.3	61681.4
VOL. (MLD)	59847.6	60124.8	60402.1	60679.5	60957.0	61234.6	61512.3
L.C.F	-2.522	-2.552	-2.581	-2.609	-2.637	-2.663	-2.689
L.C.B	4.693	4.660	4.627	4.594	4.561	4.528	4.496
V.C.B	6.175	6.201	6.228	6.254	6.281	6.307	6.334
T.P.C	56.9	56.9	56.9	56.9	57.0	57.0	57.0
M.T.C	780.41	781.19	781.97	782.73	783.47	784.21	784.94
K.M.T	13.601	13.598	13.595	13.592	13.589	13.586	13.584
CB	0.8505	0.8509	0.8512	0.8516	0.8519	0.8523	0.8527
CP	0.8536	0.8539	0.8543	0.8546	0.8550	0.8553	0.8557
CW	0.9374	0.9377	0.9381	0.9384	0.9387	0.9390	0.9394
CM	0.9964	0.9964	0.9964	0.9964	0.9964	0.9964	0.9965
W.P.A	5549.9	5551.9	5553.9	5555.9	5557.8	5559.7	5561.6
W.S.A	9290.3	9309.6	9329.0	9348.3	9367.6	9386.9	9406.1

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	12.200	12.250	12.300	12.350	12.400	12.450	12.500
DRAFT (B.O.K)	12.220	12.270	12.320	12.370	12.420	12.470	12.520
DISP. (S.W)	63223.4	63508.5	63793.7	64078.9	64364.3	64649.7	64935.3
DISP. (F.W)	61681.4	61959.5	62237.7	62516.0	62794.4	63072.9	63351.5
VOL. (MLD)	61512.3	61790.0	62067.9	62345.9	62623.9	62902.1	63180.3
L.C.F	-2.689	-2.715	-2.740	-2.763	-2.787	-2.809	-2.831
L.C.B	4.496	4.464	4.432	4.400	4.368	4.336	4.305
V.C.B	6.334	6.360	6.387	6.413	6.439	6.466	6.492
T.P.C	57.0	57.0	57.0	57.1	57.1	57.1	57.1
M.T.C	784.94	785.65	786.36	787.06	787.75	788.43	789.11
K.M.T	13.584	13.582	13.580	13.578	13.576	13.575	13.574
CB	0.8527	0.8530	0.8534	0.8537	0.8541	0.8544	0.8548
CP	0.8557	0.8560	0.8564	0.8567	0.8570	0.8574	0.8577
CW	0.9394	0.9397	0.9400	0.9403	0.9406	0.9409	0.9412
CM	0.9965	0.9965	0.9965	0.9965	0.9965	0.9965	0.9965
W.P.A	5561.6	5563.5	5565.3	5567.1	5568.9	5570.7	5572.4
W.S.A	9406.1	9425.3	9444.5	9463.7	9482.8	9502.0	9521.1

DRAFT (MLD.)	12.500	12.550	12.600	12.650	12.700	12.750	12.800
DRAFT (B.O.K)	12.520	12.570	12.620	12.670	12.720	12.770	12.820
DISP. (S.W)	64935.3	65220.9	65506.6	65792.5	66078.4	66364.3	66650.4
DISP. (F.W)	63351.5	63630.2	63908.9	64187.8	64466.7	64745.7	65024.8
VOL. (MLD)	63180.3	63458.6	63737.0	64015.5	64294.1	64572.8	64851.5
L.C.F	-2.831	-2.853	-2.873	-2.892	-2.911	-2.929	-2.947
L.C.B	4.305	4.273	4.242	4.211	4.181	4.150	4.119
V.C.B	6.492	6.519	6.545	6.572	6.598	6.624	6.651
T.P.C	57.1	57.1	57.2	57.2	57.2	57.2	57.2
M.T.C	789.11	789.77	790.44	791.11	791.79	792.47	793.13
K.M.T	13.574	13.573	13.572	13.571	13.571	13.570	13.570
CB	0.8548	0.8551	0.8554	0.8558	0.8561	0.8565	0.8568
CP	0.8577	0.8581	0.8584	0.8587	0.8591	0.8594	0.8597
CW	0.9412	0.9415	0.9418	0.9421	0.9424	0.9427	0.9429
CM	0.9965	0.9966	0.9966	0.9966	0.9966	0.9966	0.9966
W.P.A	5572.4	5574.1	5575.9	5577.6	5579.3	5581.0	5582.7
W.S.A	9521.1	9540.2	9559.3	9578.5	9597.6	9616.7	9635.8

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	12.800	12.850	12.900	12.950	13.000	13.050	13.100
DRAFT (B.O.K)	12.820	12.870	12.920	12.970	13.020	13.070	13.120
DISP. (S.W)	66650.4	66936.6	67222.8	67509.1	67795.5	68082.0	68368.6
DISP. (F.W)	65024.8	65304.0	65583.2	65862.6	66142.0	66421.5	66701.1
VOL. (MLD)	64851.5	65130.4	65409.3	65688.3	65967.4	66246.5	66525.8
L.C.F	-2.947	-2.964	-2.980	-2.996	-3.012	-3.027	-3.041
L.C.B	4.119	4.089	4.059	4.029	4.000	3.970	3.941
V.C.B	6.651	6.677	6.704	6.730	6.756	6.783	6.809
T.P.C	57.2	57.2	57.3	57.3	57.3	57.3	57.3
M.T.C	793.13	793.78	794.43	795.08	795.73	796.37	797.01
K.M.T	13.570	13.571	13.571	13.571	13.572	13.573	13.574
CB	0.8568	0.8571	0.8575	0.8578	0.8581	0.8585	0.8588
CP	0.8597	0.8600	0.8604	0.8607	0.8610	0.8613	0.8616
CW	0.9429	0.9432	0.9435	0.9438	0.9441	0.9443	0.9446
CM	0.9966	0.9966	0.9967	0.9967	0.9967	0.9967	0.9967
W.P.A	5582.7	5584.4	5586.1	5587.7	5589.4	5591.0	5592.6
W.S.A	9635.8	9654.9	9674.0	9693.1	9712.1	9731.2	9750.2

DRAFT (MLD.)	13.100	13.150	13.200	13.250	13.300	13.350	13.400
DRAFT (B.O.K)	13.120	13.170	13.220	13.270	13.320	13.370	13.420
DISP. (S.W)	68368.6	68655.3	68942.1	69228.9	69515.8	69802.8	70089.9
DISP. (F.W)	66701.1	66980.8	67260.5	67540.4	67820.3	68100.3	68380.3
VOL. (MLD)	66525.8	66805.1	67084.5	67364.0	67643.6	67923.3	68203.0
L.C.F	-3.041	-3.055	-3.068	-3.081	-3.093	-3.105	-3.117
L.C.B	3.941	3.912	3.883	3.854	3.825	3.797	3.768
V.C.B	6.809	6.835	6.862	6.888	6.915	6.941	6.967
T.P.C	57.3	57.3	57.4	57.4	57.4	57.4	57.4
M.T.C	797.01	797.64	798.27	798.90	799.52	800.15	800.76
K.M.T	13.574	13.575	13.576	13.578	13.580	13.581	13.583
CB	0.8588	0.8591	0.8595	0.8598	0.8601	0.8604	0.8607
CP	0.8616	0.8620	0.8623	0.8626	0.8629	0.8632	0.8635
CW	0.9446	0.9449	0.9452	0.9454	0.9457	0.9460	0.9462
CM	0.9967	0.9967	0.9967	0.9967	0.9968	0.9968	0.9968
W.P.A	5592.6	5594.2	5595.8	5597.4	5598.9	5600.5	5602.1
W.S.A	9750.2	9769.3	9788.3	9807.3	9826.4	9845.4	9864.4

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	13.400	13.450	13.500	13.550	13.600	13.650	13.700
DRAFT (B.O.K)	13.420	13.470	13.520	13.570	13.620	13.670	13.720
DISP. (S.W)	70089.9	70377.0	70664.3	70951.6	71239.0	71526.4	71814.0
DISP. (F.W)	68380.3	68660.5	68940.7	69221.0	69501.4	69781.9	70062.4
VOL. (MLD)	68203.0	68482.8	68762.7	69042.6	69322.7	69602.8	69883.0
L.C.F	-3.117	-3.128	-3.138	-3.148	-3.158	-3.167	-3.176
L.C.B	3.768	3.740	3.712	3.685	3.657	3.630	3.602
V.C.B	6.967	6.994	7.020	7.046	7.073	7.099	7.125
T.P.C	57.4	57.4	57.5	57.5	57.5	57.5	57.5
M.T.C	800.76	801.38	801.99	802.61	803.22	803.82	804.43
K.M.T	13.583	13.586	13.588	13.591	13.593	13.596	13.599
CB	0.8607	0.8611	0.8614	0.8617	0.8620	0.8623	0.8626
CP	0.8635	0.8638	0.8641	0.8644	0.8647	0.8651	0.8654
CW	0.9462	0.9465	0.9467	0.9470	0.9473	0.9475	0.9478
CM	0.9968	0.9968	0.9968	0.9968	0.9968	0.9968	0.9969
W.P.A	5602.1	5603.6	5605.1	5606.7	5608.2	5609.7	5611.2
W.S.A	9864.4	9883.4	9902.4	9921.4	9940.4	9959.4	9978.4

DRAFT (MLD.)	13.700	13.750	13.800	13.850	13.900	13.950	14.000
DRAFT (B.O.K)	13.720	13.770	13.820	13.870	13.920	13.970	14.020
DISP. (S.W)	71814.0	72101.6	72389.3	72677.1	72965.0	73252.9	73541.0
DISP. (F.W)	70062.4	70343.0	70623.7	70904.5	71185.3	71466.2	71747.3
VOL. (MLD)	69883.0	70163.2	70443.6	70724.0	71004.5	71285.1	71565.8
L.C.F	-3.176	-3.184	-3.192	-3.200	-3.207	-3.214	-3.220
L.C.B	3.602	3.575	3.548	3.522	3.495	3.469	3.443
V.C.B	7.125	7.152	7.178	7.204	7.231	7.257	7.283
T.P.C	57.5	57.5	57.5	57.6	57.6	57.6	57.6
M.T.C	804.43	805.03	805.63	806.23	806.83	807.43	808.02
K.M.T	13.599	13.602	13.606	13.609	13.613	13.616	13.620
CB	0.8626	0.8629	0.8632	0.8636	0.8639	0.8642	0.8645
CP	0.8654	0.8657	0.8660	0.8663	0.8666	0.8668	0.8671
CW	0.9478	0.9480	0.9483	0.9485	0.9488	0.9490	0.9493
CM	0.9969	0.9969	0.9969	0.9969	0.9969	0.9969	0.9969
W.P.A	5611.2	5612.7	5614.2	5615.7	5617.1	5618.6	5620.1
W.S.A	9978.4	9997.4	10016.4	10035.4	10054.4	10073.4	10092.4

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	14.000	14.050	14.100	14.150	14.200	14.250	14.300
DRAFT (B.O.K)	14.020	14.070	14.120	14.170	14.220	14.270	14.320
DISP. (S.W)	73541.0	73829.1	74117.3	74405.5	74693.9	74982.3	75270.8
DISP. (F.W)	71747.3	72028.4	72309.5	72590.8	72872.1	73153.5	73434.9
VOL. (MLD)	71565.8	71846.5	72127.4	72408.2	72689.2	72970.3	73251.4
L.C.F	-3.220	-3.226	-3.232	-3.237	-3.242	-3.247	-3.251
L.C.B	3.443	3.417	3.391	3.366	3.340	3.315	3.290
V.C.B	7.283	7.309	7.336	7.362	7.388	7.415	7.441
T.P.C	57.6	57.6	57.6	57.7	57.7	57.7	57.7
M.T.C	808.02	808.61	809.20	809.79	810.38	810.97	811.55
K.M.T	13.620	13.624	13.628	13.633	13.637	13.642	13.647
CB	0.8645	0.8648	0.8651	0.8654	0.8657	0.8660	0.8663
CP	0.8671	0.8674	0.8677	0.8680	0.8683	0.8686	0.8689
CW	0.9493	0.9495	0.9498	0.9500	0.9502	0.9505	0.9507
CM	0.9969	0.9969	0.9969	0.9970	0.9970	0.9970	0.9970
W.P.A	5620.1	5621.5	5623.0	5624.4	5625.9	5627.3	5628.8
W.S.A	10092.4	10111.3	10130.3	10149.3	10168.3	10187.3	10206.2

DRAFT (MLD.)	14.300	14.350	14.400	14.450	14.500	14.550	14.600
DRAFT (B.O.K)	14.320	14.370	14.420	14.470	14.520	14.570	14.620
DISP. (S.W)	75270.8	75559.4	75848.0	76136.7	76425.5	76714.4	77003.3
DISP. (F.W)	73434.9	73716.5	73998.1	74279.7	74561.5	74843.3	75125.2
VOL. (MLD)	73251.4	73532.6	73813.8	74095.2	74376.6	74658.1	74939.6
L.C.F	-3.251	-3.255	-3.258	-3.262	-3.265	-3.268	-3.270
L.C.B	3.290	3.265	3.240	3.216	3.191	3.167	3.143
V.C.B	7.441	7.467	7.494	7.520	7.546	7.572	7.599
T.P.C	57.7	57.7	57.7	57.7	57.8	57.8	57.8
M.T.C	811.55	812.14	812.72	813.30	813.88	814.46	815.04
K.M.T	13.647	13.652	13.657	13.662	13.667	13.673	13.679
CB	0.8663	0.8666	0.8669	0.8672	0.8674	0.8677	0.8680
CP	0.8689	0.8692	0.8695	0.8697	0.8700	0.8703	0.8706
CW	0.9507	0.9510	0.9512	0.9515	0.9517	0.9519	0.9522
CM	0.9970	0.9970	0.9970	0.9970	0.9970	0.9970	0.9970
W.P.A	5628.8	5630.2	5631.6	5633.0	5634.4	5635.9	5637.3
W.S.A	10206.2	10225.2	10244.2	10263.2	10282.1	10301.1	10320.1



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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	14.600	14.650	14.700	14.750
DRAFT (B.O.K)	14.620	14.670	14.720	14.770
DISP. (S.W)	77003.3	77292.3	77581.4	77870.
DISP. (F.W)	75125.2	75407.1	75689.2	75971.
VOL. (MLD)	74939.6	75221.2	75502.9	75784
L.C.F	-3.270	-3.272	-3.274	-3.2
L.C.B	3.143	3.119	3.095	3.
V.C.B	7.599	7.625	7.651	7
T.P.C	57.8	57.8	57.8	8
M.T.C	815.04	815.61	816.19	8
K.M.T	13.679	13.684	13.690	1
CB	0.8680	0.8683	0.8686	
CP	0.8706	0.8709	0.8712	
CW	0.9522	0.9524	0.9526	
CM	0.9970	0.9971	0.9971	
W.P.A	5637.3	5638.7	5640.1	
W.S.A	10320.1	10339.1	10358.0	

DRAFT (MLD.)	14.900	14.950
DRAFT (B.O.K)	14.920	14.970
DISP. (S.W)	78738.5	79027.9
DISP. (F.W)	76818.0	77100.
VOL. (MLD)	76630.4	76912.
L.C.F	-3.278	-3.2
L.C.B	3.002	2.9
V.C.B	7.756	7.
T.P.C	57.9	
M.T.C	818.49	81
K.M.T	13.715	1
CB	0.8697	
CP	0.8723	
CW	0.9536	
CM	0.9971	
W.P.A	5645.7	
W.S.A	10433.9	

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	16.400	16.450	16.500	16.550	16.600	16.650	16.700
DRAFT (B.O.K)	16.420	16.470	16.520	16.570	16.620	16.670	16.720
DISP. (S.W)	87450.3	87741.7	88033.2	88324.8	88616.5	88908.2	89200.1
DISP. (F.W)	85317.4	85601.7	85886.1	86170.6	86455.1	86739.7	87024.5
VOL. (MLD)	85119.5	85403.5	85687.6	85971.7	86255.9	86540.2	86824.6
L.C.F	-3.158	-3.150	-3.141	-3.133	-3.124	-3.115	-3.106
L.C.B	2.379	2.361	2.343	2.324	2.306	2.288	2.271
V.C.B	8.543	8.569	8.595	8.621	8.647	8.674	8.700
T.P.C	58.3	58.3	58.3	58.3	58.4	58.4	58.4
M.T.C	836.20	836.80	837.41	838.01	838.62	839.22	839.82
K.M.T	13.965	13.975	13.985	13.995	14.005	14.016	14.026
CB	0.8777	0.8780	0.8782	0.8785	0.8787	0.8790	0.8792
CP	0.8800	0.8803	0.8805	0.8808	0.8810	0.8813	0.8815
CW	0.9607	0.9610	0.9612	0.9614	0.9617	0.9619	0.9622
CM	0.9974	0.9974	0.9974	0.9974	0.9974	0.9974	0.9974
W.P.A	5687.9	5689.3	5690.7	5692.1	5693.5	5695.0	5696.4
W.S.A	11004.4	11023.5	11042.6	11061.6	11080.7	11099.8	11118.9

DRAFT (MLD.)	16.700	16.750	16.800	16.850	16.900	16.950	17.000
DRAFT (B.O.K)	16.720	16.770	16.820	16.870	16.920	16.970	17.020
DISP. (S.W)	89200.1	89492.1	89784.2	90076.3	90368.4	90660.7	90953.0
DISP. (F.W)	87024.5	87309.4	87594.3	87879.3	88164.3	88449.5	88734.7
VOL. (MLD)	86824.6	87109.1	87393.7	87678.3	87963.0	88247.8	88532.7
L.C.F	-3.106	-3.097	-3.087	-3.078	-3.068	-3.058	-3.049
L.C.B	2.271	2.253	2.236	2.219	2.201	2.184	2.168
V.C.B	8.700	8.726	8.752	8.778	8.805	8.831	8.857
T.P.C	58.4	58.4	58.4	58.4	58.4	58.5	58.5
M.T.C	839.82	840.42	841.01	841.60	842.19	842.78	843.38
K.M.T	14.026	14.037	14.048	14.058	14.069	14.080	14.091
CB	0.8792	0.8795	0.8797	0.8800	0.8802	0.8805	0.8807
CP	0.8815	0.8817	0.8820	0.8822	0.8825	0.8827	0.8829
CW	0.9622	0.9624	0.9626	0.9629	0.9631	0.9633	0.9636
CM	0.9974	0.9974	0.9974	0.9974	0.9974	0.9975	0.9975
W.P.A	5696.4	5697.8	5699.2	5700.5	5701.9	5703.3	5704.7
W.S.A	11118.9	11137.9	11157.0	11176.1	11195.2	11214.3	11233.3

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	15.800	15.850	15.900	15.950	16.000	16.050	16.100
DRAFT (B.O.K)	15.820	15.870	15.920	15.970	16.020	16.070	16.120
DISP. (S.W)	83958.4	84249.0	84539.7	84830.4	85121.3	85412.2	85703.1
DISP. (F.W)	81910.6	82194.2	82477.7	82761.4	83045.1	83328.9	83612.8
VOL. (MLD)	81716.9	82000.1	82283.3	82566.6	82850.0	83133.5	83417.0
L.C.F	-3.237	-3.232	-3.226	-3.221	-3.215	-3.209	-3.202
L.C.B	2.612	2.592	2.572	2.552	2.532	2.513	2.493
V.C.B	8.228	8.255	8.281	8.307	8.333	8.359	8.386
T.P.C	58.1	58.1	58.2	58.2	58.2	58.2	58.2
M.T.C	829.00	829.58	830.18	830.78	831.38	831.98	832.58
K.M.T	13.853	13.862	13.870	13.879	13.888	13.898	13.907
CB	0.8746	0.8749	0.8752	0.8754	0.8757	0.8759	0.8762
CP	0.8770	0.8773	0.8775	0.8778	0.8780	0.8783	0.8786
CW	0.9578	0.9581	0.9583	0.9586	0.9588	0.9590	0.9593
CM	0.9973	0.9973	0.9973	0.9973	0.9973	0.9973	0.9973
W.P.A	5670.8	5672.2	5673.7	5675.1	5676.5	5677.9	5679.3
W.S.A	10775.9	10794.9	10813.9	10833.0	10852.0	10871.0	10890.1

DRAFT (MLD.)	16.100	16.150	16.200	16.250	16.300	16.350	16.400
DRAFT (B.O.K)	16.120	16.170	16.220	16.270	16.320	16.370	16.420
DISP. (S.W)	85703.1	85994.1	86285.2	86576.4	86867.6	87158.9	87450.3
DISP. (F.W)	83612.8	83896.7	84180.7	84464.8	84748.9	85033.1	85317.4
VOL. (MLD)	83417.0	83700.6	83984.2	84267.9	84551.8	84835.6	85119.5
L.C.F	-3.202	-3.196	-3.188	-3.181	-3.173	-3.166	-3.158
L.C.B	2.493	2.474	2.455	2.436	2.417	2.398	2.379
V.C.B	8.386	8.412	8.438	8.464	8.490	8.517	8.543
T.P.C	58.2	58.2	58.2	58.3	58.3	58.3	58.3
M.T.C	832.58	833.18	833.78	834.39	834.99	835.59	836.20
K.M.T	13.907	13.916	13.926	13.935	13.945	13.955	13.965
CB	0.8762	0.8765	0.8767	0.8770	0.8772	0.8775	0.8777
CP	0.8786	0.8788	0.8791	0.8793	0.8795	0.8798	0.8800
CW	0.9593	0.9595	0.9598	0.9600	0.9602	0.9605	0.9607
CM	0.9973	0.9973	0.9973	0.9973	0.9974	0.9974	0.9974
W.P.A	5679.3	5680.8	5682.2	5683.6	5685.0	5686.4	5687.9
W.S.A	10890.1	10909.1	10928.2	10947.2	10966.3	10985.4	11004.4

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 \* HYDROSTATIC TABLE \*  
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DRAFT (MLD.)	16.400	16.450	16.500	16.550	16.600	16.650	16.700
DRAFT (B.O.K)	16.420	16.470	16.520	16.570	16.620	16.670	16.720
DISP. (S.W)	87450.3	87741.7	88033.2	88324.8	88616.5	88908.2	89200.1
DISP. (F.W)	85317.4	85601.7	85886.1	86170.6	86455.1	86739.7	87024.5
VOL. (MLD)	85119.5	85403.5	85687.6	85971.7	86255.9	86540.2	86824.6
L.C.F	-3.158	-3.150	-3.141	-3.133	-3.124	-3.115	-3.106
L.C.B	2.379	2.361	2.343	2.324	2.306	2.288	2.271
V.C.B	8.543	8.569	8.595	8.621	8.647	8.674	8.700
T.P.C	58.3	58.3	58.3	58.3	58.4	58.4	58.4
M.T.C	836.20	836.80	837.41	838.01	838.62	839.22	839.82
K.M.T	13.965	13.975	13.985	13.995	14.005	14.016	14.026
CB	0.8777	0.8780	0.8782	0.8785	0.8787	0.8790	0.8792
CP	0.8800	0.8803	0.8805	0.8808	0.8810	0.8813	0.8815
CW	0.9607	0.9610	0.9612	0.9614	0.9617	0.9619	0.9622
CM	0.9974	0.9974	0.9974	0.9974	0.9974	0.9974	0.9974
W.P.A	5687.9	5689.3	5690.7	5692.1	5693.5	5695.0	5696.4
W.S.A	11004.4	11023.5	11042.6	11061.6	11080.7	11099.8	11118.9

DRAFT (MLD.)	16.700	16.750	16.800	16.850	16.900	16.950	17.000
DRAFT (B.O.K)	16.720	16.770	16.820	16.870	16.920	16.970	17.020
DISP. (S.W)	89200.1	89492.1	89784.2	90076.3	90368.4	90660.7	90953.0
DISP. (F.W)	87024.5	87309.4	87594.3	87879.3	88164.3	88449.5	88734.7
VOL. (MLD)	86824.6	87109.1	87393.7	87678.3	87963.0	88247.8	88532.7
L.C.F	-3.106	-3.097	-3.087	-3.078	-3.068	-3.058	-3.049
L.C.B	2.271	2.253	2.236	2.219	2.201	2.184	2.168
V.C.B	8.700	8.726	8.752	8.778	8.805	8.831	8.857
T.P.C	58.4	58.4	58.4	58.4	58.4	58.5	58.5
M.T.C	839.82	840.42	841.01	841.60	842.19	842.78	843.38
K.M.T	14.026	14.037	14.048	14.058	14.069	14.080	14.091
CB	0.8792	0.8795	0.8797	0.8800	0.8802	0.8805	0.8807
CP	0.8815	0.8817	0.8820	0.8822	0.8825	0.8827	0.8829
CW	0.9622	0.9624	0.9626	0.9629	0.9631	0.9633	0.9636
CM	0.9974	0.9974	0.9974	0.9974	0.9974	0.9975	0.9975
W.P.A	5696.4	5697.8	5699.2	5700.5	5701.9	5703.3	5704.7
W.S.A	11118.9	11137.9	11157.0	11176.1	11195.2	11214.3	11233.3

## 2.5 Tank Capacities

## 2.5.1 Summary Table

COMPARTMENT	LOCATION (FR. NO.)	VOLUME 100% FULL m3	WEIGHT FULL t	L.C.G FROM MID m	T.C.G FROM C.L m	V.C.G FROM B.L m	MAX. MT OF INERTIA m4
Ballast Water : S.G. * FILL RATIO = 1.025 * 100%							
F.P.TK(C)	215-233	1666.3	1708.0	86.982	-0.000	7.064	2801.5
NO.1 W.B.TK(P)	179-215	1439.5	1475.5	67.668	-9.797	6.182	6436.9
NO.1 W.B.TK(S)	179-215	1439.5	1475.5	67.668	9.797	6.182	6436.9
NO.2 W.B.TK(P)	143-179	1537.8	1576.3	38.540	-11.409	6.975	7242.3
NO.2 W.B.TK(S)	143-179	1537.8	1576.3	38.540	11.409	6.975	7242.3
NO.3 W.B.TK(P)	107-143	1540.3	1578.8	9.056	-11.419	6.966	7274.9
NO.3 W.B.TK(S)	107-143	1540.3	1578.8	9.056	11.419	6.966	7274.9
NO.4 W.B.TK(P)	71-107	1173.8	1203.1	-20.433	-11.053	3.700	7275.0
NO.4 W.B.TK(S)	71-107	1173.8	1203.1	-20.433	11.053	3.700	7275.0
NO.5 W.B.TK(P)	35- 71	1246.2	1277.4	-50.556	-10.786	4.648	4515.3
NO.5 W.B.TK(S)	35- 71	1075.7	1102.6	-50.646	10.047	2.779	4515.3
A.P.TK(C)	-4- 11	639.3	655.2	-88.338	-0.046	11.727	8584.8
NO.3 CARGO HOLD(FLOOD.)	107-143	14308.3	14666.0	9.048	-0.001	10.543	79366.7
SUBTOTAL		30318.5					
Solid cargo : S.G. * FILL RATIO = 1 * 100%							
NO.1 CARGO HOLD	178-215	13620.0	13620.0	66.936	-0.003	10.789	63811.9
NO.2 CARGO HOLD	142-179	14872.1	14872.1	38.061	-0.004	10.513	82067.6
NO.3 CARGO HOLD	107-143	14308.3	14308.3	9.048	-0.001	10.543	79366.7
NO.4 CARGO HOLD	71-108	14875.1	14875.1	-19.961	0.003	10.513	82077.1
NO.5 CARGO HOLD	35- 72	14291.5	14291.5	-49.303	0.003	10.844	83439.3
SUBTOTAL		71967.1					
Diesel Oil : S.G. * FILL RATIO = 0.85 * 98%							
M.D.O.TK(P)	26- 33	31.9	26.6	-68.666	-2.539	1.173	16.6
M.D.O.TK(S)	18- 35	57.3	47.7	-70.097	2.948	1.276	56.5
M.D.O.SETT.TK	29- 31	17.2	14.3	-68.750	12.787	15.793	1.8
M.D.O.SERV.TK	31- 35	34.4	28.7	-66.350	12.787	15.793	3.6
SUBTOTAL		140.9					
Fresh Water : S.G. * FILL RATIO = 1 * 100%							
F.W.TK(P)	5- 11	166.6	166.6	-85.971	-9.459	16.314	173.7
F.W.TK(S)	5- 11	166.6	166.6	-85.971	9.459	16.314	173.7
SUBTOTAL		333.2					

COMPARTMENT	LOCATION (FR. NO.)	VOLUME 100% FULL m3	WEIGHT FULL t	L.C.G FROM MID m	T.C.G FROM C.L m	V.C.G FROM B.L m	MAX. MT OF INERTIA m4
Heavy Fuel Oil : S.G. * FILL RATIO = 0.98 * 98%							
NO.1 H.F.O.TK(P)	71-107	368.0	353.4	-20.470	-12.574	17.448	425.5
NO.1 H.F.O.TK(S)	71-107	368.0	353.4	-20.470	12.574	17.448	425.5
NO.2 H.F.O.TK(P)	35- 71	368.0	353.4	-49.990	-12.574	17.448	425.5
NO.2 H.F.O.TK(S)	35- 71	368.0	353.4	-49.990	12.574	17.448	425.5
H.F.O.STOR.TK(P)	26- 35	273.5	262.7	-68.050	-13.888	12.068	56.7
H.F.O.STOR.TK(S)	29- 35	190.2	182.6	-67.070	13.941	11.773	38.3
H.F.O.SETT.TK	26- 30	37.2	35.7	-70.350	-12.930	15.608	5.8
H.F.O.SERV.TK	30- 34	37.2	35.7	-67.150	-12.930	15.608	5.8
H.F.O.LOW SULP.SETT.TK	29- 32	34.2	32.9	-68.550	-7.870	15.608	11.5
H.F.O.LOW SULP.SERV.TK	32- 34	34.2	32.9	-66.550	-7.870	15.608	11.5
SUBTOTAL		2078.5					
Lubricating Oil : S.G. * FILL RATIO = 0.9 * 98%							
M.E.L.O.SUMP TK	18- 30	18.0	15.9	-73.823	0.002	1.354	8.4
M.E.L.O.STOR.TK	26- 28	26.8	23.6	-71.349	13.819	14.984	16.0
M.E.L.O.SETT.TK	23- 26	26.3	23.2	-73.346	13.783	14.993	15.9
CYL.O.STOR.TK	21- 23	31.6	27.9	-75.147	12.510	14.994	43.6
LOW TBN CYL.O.STOR.TK	21- 25	15.5	13.7	-74.350	8.300	14.980	1.2
G.E.L.O.STOR.TK	23- 25	7.8	6.9	-73.550	6.640	14.980	0.6
G.E.L.O.SETT.TK	21- 23	7.8	6.9	-75.150	6.640	14.980	0.6
SUBTOTAL		133.8					
Miscellaneous : S.G. * FILL RATIO = 1 * 50%							
BILGE HOLDING TK	11- 17	29.8	14.9	-81.108	-0.084	1.143	25.9
OILY BILGE TK	18- 26	17.3	8.7	-74.584	-2.668	1.360	4.7
S/T L.O.DRAIN TK	16- 17	2.0	1.0	-79.545	1.258	1.718	1.1
F.O.OVERFLOW TK	26- 35	11.4	5.7	-67.357	-4.832	1.502	3.5
SLUDGE TK	25- 34	11.6	5.8	-69.150	-9.115	8.000	2.6
SEWAGE HOLDING TK	21- 23	6.1	3.0	-75.150	-9.930	9.700	0.5
CARGO BILGE HOLDING TK(S)	35- 71	174.0	87.0	-49.990	15.452	16.438	6.8
S/T C.W.TK	6- 11	13.7	6.8	-84.882	0.000	3.180	1.6
SUBTOTAL		265.9					

## 2.5.2 Volume Table

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\* TANK VOLUME TABLE \*  
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SHIP NO. :  
SHIP TYPE : 57,700 DWT BULK CARRIER  
  
REFERENCE POSITION : MIDSHIP (LONGITUDINAL)  
: BASE LINE (VERTICAL)  
: CENTER LINE (TRANSVERSE)

## Abbreviation &amp; Units

=====

HEIGHT : FROM BASE LINE (M)  
LEVEL : FROM TANK BOTTOM (M)  
VOLUME : NET VOLUME (M\*\*3)  
LCG : LONGITUDINAL CENTER OF GRAVITY (M)  
VCG : VERTICAL CENTER OF GRAVITY (M)  
TCG : TRANSVERSE CENTER OF GRAVITY (M)  
TMI : TRANSVERSE MOMENT OF INERTIA (M\*\*4)

57,700 DWT BULK CARRIER  
 F.P.TK(C)  
 COMP.NO R201

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
-0.000	0.000	0.0	0.0	84.977	0.001	0.000	65.8
0.500	0.500	1.4	22.8	85.926	0.281	-0.000	473.7
1.000	1.000	3.5	58.0	86.250	0.573	-0.000	827.2
1.500	1.500	6.1	101.6	86.482	0.866	-0.000	1160.9
2.000	2.000	9.2	152.5	86.640	1.164	-0.000	1469.4
2.500	2.500	12.6	209.9	86.758	1.462	-0.000	1748.0
3.000	3.000	16.3	271.4	86.858	1.754	-0.000	1995.4
3.500	3.500	20.2	336.3	86.940	2.043	-0.000	2211.6
4.000	4.000	24.2	403.9	87.010	2.329	-0.000	2394.1
4.500	4.500	28.4	473.7	87.070	2.613	-0.000	2541.6
5.000	5.000	32.7	545.1	87.120	2.893	-0.000	2656.1
5.500	5.500	37.1	617.6	87.162	3.169	-0.000	2738.3
6.000	6.000	41.5	690.9	87.197	3.443	-0.000	2786.7
6.500	6.500	45.9	764.4	87.226	3.713	-0.000	2801.4
7.000	7.000	50.3	837.7	87.247	3.978	-0.000	2785.9
7.500	7.500	54.6	910.3	87.262	4.239	-0.000	2745.5
8.000	8.000	58.9	981.8	87.271	4.495	-0.000	2684.0
8.500	8.500	63.1	1051.7	87.272	4.744	-0.000	2606.2
9.000	9.000	67.2	1119.6	87.266	4.987	-0.000	2521.2
9.500	9.500	71.1	1185.1	87.252	5.223	-0.000	2437.4
10.000	10.000	74.9	1247.5	87.229	5.449	-0.000	2361.7
10.500	10.500	78.4	1306.3	87.195	5.665	-0.000	2303.9
11.000	11.000	81.8	1362.8	87.158	5.876	-0.000	2266.2
11.500	11.500	85.1	1417.7	87.120	6.084	-0.000	2249.7
12.000	12.000	88.3	1472.0	87.082	6.293	-0.000	2254.7
12.500	12.500	91.6	1526.4	87.048	6.505	-0.000	2282.9
13.000	13.000	94.9	1581.7	87.017	6.724	-0.000	2337.5
13.500	13.500	97.9	1631.7	86.997	6.923	-0.000	2298.7
13.850	13.850	100.0	1666.3	86.982	7.064	-0.000	2375.2



57,700 DWT BULK CARRIER  
 NO.1 W.B.TK(P)  
 COMP.NO R202

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
-0.000	0.000	0.0	0.0	65.947	0.001	-5.613	3425.7
0.500	0.500	11.2	161.6	66.435	0.256	-6.168	5014.0
1.000	1.000	23.5	338.6	66.593	0.515	-6.403	5741.4
1.500	1.500	36.4	523.6	66.711	0.775	-6.565	6213.2
2.000	2.000	46.1	664.0	66.870	0.971	-6.815	1042.7
2.500	2.500	50.6	728.1	67.097	1.083	-7.198	926.7
3.000	3.000	54.7	787.6	67.297	1.209	-7.521	805.0
3.500	3.500	58.5	841.6	67.477	1.339	-7.791	681.4
4.000	4.000	61.8	889.6	67.642	1.469	-8.015	560.4
4.500	4.500	64.7	930.9	67.795	1.592	-8.198	444.3
5.000	5.000	67.1	965.5	67.941	1.705	-8.343	330.9
5.500	5.500	69.0	993.0	68.081	1.803	-8.450	213.9
6.000	6.000	70.4	1013.3	68.216	1.882	-8.523	108.1
6.500	6.500	71.4	1028.3	68.331	1.946	-8.573	66.2
7.000	7.000	72.2	1039.1	68.418	1.996	-8.608	35.6
7.500	7.500	72.7	1046.3	68.478	2.031	-8.635	16.4
8.000	8.000	72.9	1049.7	68.511	2.051	-8.645	4.3
8.500	8.500	73.0	1051.3	68.524	2.059	-8.651	0.0
9.000	9.000	73.0	1051.4	68.525	2.059	-8.651	0.0
9.500	9.500	73.0	1051.4	68.525	2.059	-8.651	0.0
10.000	10.000	73.0	1051.4	68.525	2.059	-8.651	0.0
10.500	10.500	73.0	1051.4	68.525	2.059	-8.651	0.0
11.000	11.000	73.0	1051.4	68.525	2.059	-8.651	0.0
11.500	11.500	73.0	1051.4	68.525	2.059	-8.651	0.0
12.000	12.000	73.0	1051.4	68.525	2.059	-8.651	0.0
12.500	12.500	73.0	1051.4	68.525	2.059	-8.651	0.0
13.000	13.000	73.0	1051.4	68.525	2.059	-8.651	0.0
13.500	13.500	73.0	1051.4	68.525	2.059	-8.651	0.0
14.000	14.000	73.0	1051.4	68.525	2.059	-8.652	0.0
14.500	14.500	73.2	1053.3	68.504	2.084	-8.663	0.5
15.000	15.000	73.7	1060.8	68.441	2.175	-8.711	4.5
15.500	15.500	74.8	1076.4	68.345	2.360	-8.800	17.0
16.000	16.000	76.4	1100.1	68.216	2.655	-8.923	44.0
16.500	16.500	78.8	1134.8	68.085	3.069	-9.074	93.6
17.000	17.000	82.0	1180.9	67.959	3.600	-9.244	173.2
17.500	17.500	86.1	1238.9	67.845	4.240	-9.420	288.3
18.000	18.000	90.9	1309.2	67.751	4.965	-9.590	446.2
18.500	18.500	96.6	1390.9	67.674	5.746	-9.745	571.1
19.006	19.006	100.0	1439.5	67.668	6.182	-9.797	0.0

57,700 DWT BULK CARRIER  
 NO.1 W.B.TK(S)  
 COMP.NO R203

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
-0.000	0.000	0.0	0.0	65.947	0.001	5.613	3425.7
0.500	0.500	11.2	161.6	66.435	0.256	6.168	5014.0
1.000	1.000	23.5	338.6	66.593	0.515	6.403	5741.4
1.500	1.500	36.4	523.6	66.711	0.775	6.565	6213.2
2.000	2.000	46.1	664.0	66.870	0.971	6.815	1042.7
2.500	2.500	50.6	728.1	67.097	1.083	7.198	926.7
3.000	3.000	54.7	787.6	67.297	1.209	7.521	805.0
3.500	3.500	58.5	841.6	67.477	1.339	7.791	681.4
4.000	4.000	61.8	889.6	67.642	1.469	8.015	560.4
4.500	4.500	64.7	930.9	67.795	1.592	8.198	444.3
5.000	5.000	67.1	965.5	67.941	1.705	8.343	330.9
5.500	5.500	69.0	993.0	68.081	1.803	8.450	213.9
6.000	6.000	70.4	1013.3	68.216	1.882	8.523	108.1
6.500	6.500	71.4	1028.3	68.331	1.946	8.573	66.2
7.000	7.000	72.2	1039.1	68.418	1.996	8.608	35.6
7.500	7.500	72.7	1046.3	68.478	2.031	8.635	16.4
8.000	8.000	72.9	1049.7	68.511	2.051	8.645	4.3
8.500	8.500	73.0	1051.3	68.524	2.059	8.651	0.0
9.000	9.000	73.0	1051.4	68.525	2.059	8.651	0.0
9.500	9.500	73.0	1051.4	68.525	2.059	8.651	0.0
10.000	10.000	73.0	1051.4	68.525	2.059	8.651	0.0
10.500	10.500	73.0	1051.4	68.525	2.059	8.651	0.0
11.000	11.000	73.0	1051.4	68.525	2.059	8.651	0.0
11.500	11.500	73.0	1051.4	68.525	2.059	8.651	0.0
12.000	12.000	73.0	1051.4	68.525	2.059	8.651	0.0
12.500	12.500	73.0	1051.4	68.525	2.059	8.651	0.0
13.000	13.000	73.0	1051.4	68.525	2.059	8.651	0.0
13.500	13.500	73.0	1051.4	68.525	2.059	8.651	0.0
14.000	14.000	73.0	1051.4	68.525	2.059	8.652	0.0
14.500	14.500	73.2	1053.3	68.504	2.084	8.663	0.5
15.000	15.000	73.7	1060.8	68.441	2.175	8.711	4.5
15.500	15.500	74.8	1076.4	68.345	2.360	8.800	17.0
16.000	16.000	76.4	1100.1	68.216	2.655	8.923	44.0
16.500	16.500	78.8	1134.8	68.085	3.069	9.074	93.6
17.000	17.000	82.0	1180.9	67.959	3.600	9.244	173.2
17.500	17.500	86.1	1238.9	67.845	4.240	9.420	288.3
18.000	18.000	90.9	1309.2	67.751	4.965	9.590	446.2
18.500	18.500	96.6	1390.9	67.674	5.746	9.745	571.1
19.006	19.006	100.0	1439.5	67.668	6.182	9.797	0.0

57,700 DWT BULK CARRIER  
 NO.2.W.B.TK(P)  
 COMP.NO R204

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
-0.000	0.000	0.0	0.0	38.503	0.001	-7.977	4901.4
0.500	0.500	12.7	194.6	38.508	0.253	-8.389	6400.9
1.000	1.000	25.9	397.9	38.515	0.508	-8.543	6942.0
1.500	1.500	39.3	604.2	38.516	0.761	-8.635	7183.2
2.000	2.000	49.0	753.7	38.517	0.946	-8.849	188.6
2.500	2.500	52.8	811.8	38.518	1.039	-9.225	127.2
3.000	3.000	56.1	862.2	38.521	1.138	-9.526	80.2
3.500	3.500	58.8	904.9	38.523	1.238	-9.768	46.4
4.000	4.000	61.1	939.7	38.524	1.330	-9.959	23.7
4.500	4.500	62.9	966.8	38.525	1.412	-10.105	9.9
5.000	5.000	64.1	986.1	38.526	1.477	-10.210	2.9
5.500	5.500	64.9	997.6	38.526	1.520	-10.273	0.4
6.000	6.000	65.1	1001.3	38.526	1.535	-10.295	0.0
6.500	6.500	65.1	1001.3	38.526	1.535	-10.295	0.0
7.000	7.000	65.1	1001.3	38.526	1.535	-10.295	0.0
7.500	7.500	65.1	1001.3	38.526	1.535	-10.295	0.0
8.000	8.000	65.1	1001.3	38.526	1.535	-10.295	0.0
8.500	8.500	65.1	1001.3	38.526	1.535	-10.295	0.0
9.000	9.000	65.1	1001.3	38.526	1.535	-10.295	0.0
9.500	9.500	65.1	1001.3	38.526	1.535	-10.295	0.0
10.000	10.000	65.1	1001.3	38.526	1.535	-10.295	0.0
10.500	10.500	65.1	1001.3	38.526	1.535	-10.295	0.0
11.000	11.000	65.1	1001.3	38.526	1.535	-10.295	0.0
11.500	11.500	65.1	1001.3	38.526	1.535	-10.295	0.0
12.000	12.000	65.1	1001.3	38.526	1.535	-10.295	0.0
12.500	12.500	65.1	1001.3	38.526	1.535	-10.295	0.0
13.000	13.000	65.1	1001.3	38.526	1.535	-10.295	0.0
13.500	13.500	65.1	1001.3	38.526	1.535	-10.295	0.0
14.000	14.000	65.1	1001.5	38.526	1.538	-10.296	0.0
14.500	14.500	65.6	1009.6	38.526	1.640	-10.340	2.1
15.000	15.000	66.9	1029.1	38.527	1.889	-10.436	12.8
15.500	15.500	68.9	1060.1	38.528	2.280	-10.571	39.6
16.000	16.000	71.7	1102.6	38.529	2.800	-10.728	89.4
16.500	16.500	75.2	1156.6	38.531	3.428	-10.893	169.8
17.000	17.000	79.5	1222.1	38.533	4.142	-11.052	287.8
17.500	17.500	84.5	1299.0	38.535	4.919	-11.195	450.8
18.000	18.000	90.2	1387.5	38.537	5.738	-11.314	666.0
18.500	18.500	96.7	1486.6	38.539	6.572	-11.407	826.5
19.006	19.006	100.0	1537.8	38.540	6.975	-11.409	0.0

57,700 DWT BULK CARRIER  
 NO.2 W.B.TK(S)  
 COMP.NO R205

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
-0.000	0.000	0.0	0.0	38.503	0.001	7.977	4901.4
0.500	0.500	12.7	194.6	38.508	0.253	8.389	6400.9
1.000	1.000	25.9	397.9	38.515	0.508	8.543	6942.0
1.500	1.500	39.3	604.2	38.516	0.761	8.635	7183.2
2.000	2.000	49.0	753.7	38.517	0.946	8.849	188.6
2.500	2.500	52.8	811.8	38.518	1.039	9.225	127.2
3.000	3.000	56.1	862.2	38.521	1.138	9.526	80.2
3.500	3.500	58.8	904.9	38.523	1.238	9.768	46.4
4.000	4.000	61.1	939.7	38.524	1.330	9.959	23.7
4.500	4.500	62.9	966.8	38.525	1.412	10.105	9.9
5.000	5.000	64.1	986.1	38.526	1.477	10.210	2.9
5.500	5.500	64.9	997.6	38.526	1.520	10.273	0.4
6.000	6.000	65.1	1001.3	38.526	1.535	10.295	0.0
6.500	6.500	65.1	1001.3	38.526	1.535	10.295	0.0
7.000	7.000	65.1	1001.3	38.526	1.535	10.295	0.0
7.500	7.500	65.1	1001.3	38.526	1.535	10.295	0.0
8.000	8.000	65.1	1001.3	38.526	1.535	10.295	0.0
8.500	8.500	65.1	1001.3	38.526	1.535	10.295	0.0
9.000	9.000	65.1	1001.3	38.526	1.535	10.295	0.0
9.500	9.500	65.1	1001.3	38.526	1.535	10.295	0.0
10.000	10.000	65.1	1001.3	38.526	1.535	10.295	0.0
10.500	10.500	65.1	1001.3	38.526	1.535	10.295	0.0
11.000	11.000	65.1	1001.3	38.526	1.535	10.295	0.0
11.500	11.500	65.1	1001.3	38.526	1.535	10.295	0.0
12.000	12.000	65.1	1001.3	38.526	1.535	10.295	0.0
12.500	12.500	65.1	1001.3	38.526	1.535	10.295	0.0
13.000	13.000	65.1	1001.3	38.526	1.535	10.295	0.0
13.500	13.500	65.1	1001.3	38.526	1.535	10.295	0.0
14.000	14.000	65.1	1001.5	38.526	1.535	10.295	0.0
14.500	14.500	65.6	1009.6	38.526	1.538	10.296	0.0
15.000	15.000	66.9	1029.1	38.527	1.640	10.340	2.1
15.500	15.500	68.9	1060.1	38.528	1.889	10.436	12.8
16.000	16.000	71.7	1102.6	38.529	2.280	10.571	39.6
16.500	16.500	75.2	1156.6	38.531	2.800	10.728	89.4
17.000	17.000	79.5	1222.1	38.533	3.428	10.893	169.8
17.500	17.500	84.5	1299.0	38.535	4.142	11.052	287.8
18.000	18.000	90.2	1387.5	38.537	4.919	11.195	450.8
18.500	18.500	96.7	1486.6	38.539	5.738	11.314	666.0
19.006	19.006	100.0	1537.8	38.540	6.572	11.407	826.5
					6.975	11.409	0.0

57,700 DWT BULK CARRIER  
 NO.3 W.B.TK(P)  
 COMP.NO R206

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
-0.000	0.000	0.0	0.0	9.052	0.001	-8.012	4982.8
0.500	0.500	12.7	195.6	9.050	0.253	-8.426	6494.1
1.000	1.000	26.0	399.9	9.050	0.507	-8.576	7023.3
1.500	1.500	39.4	606.4	9.057	0.760	-8.663	7236.1
2.000	2.000	49.1	755.7	9.062	0.944	-8.873	191.0
2.500	2.500	52.8	814.0	9.061	1.037	-9.248	127.8
3.000	3.000	56.1	864.4	9.060	1.137	-9.548	80.4
3.500	3.500	58.9	907.1	9.060	1.236	-9.788	46.4
4.000	4.000	61.2	942.0	9.059	1.329	-9.978	23.7
4.500	4.500	62.9	969.0	9.059	1.410	-10.123	9.9
5.000	5.000	64.2	988.4	9.059	1.475	-10.228	2.9
5.500	5.500	64.9	999.9	9.059	1.518	-10.291	0.4
6.000	6.000	65.2	1003.6	9.059	1.534	-10.312	0.0
6.500	6.500	65.2	1003.6	9.059	1.534	-10.312	0.0
7.000	7.000	65.2	1003.6	9.059	1.534	-10.312	0.0
7.500	7.500	65.2	1003.6	9.059	1.534	-10.312	0.0
8.000	8.000	65.2	1003.6	9.059	1.534	-10.312	0.0
8.500	8.500	65.2	1003.6	9.059	1.534	-10.312	0.0
9.000	9.000	65.2	1003.6	9.059	1.534	-10.312	0.0
9.500	9.500	65.2	1003.6	9.059	1.534	-10.312	0.0
10.000	10.000	65.2	1003.6	9.059	1.534	-10.312	0.0
10.500	10.500	65.2	1003.6	9.059	1.534	-10.312	0.0
11.000	11.000	65.2	1003.6	9.059	1.534	-10.312	0.0
11.500	11.500	65.2	1003.6	9.059	1.534	-10.312	0.0
12.000	12.000	65.2	1003.6	9.059	1.534	-10.312	0.0
12.500	12.500	65.2	1003.6	9.059	1.534	-10.312	0.0
13.000	13.000	65.2	1003.6	9.059	1.534	-10.312	0.0
13.500	13.500	65.2	1003.6	9.059	1.534	-10.312	0.0
14.000	14.000	65.2	1003.8	9.059	1.536	-10.313	0.0
14.500	14.500	65.7	1011.9	9.059	1.638	-10.357	2.1
15.000	15.000	67.0	1031.4	9.059	1.887	-10.453	12.9
15.500	15.500	69.0	1062.4	9.058	2.277	-10.587	39.6
16.000	16.000	71.7	1105.0	9.058	2.796	-10.743	89.5
16.500	16.500	75.2	1159.0	9.058	3.424	-10.907	169.9
17.000	17.000	79.5	1224.5	9.057	4.137	-11.065	288.0
17.500	17.500	84.5	1301.4	9.057	4.913	-11.207	451.1
18.000	18.000	90.2	1389.9	9.056	5.730	-11.325	666.3
18.500	18.500	96.7	1489.0	9.056	6.564	-11.417	826.9
19.006	19.006	100.0	1540.3	9.056	6.966	-11.419	0.0

57,700 DWT BULK CARRIER  
 NO.3 W.B.TK(S)  
 COMP.NO R207

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
-0.000	0.000	0.0	0.0	9.052	0.001	8.012	4982.8
0.500	0.500	12.7	195.6	9.050	0.253	8.426	6494.1
1.000	1.000	26.0	399.9	9.050	0.507	8.576	7023.3
1.500	1.500	39.4	606.4	9.057	0.760	8.663	7236.1
2.000	2.000	49.1	755.7	9.062	0.944	8.873	191.0
2.500	2.500	52.8	814.0	9.061	1.037	9.248	127.8
3.000	3.000	56.1	864.4	9.060	1.137	9.548	80.4
3.500	3.500	58.9	907.1	9.060	1.236	9.788	46.4
4.000	4.000	61.2	942.0	9.059	1.329	9.978	23.7
4.500	4.500	62.9	969.0	9.059	1.410	10.123	9.9
5.000	5.000	64.2	988.4	9.059	1.475	10.228	2.9
5.500	5.500	64.9	999.9	9.059	1.518	10.291	0.4
6.000	6.000	65.2	1003.6	9.059	1.534	10.312	0.0
6.500	6.500	65.2	1003.6	9.059	1.534	10.312	0.0
7.000	7.000	65.2	1003.6	9.059	1.534	10.312	0.0
7.500	7.500	65.2	1003.6	9.059	1.534	10.312	0.0
8.000	8.000	65.2	1003.6	9.059	1.534	10.312	0.0
8.500	8.500	65.2	1003.6	9.059	1.534	10.312	0.0
9.000	9.000	65.2	1003.6	9.059	1.534	10.312	0.0
9.500	9.500	65.2	1003.6	9.059	1.534	10.312	0.0
10.000	10.000	65.2	1003.6	9.059	1.534	10.312	0.0
10.500	10.500	65.2	1003.6	9.059	1.534	10.312	0.0
11.000	11.000	65.2	1003.6	9.059	1.534	10.312	0.0
11.500	11.500	65.2	1003.6	9.059	1.534	10.312	0.0
12.000	12.000	65.2	1003.6	9.059	1.534	10.312	0.0
12.500	12.500	65.2	1003.6	9.059	1.534	10.312	0.0
13.000	13.000	65.2	1003.6	9.059	1.534	10.312	0.0
13.500	13.500	65.2	1003.6	9.059	1.534	10.312	0.0
14.000	14.000	65.2	1003.8	9.059	1.536	10.313	0.0
14.500	14.500	65.7	1011.9	9.059	1.638	10.357	2.1
15.000	15.000	67.0	1031.4	9.059	1.887	10.453	12.9
15.500	15.500	69.0	1062.4	9.058	2.277	10.587	39.6
16.000	16.000	71.7	1105.0	9.058	2.796	10.743	89.5
16.500	16.500	75.2	1159.0	9.058	3.424	10.907	169.9
17.000	17.000	79.5	1224.5	9.057	4.137	11.065	288.0
17.500	17.500	84.5	1301.4	9.057	4.913	11.207	451.1
18.000	18.000	90.2	1389.9	9.056	5.730	11.325	666.3
18.500	18.500	96.7	1489.0	9.056	6.564	11.417	826.9
19.006	19.006	100.0	1540.3	9.056	6.966	11.419	0.0

57,700 DWT BULK CARRIER  
 NO.4 W.B.TK(P)  
 COMP.NO R208

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
-0.000	0.000	0.0	0.0	-20.382	0.001	-7.970	4892.4
0.500	0.500	16.6	195.0	-20.424	0.253	-8.403	6446.4
1.000	1.000	34.0	398.8	-20.434	0.508	-8.558	6989.7
1.500	1.500	51.6	605.5	-20.421	0.761	-8.650	7226.3
2.000	2.000	64.4	755.4	-20.412	0.946	-8.864	190.6
2.500	2.500	69.3	813.6	-20.416	1.039	-9.239	127.8
3.000	3.000	73.6	864.1	-20.419	1.138	-9.540	80.4
3.500	3.500	77.2	906.7	-20.422	1.237	-9.780	46.4
4.000	4.000	80.2	941.6	-20.423	1.330	-9.971	23.7
4.500	4.500	82.5	968.7	-20.425	1.411	-10.116	9.9
5.000	5.000	84.2	988.0	-20.425	1.476	-10.221	2.9
5.500	5.500	85.2	999.5	-20.426	1.519	-10.284	0.4
6.000	6.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
6.500	6.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
7.000	7.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
7.500	7.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
8.000	8.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
8.500	8.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
9.000	9.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
9.500	9.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
10.000	10.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
10.500	10.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
11.000	11.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
11.500	11.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
12.000	12.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
12.500	12.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
13.000	13.000	85.5	1003.3	-20.426	1.535	-10.305	0.0
13.500	13.500	85.5	1003.3	-20.426	1.535	-10.305	0.0
14.000	14.000	85.5	1003.5	-20.426	1.538	-10.307	0.0
14.500	14.500	86.2	1011.5	-20.427	1.639	-10.350	2.1
15.000	15.000	87.7	1030.0	-20.427	1.874	-10.442	6.6
15.500	15.500	89.5	1050.2	-20.428	2.132	-10.538	6.6
16.000	16.000	91.2	1070.5	-20.429	2.390	-10.631	6.6
16.500	16.500	92.9	1090.7	-20.430	2.647	-10.720	6.6
17.000	17.000	94.6	1111.0	-20.430	2.904	-10.806	6.6
17.500	17.500	96.4	1131.2	-20.431	3.161	-10.889	6.6
18.000	18.000	98.1	1151.5	-20.432	3.418	-10.968	6.6
18.500	18.500	99.8	1171.7	-20.432	3.674	-11.046	6.6
18.601	18.601	100.0	1173.8	-20.433	3.700	-11.053	0.0

57,700 DWT BULK CARRIER  
 NO.4 W.B.TK(S)  
 COMP.NO R209

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
-0.000	0.000	0.0	0.0	-20.382	0.001	7.970	4892.4
0.500	0.500	16.6	195.0	-20.424	0.253	8.403	6446.4
1.000	1.000	34.0	398.8	-20.434	0.508	8.558	6989.7
1.500	1.500	51.6	605.5	-20.421	0.761	8.650	7226.3
2.000	2.000	64.4	755.4	-20.412	0.946	8.864	190.6
2.500	2.500	69.3	813.6	-20.416	1.039	9.239	127.8
3.000	3.000	73.6	864.1	-20.419	1.138	9.540	80.4
3.500	3.500	77.2	906.7	-20.422	1.237	9.780	46.4
4.000	4.000	80.2	941.6	-20.423	1.330	9.971	23.7
4.500	4.500	82.5	968.7	-20.425	1.411	10.116	9.9
5.000	5.000	84.2	988.0	-20.425	1.476	10.221	2.9
5.500	5.500	85.2	999.5	-20.426	1.519	10.284	0.4
6.000	6.000	85.5	1003.3	-20.426	1.535	10.305	0.0
6.500	6.500	85.5	1003.3	-20.426	1.535	10.305	0.0
7.000	7.000	85.5	1003.3	-20.426	1.535	10.305	0.0
7.500	7.500	85.5	1003.3	-20.426	1.535	10.305	0.0
8.000	8.000	85.5	1003.3	-20.426	1.535	10.305	0.0
8.500	8.500	85.5	1003.3	-20.426	1.535	10.305	0.0
9.000	9.000	85.5	1003.3	-20.426	1.535	10.305	0.0
9.500	9.500	85.5	1003.3	-20.426	1.535	10.305	0.0
10.000	10.000	85.5	1003.3	-20.426	1.535	10.305	0.0
10.500	10.500	85.5	1003.3	-20.426	1.535	10.305	0.0
11.000	11.000	85.5	1003.3	-20.426	1.535	10.305	0.0
11.500	11.500	85.5	1003.3	-20.426	1.535	10.305	0.0
12.000	12.000	85.5	1003.3	-20.426	1.535	10.305	0.0
12.500	12.500	85.5	1003.3	-20.426	1.535	10.305	0.0
13.000	13.000	85.5	1003.3	-20.426	1.535	10.305	0.0
13.500	13.500	85.5	1003.3	-20.426	1.535	10.305	0.0
14.000	14.000	85.5	1003.5	-20.426	1.538	10.307	0.0
14.500	14.500	86.2	1011.5	-20.427	1.639	10.350	2.1
15.000	15.000	87.7	1030.0	-20.427	1.874	10.442	6.6
15.500	15.500	89.5	1050.2	-20.428	2.132	10.538	6.6
16.000	16.000	91.2	1070.5	-20.429	2.390	10.631	6.6
16.500	16.500	92.9	1090.7	-20.430	2.647	10.720	6.6
17.000	17.000	94.6	1111.0	-20.430	2.904	10.806	6.6
17.500	17.500	96.4	1131.2	-20.431	3.161	10.889	6.6
18.000	18.000	98.1	1151.5	-20.432	3.418	10.968	6.6
18.500	18.500	99.8	1171.7	-20.432	3.674	11.046	6.6
18.601	18.601	100.0	1173.8	-20.433	3.700	11.053	0.0



57,700 DWT BULK CARRIER  
 NO.5 W.B.TK(P)  
 COMP.NO R210

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
-0.000	0.000	0.0	0.0	-46.240	0.001	-5.747	1624.7
0.500	0.500	9.8	122.2	-46.862	0.259	-6.478	3035.8
1.000	1.000	21.1	263.3	-47.120	0.525	-6.771	3737.5
1.500	1.500	33.4	415.9	-47.292	0.792	-7.002	4228.9
2.000	2.000	43.0	536.2	-47.484	0.996	-7.306	895.8
2.500	2.500	47.9	597.4	-47.746	1.124	-7.730	833.7
3.000	3.000	52.8	658.0	-48.011	1.274	-8.105	753.2
3.500	3.500	57.5	716.9	-48.281	1.436	-8.437	662.9
4.000	4.000	62.1	773.4	-48.556	1.605	-8.729	569.2
4.500	4.500	66.3	826.6	-48.832	1.775	-8.985	475.2
5.000	5.000	70.3	875.7	-49.109	1.942	-9.207	383.9
5.500	5.500	73.8	920.0	-49.383	2.101	-9.398	296.5
6.000	6.000	76.9	958.8	-49.654	2.248	-9.557	212.5
6.500	6.500	79.6	992.4	-49.910	2.384	-9.690	154.2
7.000	7.000	81.8	1019.9	-50.128	2.502	-9.800	90.8
7.500	7.500	83.5	1040.7	-50.304	2.595	-9.888	49.4
8.000	8.000	84.7	1055.0	-50.437	2.668	-9.950	23.3
8.500	8.500	85.5	1065.5	-50.536	2.720	-9.997	9.5
9.000	9.000	86.0	1071.6	-50.598	2.754	-10.026	3.2
9.500	9.500	86.1	1073.5	-50.622	2.769	-10.039	0.5
10.000	10.000	86.3	1075.6	-50.644	2.778	-10.046	0.0
10.500	10.500	86.3	1075.7	-50.646	2.779	-10.047	0.0
11.000	11.000	86.3	1075.7	-50.646	2.779	-10.047	0.0
11.500	11.500	86.3	1075.7	-50.646	2.779	-10.047	0.0
12.000	12.000	86.3	1075.7	-50.646	2.779	-10.047	0.0
12.500	12.500	86.3	1075.7	-50.646	2.779	-10.047	0.0
13.000	13.000	86.3	1075.7	-50.646	2.779	-10.047	0.0
13.500	13.500	86.3	1075.7	-50.646	2.779	-10.047	0.0
14.000	14.000	86.3	1075.9	-50.645	2.782	-10.048	0.0
14.500	14.500	87.0	1084.0	-50.641	2.867	-10.091	2.1
15.000	15.000	88.5	1102.4	-50.630	3.066	-10.181	6.6
15.500	15.500	90.1	1122.7	-50.618	3.286	-10.276	6.6
16.000	16.000	91.7	1142.9	-50.607	3.507	-10.367	6.6
16.500	16.500	93.3	1163.2	-50.596	3.729	-10.455	6.6
17.000	17.000	95.0	1183.4	-50.586	3.951	-10.540	6.6
17.500	17.500	96.6	1203.7	-50.576	4.175	-10.622	6.6
18.000	18.000	98.2	1223.9	-50.566	4.400	-10.702	6.6
18.500	18.500	99.8	1244.2	-50.557	4.625	-10.779	6.6
18.601	18.601	100.0	1246.2	-50.556	4.648	-10.786	0.0

57,700 DWT BULK CARRIER  
 NO.5 W.B.TK(S)  
 COMP.NO R211

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
-0.000	0.000	0.0	0.0	-46.240	0.001	5.747	1624.7
0.400	0.400	8.9	95.8	-46.798	0.207	6.403	2866.9
0.800	0.800	19.1	205.2	-47.025	0.418	6.666	3479.5
1.200	1.200	30.1	323.4	-47.207	0.632	6.866	3973.9
1.600	1.600	41.6	447.5	-47.321	0.845	7.043	4327.7
2.000	2.000	49.8	536.2	-47.484	0.996	7.306	895.8
2.400	2.400	54.4	585.2	-47.693	1.097	7.649	848.0
2.800	2.800	58.9	633.9	-47.904	1.212	7.961	786.9
3.200	3.200	63.4	681.8	-48.119	1.337	8.243	717.9
3.600	3.600	67.7	728.4	-48.336	1.469	8.498	644.3
4.000	4.000	71.9	773.4	-48.556	1.605	8.729	569.2
4.400	4.400	75.9	816.2	-48.777	1.741	8.936	493.9
4.800	4.800	79.6	856.6	-48.998	1.876	9.122	420.0
5.200	5.200	83.1	894.0	-49.219	2.006	9.287	348.5
5.600	5.600	86.3	928.2	-49.438	2.131	9.432	279.5
6.000	6.000	89.1	958.8	-49.654	2.248	9.557	212.5
6.400	6.400	91.7	986.2	-49.861	2.358	9.666	170.6
6.800	6.800	93.9	1009.6	-50.046	2.458	9.757	112.3
7.200	7.200	95.7	1028.9	-50.203	2.541	9.839	72.2
7.600	7.600	97.1	1044.1	-50.334	2.612	9.903	43.3
8.000	8.000	98.1	1055.0	-50.437	2.668	9.950	23.3
8.400	8.400	98.9	1063.5	-50.519	2.711	9.988	11.5
8.800	8.800	99.4	1069.6	-50.577	2.742	10.016	5.0
9.200	9.200	99.7	1073.0	-50.614	2.762	10.033	1.9
9.600	9.600	99.8	1074.0	-50.627	2.772	10.041	0.3
10.000	10.000	100.0	1075.6	-50.644	2.778	10.046	0.0
10.400	10.400	100.0	1075.7	-50.646	2.779	10.047	0.0
10.425	10.425	100.0	1075.7	-50.646	2.779	10.047	0.0

57,700 DWT BULK CARRIER  
 A.P.TK(C)  
 COMP.NO R212

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
7.500	0.000	0.0	0.000	-84.396	7.501	-0.000	0.2
7.750	0.250	0.1	0.381	-84.504	7.631	-0.000	0.3
8.000	0.500	0.1	0.932	-84.588	7.776	-0.000	0.7
8.250	0.750	0.3	1.715	-84.639	7.935	-0.000	1.8
8.500	1.000	0.4	2.866	-84.701	8.115	-0.000	4.8
8.750	1.250	0.7	4.783	-84.817	8.321	-0.000	19.1
9.000	1.500	1.3	8.448	-84.996	8.562	-0.000	96.3
9.250	1.750	2.5	15.683	-85.248	8.816	-0.000	315.3
9.500	2.000	4.1	25.937	-85.460	9.048	-0.000	563.2
9.750	2.250	6.2	39.338	-85.792	9.256	-0.041	910.7
10.000	2.500	9.0	57.381	-86.124	9.452	-0.056	1364.7
10.250	2.750	12.5	80.132	-86.452	9.644	-0.060	1924.4
10.500	3.000	16.9	108.077	-86.799	9.834	-0.059	2541.2
10.750	3.250	22.0	140.822	-87.126	10.019	-0.057	3175.4
11.000	3.500	27.7	177.046	-87.388	10.194	-0.054	3791.2
11.250	3.750	33.8	215.990	-87.591	10.362	-0.052	4379.3
11.500	4.000	40.2	257.094	-87.749	10.524	-0.050	4936.4
11.750	4.250	46.9	299.985	-87.873	10.682	-0.050	5469.7
12.000	4.500	53.9	344.577	-87.976	10.836	-0.049	5977.1
12.250	4.750	61.1	390.677	-88.061	10.989	-0.049	6460.2
12.500	5.000	68.5	438.129	-88.133	11.139	-0.048	6921.2
12.750	5.250	76.2	486.809	-88.195	11.287	-0.048	7362.4
13.000	5.500	83.9	536.612	-88.249	11.435	-0.047	7787.3
13.250	5.750	91.9	587.453	-88.296	11.581	-0.046	8195.8
13.500	6.000	100.0	639.253	-88.338	11.727	-0.046	8583.2

57,700 DWT BULK CARRIER  
 NO.3 CARGO HOLD(FLOOD.)  
 COMP.NO R213

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
1.800	0.000	0.0	0.0	9.050	1.801	0.000	25591.2
2.300	0.500	2.1	298.4	9.050	2.052	-0.000	30083.3
2.800	1.000	4.3	610.5	9.050	2.307	0.000	34257.7
3.300	1.500	6.5	936.0	9.050	2.566	-0.000	38801.5
3.800	2.000	9.0	1292.8	9.050	2.839	0.000	46430.9
4.300	2.500	11.7	1667.1	9.050	3.111	0.000	52089.4
4.800	3.000	14.4	2057.3	9.049	3.384	0.000	58911.9
5.300	3.500	17.2	2464.8	9.047	3.660	-0.000	65471.0
5.800	4.000	20.3	2900.6	9.052	3.945	-0.000	76471.5
6.300	4.500	23.5	3357.8	9.052	4.231	-0.000	79366.7
6.800	5.000	26.7	3816.1	9.051	4.510	-0.000	79366.7
7.300	5.500	29.9	4274.4	9.051	4.782	-0.000	79366.7
7.800	6.000	33.1	4732.7	9.050	5.050	-0.000	79366.7
8.300	6.500	36.3	5191.0	9.050	5.315	-0.000	79366.7
8.800	7.000	39.5	5649.3	9.050	5.577	-0.001	79366.7
9.300	7.500	42.7	6107.6	9.049	5.838	-0.001	79366.7
9.800	8.000	45.9	6565.9	9.049	6.097	-0.001	79366.7
10.300	8.500	49.1	7024.2	9.049	6.355	-0.001	79366.7
10.800	9.000	52.3	7482.4	9.049	6.612	-0.001	79366.7
11.300	9.500	55.5	7940.7	9.049	6.868	-0.001	79366.7
11.800	10.000	58.7	8399.0	9.049	7.124	-0.001	79366.7
12.300	10.500	61.9	8857.3	9.049	7.378	-0.001	79366.7
12.800	11.000	65.1	9315.6	9.049	7.633	-0.001	79366.7
13.300	11.500	68.3	9773.9	9.048	7.887	-0.001	79366.7
13.800	12.000	71.5	10232.2	9.048	8.141	-0.001	79366.7
14.300	12.500	74.7	10683.5	9.048	8.390	-0.001	70609.4
14.800	13.000	77.7	11113.2	9.048	8.628	-0.001	60420.4
15.300	13.500	80.5	11519.9	9.048	8.855	-0.001	50881.1
15.800	14.000	83.2	11903.7	9.048	9.071	-0.001	42644.3
16.300	14.500	85.7	12265.3	9.048	9.276	-0.001	35562.9
16.800	15.000	88.0	12593.5	9.048	9.466	-0.001	27189.6
17.300	15.500	90.1	12890.1	9.048	9.640	-0.001	21945.0
17.800	16.000	92.0	13165.5	9.048	9.806	-0.001	17422.3
18.300	16.500	93.8	13419.7	9.048	9.962	-0.001	13568.1
18.800	17.000	95.5	13663.1	9.048	10.115	-0.001	13525.6
19.300	17.500	97.0	13879.7	9.048	10.254	-0.001	9925.0
19.800	18.000	98.3	14058.3	9.048	10.372	-0.001	9925.0
20.500	18.700	100.0	14308.3	9.048	10.543	-0.001	9925.0

57,700 DWT BULK CARRIER  
 NO.1 CARGO HOLD  
 COMP.NO R101

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
1.800	0.000	0.0	0.0	65.535	1.801	0.000	17349.2
2.300	0.500	2.0	267.8	65.610	2.052	-0.000	20209.4
2.800	1.000	4.0	551.3	65.681	2.310	-0.000	23399.7
3.300	1.500	6.2	850.6	65.748	2.571	-0.000	26927.7
3.800	2.000	8.6	1165.8	65.811	2.836	-0.000	30811.5
4.300	2.500	11.0	1496.7	65.871	3.105	-0.000	35069.4
4.800	3.000	13.5	1844.6	65.920	3.378	-0.000	40209.4
5.300	3.500	16.2	2210.7	65.954	3.655	-0.000	45362.9
5.800	4.000	19.1	2595.1	65.979	3.936	-0.000	51367.6
6.300	4.500	22.0	2993.5	66.009	4.218	-0.001	54576.0
6.800	5.000	25.0	3401.4	66.055	4.497	-0.002	57390.3
7.300	5.500	28.0	3817.5	66.110	4.776	-0.002	59462.1
7.800	6.000	31.1	4240.8	66.172	5.053	-0.002	61440.2
8.300	6.500	34.3	4670.1	66.236	5.328	-0.002	63015.5
8.800	7.000	37.5	5103.2	66.299	5.602	-0.003	63539.6
9.300	7.500	40.7	5536.6	66.352	5.872	-0.003	63501.5
9.800	8.000	43.8	5969.9	66.398	6.139	-0.003	63461.6
10.300	8.500	47.0	6403.1	66.438	6.403	-0.003	63421.6
10.800	9.000	50.2	6836.3	66.472	6.666	-0.003	63391.2
11.300	9.500	53.4	7269.3	66.502	6.927	-0.003	63372.8
11.800	10.000	56.6	7702.3	66.529	7.187	-0.003	63379.4
12.300	10.500	59.7	8135.5	66.553	7.446	-0.003	63417.1
12.800	11.000	62.9	8568.7	66.575	7.704	-0.003	63494.2
13.300	11.500	66.1	9002.3	66.595	7.962	-0.003	63611.0
13.800	12.000	69.3	9436.3	66.614	8.219	-0.004	63771.8
14.300	12.500	72.5	9869.2	66.633	8.474	-0.004	61284.2
14.800	13.000	75.6	10293.2	66.659	8.725	-0.004	55856.1
15.300	13.500	78.6	10704.0	66.689	8.967	-0.004	49753.1
15.800	14.000	81.5	11098.3	66.722	9.201	-0.004	43279.0
16.300	14.500	84.2	11473.5	66.756	9.425	-0.004	36595.9
16.800	15.000	86.8	11825.0	66.792	9.637	-0.004	29898.7
17.300	15.500	89.2	12151.4	66.827	9.836	-0.004	24154.7
17.800	16.000	91.4	12454.6	66.858	10.023	-0.004	19176.6
18.300	16.500	93.5	12734.4	66.885	10.200	-0.003	14934.3
18.800	17.000	95.5	13002.3	66.910	10.372	-0.003	14887.6
19.300	17.500	97.1	13227.1	66.926	10.519	-0.003	9098.0
19.800	18.000	98.3	13390.8	66.930	10.629	-0.003	9098.0
20.500	18.700	100.0	13620.0	66.936	10.789	-0.003	9098.0

57,700 DWT BULK CARRIER  
 NO.2 CARGO HOLD  
 COMP.NO R102

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
1.800	0.000	0.0	0.0	37.340	1.801	0.000	28150.3
2.300	0.500	2.2	328.9	37.730	2.052	-0.000	33156.8
2.800	1.000	4.5	672.8	37.732	2.307	-0.000	37757.9
3.300	1.500	6.9	1031.6	37.733	2.566	-0.000	42766.1
3.800	2.000	9.4	1405.3	37.733	2.828	0.000	48198.6
4.300	2.500	12.1	1793.9	37.733	3.093	-0.000	54072.7
4.800	3.000	14.8	2199.2	37.730	3.362	0.000	61224.7
5.300	3.500	17.6	2623.3	37.723	3.635	-0.000	68126.2
5.800	4.000	20.7	3075.2	37.756	3.917	-0.000	78991.2
6.300	4.500	23.8	3546.7	37.804	4.201	-0.001	82065.0
6.800	5.000	27.0	4019.4	37.841	4.477	-0.002	82065.2
7.300	5.500	30.2	4492.1	37.870	4.748	-0.002	82065.5
7.800	6.000	33.4	4964.8	37.894	5.015	-0.002	82065.8
8.300	6.500	36.6	5437.4	37.913	5.278	-0.003	82066.0
8.800	7.000	39.7	5910.1	37.929	5.540	-0.003	82066.2
9.300	7.500	42.9	6382.8	37.943	5.800	-0.003	82066.4
9.800	8.000	46.1	6855.5	37.955	6.059	-0.003	82066.6
10.300	8.500	49.3	7328.1	37.966	6.316	-0.003	82066.8
10.800	9.000	52.5	7800.8	37.975	6.573	-0.004	82066.9
11.300	9.500	55.6	8273.5	37.983	6.828	-0.004	82067.0
11.800	10.000	58.8	8746.2	37.990	7.084	-0.004	82067.2
12.300	10.500	62.0	9218.9	37.997	7.338	-0.004	82067.3
12.800	11.000	65.2	9691.5	38.003	7.592	-0.004	82067.5
13.300	11.500	68.3	10164.2	38.008	7.846	-0.004	82067.6
13.800	12.000	71.5	10636.9	38.013	8.100	-0.004	82067.5
14.300	12.500	74.7	11102.1	38.018	8.349	-0.004	72749.0
14.800	13.000	77.6	11544.5	38.022	8.586	-0.004	62120.3
15.300	13.500	80.4	11963.6	38.026	8.813	-0.004	52580.4
15.800	14.000	83.1	12359.4	38.029	9.028	-0.004	44070.5
16.300	14.500	85.6	12731.9	38.032	9.234	-0.004	36531.8
16.800	15.000	87.9	13075.8	38.035	9.426	-0.004	29015.6
17.300	15.500	90.0	13392.3	38.037	9.606	-0.004	23418.6
17.800	16.000	92.0	13686.2	38.039	9.777	-0.004	18592.1
18.300	16.500	93.9	13957.5	38.041	9.938	-0.004	14478.9
18.800	17.000	95.6	14217.3	38.042	10.095	-0.004	14433.7
19.300	17.500	97.1	14443.4	38.046	10.235	-0.004	9925.0
19.800	18.000	98.3	14622.0	38.052	10.349	-0.004	9925.0
20.500	18.700	100.0	14872.1	38.061	10.513	-0.004	9925.0

57,700 DWT BULK CARRIER  
 NO.3 CARGO HOLD  
 COMP.NO R103

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
1.800	0.000	0.0	0.0	9.050	1.801	0.000	25591.2
2.300	0.500	2.1	298.4	9.050	2.052	-0.000	30083.3
2.800	1.000	4.3	610.5	9.050	2.307	0.000	34257.7
3.300	1.500	6.5	936.0	9.050	2.566	-0.000	38801.5
3.800	2.000	9.0	1292.8	9.050	2.839	0.000	46430.9
4.300	2.500	11.7	1667.1	9.050	3.111	0.000	52089.4
4.800	3.000	14.4	2057.3	9.049	3.384	0.000	58911.9
5.300	3.500	17.2	2464.8	9.047	3.660	-0.000	65471.0
5.800	4.000	20.3	2900.6	9.052	3.945	-0.000	76471.5
6.300	4.500	23.5	3357.8	9.052	4.231	-0.000	79366.7
6.800	5.000	26.7	3816.1	9.051	4.510	-0.000	79366.7
7.300	5.500	29.9	4274.4	9.051	4.782	-0.000	79366.7
7.800	6.000	33.1	4732.7	9.050	5.050	-0.000	79366.7
8.300	6.500	36.3	5191.0	9.050	5.315	-0.000	79366.7
8.800	7.000	39.5	5649.3	9.050	5.577	-0.001	79366.7
9.300	7.500	42.7	6107.6	9.049	5.838	-0.001	79366.7
9.800	8.000	45.9	6565.9	9.049	6.097	-0.001	79366.7
10.300	8.500	49.1	7024.2	9.049	6.355	-0.001	79366.7
10.800	9.000	52.3	7482.4	9.049	6.612	-0.001	79366.7
11.300	9.500	55.5	7940.7	9.049	6.868	-0.001	79366.7
11.800	10.000	58.7	8399.0	9.049	7.124	-0.001	79366.7
12.300	10.500	61.9	8857.3	9.049	7.378	-0.001	79366.7
12.800	11.000	65.1	9315.6	9.049	7.633	-0.001	79366.7
13.300	11.500	68.3	9773.9	9.048	7.887	-0.001	79366.7
13.800	12.000	71.5	10232.2	9.048	8.141	-0.001	79366.7
14.300	12.500	74.7	10683.5	9.048	8.390	-0.001	70609.4
14.800	13.000	77.7	11113.2	9.048	8.628	-0.001	60420.4
15.300	13.500	80.5	11519.9	9.048	8.855	-0.001	50881.1
15.800	14.000	83.2	11903.7	9.048	9.071	-0.001	42644.3
16.300	14.500	85.7	12265.3	9.048	9.276	-0.001	35562.9
16.800	15.000	88.0	12593.5	9.048	9.466	-0.001	27189.6
17.300	15.500	90.1	12890.1	9.048	9.640	-0.001	21945.0
17.800	16.000	92.0	13165.5	9.048	9.806	-0.001	17422.3
18.300	16.500	93.8	13419.7	9.048	9.962	-0.001	13568.1
18.800	17.000	95.5	13663.1	9.048	10.115	-0.001	13525.6
19.300	17.500	97.0	13879.7	9.048	10.254	-0.001	9925.0
19.800	18.000	98.3	14058.3	9.048	10.372	-0.001	9925.0
20.500	18.700	100.0	14308.3	9.048	10.543	-0.001	9925.0

57,700 DWT BULK CARRIER  
 NO.4 CARGO HOLD  
 COMP.NO R104

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
1.800	0.000	0.0	0.0	-19.240	1.801	-0.000	28150.2
2.300	0.500	2.2	328.9	-19.630	2.052	-0.000	33156.6
2.800	1.000	4.5	672.8	-19.632	2.307	0.000	37757.4
3.300	1.500	6.9	1031.6	-19.633	2.566	0.000	42765.3
3.800	2.000	9.4	1405.3	-19.633	2.828	-0.000	48197.6
4.300	2.500	12.1	1793.9	-19.633	3.093	0.000	54071.4
4.800	3.000	14.8	2199.6	-19.630	3.362	0.000	61380.4
5.300	3.500	17.6	2624.7	-19.621	3.636	-0.000	68299.2
5.800	4.000	20.7	3075.2	-19.651	3.917	0.000	78993.9
6.300	4.500	23.8	3546.9	-19.700	4.201	0.001	82077.1
6.800	5.000	27.0	4019.7	-19.738	4.477	0.001	82077.1
7.300	5.500	30.2	4492.5	-19.768	4.748	0.002	82077.1
7.800	6.000	33.4	4965.3	-19.792	5.015	0.002	82077.1
8.300	6.500	36.6	5438.2	-19.811	5.279	0.002	82077.1
8.800	7.000	39.7	5911.0	-19.828	5.540	0.002	82077.1
9.300	7.500	42.9	6383.8	-19.842	5.800	0.002	82077.1
9.800	8.000	46.1	6856.6	-19.855	6.059	0.003	82077.1
10.300	8.500	49.3	7329.5	-19.865	6.316	0.003	82077.1
10.800	9.000	52.5	7802.3	-19.875	6.573	0.003	82077.1
11.300	9.500	55.6	8275.1	-19.883	6.829	0.003	82077.1
11.800	10.000	58.8	8747.9	-19.890	7.084	0.003	82077.1
12.300	10.500	62.0	9220.8	-19.897	7.339	0.003	82077.1
12.800	11.000	65.2	9693.6	-19.903	7.593	0.003	82077.1
13.300	11.500	68.3	10166.4	-19.908	7.847	0.003	82077.1
13.800	12.000	71.5	10639.3	-19.913	8.100	0.003	82077.1
14.300	12.500	74.7	11104.6	-19.918	8.349	0.003	72751.2
14.800	13.000	77.6	11547.1	-19.923	8.587	0.003	62123.1
15.300	13.500	80.4	11966.4	-19.927	8.813	0.003	52583.7
15.800	14.000	83.1	12362.3	-19.930	9.029	0.003	44074.3
16.300	14.500	85.6	12734.9	-19.933	9.234	0.003	36536.0
16.800	15.000	87.9	13078.9	-19.936	9.426	0.003	29014.9
17.300	15.500	90.1	13395.4	-19.938	9.607	0.003	23418.2
17.800	16.000	92.0	13689.3	-19.940	9.777	0.003	18591.9
18.300	16.500	93.9	13960.6	-19.941	9.938	0.003	14478.9
18.800	17.000	95.6	14220.3	-19.943	10.095	0.003	14433.7
19.300	17.500	97.1	14446.5	-19.946	10.235	0.003	9925.0
19.800	18.000	98.3	14625.1	-19.953	10.349	0.003	9925.0
20.500	18.700	100.0	14875.1	-19.961	10.513	0.003	9925.0



57,700 DWT BULK CARRIER  
 NO.5 CARGO HOLD  
 COMP.NO R105

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
1.800	0.000	0.0	0.0	-47.644	1.801	0.000	16462.2
2.300	0.500	1.9	266.5	-47.713	2.052	0.000	19246.4
2.800	1.000	3.8	548.7	-47.778	2.310	0.000	22358.2
3.300	1.500	5.9	846.7	-47.840	2.571	0.000	25805.1
3.800	2.000	8.1	1160.5	-47.898	2.836	0.000	29605.3
4.300	2.500	10.4	1490.0	-47.953	3.105	0.000	33777.0
4.800	3.000	12.9	1836.7	-47.996	3.378	0.000	38922.5
5.300	3.500	15.4	2202.1	-48.021	3.656	0.000	44002.0
5.800	4.000	18.1	2584.6	-48.044	3.937	0.000	49954.3
6.300	4.500	20.9	2983.6	-48.068	4.219	0.001	54760.8
6.800	5.000	23.8	3396.1	-48.109	4.503	0.001	59718.2
7.300	5.500	26.8	3824.5	-48.172	4.788	0.002	65076.9
7.800	6.000	29.9	4267.3	-48.250	5.075	0.002	69995.6
8.300	6.500	33.0	4721.6	-48.337	5.361	0.002	74168.7
8.800	7.000	36.3	5185.5	-48.429	5.647	0.002	77968.6
9.300	7.500	39.6	5657.0	-48.521	5.930	0.003	80471.2
9.800	8.000	42.9	6133.4	-48.609	6.211	0.003	82451.9
10.300	8.500	46.3	6612.8	-48.692	6.490	0.003	83311.0
10.800	9.000	49.6	7093.1	-48.765	6.765	0.003	83423.6
11.300	9.500	53.0	7573.3	-48.828	7.036	0.003	83434.6
11.800	10.000	56.4	8053.6	-48.884	7.306	0.003	83438.8
12.300	10.500	59.7	8533.9	-48.934	7.573	0.003	83439.3
12.800	11.000	63.1	9014.1	-48.979	7.838	0.003	83439.3
13.300	11.500	66.4	9494.4	-49.019	8.101	0.003	83439.3
13.800	12.000	69.8	9974.7	-49.055	8.364	0.003	83439.3
14.300	12.500	73.1	10447.3	-49.087	8.621	0.003	73829.0
14.800	13.000	76.2	10896.4	-49.116	8.865	0.003	62981.4
15.300	13.500	79.2	11322.0	-49.141	9.098	0.003	53442.1
15.800	14.000	82.0	11724.2	-49.163	9.319	0.003	44796.1
16.300	14.500	84.7	12102.5	-49.182	9.529	0.003	37030.3
16.800	15.000	87.1	12454.5	-49.202	9.728	0.003	29927.3
17.300	15.500	89.4	12781.0	-49.222	9.914	0.003	24154.7
17.800	16.000	91.6	13084.1	-49.240	10.091	0.003	19176.6
18.300	16.500	93.5	13364.0	-49.256	10.258	0.003	14934.2
18.800	17.000	95.4	13631.9	-49.270	10.421	0.003	14887.5
19.300	17.500	97.0	13862.8	-49.282	10.564	0.003	9925.0
19.800	18.000	98.3	14041.4	-49.291	10.679	0.003	9925.0
20.500	18.700	100.0	14291.5	-49.303	10.844	0.003	9925.0

57,700 DWT BULK CARRIER  
M.D.O.TK(P)  
COMP.NO R501

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
-0.000	0.000	0.0	0.000	-67.436	0.001	-1.520	3.5
0.100	0.100	2.5	0.792	-67.971	0.054	-1.870	7.1
0.200	0.200	5.7	1.823	-68.125	0.109	-2.013	9.4
0.300	0.300	9.4	3.003	-68.217	0.165	-2.115	11.4
0.400	0.400	13.4	4.291	-68.285	0.221	-2.195	12.8
0.500	0.500	17.7	5.655	-68.341	0.276	-2.256	13.7
0.600	0.600	22.1	7.071	-68.389	0.331	-2.304	14.5
0.700	0.700	26.7	8.534	-68.432	0.386	-2.343	15.3
0.800	0.800	31.4	10.038	-68.469	0.440	-2.378	16.1
0.900	0.900	36.2	11.564	-68.501	0.494	-2.407	16.2
1.000	1.000	41.0	13.097	-68.528	0.548	-2.429	16.3
1.100	1.100	45.8	14.636	-68.550	0.600	-2.448	16.4
1.200	1.200	50.7	16.180	-68.569	0.653	-2.463	16.5
1.300	1.300	55.5	17.729	-68.585	0.705	-2.476	16.6
1.400	1.400	60.4	19.282	-68.600	0.757	-2.488	16.6
1.500	1.500	65.2	20.835	-68.612	0.809	-2.497	16.6
1.600	1.600	70.1	22.388	-68.623	0.860	-2.506	16.6
1.700	1.700	75.0	23.941	-68.632	0.911	-2.513	16.6
1.800	1.800	79.8	25.494	-68.641	0.962	-2.519	16.6
1.900	1.900	84.7	27.048	-68.648	1.013	-2.525	16.6
2.000	2.000	89.5	28.601	-68.654	1.064	-2.530	16.6
2.100	2.100	94.4	30.154	-68.660	1.115	-2.535	16.6
2.200	2.200	99.3	31.707	-68.665	1.166	-2.539	16.6
2.215	2.215	100.0	31.940	-68.666	1.173	-2.539	16.6

57,700 DWT BULK CARRIER  
M.D.O.TK(S)  
COMP.NO R502

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
-0.000	0.000	0.0	0.000	-67.451	0.001	1.515	3.4
0.100	0.100	1.4	0.819	-68.128	0.054	1.875	7.1
0.200	0.200	3.5	2.000	-68.546	0.112	2.030	10.4
0.300	0.300	6.1	3.483	-68.846	0.172	2.152	14.1
0.400	0.400	9.1	5.228	-69.086	0.232	2.249	17.4
0.500	0.500	12.5	7.182	-69.268	0.291	2.329	20.5
0.600	0.600	16.3	9.313	-69.408	0.351	2.398	23.7
0.700	0.700	20.3	11.602	-69.518	0.410	2.458	26.9
0.800	0.800	24.5	14.034	-69.605	0.469	2.513	30.1
0.900	0.900	29.0	16.596	-69.676	0.528	2.564	33.3
1.000	1.000	33.7	19.276	-69.734	0.586	2.610	36.3
1.100	1.100	38.5	22.063	-69.783	0.645	2.653	39.3
1.200	1.200	43.5	24.942	-69.824	0.703	2.693	41.4
1.300	1.300	48.7	27.901	-69.861	0.761	2.729	43.5
1.400	1.400	54.0	30.932	-69.894	0.819	2.762	45.4
1.500	1.500	59.4	34.029	-69.923	0.876	2.792	47.4
1.600	1.600	64.9	37.187	-69.948	0.934	2.820	49.4
1.700	1.700	70.5	40.404	-69.971	0.991	2.847	51.6
1.800	1.800	76.3	43.678	-69.991	1.048	2.872	52.1
1.900	1.900	82.0	46.968	-70.013	1.104	2.895	53.9
2.000	2.000	87.7	50.248	-70.039	1.159	2.914	54.5
2.100	2.100	93.4	53.526	-70.065	1.214	2.931	55.3
2.200	2.200	99.1	56.793	-70.093	1.268	2.946	56.4
2.215	2.215	100.0	57.282	-70.097	1.276	2.948	56.5

57,700 DWT BULK CARRIER  
M.D.O.SETT.TK  
COMP.NO R503

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-68.750	13.501	12.730	1.8
13.700	0.200	4.4	0.759	-68.750	13.600	12.730	1.8
13.900	0.400	8.8	1.518	-68.750	13.700	12.730	1.8
14.100	0.600	13.2	2.276	-68.750	13.800	12.730	1.8
14.300	0.800	17.6	3.035	-68.750	13.900	12.730	1.8
14.500	1.000	22.0	3.794	-68.750	14.000	12.730	1.8
14.700	1.200	26.4	4.553	-68.750	14.100	12.730	1.8
14.900	1.400	30.8	5.311	-68.750	14.200	12.730	1.8
15.100	1.600	35.2	6.070	-68.750	14.300	12.730	1.8
15.300	1.800	39.7	6.829	-68.750	14.400	12.730	1.8
15.500	2.000	44.1	7.588	-68.750	14.500	12.730	1.8
15.700	2.200	48.5	8.347	-68.750	14.600	12.730	1.8
15.900	2.400	52.9	9.105	-68.750	14.700	12.730	1.8
16.100	2.600	57.3	9.864	-68.750	14.800	12.730	1.8
16.300	2.800	61.7	10.623	-68.750	14.900	12.730	1.8
16.500	3.000	66.1	11.382	-68.750	15.000	12.730	1.8
16.700	3.200	70.5	12.141	-68.750	15.100	12.730	1.8
16.900	3.400	74.9	12.899	-68.750	15.200	12.730	1.8
17.100	3.600	79.3	13.658	-68.750	15.300	12.730	1.8
17.300	3.800	83.7	14.417	-68.750	15.400	12.730	1.8
17.500	4.000	88.1	15.176	-68.750	15.500	12.730	1.8
17.700	4.200	92.5	15.934	-68.750	15.600	12.730	1.8
17.900	4.400	94.2	16.225	-68.750	15.639	12.742	0.1
18.100	4.600	95.7	16.478	-68.750	15.675	12.754	0.1
18.300	4.800	97.2	16.731	-68.750	15.714	12.765	0.1
18.500	5.000	98.6	16.984	-68.750	15.754	12.777	0.1
18.717	5.217	100.0	17.222	-68.750	15.793	12.787	0.0

57,700 DWT BULK CARRIER  
M.D.O.SERV.TK  
COMP.NO R504

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
13.500	0.000	0.0	0.000	-66.350	13.501	12.730	3.6
13.700	0.200	4.4	1.518	-66.350	13.600	12.730	3.6
13.900	0.400	8.8	3.035	-66.350	13.700	12.730	3.6
14.100	0.600	13.2	4.553	-66.350	13.800	12.730	3.6
14.300	0.800	17.6	6.070	-66.350	13.900	12.730	3.6
14.500	1.000	22.0	7.588	-66.350	14.000	12.730	3.6
14.700	1.200	26.4	9.105	-66.350	14.100	12.730	3.6
14.900	1.400	30.8	10.623	-66.350	14.200	12.730	3.6
15.100	1.600	35.2	12.141	-66.350	14.300	12.730	3.6
15.300	1.800	39.7	13.658	-66.350	14.400	12.730	3.6
15.500	2.000	44.1	15.176	-66.350	14.500	12.730	3.6
15.700	2.200	48.5	16.693	-66.350	14.600	12.730	3.6
15.900	2.400	52.9	18.211	-66.350	14.700	12.730	3.6
16.100	2.600	57.3	19.728	-66.350	14.800	12.730	3.6
16.300	2.800	61.7	21.246	-66.350	14.900	12.730	3.6
16.500	3.000	66.1	22.764	-66.350	15.000	12.730	3.6
16.700	3.200	70.5	24.281	-66.350	15.100	12.730	3.6
16.900	3.400	74.9	25.799	-66.350	15.200	12.730	3.6
17.100	3.600	79.3	27.316	-66.350	15.300	12.730	3.6
17.300	3.800	83.7	28.834	-66.350	15.400	12.730	3.6
17.500	4.000	88.1	30.351	-66.350	15.500	12.730	3.6
17.700	4.200	92.5	31.869	-66.350	15.600	12.730	3.6
17.900	4.400	94.2	32.451	-66.350	15.639	12.742	0.1
18.100	4.600	95.7	32.957	-66.350	15.675	12.754	0.1
18.300	4.800	97.2	33.462	-66.350	15.714	12.765	0.1
18.500	5.000	98.6	33.968	-66.350	15.754	12.777	0.1
18.717	5.217	100.0	34.444	-66.350	15.793	12.787	0.0

57,700 DWT BULK CARRIER  
 F.W.TK(P)  
 COMP.NO R301

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-85.942	13.501	-9.023	94.1
13.700	0.200	3.2	5.350	-85.944	13.600	-9.051	98.9
13.900	0.400	6.5	10.791	-85.945	13.701	-9.079	103.6
14.100	0.600	9.8	16.318	-85.947	13.802	-9.105	108.1
14.300	0.800	13.2	21.925	-85.948	13.904	-9.130	112.5
14.500	1.000	16.6	27.608	-85.950	14.006	-9.154	116.8
14.700	1.200	20.0	33.362	-85.951	14.109	-9.178	120.9
14.900	1.400	23.5	39.185	-85.952	14.211	-9.200	124.9
15.100	1.600	27.1	45.071	-85.953	14.314	-9.222	128.8
15.300	1.800	30.6	51.018	-85.954	14.418	-9.244	132.6
15.500	2.000	34.2	57.023	-85.955	14.521	-9.264	136.3
15.700	2.200	37.9	63.083	-85.956	14.625	-9.284	139.8
15.900	2.400	41.5	69.195	-85.957	14.729	-9.303	143.1
16.100	2.600	45.2	75.356	-85.958	14.833	-9.322	146.4
16.300	2.800	49.0	81.564	-85.959	14.937	-9.340	149.5
16.500	3.000	52.7	87.814	-85.959	15.041	-9.358	152.4
16.700	3.200	56.5	94.104	-85.960	15.145	-9.374	155.1
16.900	3.400	60.3	100.433	-85.961	15.249	-9.390	157.8
17.100	3.600	64.1	106.796	-85.962	15.354	-9.406	160.2
17.300	3.800	67.9	113.192	-85.962	15.458	-9.421	162.5
17.500	4.000	71.8	119.618	-85.963	15.562	-9.435	164.6
17.700	4.200	75.7	126.072	-85.964	15.667	-9.449	166.7
17.900	4.400	79.6	132.552	-85.964	15.771	-9.462	168.5
18.100	4.600	83.5	139.054	-85.965	15.875	-9.475	170.1
18.300	4.800	87.4	145.578	-85.965	15.979	-9.487	171.6
18.500	5.000	91.3	152.119	-85.966	16.083	-9.499	172.9
18.700	5.200	95.2	158.633	-85.967	16.187	-9.509	144.9
18.900	5.400	98.3	163.758	-85.969	16.268	-9.491	38.0
19.100	5.600	100.0	166.588	-85.971	16.314	-9.459	3.0

57,700 DWT BULK CARRIER  
 F.W.TK(S)  
 COMP.NO R302

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
13.500	0.000	0.0	0.000	-85.942	13.501	9.023	94.1
13.700	0.200	3.2	5.350	-85.944	13.600	9.051	98.9
13.900	0.400	6.5	10.791	-85.945	13.701	9.079	103.6
14.100	0.600	9.8	16.318	-85.947	13.802	9.105	108.1
14.300	0.800	13.2	21.925	-85.948	13.904	9.130	112.5
14.500	1.000	16.6	27.608	-85.950	14.006	9.154	116.8
14.700	1.200	20.0	33.362	-85.951	14.109	9.178	120.9
14.900	1.400	23.5	39.185	-85.952	14.211	9.200	124.9
15.100	1.600	27.1	45.071	-85.953	14.314	9.222	128.8
15.300	1.800	30.6	51.018	-85.954	14.418	9.244	132.6
15.500	2.000	34.2	57.023	-85.955	14.521	9.264	136.3
15.700	2.200	37.9	63.083	-85.956	14.625	9.284	139.8
15.900	2.400	41.5	69.195	-85.957	14.729	9.303	143.1
16.100	2.600	45.2	75.356	-85.958	14.833	9.322	146.4
16.300	2.800	49.0	81.564	-85.959	14.937	9.340	149.5
16.500	3.000	52.7	87.814	-85.959	15.041	9.358	152.4
16.700	3.200	56.5	94.104	-85.960	15.145	9.374	155.1
16.900	3.400	60.3	100.433	-85.961	15.249	9.390	157.8
17.100	3.600	64.1	106.796	-85.962	15.354	9.406	160.2
17.300	3.800	67.9	113.192	-85.962	15.458	9.421	162.5
17.500	4.000	71.8	119.618	-85.963	15.562	9.435	164.6
17.700	4.200	75.7	126.072	-85.964	15.667	9.449	166.7
17.900	4.400	79.6	132.552	-85.964	15.771	9.462	168.5
18.100	4.600	83.5	139.054	-85.965	15.875	9.475	170.1
18.300	4.800	87.4	145.578	-85.965	15.979	9.487	171.6
18.500	5.000	91.3	152.119	-85.966	16.083	9.499	172.9
18.700	5.200	95.2	158.633	-85.967	16.187	9.509	144.9
18.900	5.400	98.3	163.758	-85.969	16.268	9.491	38.0
19.100	5.600	100.0	166.588	-85.971	16.314	9.459	3.0

57,700 DWT BULK CARRIER  
 NO.1 H.F.O.TK(P)  
 COMP.NO R401

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
14.781	0.000	0.0	0.000	-91.650	0.000	0.000	-0.0
14.981	0.200	0.3	0.924	-20.470	14.915	-14.624	0.1
15.181	0.400	1.0	3.696	-20.470	15.048	-14.518	0.6
15.381	0.600	2.3	8.315	-20.470	15.181	-14.412	2.1
15.581	0.800	4.0	14.783	-20.470	15.315	-14.306	5.0
15.781	1.000	6.3	23.098	-20.470	15.448	-14.200	9.7
15.981	1.200	9.0	33.261	-20.470	15.581	-14.095	16.8
16.181	1.400	12.3	45.272	-20.470	15.715	-13.989	26.7
16.381	1.600	16.1	59.131	-20.470	15.848	-13.883	39.8
16.581	1.800	20.3	74.838	-20.470	15.981	-13.777	56.7
16.781	2.000	25.1	92.392	-20.470	16.115	-13.671	77.7
16.981	2.200	30.4	111.795	-20.470	16.248	-13.565	103.5
17.181	2.400	36.2	133.045	-20.470	16.381	-13.459	134.3
17.381	2.600	42.4	156.143	-20.470	16.515	-13.353	170.8
17.581	2.800	49.2	181.089	-20.470	16.648	-13.247	213.3
17.781	3.000	56.5	207.883	-20.470	16.781	-13.141	262.4
17.981	3.200	64.3	236.524	-20.470	16.915	-13.035	318.4
18.181	3.400	72.6	267.014	-20.470	17.048	-12.929	381.9
18.381	3.600	81.3	299.221	-20.470	17.181	-12.825	425.5
18.581	3.800	90.2	331.787	-20.470	17.308	-12.737	425.5
18.781	4.000	97.2	357.838	-20.470	17.408	-12.643	72.9
19.006	4.225	100.0	368.003	-20.470	17.448	-12.574	0.0



57,700 DWT BULK CARRIER  
 NO.1 H.F.O.TK(S)  
 COMP.NO R402

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
14.781	0.000	0.0	0.000	-91.650	0.000	0.000	-0.0
14.981	0.200	0.3	0.924	-20.470	14.915	14.624	0.1
15.181	0.400	1.0	3.696	-20.470	15.048	14.518	0.6
15.381	0.600	2.3	8.315	-20.470	15.181	14.412	2.1
15.581	0.800	4.0	14.783	-20.470	15.315	14.306	5.0
15.781	1.000	6.3	23.098	-20.470	15.448	14.200	9.7
15.981	1.200	9.0	33.261	-20.470	15.581	14.095	16.8
16.181	1.400	12.3	45.272	-20.470	15.715	13.989	26.7
16.381	1.600	16.1	59.131	-20.470	15.848	13.883	39.8
16.581	1.800	20.3	74.838	-20.470	15.981	13.777	56.7
16.781	2.000	25.1	92.392	-20.470	16.115	13.671	77.7
16.981	2.200	30.4	111.795	-20.470	16.248	13.565	103.5
17.181	2.400	36.2	133.045	-20.470	16.381	13.459	134.3
17.381	2.600	42.4	156.143	-20.470	16.515	13.353	170.8
17.581	2.800	49.2	181.089	-20.470	16.648	13.247	213.3
17.781	3.000	56.5	207.883	-20.470	16.781	13.141	262.4
17.981	3.200	64.3	236.524	-20.470	16.915	13.035	318.4
18.181	3.400	72.6	267.014	-20.470	17.048	12.929	381.9
18.381	3.600	81.3	299.221	-20.470	17.181	12.825	425.5
18.581	3.800	90.2	331.787	-20.470	17.308	12.737	425.5
18.781	4.000	97.2	357.838	-20.470	17.408	12.643	72.9
19.006	4.225	100.0	368.003	-20.470	17.448	12.574	0.0

57,700 DWT BULK CARRIER  
 NO.2 H.F.O.TK(P)  
 COMP.NO R403

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
14.781	0.000	0.0	0.000	-91.650	0.000	0.000	-0.0
14.981	0.200	0.3	0.924	-49.990	14.915	-14.624	0.1
15.181	0.400	1.0	3.696	-49.990	15.048	-14.518	0.6
15.381	0.600	2.3	8.315	-49.990	15.181	-14.412	2.1
15.581	0.800	4.0	14.783	-49.990	15.315	-14.306	5.0
15.781	1.000	6.3	23.098	-49.990	15.448	-14.200	9.7
15.981	1.200	9.0	33.261	-49.990	15.581	-14.095	16.8
16.181	1.400	12.3	45.272	-49.990	15.715	-13.989	26.7
16.381	1.600	16.1	59.131	-49.990	15.848	-13.883	39.8
16.581	1.800	20.3	74.838	-49.990	15.981	-13.777	56.7
16.781	2.000	25.1	92.392	-49.990	16.115	-13.671	77.7
16.981	2.200	30.4	111.795	-49.990	16.248	-13.565	103.5
17.181	2.400	36.2	133.045	-49.990	16.381	-13.459	134.3
17.381	2.600	42.4	156.143	-49.990	16.515	-13.353	170.8
17.581	2.800	49.2	181.089	-49.990	16.648	-13.247	213.3
17.781	3.000	56.5	207.883	-49.990	16.781	-13.141	262.4
17.981	3.200	64.3	236.524	-49.990	16.915	-13.035	318.4
18.181	3.400	72.6	267.014	-49.990	17.048	-12.929	381.9
18.381	3.600	81.3	299.221	-49.990	17.181	-12.825	425.5
18.581	3.800	90.2	331.787	-49.990	17.308	-12.737	425.5
18.781	4.000	97.2	357.838	-49.990	17.408	-12.643	72.9
19.006	4.225	100.0	368.003	-49.990	17.448	-12.574	0.0

57,700 DWT BULK CARRIER  
 NO.2 H.F.O.TK(S)  
 COMP.NO R404

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
14.781	0.000	0.0	0.000	-91.650	0.000	0.000	-0.0
14.981	0.200	0.3	0.924	-49.990	14.915	14.624	0.1
15.181	0.400	1.0	3.696	-49.990	15.048	14.518	0.6
15.381	0.600	2.3	8.315	-49.990	15.181	14.412	2.1
15.581	0.800	4.0	14.783	-49.990	15.315	14.306	5.0
15.781	1.000	6.3	23.098	-49.990	15.448	14.200	9.7
15.981	1.200	9.0	33.261	-49.990	15.581	14.095	16.8
16.181	1.400	12.3	45.272	-49.990	15.715	13.989	26.7
16.381	1.600	16.1	59.131	-49.990	15.848	13.883	39.8
16.581	1.800	20.3	74.838	-49.990	15.981	13.777	56.7
16.781	2.000	25.1	92.392	-49.990	16.115	13.671	77.7
16.981	2.200	30.4	111.795	-49.990	16.248	13.565	103.5
17.181	2.400	36.2	133.045	-49.990	16.381	13.459	134.3
17.381	2.600	42.4	156.143	-49.990	16.515	13.353	170.8
17.581	2.800	49.2	181.089	-49.990	16.648	13.247	213.3
17.781	3.000	56.5	207.883	-49.990	16.781	13.141	262.4
17.981	3.200	64.3	236.524	-49.990	16.915	13.035	318.4
18.181	3.400	72.6	267.014	-49.990	17.048	12.929	381.9
18.381	3.600	81.3	299.221	-49.990	17.181	12.825	425.5
18.581	3.800	90.2	331.787	-49.990	17.308	12.737	425.5
18.781	4.000	97.2	357.838	-49.990	17.408	12.643	72.9
19.006	4.225	100.0	368.003	-49.990	17.448	12.574	0.0

57,700 DWT BULK CARRIER  
H.F.O.STOR.TK(P)  
COMP.NO R405

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
4.495	0.000	0.0	0.000	-91.650	0.000	0.000	-0.0
4.995	0.500	0.0	0.115	-65.151	4.869	-11.756	0.0
5.495	1.000	0.3	0.903	-65.527	5.227	-11.996	0.5
5.995	1.500	1.0	2.821	-65.860	5.614	-12.166	1.8
6.495	2.000	2.4	6.556	-66.277	5.985	-12.338	4.5
6.995	2.500	4.5	12.275	-66.649	6.350	-12.488	9.1
7.495	3.000	7.4	20.321	-67.018	6.709	-12.623	14.5
7.995	3.500	11.1	30.234	-67.288	7.051	-12.752	20.1
8.495	4.000	15.2	41.601	-67.478	7.378	-12.871	25.9
8.995	4.500	19.8	54.118	-67.615	7.695	-12.976	31.5
9.495	5.000	24.7	67.553	-67.719	8.004	-13.070	36.8
9.995	5.500	29.9	81.725	-67.799	8.306	-13.152	41.5
10.495	6.000	35.3	96.472	-67.863	8.603	-13.223	45.5
10.995	6.500	40.8	111.663	-67.916	8.894	-13.285	48.7
11.495	7.000	46.5	127.199	-67.959	9.181	-13.338	51.5
11.995	7.500	52.3	143.000	-67.996	9.465	-13.385	53.6
12.495	8.000	58.1	158.994	-68.027	9.744	-13.425	55.1
12.995	8.500	64.0	175.118	-68.055	10.021	-13.460	56.1
13.495	9.000	69.9	191.325	-68.078	10.294	-13.490	56.7
13.995	9.500	72.7	198.848	-68.070	10.424	-13.542	14.7
14.495	10.000	75.4	206.310	-68.063	10.562	-13.591	14.8
14.995	10.500	78.2	213.788	-68.056	10.709	-13.636	14.8
15.495	11.000	80.9	221.272	-68.050	10.862	-13.679	14.8
15.995	11.500	83.6	228.758	-68.045	11.022	-13.718	14.8
16.495	12.000	86.4	236.244	-68.039	11.187	-13.755	14.8
16.995	12.500	89.1	243.730	-68.034	11.358	-13.790	14.8
17.495	13.000	91.8	251.216	-68.030	11.534	-13.823	14.8
17.995	13.500	95.2	260.466	-68.035	11.755	-13.855	16.0
18.495	14.000	99.1	271.104	-68.047	12.010	-13.885	16.0
18.717	14.222	100.0	273.522	-68.050	12.068	-13.888	0.0

57,700 DWT BULK CARRIER  
H.F.O.STOR.TK(S)  
COMP.NO R406

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
4.495	0.000	0.0	0.000	-91.650	0.000	0.000	-0.0
4.995	0.500	0.1	0.162	-65.236	4.827	11.830	0.0
5.495	1.000	0.4	0.855	-65.491	5.235	11.980	0.4
5.995	1.500	1.5	2.826	-65.864	5.614	12.167	1.8
6.495	2.000	3.4	6.453	-66.224	5.981	12.344	4.4
6.995	2.500	6.2	11.711	-66.478	6.329	12.515	7.8
7.495	3.000	9.6	18.278	-66.635	6.661	12.676	12.0
7.995	3.500	13.6	25.872	-66.738	6.980	12.818	16.4
8.495	4.000	18.0	34.267	-66.809	7.291	12.941	20.6
8.995	4.500	22.8	43.292	-66.861	7.595	13.047	24.4
9.495	5.000	27.8	52.815	-66.900	7.892	13.138	27.9
9.995	5.500	33.0	62.732	-66.930	8.185	13.216	30.8
10.495	6.000	38.4	72.946	-66.955	8.474	13.283	33.1
10.995	6.500	43.8	83.384	-66.975	8.758	13.340	34.9
11.495	7.000	49.4	93.989	-66.992	9.039	13.389	36.3
11.995	7.500	55.1	104.716	-67.007	9.316	13.431	37.3
12.495	8.000	60.7	115.519	-67.019	9.590	13.467	37.9
12.995	8.500	66.4	126.364	-67.030	9.861	13.497	38.2
13.495	9.000	72.2	137.230	-67.040	10.129	13.523	38.3
13.995	9.500	74.9	142.489	-67.044	10.262	13.578	4.2
14.495	10.000	77.7	147.689	-67.047	10.402	13.629	4.2
14.995	10.500	80.4	152.890	-67.051	10.550	13.677	4.2
15.495	11.000	83.1	158.091	-67.054	10.705	13.721	4.2
15.995	11.500	85.9	163.292	-67.057	10.865	13.763	4.2
16.495	12.000	88.6	168.493	-67.060	11.031	13.802	4.2
16.995	12.500	91.3	173.693	-67.063	11.202	13.839	4.2
17.495	13.000	94.1	178.894	-67.065	11.378	13.874	4.2
17.995	13.500	96.8	184.095	-67.068	11.558	13.906	4.2
18.495	14.000	99.5	189.296	-67.070	11.741	13.937	4.2
18.659	14.164	100.0	190.177	-67.070	11.773	13.941	0.0

57,700 DWT BULK CARRIER  
H.F.O.SETT.TK  
COMP.NO R407

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-70.350	13.501	-12.930	5.8
13.700	0.200	4.7	1.765	-70.350	13.600	-12.930	5.8
13.900	0.400	9.5	3.530	-70.350	13.700	-12.930	5.8
14.100	0.600	14.2	5.295	-70.350	13.800	-12.930	5.8
14.300	0.800	19.0	7.060	-70.350	13.900	-12.930	5.8
14.500	1.000	23.7	8.826	-70.350	14.000	-12.930	5.8
14.700	1.200	28.5	10.591	-70.350	14.100	-12.930	5.8
14.900	1.400	33.2	12.356	-70.350	14.200	-12.930	5.8
15.100	1.600	38.0	14.121	-70.350	14.300	-12.930	5.8
15.300	1.800	42.7	15.886	-70.350	14.400	-12.930	5.8
15.500	2.000	47.4	17.651	-70.350	14.500	-12.930	5.8
15.700	2.200	52.2	19.416	-70.350	14.600	-12.930	5.8
15.900	2.400	56.9	21.181	-70.350	14.700	-12.930	5.8
16.100	2.600	61.7	22.947	-70.350	14.800	-12.930	5.8
16.300	2.800	66.4	24.712	-70.350	14.900	-12.930	5.8
16.500	3.000	71.2	26.477	-70.350	15.000	-12.930	5.8
16.700	3.200	75.9	28.242	-70.350	15.100	-12.930	5.8
16.900	3.400	80.7	30.007	-70.350	15.200	-12.930	5.8
17.100	3.600	85.4	31.772	-70.350	15.300	-12.930	5.8
17.300	3.800	90.2	33.537	-70.350	15.400	-12.930	5.8
17.500	4.000	94.9	35.302	-70.350	15.500	-12.930	5.8
17.715	4.215	100.0	37.200	-70.350	15.608	-12.930	5.8

57,700 DWT BULK CARRIER  
H.F.O.SERV.TK  
COMP.NO R408

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-67.150	13.501	-12.930	5.8
13.700	0.200	4.7	1.765	-67.150	13.600	-12.930	5.8
13.900	0.400	9.5	3.530	-67.150	13.700	-12.930	5.8
14.100	0.600	14.2	5.295	-67.150	13.800	-12.930	5.8
14.300	0.800	19.0	7.060	-67.150	13.900	-12.930	5.8
14.500	1.000	23.7	8.826	-67.150	14.000	-12.930	5.8
14.700	1.200	28.5	10.591	-67.150	14.100	-12.930	5.8
14.900	1.400	33.2	12.356	-67.150	14.200	-12.930	5.8
15.100	1.600	38.0	14.121	-67.150	14.300	-12.930	5.8
15.300	1.800	42.7	15.886	-67.150	14.400	-12.930	5.8
15.500	2.000	47.4	17.651	-67.150	14.500	-12.930	5.8
15.700	2.200	52.2	19.416	-67.150	14.600	-12.930	5.8
15.900	2.400	56.9	21.181	-67.150	14.700	-12.930	5.8
16.100	2.600	61.7	22.947	-67.150	14.800	-12.930	5.8
16.300	2.800	66.4	24.712	-67.150	14.900	-12.930	5.8
16.500	3.000	71.2	26.477	-67.150	15.000	-12.930	5.8
16.700	3.200	75.9	28.242	-67.150	15.100	-12.930	5.8
16.900	3.400	80.7	30.007	-67.150	15.200	-12.930	5.8
17.100	3.600	85.4	31.772	-67.150	15.300	-12.930	5.8
17.300	3.800	90.2	33.537	-67.150	15.400	-12.930	5.8
17.500	4.000	94.9	35.302	-67.150	15.500	-12.930	5.8
17.715	4.215	100.0	37.200	-67.150	15.608	-12.930	5.8

57,700 DWT BULK CARRIER  
H.F.O.LOW SULP.SETT.TK  
COMP.NO R409

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-68.550	13.501	-7.870	11.5
13.700	0.200	4.7	1.623	-68.550	13.600	-7.870	11.5
13.900	0.400	9.5	3.247	-68.550	13.700	-7.870	11.5
14.100	0.600	14.2	4.870	-68.550	13.800	-7.870	11.5
14.300	0.800	19.0	6.493	-68.550	13.900	-7.870	11.5
14.500	1.000	23.7	8.116	-68.550	14.000	-7.870	11.5
14.700	1.200	28.5	9.740	-68.550	14.100	-7.870	11.5
14.900	1.400	33.2	11.363	-68.550	14.200	-7.870	11.5
15.100	1.600	38.0	12.986	-68.550	14.300	-7.870	11.5
15.300	1.800	42.7	14.610	-68.550	14.400	-7.870	11.5
15.500	2.000	47.4	16.233	-68.550	14.500	-7.870	11.5
15.700	2.200	52.2	17.856	-68.550	14.600	-7.870	11.5
15.900	2.400	56.9	19.479	-68.550	14.700	-7.870	11.5
16.100	2.600	61.7	21.103	-68.550	14.800	-7.870	11.5
16.300	2.800	66.4	22.726	-68.550	14.900	-7.870	11.5
16.500	3.000	71.2	24.349	-68.550	15.000	-7.870	11.5
16.700	3.200	75.9	25.973	-68.550	15.100	-7.870	11.5
16.900	3.400	80.7	27.596	-68.550	15.200	-7.870	11.5
17.100	3.600	85.4	29.219	-68.550	15.300	-7.870	11.5
17.300	3.800	90.2	30.843	-68.550	15.400	-7.870	11.5
17.500	4.000	94.9	32.466	-68.550	15.500	-7.870	11.5
17.715	4.215	100.0	34.211	-68.550	15.608	-7.870	11.5



57,700 DWT BULK CARRIER  
 H.F.O.LOW SULP.SERV.TK  
 COMP.NO R410

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-66.550	13.501	-7.870	11.5
13.700	0.200	4.7	1.623	-66.550	13.600	-7.870	11.5
13.900	0.400	9.5	3.247	-66.550	13.700	-7.870	11.5
14.100	0.600	14.2	4.870	-66.550	13.800	-7.870	11.5
14.300	0.800	19.0	6.493	-66.550	13.900	-7.870	11.5
14.500	1.000	23.7	8.116	-66.550	14.000	-7.870	11.5
14.700	1.200	28.5	9.740	-66.550	14.100	-7.870	11.5
14.900	1.400	33.2	11.363	-66.550	14.200	-7.870	11.5
15.100	1.600	38.0	12.986	-66.550	14.300	-7.870	11.5
15.300	1.800	42.7	14.609	-66.550	14.400	-7.870	11.5
15.500	2.000	47.4	16.233	-66.550	14.500	-7.870	11.5
15.700	2.200	52.2	17.856	-66.550	14.600	-7.870	11.5
15.900	2.400	56.9	19.479	-66.550	14.700	-7.870	11.5
16.100	2.600	61.7	21.103	-66.550	14.800	-7.870	11.5
16.300	2.800	66.4	22.726	-66.550	14.900	-7.870	11.5
16.500	3.000	71.2	24.349	-66.550	15.000	-7.870	11.5
16.700	3.200	75.9	25.972	-66.550	15.100	-7.870	11.5
16.900	3.400	80.7	27.596	-66.550	15.200	-7.870	11.5
17.100	3.600	85.4	29.219	-66.550	15.300	-7.870	11.5
17.300	3.800	90.2	30.842	-66.550	15.400	-7.870	11.5
17.500	4.000	94.9	32.465	-66.550	15.500	-7.870	11.5
17.715	4.215	100.0	34.210	-66.550	15.608	-7.870	11.5

57,700 DWT BULK CARRIER  
M.E.L.O.SUMP TK  
COMP.NO R601

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
0.725	0.000	0.0	0.000	-77.950	0.726	0.000	0.7
0.825	0.100	1.0	0.171	-77.950	0.775	0.000	0.7
0.925	0.200	1.9	0.343	-77.950	0.825	0.000	0.7
1.025	0.300	13.3	2.399	-74.179	0.954	0.000	8.4
1.125	0.400	24.7	4.456	-73.888	1.010	0.000	8.4
1.225	0.500	36.1	6.513	-73.782	1.062	0.000	8.4
1.325	0.600	47.6	8.569	-73.726	1.113	0.000	8.4
1.425	0.700	59.0	10.626	-73.692	1.164	0.000	8.4
1.525	0.800	70.4	12.682	-73.669	1.214	0.000	8.4
1.625	0.900	81.7	14.727	-73.649	1.264	0.001	8.3
1.725	1.000	93.1	16.768	-73.634	1.314	0.001	8.3
1.825	1.100	96.3	17.351	-73.664	1.329	0.002	0.7
1.925	1.200	97.2	17.522	-73.706	1.334	0.002	0.7
2.025	1.300	98.2	17.694	-73.747	1.340	0.002	0.7
2.125	1.400	99.1	17.865	-73.787	1.347	0.002	0.7
2.215	1.490	100.0	18.019	-73.823	1.354	0.002	0.7

57,700 DWT BULK CARRIER  
M.E.L.O.STOR.TK  
COMP.NO R602

HEIGHT m	LEVEL m	FILL %	VOLUME m <sup>3</sup>	LCG m	VCG m	TCG m	TMI m <sup>4</sup>
13.500	0.000	0.0	0.000	-71.346	13.501	13.785	15.1
13.600	0.100	3.3	0.892	-71.346	13.550	13.787	15.2
13.700	0.200	6.7	1.785	-71.346	13.600	13.789	15.3
13.800	0.300	10.0	2.680	-71.346	13.650	13.791	15.3
13.900	0.400	13.4	3.577	-71.346	13.700	13.793	15.4
14.000	0.500	16.7	4.475	-71.346	13.750	13.795	15.5
14.100	0.600	20.1	5.374	-71.346	13.800	13.797	15.6
14.200	0.700	23.4	6.275	-71.347	13.851	13.798	15.6
14.300	0.800	26.8	7.176	-71.347	13.901	13.800	15.7
14.400	0.900	30.2	8.079	-71.347	13.951	13.802	15.7
14.500	1.000	33.5	8.983	-71.347	14.001	13.803	15.8
14.600	1.100	36.9	9.888	-71.347	14.051	13.805	15.8
14.700	1.200	40.3	10.793	-71.347	14.102	13.806	15.9
14.800	1.300	43.7	11.699	-71.347	14.152	13.807	15.9
14.900	1.400	47.1	12.606	-71.347	14.202	13.809	15.9
15.000	1.500	50.5	13.514	-71.347	14.252	13.810	16.0
15.100	1.600	53.9	14.422	-71.348	14.303	13.811	16.0
15.200	1.700	57.2	15.330	-71.348	14.353	13.812	16.0
15.300	1.800	60.6	16.238	-71.348	14.403	13.813	16.0
15.400	1.900	64.0	17.147	-71.348	14.453	13.814	16.0
15.500	2.000	67.4	18.055	-71.348	14.503	13.814	16.0
15.600	2.100	70.8	18.964	-71.348	14.553	13.815	16.0
15.700	2.200	74.2	19.873	-71.348	14.604	13.816	16.0
15.800	2.300	77.6	20.782	-71.348	14.654	13.816	16.0
15.900	2.400	81.0	21.690	-71.348	14.704	13.817	16.0
16.000	2.500	84.4	22.599	-71.348	14.754	13.818	16.0
16.100	2.600	87.8	23.508	-71.348	14.804	13.818	16.0
16.200	2.700	91.2	24.417	-71.348	14.854	13.818	16.0
16.300	2.800	94.6	25.326	-71.348	14.904	13.819	16.0
16.400	2.900	98.0	26.235	-71.349	14.954	13.819	16.0
16.460	2.960	100.0	26.780	-71.349	14.984	13.819	16.0

57,700 DWT BULK CARRIER  
M.E.L.O.SETT.TK  
COMP.NO R603

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-73.342	13.501	13.706	13.6
13.600	0.100	3.3	0.861	-73.342	13.550	13.710	13.7
13.700	0.200	6.6	1.726	-73.342	13.600	13.714	13.9
13.800	0.300	9.8	2.593	-73.342	13.650	13.717	14.0
13.900	0.400	13.1	3.463	-73.343	13.700	13.721	14.1
14.000	0.500	16.5	4.335	-73.343	13.751	13.724	14.2
14.100	0.600	19.8	5.210	-73.343	13.801	13.728	14.4
14.200	0.700	23.1	6.087	-73.343	13.851	13.731	14.5
14.300	0.800	26.4	6.967	-73.343	13.902	13.734	14.6
14.400	0.900	29.8	7.848	-73.343	13.952	13.737	14.7
14.500	1.000	33.1	8.732	-73.343	14.002	13.740	14.8
14.600	1.100	36.5	9.618	-73.343	14.053	13.743	14.9
14.700	1.200	39.9	10.505	-73.344	14.103	13.746	15.0
14.800	1.300	43.3	11.395	-73.344	14.154	13.748	15.1
14.900	1.400	46.6	12.286	-73.344	14.204	13.751	15.2
15.000	1.500	50.0	13.179	-73.344	14.255	13.754	15.2
15.100	1.600	53.4	14.073	-73.344	14.305	13.756	15.3
15.200	1.700	56.8	14.969	-73.344	14.356	13.759	15.4
15.300	1.800	60.2	15.866	-73.344	14.406	13.761	15.5
15.400	1.900	63.6	16.765	-73.344	14.457	13.763	15.5
15.500	2.000	67.0	17.664	-73.345	14.508	13.765	15.6
15.600	2.100	70.5	18.565	-73.345	14.558	13.768	15.6
15.700	2.200	73.9	19.467	-73.345	14.609	13.770	15.7
15.800	2.300	77.3	20.370	-73.345	14.659	13.772	15.7
15.900	2.400	80.7	21.274	-73.345	14.710	13.774	15.8
16.000	2.500	84.2	22.178	-73.345	14.760	13.775	15.8
16.100	2.600	87.6	23.083	-73.345	14.811	13.777	15.8
16.200	2.700	91.1	23.989	-73.345	14.862	13.779	15.9
16.300	2.800	94.5	24.895	-73.345	14.912	13.780	15.9
16.400	2.900	97.9	25.802	-73.346	14.963	13.782	15.9
16.460	2.960	100.0	26.346	-73.346	14.993	13.783	15.9

57,700 DWT BULK CARRIER  
 CYL.O.STOR.TK  
 COMP.NO R604

HEIGHT m	LEVEL m	FILL %	VOLUME m <sup>3</sup>	LCG m	VCG m	TCG m	TMI m <sup>4</sup>
13.500	0.000	0.0	0.000	-75.145	13.501	12.390	36.5
13.600	0.100	3.3	1.032	-75.145	13.550	12.396	36.9
13.700	0.200	6.5	2.068	-75.145	13.600	12.401	37.3
13.800	0.300	9.8	3.107	-75.145	13.650	12.406	37.6
13.900	0.400	13.1	4.149	-75.145	13.700	12.411	37.9
14.000	0.500	16.4	5.194	-75.145	13.751	12.416	38.3
14.100	0.600	19.7	6.242	-75.145	13.801	12.421	38.6
14.200	0.700	23.1	7.293	-75.145	13.851	12.426	38.9
14.300	0.800	26.4	8.347	-75.145	13.902	12.430	39.2
14.400	0.900	29.7	9.403	-75.146	13.952	12.435	39.4
14.500	1.000	33.1	10.461	-75.146	14.002	12.439	39.7
14.600	1.100	36.4	11.522	-75.146	14.053	12.444	40.0
14.700	1.200	39.8	12.586	-75.146	14.103	12.448	40.3
14.800	1.300	43.2	13.652	-75.146	14.154	12.452	40.5
14.900	1.400	46.6	14.720	-75.146	14.204	12.456	40.8
15.000	1.500	49.9	15.790	-75.146	14.255	12.460	41.0
15.100	1.600	53.3	16.862	-75.146	14.305	12.464	41.3
15.200	1.700	56.7	17.937	-75.146	14.356	12.468	41.5
15.300	1.800	60.1	19.013	-75.146	14.407	12.472	41.7
15.400	1.900	63.5	20.091	-75.146	14.457	12.475	41.9
15.500	2.000	67.0	21.171	-75.146	14.508	12.479	42.1
15.600	2.100	70.4	22.253	-75.146	14.559	12.483	42.3
15.700	2.200	73.8	23.337	-75.146	14.609	12.486	42.5
15.800	2.300	77.2	24.422	-75.146	14.660	12.489	42.7
15.900	2.400	80.7	25.508	-75.146	14.711	12.493	42.9
16.000	2.500	84.1	26.596	-75.146	14.761	12.496	43.0
16.100	2.600	87.6	27.685	-75.146	14.812	12.499	43.2
16.200	2.700	91.0	28.775	-75.146	14.863	12.502	43.3
16.300	2.800	94.5	29.867	-75.147	14.913	12.505	43.4
16.400	2.900	97.9	30.960	-75.147	14.964	12.508	43.6
16.460	2.960	100.0	31.616	-75.147	14.994	12.510	43.6

57,700 DWT BULK CARRIER  
 LOW TBN CYL.O.STOR.TK  
 COMP.NO R605

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-74.350	13.501	8.300	1.2
13.600	0.100	3.4	0.525	-74.350	13.550	8.300	1.2
13.700	0.200	6.8	1.050	-74.350	13.600	8.300	1.2
13.800	0.300	10.1	1.574	-74.350	13.650	8.300	1.2
13.900	0.400	13.5	2.099	-74.350	13.700	8.300	1.2
14.000	0.500	16.9	2.624	-74.350	13.750	8.300	1.2
14.100	0.600	20.3	3.149	-74.350	13.800	8.300	1.2
14.200	0.700	23.6	3.674	-74.350	13.850	8.300	1.2
14.300	0.800	27.0	4.199	-74.350	13.900	8.300	1.2
14.400	0.900	30.4	4.723	-74.350	13.950	8.300	1.2
14.500	1.000	33.8	5.248	-74.350	14.000	8.300	1.2
14.600	1.100	37.2	5.773	-74.350	14.050	8.300	1.2
14.700	1.200	40.5	6.298	-74.350	14.100	8.300	1.2
14.800	1.300	43.9	6.823	-74.350	14.150	8.300	1.2
14.900	1.400	47.3	7.348	-74.350	14.200	8.300	1.2
15.000	1.500	50.7	7.872	-74.350	14.250	8.300	1.2
15.100	1.600	54.1	8.397	-74.350	14.300	8.300	1.2
15.200	1.700	57.4	8.922	-74.350	14.350	8.300	1.2
15.300	1.800	60.8	9.447	-74.350	14.400	8.300	1.2
15.400	1.900	64.2	9.972	-74.350	14.450	8.300	1.2
15.500	2.000	67.6	10.497	-74.350	14.500	8.300	1.2
15.600	2.100	70.9	11.021	-74.350	14.550	8.300	1.2
15.700	2.200	74.3	11.546	-74.350	14.600	8.300	1.2
15.800	2.300	77.7	12.071	-74.350	14.650	8.300	1.2
15.900	2.400	81.1	12.596	-74.350	14.700	8.300	1.2
16.000	2.500	84.5	13.121	-74.350	14.750	8.300	1.2
16.100	2.600	87.8	13.645	-74.350	14.800	8.300	1.2
16.200	2.700	91.2	14.170	-74.350	14.850	8.300	1.2
16.300	2.800	94.6	14.695	-74.350	14.900	8.300	1.2
16.400	2.900	98.0	15.220	-74.350	14.950	8.300	1.2
16.460	2.960	100.0	15.535	-74.350	14.980	8.300	1.2

57,700 DWT BULK CARRIER  
 G.E.L.O.STOR.TK  
 COMP.NO R606

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
13.500	0.000	0.0	0.000	-73.550	13.501	6.640	0.6
13.600	0.100	3.4	0.262	-73.550	13.550	6.640	0.6
13.700	0.200	6.8	0.525	-73.550	13.600	6.640	0.6
13.800	0.300	10.1	0.787	-73.550	13.650	6.640	0.6
13.900	0.400	13.5	1.050	-73.550	13.700	6.640	0.6
14.000	0.500	16.9	1.312	-73.550	13.750	6.640	0.6
14.100	0.600	20.3	1.574	-73.550	13.800	6.640	0.6
14.200	0.700	23.6	1.837	-73.550	13.850	6.640	0.6
14.300	0.800	27.0	2.099	-73.550	13.900	6.640	0.6
14.400	0.900	30.4	2.362	-73.550	13.950	6.640	0.6
14.500	1.000	33.8	2.624	-73.550	14.000	6.640	0.6
14.600	1.100	37.2	2.887	-73.550	14.050	6.640	0.6
14.700	1.200	40.5	3.149	-73.550	14.100	6.640	0.6
14.800	1.300	43.9	3.411	-73.550	14.150	6.640	0.6
14.900	1.400	47.3	3.674	-73.550	14.200	6.640	0.6
15.000	1.500	50.7	3.936	-73.550	14.250	6.640	0.6
15.100	1.600	54.1	4.199	-73.550	14.300	6.640	0.6
15.200	1.700	57.4	4.461	-73.550	14.350	6.640	0.6
15.300	1.800	60.8	4.723	-73.550	14.400	6.640	0.6
15.400	1.900	64.2	4.986	-73.550	14.450	6.640	0.6
15.500	2.000	67.6	5.248	-73.550	14.500	6.640	0.6
15.600	2.100	70.9	5.511	-73.550	14.550	6.640	0.6
15.700	2.200	74.3	5.773	-73.550	14.600	6.640	0.6
15.800	2.300	77.7	6.035	-73.550	14.650	6.640	0.6
15.900	2.400	81.1	6.298	-73.550	14.700	6.640	0.6
16.000	2.500	84.5	6.560	-73.550	14.750	6.640	0.6
16.100	2.600	87.8	6.823	-73.550	14.800	6.640	0.6
16.200	2.700	91.2	7.085	-73.550	14.850	6.640	0.6
16.300	2.800	94.6	7.348	-73.550	14.900	6.640	0.6
16.400	2.900	98.0	7.610	-73.550	14.950	6.640	0.6
16.460	2.960	100.0	7.767	-73.550	14.980	6.640	0.6

57,700 DWT BULK CARRIER  
 G.E.L.O.SETT.TK  
 COMP.NO R607

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
13.500	0.000	0.0	0.000	-75.150	13.501	6.640	0.6
13.600	0.100	3.4	0.262	-75.150	13.550	6.640	0.6
13.700	0.200	6.8	0.525	-75.150	13.600	6.640	0.6
13.800	0.300	10.1	0.787	-75.150	13.650	6.640	0.6
13.900	0.400	13.5	1.050	-75.150	13.700	6.640	0.6
14.000	0.500	16.9	1.312	-75.150	13.750	6.640	0.6
14.100	0.600	20.3	1.574	-75.150	13.800	6.640	0.6
14.200	0.700	23.6	1.837	-75.150	13.850	6.640	0.6
14.300	0.800	27.0	2.099	-75.150	13.900	6.640	0.6
14.400	0.900	30.4	2.362	-75.150	13.950	6.640	0.6
14.500	1.000	33.8	2.624	-75.150	14.000	6.640	0.6
14.600	1.100	37.2	2.887	-75.150	14.050	6.640	0.6
14.700	1.200	40.5	3.149	-75.150	14.100	6.640	0.6
14.800	1.300	43.9	3.411	-75.150	14.150	6.640	0.6
14.900	1.400	47.3	3.674	-75.150	14.200	6.640	0.6
15.000	1.500	50.7	3.936	-75.150	14.250	6.640	0.6
15.100	1.600	54.1	4.199	-75.150	14.300	6.640	0.6
15.200	1.700	57.4	4.461	-75.150	14.350	6.640	0.6
15.300	1.800	60.8	4.723	-75.150	14.400	6.640	0.6
15.400	1.900	64.2	4.986	-75.150	14.450	6.640	0.6
15.500	2.000	67.6	5.248	-75.150	14.500	6.640	0.6
15.600	2.100	70.9	5.511	-75.150	14.550	6.640	0.6
15.700	2.200	74.3	5.773	-75.150	14.600	6.640	0.6
15.800	2.300	77.7	6.035	-75.150	14.650	6.640	0.6
15.900	2.400	81.1	6.298	-75.150	14.700	6.640	0.6
16.000	2.500	84.5	6.560	-75.150	14.750	6.640	0.6
16.100	2.600	87.8	6.823	-75.150	14.800	6.640	0.6
16.200	2.700	91.2	7.085	-75.150	14.850	6.640	0.6
16.300	2.800	94.6	7.348	-75.150	14.900	6.640	0.6
16.400	2.900	98.0	7.610	-75.150	14.950	6.640	0.6
16.460	2.960	100.0	7.767	-75.150	14.980	6.640	0.6



57,700 DWT BULK CARRIER  
 BILGE HOLDING TK  
 COMP.NO R701

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
-0.000	0.000	0.0	0.000	-80.104	0.001	-0.000	0.2
0.100	0.100	1.6	0.481	-80.600	0.057	0.000	2.1
0.200	0.200	4.2	1.253	-80.719	0.116	-0.000	4.4
0.300	0.300	7.5	2.238	-80.818	0.176	-0.000	6.7
0.400	0.400	11.4	3.407	-80.906	0.236	-0.000	9.2
0.500	0.500	15.8	4.713	-80.969	0.295	-0.000	11.6
0.600	0.600	20.6	6.138	-81.020	0.355	-0.000	14.0
0.700	0.700	25.7	7.661	-81.060	0.414	-0.000	16.4
0.800	0.800	31.1	9.267	-81.093	0.472	-0.000	18.6
0.900	0.900	36.8	10.945	-81.119	0.530	-0.000	20.6
1.000	1.000	42.6	12.684	-81.142	0.588	-0.000	22.5
1.100	1.100	48.6	14.474	-81.161	0.645	0.000	24.2
1.200	1.200	54.8	16.310	-81.177	0.702	0.000	25.7
1.300	1.300	60.5	18.018	-81.206	0.754	-0.011	22.7
1.400	1.400	66.3	19.725	-81.234	0.805	-0.022	23.6
1.500	1.500	70.6	21.009	-81.218	0.844	-0.033	19.3
1.600	1.600	74.7	22.225	-81.198	0.883	-0.042	19.7
1.700	1.700	78.8	23.448	-81.179	0.923	-0.051	20.0
1.800	1.800	82.9	24.677	-81.163	0.964	-0.059	20.1
1.900	1.900	87.0	25.907	-81.147	1.006	-0.066	20.2
2.000	2.000	91.2	27.137	-81.134	1.049	-0.072	20.1
2.100	2.100	95.3	28.364	-81.121	1.092	-0.078	19.9
2.200	2.200	99.4	29.585	-81.110	1.136	-0.083	19.5
2.215	2.215	100.0	29.767	-81.108	1.143	-0.084	19.5

57,700 DWT BULK CARRIER  
 OILY BILGE TK  
 COMP.NO R702

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
0.011	0.000	0.0	0.000	-91.650	0.000	0.000	0.0
0.111	0.100	0.3	0.054	-73.018	0.075	-2.086	0.0
0.211	0.200	1.1	0.193	-73.304	0.149	-2.129	0.1
0.311	0.300	2.8	0.479	-73.690	0.220	-2.168	0.2
0.411	0.400	5.1	0.880	-73.926	0.285	-2.219	0.4
0.511	0.500	8.0	1.380	-74.090	0.350	-2.265	0.6
0.611	0.600	11.3	1.966	-74.204	0.413	-2.307	0.9
0.711	0.700	15.1	2.624	-74.287	0.476	-2.345	1.1
0.811	0.800	19.3	3.347	-74.349	0.537	-2.379	1.4
0.911	0.900	23.8	4.125	-74.397	0.599	-2.411	1.6
1.011	1.000	28.6	4.954	-74.434	0.659	-2.441	1.9
1.111	1.100	33.6	5.826	-74.465	0.720	-2.468	2.1
1.211	1.200	38.9	6.738	-74.489	0.779	-2.493	2.4
1.311	1.300	44.3	7.686	-74.509	0.839	-2.516	2.7
1.411	1.400	50.0	8.664	-74.526	0.898	-2.538	2.9
1.511	1.500	55.8	9.670	-74.539	0.956	-2.558	3.1
1.611	1.600	61.7	10.700	-74.551	1.015	-2.577	3.4
1.711	1.700	67.8	11.753	-74.560	1.073	-2.594	3.6
1.811	1.800	74.0	12.827	-74.567	1.130	-2.610	3.8
1.911	1.900	80.3	13.919	-74.573	1.188	-2.626	4.1
2.011	2.000	86.7	15.028	-74.578	1.245	-2.640	4.3
2.111	2.100	93.2	16.153	-74.581	1.302	-2.654	4.5
2.215	2.204	100.0	17.334	-74.584	1.360	-2.668	4.7

57,700 DWT BULK CARRIER  
 S/T L.O.DRAIN TK  
 COMP.NO R703

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m <sup>3</sup>	m	m	m	m <sup>4</sup>
1.215	0.000	0.0	0.000	-79.545	1.216	1.216	1.0
1.315	0.100	9.7	0.194	-79.545	1.265	1.224	1.0
1.415	0.200	19.6	0.390	-79.545	1.315	1.231	1.0
1.515	0.300	29.5	0.588	-79.545	1.366	1.237	1.0
1.615	0.400	39.5	0.787	-79.545	1.416	1.242	1.1
1.715	0.500	49.5	0.987	-79.545	1.467	1.247	1.1
1.815	0.600	59.6	1.188	-79.545	1.517	1.251	1.1
1.915	0.700	69.7	1.389	-79.545	1.568	1.254	1.1
2.015	0.800	79.8	1.591	-79.545	1.618	1.256	1.1
2.115	0.900	89.9	1.792	-79.545	1.668	1.258	1.1
2.215	1.000	100.0	1.992	-79.545	1.718	1.258	1.1

57,700 DWT BULK CARRIER  
 F.O.OVERFLOW TK  
 COMP.NO R704

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
0.090	0.000	0.0	0.000	-91.650	0.000	0.000	0.0
0.190	0.100	0.1	0.007	-65.041	0.160	-4.246	0.0
0.290	0.200	0.4	0.044	-65.269	0.236	-4.298	0.0
0.390	0.300	1.1	0.130	-65.522	0.307	-4.351	0.0
0.490	0.400	2.5	0.281	-65.759	0.377	-4.401	0.1
0.590	0.500	4.4	0.504	-65.968	0.444	-4.450	0.2
0.690	0.600	6.8	0.783	-66.095	0.511	-4.500	0.3
0.790	0.700	9.5	1.092	-66.149	0.579	-4.543	0.5
0.890	0.800	12.7	1.454	-66.210	0.651	-4.578	0.7
0.990	0.900	16.5	1.884	-66.288	0.723	-4.607	0.9
1.090	1.000	21.1	2.414	-66.398	0.793	-4.636	1.1
1.190	1.100	26.3	3.007	-66.503	0.862	-4.659	1.2
1.290	1.200	32.0	3.658	-66.606	0.931	-4.678	1.4
1.390	1.300	38.1	4.360	-66.702	0.998	-4.696	1.5
1.490	1.400	44.7	5.111	-66.789	1.063	-4.714	1.7
1.590	1.500	51.7	5.910	-66.870	1.127	-4.731	1.9
1.690	1.600	59.1	6.758	-66.946	1.191	-4.747	2.1
1.790	1.700	66.9	7.653	-67.016	1.256	-4.764	2.4
1.890	1.800	74.9	8.563	-67.089	1.318	-4.780	2.6
1.990	1.900	82.7	9.458	-67.169	1.377	-4.796	2.8
2.090	2.000	90.4	10.346	-67.252	1.434	-4.811	3.0
2.190	2.100	98.1	11.220	-67.335	1.488	-4.828	3.4
2.215	2.125	100.0	11.440	-67.357	1.502	-4.832	3.5

57,700 DWT BULK CARRIER  
SLUDGE TK  
COMP.NO R705

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
7.500	0.000	0.0	0.000	-69.150	7.501	-9.115	2.6
7.600	0.100	10.0	1.162	-69.150	7.550	-9.115	2.6
7.700	0.200	20.0	2.324	-69.150	7.600	-9.115	2.6
7.800	0.300	30.0	3.486	-69.150	7.650	-9.115	2.6
7.900	0.400	40.0	4.647	-69.150	7.700	-9.115	2.6
8.000	0.500	50.0	5.809	-69.150	7.750	-9.115	2.6
8.100	0.600	60.0	6.971	-69.150	7.800	-9.115	2.6
8.200	0.700	70.0	8.133	-69.150	7.850	-9.115	2.6
8.300	0.800	80.0	9.295	-69.150	7.900	-9.115	2.6
8.400	0.900	90.0	10.457	-69.150	7.950	-9.115	2.6
8.500	1.000	100.0	11.619	-69.150	8.000	-9.115	2.6

57,700 DWT BULK CARRIER  
SEWAGE HOLDING TK  
COMP.NO R706

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
8.500	0.000	0.0	0.000	-75.150	8.501	-9.930	0.5
8.600	0.100	4.2	0.253	-75.150	8.550	-9.930	0.5
8.700	0.200	8.3	0.507	-75.150	8.600	-9.930	0.5
8.800	0.300	12.5	0.760	-75.150	8.650	-9.930	0.5
8.900	0.400	16.7	1.014	-75.150	8.700	-9.930	0.5
9.000	0.500	20.8	1.267	-75.150	8.750	-9.930	0.5
9.100	0.600	25.0	1.521	-75.150	8.800	-9.930	0.5
9.200	0.700	29.2	1.774	-75.150	8.850	-9.930	0.5
9.300	0.800	33.3	2.028	-75.150	8.900	-9.930	0.5
9.400	0.900	37.5	2.281	-75.150	8.950	-9.930	0.5
9.500	1.000	41.7	2.534	-75.150	9.000	-9.930	0.5
9.600	1.100	45.8	2.788	-75.150	9.050	-9.930	0.5
9.700	1.200	50.0	3.041	-75.150	9.100	-9.930	0.5
9.800	1.300	54.2	3.295	-75.150	9.150	-9.930	0.5
9.900	1.400	58.3	3.548	-75.150	9.200	-9.930	0.5
10.000	1.500	62.5	3.802	-75.150	9.250	-9.930	0.5
10.100	1.600	66.7	4.055	-75.150	9.300	-9.930	0.5
10.200	1.700	70.8	4.308	-75.150	9.350	-9.930	0.5
10.300	1.800	75.0	4.562	-75.150	9.400	-9.930	0.5
10.400	1.900	79.2	4.815	-75.150	9.450	-9.930	0.5
10.500	2.000	83.3	5.069	-75.150	9.500	-9.930	0.5
10.600	2.100	87.5	5.322	-75.150	9.550	-9.930	0.5
10.700	2.200	91.7	5.576	-75.150	9.600	-9.930	0.5
10.800	2.300	95.8	5.829	-75.150	9.650	-9.930	0.5
10.900	2.400	100.0	6.083	-75.150	9.700	-9.930	0.5

57,700 DWT BULK CARRIER  
 CARGO BILGE HOLDING TK(S)  
 COMP.NO R707

HEIGHT	LEVEL	FILL	VOLUME	LCG	VCG	TCG	TMI
m	m	%	m3	m	m	m	m4
13.900	0.000	0.0	0.000	-51.987	14.033	10.241	0.0
14.100	0.200	0.5	0.938	-49.990	14.033	16.024	0.1
14.300	0.400	2.2	3.752	-49.990	14.167	15.918	0.6
14.500	0.600	4.9	8.442	-49.990	14.300	15.812	2.1
14.700	0.800	8.6	15.008	-49.990	14.433	15.706	5.1
14.900	1.000	13.3	23.119	-49.990	14.562	15.614	6.8
15.100	1.200	18.0	31.385	-49.990	14.678	15.565	6.8
15.300	1.400	22.8	39.650	-49.990	14.787	15.537	6.8
15.500	1.600	27.5	47.916	-49.990	14.892	15.519	6.8
15.700	1.800	32.3	56.181	-49.990	14.996	15.506	6.8
15.900	2.000	37.0	64.447	-49.990	15.100	15.496	6.8
16.100	2.200	41.8	72.713	-49.990	15.202	15.488	6.8
16.300	2.400	46.5	80.978	-49.990	15.304	15.482	6.8
16.500	2.600	51.3	89.244	-49.990	15.405	15.478	6.8
16.700	2.800	56.0	97.509	-49.990	15.507	15.474	6.7
16.900	3.000	60.8	105.775	-49.990	15.608	15.470	6.7
17.100	3.200	65.5	114.041	-49.990	15.709	15.467	6.7
17.300	3.400	70.3	122.306	-49.990	15.809	15.465	6.7
17.500	3.600	75.0	130.572	-49.990	15.910	15.463	6.7
17.700	3.800	79.8	138.837	-49.990	16.011	15.461	6.7
17.900	4.000	84.5	147.103	-49.990	16.111	15.459	6.7
18.100	4.200	89.3	155.369	-49.990	16.212	15.457	6.7
18.300	4.400	94.0	163.634	-49.990	16.312	15.456	6.7
18.601	4.701	100.0	173.991	-49.990	16.438	15.452	0.0

57,700 DWT BULK CARRIER  
S/T C.W.TK  
COMP.NO R708

HEIGHT m	LEVEL m	FILL %	VOLUME m3	LCG m	VCG m	TCG m	TMI m4
0.415	0.000	0.0	0.000	-91.650	0.000	0.000	0.0
0.665	0.250	0.3	0.047	-84.091	0.575	0.000	0.1
0.915	0.500	1.7	0.234	-84.199	0.771	0.000	0.2
1.165	0.750	4.4	0.603	-84.293	0.941	0.000	0.6
1.415	1.000	8.1	1.112	-84.353	1.105	0.000	0.9
1.665	1.250	13.0	1.783	-84.419	1.272	0.000	1.3
1.915	1.500	18.8	2.580	-84.479	1.433	0.000	1.5
2.165	1.750	25.4	3.474	-84.534	1.590	0.000	1.6
2.415	2.000	32.6	4.468	-84.595	1.746	0.000	1.6
2.665	2.250	40.6	5.557	-84.667	1.902	0.000	1.5
2.915	2.500	49.0	6.714	-84.745	2.056	0.000	1.3
3.165	2.750	57.8	7.916	-84.831	2.205	0.000	1.0
3.415	3.000	66.0	9.035	-84.900	2.339	0.000	0.7
3.665	3.250	73.0	9.990	-84.946	2.454	0.000	0.4
3.915	3.500	78.3	10.724	-84.968	2.545	0.000	0.2
4.165	3.750	81.7	11.188	-84.965	2.606	0.000	0.1
4.415	4.000	84.2	11.524	-84.958	2.654	0.000	0.1
4.665	4.250	86.0	11.782	-84.951	2.695	0.000	0.0
4.915	4.500	87.5	11.982	-84.943	2.732	0.000	0.0
5.165	4.750	88.8	12.157	-84.937	2.765	0.000	0.0
5.415	5.000	89.9	12.312	-84.931	2.797	0.000	0.0
5.665	5.250	90.9	12.454	-84.925	2.828	0.000	0.0
5.915	5.500	91.9	12.589	-84.920	2.860	0.000	0.0
6.165	5.750	92.9	12.720	-84.915	2.893	0.000	0.0
6.415	6.000	93.8	12.851	-84.910	2.927	0.000	0.0
6.665	6.250	94.8	12.988	-84.905	2.965	0.000	0.0
6.915	6.500	96.0	13.144	-84.899	3.011	0.000	0.0
7.165	6.750	97.4	13.337	-84.892	3.069	0.000	0.1
7.500	7.085	100.0	13.694	-84.882	3.180	0.000	0.1

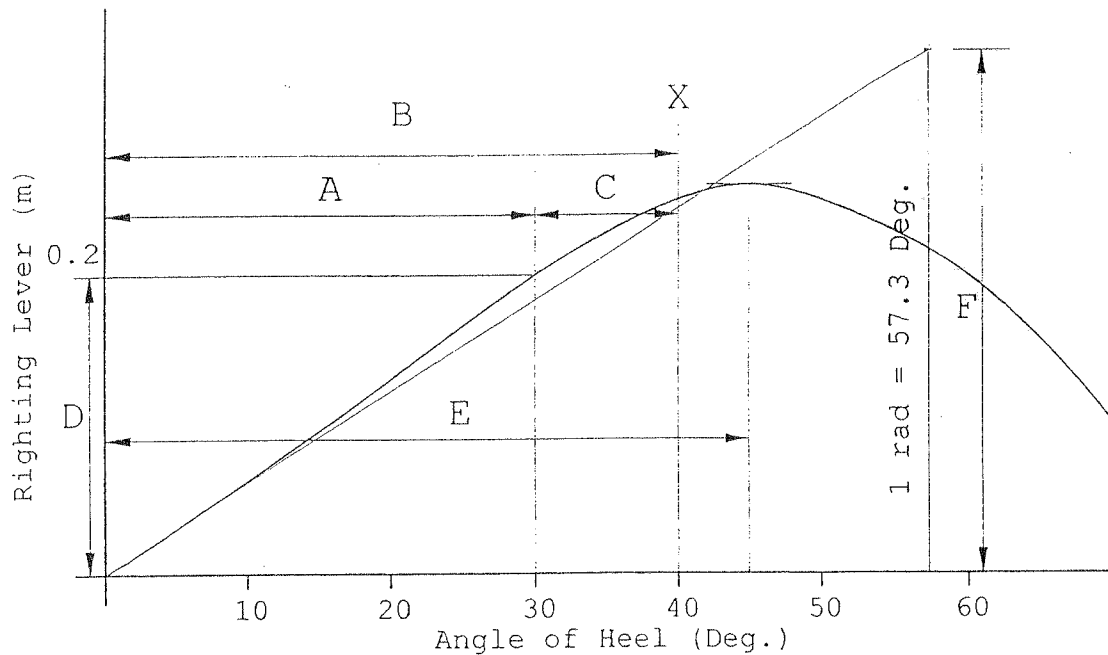


### 3 Stability Calculation

#### 3.1 General Intact Stability Criteria for all Ships

The following criteria are recommended for passenger and cargo ships.

It is most important to ensure that in any sailing condition the stability complies at least with the following minimum criteria :



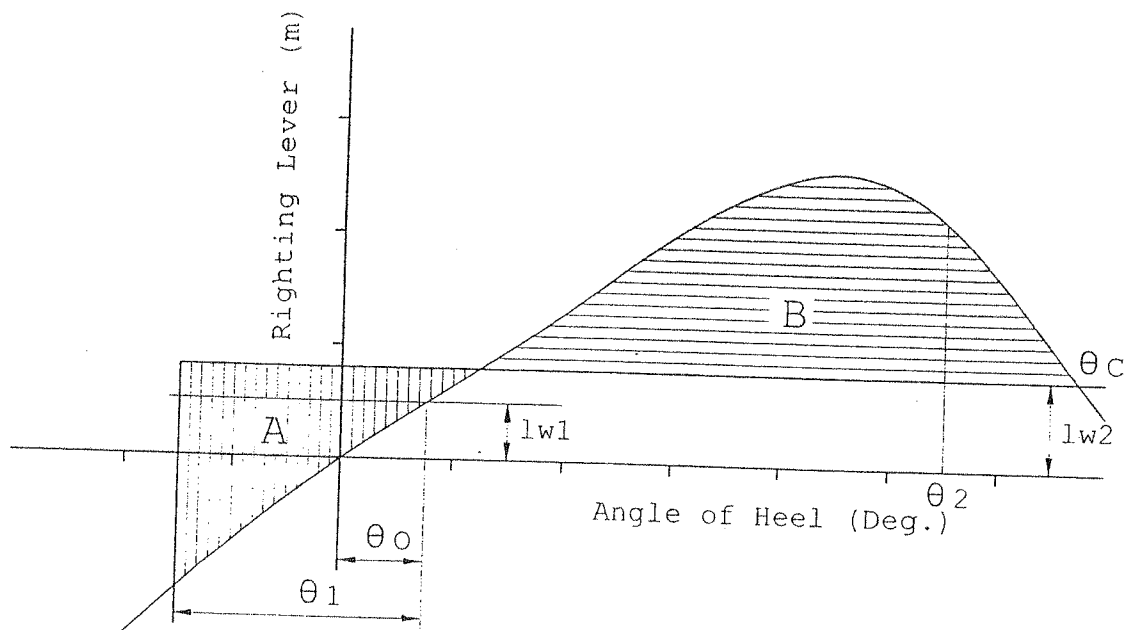
- The area under GoZ curve should not be less than 0.055 metre-radian up to 30 degrees angle of heel.
- The area under GoZ curve should not be less than 0.090 metre-radian up to X degrees angle of heel.
- The area under GoZ curve should not be less than 0.030 between 30 degrees and X degrees angle of heel.
- The righting lever GoZ should be at least 0.20 metre at an angle of heel equal to or greater than 30 deg.
- The maximum righting arm should occur at an angle of heel preferable exceeding 30 degrees but not less than 25 degrees.
- Initial metacentric height GoM should not be less than 0.15 metre.

X - 40 degrees or any lesser angle at which the lower edges of any opening in the hull, superstructure or deckhouses which lead below deck and cannot be closed weathertight, would be immersed.

### 3.2 Severe Wind and Rolling Criterion (Weather Criterion)

This criterion supplements the stability criteria given in section 3.1. The more stringent criteria of section 3.1 given above and the weather criterion should govern the minimum requirements for passenger or cargo ships of 24m in length and over. Recommended Weather Criterion The ability of a ship to withstand the combined effects of beam wind and rolling should be demonstrated for each standard condition of loading, with reference to the figure as follows:

- a) The ship is subjected to a steady wind pressure acting perpendicular to the ship's centerline which results in a steady wind heeling lever ( $lw_1$ )
- b) From the resultant angle of equilibrium ( $\theta_0$ ), the ship is assumed to roll owing to wave action to an angle of roll ( $\theta_1$ ) to windward. Attention should be paid to the effect of steady wind so that excessive resultant angle of heel are avoided.
- c) The ship is then subjected to a gust wind pressure which results in a gust wind heeling lever ( $lw_2$ ).
- d) Under these circumstances, area B should be equal to or greater than area A
- e) Free surface effects should be accounted for in the standard conditions of loading e.g. according to resolution A.749(18) \* The angle of heel under action of steady wind ( $\theta_0$ ) should be limited to a certain angle to the satisfaction of the Administration. As a guide 16 deg. or 80% of the angle of deck edge immersion, whichever is less, is suggested.



The angle in the above figure are defined as follows :  $\theta_0$  = angle of heel under action of steady wind (see b) and footnote)  $\theta_1$  = angle of roll to windward due to wave action  $\theta_2$  = angle of downflooding ( $\theta_f$ ) or 50 Deg. or  $\theta_c$  whichever is less where :

$\theta_f$  = angle of heel at which openings in the hull, superstructure or deckhouse which cannot be closed weathertight immerse.

In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open.

$\theta_c$  = angle of second intercept between wind heeling lever  $lw_2$  and GZ curves.

The wind heeling levers  $lw_1$  and  $lw_2$  referred to a) and c) are constant values at all angle of inclination and should be calculated as follows :

$$lw_1 = \frac{P * A * Z}{\Delta} \quad (\text{m}) \quad \text{and} \quad lw_2 = 1.5 * lw_1 \quad (\text{m})$$

Where :  $P^*$  = 0.0514 (t/m<sup>2</sup>)

A = projected lateral area of the portion of the ship and deck cargo above the waterline (m<sup>2</sup>)

Z = vertical distance from the centre of A to the centre of the underwater lateral area of approximately to a point at one half the draught (m)

$\Delta$  = displacement (t)

The angle of roll ( $\theta_1^{**}$ ) referred to in b) should be calculated as follows :

$$\theta_1 = 109k * X_1 * X_2 * \sqrt{r * s} \quad (\text{degrees})$$

Where :  $X_1$  = factor as shown in table 1

$X_2$  = factor as shown in table 2

k = factor as follows :

k = 1.0 for round-bilged ship having no bilge or bar keels:

k = 0.7 for a ship having sharp bilges:

k = as shown in table 3 for a ship having bilge keels, a bar keel or both

$$r = 0.73 \pm 0.6 \text{ OG/d}$$

with : OG = distance between the centre of gravity and the waterline

+ ; if centre of gravity is above the waterline

- ; if it is below

d = mean moulded draught of the ship (m)

s = factor as shown in table 4

\* The value of P used for ships in restricted service may be reduced subject to the approval of the Administration. \*\* The angle of roll for, ships provided with antirolling devices should be determined without taking the account the operation of these devices.

Table 1 Values of factor X1		Table 2 Values of factor X2		Table 3 Values of factor k		Table 4 Values of factor s	
B/d	X1	Cb	X2	Ak*100 L.B	k	T	s
<= 2.40	1.00	<= 0.45	0.75	0.0	1.00	<= 6	0.100
2.50	0.98	0.50	0.82	1.0	0.98	7	0.098
2.60	0.96	0.55	0.89	1.5	0.95	8	0.093
2.70	0.95	0.60	0.95	2.0	0.88	12	0.065
2.80	0.93	0.65	0.97	2.5	0.79	14	0.053
2.90	0.91	>= 0.70	1.00	3.0	0.74	16	0.044
3.00	0.90			3.5	0.72	18	0.038
3.10	0.88			>= 4.0	0.70	>= 20	0.035
3.20	0.86						
3.30	0.84						
3.40	0.82						
>= 3.50	0.80						

\* Intermediate values in tables 1~4 should be obtained by linear interpolation

$$\text{Rolling period } T = \frac{2C * B}{\sqrt{GM}} \quad (\text{seconds})$$

where :  $C = 0.373 + 0.023 (B/d) - 0.043 (L/100)$ . The symbols in the above tables and formula for the rolling period are defined as follows :

- L = waterline length of the ship (m)
- B = moulded breadth of the ship (m)
- d = mean moulded draught of the ship (m)
- Cb = block coefficient = Displacement / (L x B x d x 1.025)
- Ak = total overall area of bilge keels, or area of the lateral projection of the bar keel, or sum of these areas (m<sup>2</sup>)
- GM = metacentric height corrected for free surface effect (m)

## STEADY WIND HEELING LEVER CALCULATION

DRAFT (MLD) (M)	WATERLINE LENGTH (M)	DISPLACEMENT (TON)	WIND AREA (M <sup>2</sup> )	HEELING LEVER (M)	MOMENT (M <sup>3</sup> )	STEADY WIND HEELING LEVER (M)
5.00	190.005	24191.1	3124.4	11.484	35879.2	0.07623
5.50	190.037	26764.1	3031.5	11.501	34866.0	0.06696
6.00	190.062	29355.5	2938.6	11.520	33852.7	0.05927
6.50	190.081	31965.2	2845.7	11.540	32839.2	0.05281
7.00	190.088	34594.0	2752.7	11.562	31825.5	0.04729
7.50	190.072	37242.7	2659.6	11.585	30811.3	0.04252
8.00	190.016	39911.2	2566.3	11.611	29796.6	0.03837
8.50	189.916	42599.4	2472.7	11.639	28780.9	0.03473
9.00	189.721	45310.5	2378.9	11.671	27763.9	0.03150
9.50	189.283	48047.5	2284.4	11.707	26743.9	0.02861
10.00	186.132	50810.5	2190.8	11.744	25728.5	0.02603
10.50	187.035	53601.4	2097.5	11.783	24714.2	0.02370
11.00	186.393	56414.2	2004.2	11.825	23699.8	0.02159
11.50	186.107	59243.1	1911.1	11.871	22686.6	0.01968
12.00	186.025	62084.1	1818.0	11.922	21674.0	0.01794
12.50	186.090	64935.3	1725.0	11.977	20661.3	0.01635
13.00	186.246	67795.5	1631.9	12.040	19648.3	0.01490
13.50	186.432	70664.3	1538.8	12.110	18634.7	0.01355
14.00	186.624	73541.0	1445.5	12.190	17620.5	0.01232

NOTE: ALL OF IMO RES. A.749(18) Ch.3.2 STABILITY CALCULATIONS FOR TYPICAL LOADING CONDITIONS IN THIS BOOKLET WERE CONDUCTED BY USING THIS DATA

1. Waterline Length The length of water plan at each draught.
2. Wind Area : Projected lateral area in m<sup>2</sup> above the waterline.
3. Heeling lever : Heeling lever in meters is the vertical distance from the center of Wind Area to the point of one half of the Draught.
4. Moment : moment of area above water line from one half of the Draught.
5. Intermediate values to be obtained by linear interpolation.

ITEM	ABBREVIATION	VALUE
Wind pressure for wind heeling lever	P	0.0514 (t/m <sup>2</sup> )
Moulded breadth of the ship	B	32.26 (m)
Total overall area of bilge keel	Ak	25.52 (m <sup>2</sup> )

### 3.3 General precautions against capsizing

- a) Compliance with the stability criteria does not ensure immunity against capsizing regardless of the circumstance, or absolve the master from his responsibilities.

The master should therefore exercise prudence and good seamanship having regard to the season of the year, weather forecasts and the navigational zone and should take the appropriate action as to speed and course warranted by the prevailing circumstances.

- b) Care should be taken to ensure that the cargo allocated to the ship is capable of being stowed so that compliance with the criteria can be achieved. If necessary the amount should be limited to the extent that ballast weight may be required.
- c) Before a voyage commences care should be taken to ensure that the cargo and sizable pieces of equipment have been properly stowed or lashed so as to minimize the possibility of both longitudinal and lateral shifting while at sea, under the effect of acceleration caused by rolling and pitching.

### 3.4 Notes on Stability for the Master

The stability of the ship at small angles of heel is governed by the metacentric height GM which is the difference between : -

The transverse metacentric height above base line ..... KM  
and the vertical centre of gravity above the base line ..... KG

For positive stability GM must be positive i.e KM must be greater than KG for any ship the value of KM depends solely on the draught and may be read from the hydrostatic particulars. The value of KG depends on the loading of the ship and must be calculated for each condition, using the light ship condition (See loading condition No.1) and the weights and KGs of the various items of deadweight. A typical calculation is shown in each condition. Where there is free surface in a slack tank, the possible transfer of liquid from one side of the tank to the other, result in a vertical rise of the centre of gravity found by the above calculation with a corresponding reduction in GM This increase in KG is found by summing the free surface effects (the transverse moment of inertia given on tank capacity table corrected for specific gravity) for the tanks which are slack and dividing by the displacement. The stability of the ship at larger angles of heel is governed by the value and the range of righting lever GZ. The method of calculating this is given (Example of intact stability calc.) and the curves for the various conditions are shown on the LOADING CONDITION sheets For certain conditions of loading, the metacentric height in the Arrival Condition may be small & the following precautions should therefore be taken:

- (1) Heavy items of cargo should be loaded as low as possible.
- (2) Free surface should be kept to a minimum.
- (3) Tanks should be ballasted as required to maintain reasonable stability.

Ballasting should be done while the ship has an adequate GM since the free surface occurring temporarily during the operation reduces stability. The calculated conditions given in this book are for the guidance of the master and show the effects of various typical loading on Trim & Stability. When the heeling tank is used. the free surface moment should always be taken into account.

### 3.5 Notes on use of Free surface moments

Provided a tank is completely filled with liquid and no movement of the liquid is possible, the effect on the ship's stability is precisely the same as if the tank contained solid material.

Immediately a quantity of liquid is withdrawn from the tank the situation changes completely, and the stability of the ship is adversely affected by what is known as the Free Surface Effects.

This adverse effect on the stability is referred to as a Loss in GM or as a virtual rise in V.C.G. and is calculated as follows :-

$$\text{F.S.M.} = \frac{\text{Transverse moment of Inertia}}{\text{Specific Gravity liquid in tank}}$$

$$\text{Loss in GM due to free surface effect} = \frac{\text{Free Surface Moment (ton*m)}}{\text{Displacement of vessel in ton}}$$

Where the specific gravity of the liquid in any tank varies then the loss in G.M. becomes :-

$$\frac{\text{F.S.M.}}{\text{Displacement}} \times \frac{\text{NEW S.G.}}{\text{OLD S.G.}}$$

N.B. The Free surface Effects of a proportion of all oil-fuel, freshwater and the service tanks should be taken into account in both the departure and arrival conditions.



## 3.6 Cross(kN) diagram &amp; table

## \* CROSS KN TABLE \*

SHIP NO. ;  
 SHIP TYPE ; 57,700 DWT BULK CARRIER

## NOTE ;

- 1) THE INTACT VOLUME OF MAIN HULL HAVE BEEN INCLUDED IN CALCULATION.
- 2)  $GoZ = KN - KGo \times SING(\theta)$

KN ; CROSS CURVE ORDINATE  
 KGo ; CENTER OF GRAVITY ABOVE BASELINE  
 $\theta$  ; ANGLE OF HEEL  
 GoZ ; CORRECTED RIGHTING ARM

## Abbreviation &amp; Units

=====

DRAUGHT ; Mean Draft Above Base Line (M)  
 KN ; CROSS CURVE ORDINATE (M)

initial trim 0 m (level)

draught T	heeling angle (deg.)									
	5.0 KN	10.0 KN	15.0 KN	20.0 KN	25.0 KN	30.0 KN	35.0 KN	40.0 KN	50.0 KN	60.0 KN
2.000	3.517	6.538	8.305	9.434	10.207	10.730	11.061	11.247	11.304	11.107
2.050	3.443	6.443	8.226	9.369	10.155	10.690	11.035	11.233	11.314	11.141
2.100	3.373	6.349	8.149	9.305	10.103	10.652	11.010	11.219	11.324	11.174
2.150	3.305	6.257	8.073	9.241	10.051	10.613	10.984	11.206	11.333	11.208
2.200	3.241	6.167	7.998	9.179	10.001	10.575	10.959	11.193	11.342	11.240
2.250	3.179	6.078	7.925	9.118	9.951	10.538	10.934	11.180	11.351	11.273
2.300	3.120	5.990	7.852	9.057	9.901	10.500	10.910	11.167	11.360	11.305
2.350	3.063	5.904	7.781	8.998	9.853	10.464	10.885	11.154	11.368	11.336
2.400	3.008	5.819	7.711	8.939	9.805	10.427	10.861	11.141	11.377	11.368
2.450	2.955	5.735	7.641	8.881	9.758	10.391	10.836	11.128	11.386	11.398
2.500	2.905	5.653	7.573	8.824	9.711	10.356	10.812	11.115	11.394	11.429
2.550	2.856	5.572	7.506	8.768	9.665	10.321	10.788	11.102	11.402	11.459
2.600	2.809	5.493	7.439	8.713	9.620	10.286	10.765	11.090	11.411	11.489
2.650	2.764	5.415	7.374	8.658	9.576	10.251	10.742	11.077	11.419	11.519
2.700	2.720	5.339	7.309	8.604	9.532	10.217	10.719	11.065	11.427	11.548
2.750	2.678	5.265	7.245	8.551	9.488	10.185	10.696	11.052	11.435	11.577
2.800	2.638	5.193	7.182	8.498	9.446	10.152	10.673	11.039	11.443	11.606
2.850	2.599	5.123	7.120	8.447	9.403	10.119	10.650	11.027	11.451	11.634
2.900	2.561	5.055	7.058	8.395	9.362	10.087	10.627	11.014	11.459	11.661
2.950	2.524	4.989	6.997	8.345	9.321	10.055	10.605	11.002	11.467	11.688
3.000	2.489	4.925	6.937	8.295	9.280	10.023	10.582	10.990	11.475	11.714
3.050	2.455	4.863	6.878	8.246	9.240	9.992	10.560	10.978	11.483	11.739
3.100	2.422	4.802	6.819	8.197	9.200	9.961	10.538	10.966	11.490	11.763
3.150	2.390	4.743	6.761	8.149	9.161	9.930	10.517	10.954	11.498	11.786
3.200	2.359	4.686	6.704	8.102	9.122	9.900	10.495	10.943	11.505	11.809
3.250	2.329	4.631	6.647	8.055	9.084	9.870	10.474	10.930	11.512	11.830
3.300	2.300	4.577	6.591	8.008	9.046	9.840	10.453	10.918	11.519	11.851
3.350	2.272	4.524	6.536	7.962	9.008	9.810	10.432	10.907	11.526	11.870
3.400	2.245	4.473	6.481	7.917	8.971	9.781	10.411	10.895	11.533	11.889
3.450	2.219	4.423	6.426	7.872	8.934	9.753	10.388	10.884	11.540	11.906
3.500	2.193	4.375	6.373	7.828	8.898	9.724	10.368	10.872	11.547	11.923
3.550	2.168	4.328	6.320	7.784	8.864	9.696	10.349	10.861	11.554	11.939
3.600	2.144	4.282	6.267	7.740	8.828	9.668	10.329	10.850	11.561	11.954
3.650	2.121	4.237	6.215	7.697	8.793	9.641	10.309	10.839	11.567	11.967
3.700	2.098	4.193	6.163	7.654	8.758	9.611	10.290	10.828	11.574	11.980
3.750	2.076	4.151	6.113	7.612	8.724	9.585	10.271	10.817	11.581	11.993
3.800	2.055	4.109	6.062	7.570	8.689	9.558	10.252	10.806	11.587	12.004
3.850	2.034	4.069	6.012	7.528	8.655	9.532	10.234	10.795	11.594	12.015
3.900	2.014	4.030	5.963	7.487	8.622	9.506	10.215	10.784	11.600	12.025
3.950	1.994	3.991	5.914	7.446	8.589	9.480	10.197	10.774	11.607	12.034
4.000	1.975	3.954	5.866	7.405	8.553	9.455	10.178	10.763	11.613	12.042
4.050	1.956	3.918	5.818	7.365	8.521	9.430	10.160	10.753	11.620	12.050
4.100	1.938	3.882	5.772	7.326	8.489	9.405	10.143	10.742	11.626	12.058
4.150	1.921	3.847	5.726	7.286	8.457	9.380	10.125	10.732	11.632	12.064
4.200	1.904	3.813	5.681	7.247	8.426	9.356	10.107	10.722	11.638	12.070

initial trim 0 m (level)

draught T	heeling angle (deg.)									
	5.0 KN	10.0 KN	15.0 KN	20.0 KN	25.0 KN	30.0 KN	35.0 KN	40.0 KN	50.0 KN	60.0 KN
4.200	1.904	3.813	5.681	7.247	8.426	9.356	10.107	10.722	11.638	12.070
4.250	1.887	3.780	5.637	7.208	8.395	9.332	10.090	10.712	11.644	12.076
4.300	1.870	3.748	5.593	7.170	8.364	9.308	10.073	10.702	11.650	12.081
4.350	1.855	3.717	5.551	7.132	8.334	9.284	10.056	10.692	11.655	12.085
4.400	1.839	3.686	5.509	7.094	8.304	9.261	10.039	10.682	11.660	12.089
4.450	1.824	3.656	5.468	7.056	8.274	9.237	10.023	10.673	11.666	12.092
4.500	1.809	3.627	5.427	7.020	8.244	9.214	10.006	10.663	11.670	12.095
4.550	1.795	3.598	5.388	6.983	8.215	9.191	9.990	10.654	11.675	12.097
4.600	1.781	3.570	5.349	6.947	8.186	9.169	9.974	10.644	11.679	12.099
4.650	1.767	3.543	5.311	6.911	8.157	9.146	9.958	10.635	11.682	12.101
4.700	1.754	3.517	5.274	6.876	8.128	9.124	9.942	10.626	11.685	12.102
4.750	1.741	3.491	5.238	6.841	8.100	9.102	9.926	10.617	11.688	12.103
4.800	1.728	3.465	5.202	6.806	8.072	9.080	9.911	10.608	11.691	12.103
4.850	1.715	3.441	5.167	6.771	8.044	9.058	9.895	10.599	11.693	12.103
4.900	1.703	3.416	5.132	6.737	8.016	9.037	9.880	10.590	11.694	12.103
4.950	1.691	3.393	5.099	6.703	7.988	9.016	9.865	10.581	11.696	12.102
5.000	1.680	3.370	5.066	6.669	7.961	8.995	9.850	10.573	11.696	12.102
5.050	1.669	3.347	5.033	6.635	7.934	8.974	9.835	10.564	11.697	12.101
5.100	1.657	3.325	5.002	6.602	7.907	8.953	9.821	10.556	11.696	12.100
5.150	1.647	3.303	4.971	6.569	7.880	8.933	9.806	10.548	11.696	12.098
5.200	1.636	3.282	4.940	6.536	7.854	8.912	9.792	10.539	11.695	12.097
5.250	1.626	3.262	4.911	6.504	7.827	8.892	9.778	10.531	11.693	12.095
5.300	1.616	3.241	4.882	6.471	7.801	8.872	9.764	10.523	11.691	12.093
5.350	1.606	3.222	4.853	6.439	7.775	8.853	9.750	10.516	11.689	12.091
5.400	1.596	3.202	4.825	6.408	7.750	8.833	9.736	10.508	11.686	12.088
5.450	1.587	3.184	4.798	6.376	7.724	8.814	9.723	10.500	11.683	12.085
5.500	1.577	3.165	4.771	6.345	7.699	8.794	9.709	10.492	11.680	12.082
5.550	1.568	3.147	4.744	6.315	7.674	8.775	9.696	10.485	11.676	12.078
5.600	1.560	3.129	4.718	6.284	7.649	8.756	9.683	10.477	11.672	12.074
5.650	1.551	3.112	4.693	6.254	7.624	8.737	9.670	10.470	11.668	12.070
5.700	1.543	3.095	4.668	6.225	7.599	8.719	9.657	10.463	11.663	12.065
5.750	1.534	3.079	4.644	6.196	7.575	8.700	9.644	10.456	11.658	12.060
5.800	1.526	3.062	4.620	6.167	7.551	8.682	9.631	10.449	11.652	12.055
5.850	1.518	3.047	4.596	6.139	7.527	8.664	9.618	10.442	11.647	12.050
5.900	1.511	3.031	4.573	6.111	7.503	8.646	9.606	10.435	11.641	12.044
5.950	1.503	3.016	4.551	6.084	7.479	8.628	9.594	10.428	11.635	12.038
6.000	1.496	3.001	4.528	6.057	7.456	8.610	9.581	10.421	11.628	12.032
6.050	1.488	2.987	4.507	6.030	7.432	8.592	9.569	10.415	11.622	12.026
6.100	1.481	2.973	4.485	6.004	7.409	8.575	9.557	10.408	11.615	12.019
6.150	1.474	2.959	4.465	5.978	7.386	8.557	9.545	10.402	11.608	12.012
6.200	1.467	2.945	4.444	5.953	7.363	8.540	9.533	10.395	11.600	12.005
6.250	1.461	2.932	4.424	5.928	7.340	8.523	9.522	10.389	11.593	11.998
6.300	1.454	2.919	4.404	5.903	7.318	8.506	9.510	10.383	11.585	11.991
6.350	1.448	2.906	4.385	5.879	7.295	8.489	9.499	10.376	11.577	11.984
6.400	1.442	2.894	4.366	5.856	7.273	8.472	9.487	10.370	11.569	11.976

initial trim 0 m (level)

draught T	heeling angle (deg.)									
	5.0 KN	10.0 KN	15.0 KN	20.0 KN	25.0 KN	30.0 KN	35.0 KN	40.0 -KN	50.0 KN	60.0 KN
6.400	1.442	2.894	4.366	5.856	7.273	8.472	9.487	10.370	11.569	11.976
6.450	1.436	2.881	4.348	5.832	7.251	8.456	9.476	10.363	11.561	11.968
6.500	1.430	2.869	4.329	5.809	7.229	8.439	9.465	10.357	11.552	11.961
6.550	1.424	2.858	4.312	5.787	7.207	8.423	9.454	10.350	11.544	11.953
6.600	1.418	2.846	4.294	5.765	7.185	8.406	9.443	10.344	11.535	11.945
6.650	1.412	2.835	4.277	5.743	7.164	8.390	9.432	10.337	11.526	11.936
6.700	1.407	2.824	4.261	5.721	7.142	8.374	9.421	10.330	11.517	11.928
6.750	1.402	2.813	4.244	5.700	7.121	8.358	9.410	10.323	11.507	11.919
6.800	1.396	2.802	4.228	5.679	7.100	8.342	9.400	10.316	11.498	11.911
6.850	1.391	2.792	4.213	5.659	7.079	8.326	9.389	10.309	11.488	11.902
6.900	1.386	2.782	4.197	5.639	7.058	8.311	9.379	10.301	11.479	11.893
6.950	1.381	2.772	4.182	5.619	7.038	8.295	9.369	10.294	11.469	11.885
7.000	1.376	2.762	4.167	5.600	7.018	8.280	9.358	10.286	11.459	11.876
7.050	1.372	2.752	4.153	5.581	6.997	8.265	9.348	10.278	11.449	11.867
7.100	1.367	2.743	4.139	5.562	6.977	8.249	9.338	10.270	11.438	11.858
7.150	1.362	2.734	4.125	5.544	6.958	8.234	9.328	10.262	11.428	11.849
7.200	1.358	2.725	4.111	5.526	6.938	8.219	9.318	10.254	11.418	11.840
7.250	1.353	2.716	4.098	5.508	6.919	8.204	9.309	10.245	11.407	11.830
7.300	1.349	2.707	4.085	5.491	6.900	8.189	9.299	10.237	11.397	11.821
7.350	1.345	2.699	4.072	5.474	6.881	8.175	9.289	10.228	11.386	11.812
7.400	1.341	2.691	4.059	5.457	6.862	8.160	9.280	10.219	11.375	11.803
7.450	1.337	2.682	4.047	5.440	6.844	8.146	9.270	10.209	11.364	11.794
7.500	1.333	2.674	4.035	5.424	6.826	8.131	9.261	10.200	11.352	11.785
7.550	1.329	2.667	4.023	5.408	6.808	8.117	9.251	10.190	11.341	11.775
7.600	1.325	2.659	4.011	5.393	6.790	8.103	9.242	10.180	11.329	11.766
7.650	1.322	2.652	4.000	5.378	6.773	8.088	9.233	10.170	11.318	11.757
7.700	1.318	2.644	3.989	5.363	6.756	8.074	9.223	10.160	11.306	11.748
7.750	1.314	2.637	3.978	5.348	6.739	8.060	9.214	10.150	11.294	11.739
7.800	1.311	2.630	3.967	5.334	6.722	8.046	9.204	10.139	11.282	11.729
7.850	1.307	2.623	3.957	5.319	6.706	8.033	9.195	10.128	11.270	11.720
7.900	1.304	2.616	3.947	5.306	6.690	8.019	9.186	10.118	11.258	11.711
7.950	1.301	2.610	3.937	5.292	6.674	8.005	9.176	10.107	11.246	11.701
8.000	1.298	2.603	3.927	5.279	6.658	7.992	9.166	10.095	11.233	11.692
8.050	1.295	2.597	3.917	5.266	6.643	7.978	9.157	10.084	11.221	11.683
8.100	1.291	2.591	3.908	5.253	6.627	7.965	9.147	10.073	11.208	11.673
8.150	1.288	2.585	3.899	5.240	6.612	7.952	9.137	10.061	11.196	11.664
8.200	1.286	2.579	3.890	5.228	6.598	7.938	9.127	10.049	11.183	11.655
8.250	1.283	2.573	3.881	5.216	6.583	7.925	9.117	10.038	11.170	11.645
8.300	1.280	2.568	3.872	5.204	6.569	7.912	9.107	10.026	11.158	11.636
8.350	1.277	2.562	3.864	5.193	6.555	7.899	9.096	10.013	11.145	11.626
8.400	1.274	2.557	3.855	5.181	6.541	7.886	9.086	10.001	11.132	11.617
8.450	1.272	2.551	3.847	5.170	6.527	7.874	9.075	9.989	11.119	11.607
8.500	1.269	2.546	3.839	5.159	6.514	7.861	9.064	9.976	11.106	11.598
8.550	1.267	2.541	3.832	5.149	6.501	7.849	9.053	9.964	11.093	11.588
8.600	1.264	2.536	3.824	5.138	6.488	7.836	9.042	9.951	11.080	11.579

initial trim 0 m (level)

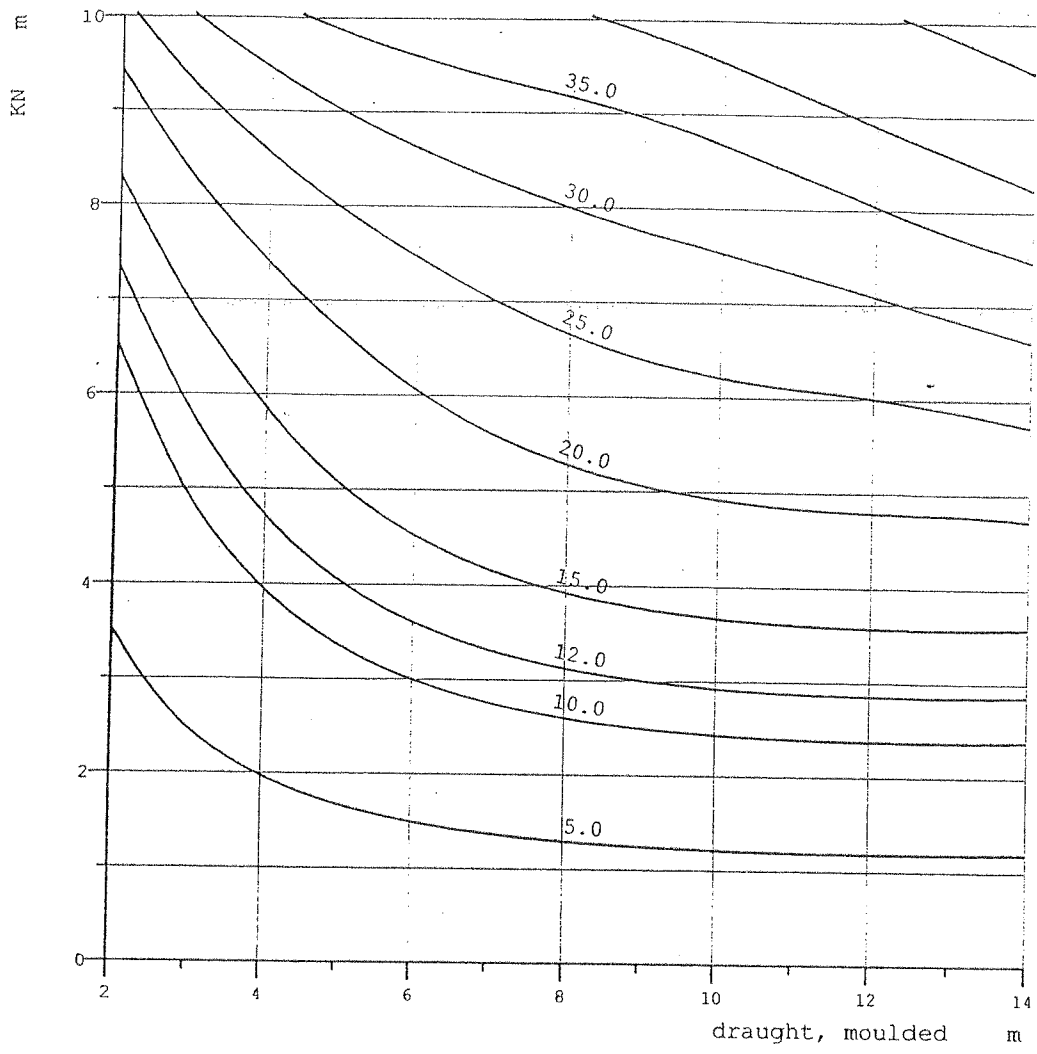
draught T	heeling angle (deg.)									
	5.0 KN	10.0 KN	15.0 KN	20.0 KN	25.0 KN	30.0 KN	35.0 KN	40.0 KN	50.0 KN	60.0 KN
8.600	1.264	2.536	3.824	5.138	6.488	7.836	9.042	9.951	11.080	11.579
8.650	1.262	2.531	3.816	5.128	6.475	7.824	9.031	9.938	11.067	11.569
8.700	1.260	2.526	3.809	5.118	6.463	7.812	9.020	9.925	11.054	11.560
8.750	1.257	2.522	3.802	5.108	6.451	7.799	9.008	9.912	11.041	11.550
8.800	1.255	2.517	3.795	5.099	6.439	7.787	8.996	9.899	11.028	11.540
8.850	1.253	2.513	3.788	5.089	6.427	7.776	8.984	9.885	11.014	11.531
8.900	1.251	2.508	3.782	5.080	6.415	7.764	8.972	9.872	11.001	11.521
8.950	1.249	2.504	3.775	5.071	6.404	7.752	8.960	9.859	10.988	11.511
9.000	1.247	2.500	3.769	5.062	6.393	7.741	8.948	9.845	10.975	11.501
9.050	1.245	2.496	3.762	5.054	6.382	7.730	8.935	9.831	10.962	11.491
9.100	1.243	2.492	3.756	5.045	6.371	7.718	8.923	9.817	10.948	11.481
9.150	1.241	2.488	3.750	5.037	6.360	7.707	8.910	9.803	10.935	11.471
9.200	1.239	2.484	3.745	5.029	6.350	7.697	8.897	9.789	10.922	11.461
9.250	1.237	2.481	3.739	5.021	6.340	7.686	8.884	9.775	10.909	11.451
9.300	1.235	2.477	3.733	5.013	6.330	7.675	8.871	9.761	10.896	11.440
9.350	1.234	2.474	3.728	5.006	6.320	7.665	8.858	9.747	10.883	11.430
9.400	1.232	2.470	3.723	4.999	6.311	7.654	8.844	9.732	10.870	11.420
9.450	1.230	2.467	3.717	4.991	6.301	7.644	8.830	9.718	10.856	11.409
9.500	1.229	2.464	3.712	4.984	6.292	7.633	8.817	9.703	10.843	11.399
9.550	1.227	2.461	3.707	4.977	6.283	7.623	8.803	9.689	10.830	11.388
9.600	1.226	2.457	3.703	4.971	6.274	7.612	8.789	9.674	10.817	11.377
9.650	1.224	2.454	3.698	4.964	6.266	7.602	8.775	9.659	10.804	11.367
9.700	1.223	2.451	3.693	4.958	6.257	7.592	8.761	9.644	10.791	11.356
9.750	1.221	2.449	3.689	4.951	6.249	7.582	8.746	9.629	10.778	11.345
9.800	1.220	2.446	3.684	4.945	6.241	7.571	8.732	9.614	10.765	11.334
9.850	1.219	2.443	3.680	4.939	6.233	7.561	8.717	9.599	10.752	11.323
9.900	1.217	2.440	3.676	4.934	6.226	7.550	8.703	9.583	10.739	11.312
9.950	1.216	2.438	3.672	4.928	6.218	7.540	8.688	9.568	10.726	11.301
10.000	1.215	2.435	3.668	4.922	6.211	7.530	8.673	9.553	10.713	11.290
10.050	1.214	2.433	3.664	4.917	6.204	7.519	8.658	9.537	10.700	11.279
10.100	1.213	2.430	3.660	4.912	6.197	7.509	8.643	9.521	10.687	11.268
10.150	1.211	2.428	3.657	4.907	6.190	7.498	8.628	9.506	10.674	11.257
10.200	1.210	2.426	3.653	4.902	6.184	7.487	8.613	9.490	10.661	11.245
10.250	1.209	2.424	3.650	4.897	6.177	7.477	8.598	9.474	10.648	11.234
10.300	1.208	2.422	3.646	4.892	6.171	7.466	8.582	9.458	10.635	11.223
10.350	1.207	2.419	3.643	4.887	6.165	7.455	8.567	9.442	10.621	11.211
10.400	1.206	2.417	3.640	4.883	6.159	7.444	8.551	9.425	10.608	11.200
10.450	1.205	2.415	3.637	4.879	6.153	7.433	8.535	9.409	10.595	11.188
10.500	1.204	2.414	3.634	4.874	6.147	7.423	8.520	9.393	10.582	11.177
10.550	1.203	2.412	3.631	4.870	6.142	7.412	8.504	9.376	10.568	11.165
10.600	1.203	2.410	3.628	4.866	6.136	7.401	8.488	9.360	10.555	11.154
10.650	1.202	2.408	3.625	4.862	6.131	7.390	8.472	9.343	10.542	11.142
10.700	1.201	2.406	3.623	4.858	6.126	7.379	8.457	9.326	10.528	11.130
10.750	1.200	2.405	3.620	4.855	6.121	7.368	8.441	9.309	10.515	11.118
10.800	1.199	2.403	3.618	4.851	6.116	7.356	8.425	9.293	10.501	11.106

initial trim 0 m (level)

draught T	heeling angle (deg.)									
	5.0 KN	10.0 KN	15.0 KN	20.0 KN	25.0 KN	30.0 KN	35.0 KN	40.0 KN	50.0 KN	60.0 KN
10.800	1.199	2.403	3.618	4.851	6.116	7.356	8.425	9.293	10.501	11.106
10.850	1.199	2.402	3.615	4.848	6.112	7.345	8.409	9.276	10.487	11.095
10.900	1.198	2.400	3.613	4.844	6.107	7.334	8.393	9.259	10.473	11.083
10.950	1.197	2.399	3.610	4.841	6.103	7.323	8.377	9.242	10.459	11.071
11.000	1.197	2.397	3.608	4.838	6.098	7.312	8.361	9.225	10.445	11.059
11.050	1.196	2.396	3.606	4.835	6.094	7.300	8.345	9.208	10.431	11.047
11.100	1.195	2.395	3.604	4.832	6.090	7.289	8.328	9.191	10.417	11.035
11.150	1.195	2.393	3.602	4.829	6.086	7.278	8.312	9.173	10.403	11.022
11.200	1.194	2.392	3.600	4.826	6.082	7.267	8.296	9.156	10.388	11.010
11.250	1.193	2.391	3.598	4.824	6.078	7.255	8.280	9.139	10.374	10.998
11.300	1.193	2.390	3.596	4.821	6.074	7.244	8.264	9.122	10.359	10.986
11.350	1.192	2.389	3.595	4.818	6.069	7.232	8.248	9.105	10.345	10.974
11.400	1.192	2.388	3.593	4.816	6.065	7.221	8.232	9.088	10.330	10.961
11.450	1.191	2.387	3.591	4.814	6.061	7.210	8.215	9.071	10.315	10.949
11.500	1.191	2.386	3.590	4.812	6.056	7.198	8.199	9.053	10.300	10.936
11.550	1.190	2.385	3.588	4.809	6.052	7.187	8.183	9.036	10.286	10.924
11.600	1.190	2.384	3.587	4.807	6.047	7.175	8.167	9.019	10.271	10.911
11.650	1.190	2.383	3.586	4.805	6.042	7.164	8.151	9.002	10.255	10.899
11.700	1.189	2.382	3.584	4.803	6.037	7.152	8.135	8.986	10.240	10.886
11.750	1.189	2.381	3.583	4.802	6.033	7.141	8.118	8.969	10.225	10.874
11.800	1.188	2.381	3.582	4.800	6.027	7.129	8.102	8.952	10.210	10.861
11.850	1.188	2.380	3.581	4.798	6.022	7.118	8.086	8.935	10.194	10.848
11.900	1.188	2.379	3.580	4.797	6.017	7.106	8.070	8.919	10.179	10.835
11.950	1.187	2.379	3.579	4.795	6.012	7.095	8.054	8.902	10.163	10.823
12.000	1.187	2.378	3.578	4.794	6.006	7.083	8.038	8.885	10.148	10.810
12.050	1.187	2.377	3.577	4.793	6.001	7.072	8.022	8.869	10.132	10.797
12.100	1.187	2.377	3.576	4.791	5.995	7.060	8.006	8.852	10.116	10.784
12.150	1.186	2.376	3.575	4.790	5.990	7.048	7.989	8.836	10.100	10.771
12.200	1.186	2.376	3.574	4.789	5.984	7.037	7.973	8.820	10.084	10.758
12.250	1.186	2.376	3.574	4.788	5.978	7.025	7.957	8.803	10.068	10.744
12.300	1.186	2.375	3.573	4.787	5.972	7.013	7.942	8.787	10.052	10.731
12.350	1.186	2.375	3.573	4.786	5.966	7.002	7.926	8.771	10.036	10.718
12.400	1.186	2.375	3.572	4.785	5.960	6.990	7.910	8.754	10.020	10.705
12.450	1.185	2.374	3.572	4.784	5.954	6.978	7.894	8.738	10.004	10.691
12.500	1.185	2.374	3.571	4.784	5.947	6.967	7.879	8.722	9.987	10.678
12.550	1.185	2.374	3.571	4.783	5.941	6.955	7.863	8.706	9.971	10.665
12.600	1.185	2.374	3.571	4.783	5.934	6.943	7.848	8.689	9.955	10.651
12.650	1.185	2.374	3.570	4.782	5.928	6.931	7.833	8.673	9.938	10.638
12.700	1.185	2.373	3.570	4.782	5.921	6.920	7.818	8.657	9.921	10.624
12.750	1.185	2.373	3.570	4.781	5.914	6.908	7.803	8.640	9.905	10.611
12.800	1.185	2.373	3.570	4.781	5.907	6.896	7.788	8.624	9.888	10.597
12.850	1.185	2.373	3.570	4.780	5.900	6.884	7.774	8.607	9.872	10.583
12.900	1.185	2.373	3.570	4.779	5.893	6.872	7.759	8.591	9.855	10.570
12.950	1.185	2.373	3.570	4.778	5.886	6.860	7.745	8.574	9.838	10.556
13.000	1.185	2.373	3.570	4.777	5.879	6.849	7.731	8.558	9.821	10.542

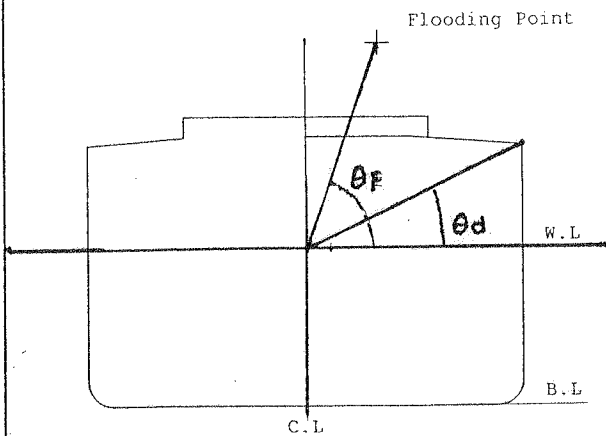
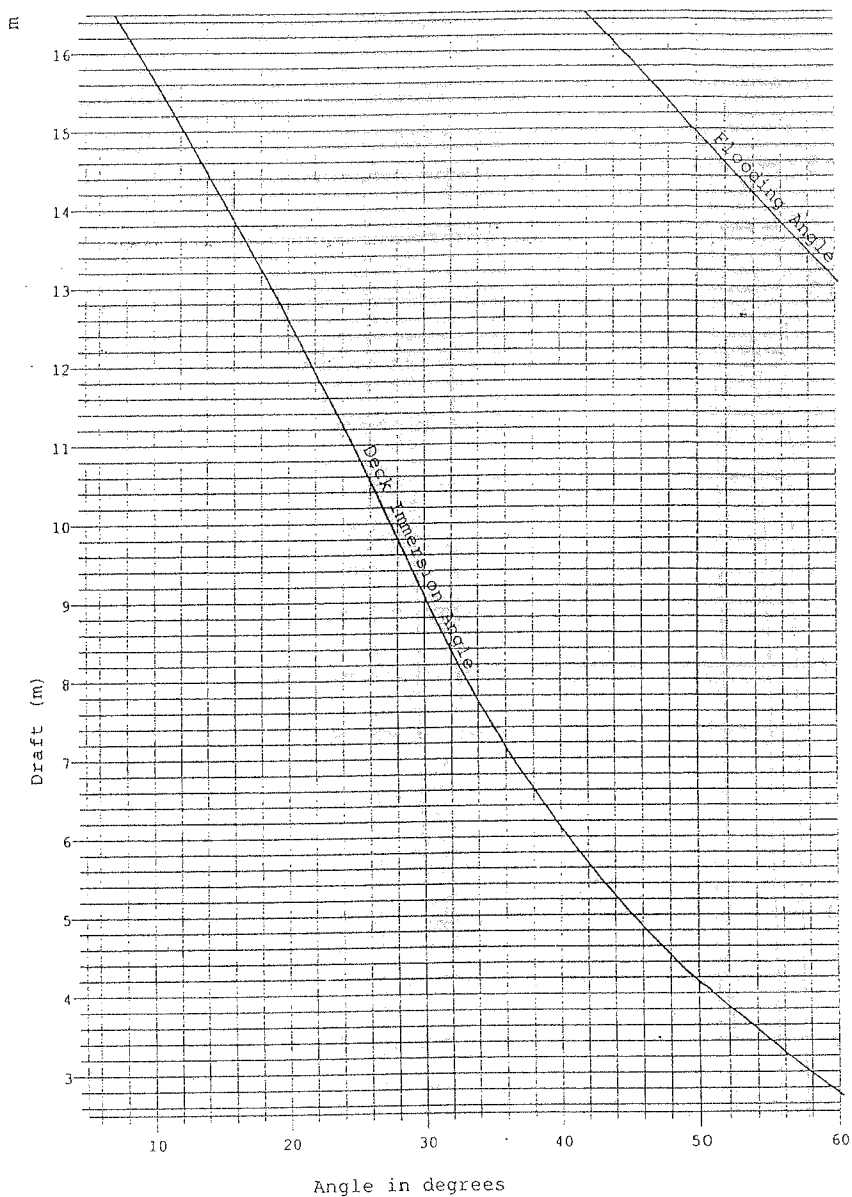
initial trim 0 m (level)

draught T	heeling angle (deg.)									
	5.0 KN	10.0 KN	15.0 KN	20.0 KN	25.0 KN	30.0 KN	35.0 KN	40.0 KN	50.0 KN	60.0 KN
13.000	1.185	2.373	3.570	4.777	5.879	6.849	7.731	8.558	9.821	10.542
13.050	1.185	2.374	3.570	4.775	5.871	6.837	7.717	8.541	9.804	10.528
13.100	1.185	2.374	3.570	4.774	5.864	6.825	7.703	8.525	9.787	10.514
13.150	1.185	2.374	3.570	4.772	5.857	6.813	7.689	8.508	9.770	10.500
13.200	1.185	2.374	3.570	4.771	5.849	6.801	7.675	8.492	9.753	10.487
13.250	1.186	2.374	3.571	4.769	5.841	6.789	7.662	8.475	9.736	10.473
13.300	1.186	2.375	3.571	4.767	5.834	6.777	7.649	8.459	9.718	10.459
13.350	1.186	2.375	3.571	4.764	5.826	6.765	7.635	8.442	9.701	10.445
13.400	1.186	2.375	3.572	4.762	5.818	6.753	7.622	8.426	9.684	10.430
13.450	1.186	2.376	3.572	4.759	5.810	6.741	7.609	8.409	9.666	10.416
13.500	1.186	2.376	3.573	4.757	5.802	6.729	7.596	8.393	9.649	10.402
13.550	1.187	2.376	3.573	4.754	5.794	6.717	7.583	8.376	9.631	10.388
13.600	1.187	2.377	3.574	4.751	5.785	6.706	7.570	8.360	9.614	10.374
13.650	1.187	2.377	3.575	4.748	5.777	6.694	7.557	8.343	9.596	10.359
13.700	1.187	2.378	3.575	4.744	5.769	6.683	7.544	8.327	9.578	10.345
13.750	1.188	2.378	3.576	4.741	5.760	6.671	7.530	8.310	9.561	10.331
13.800	1.188	2.379	3.577	4.737	5.752	6.660	7.517	8.294	9.543	10.316
13.850	1.188	2.379	3.578	4.734	5.743	6.649	7.504	8.277	9.525	10.302
13.900	1.189	2.380	3.578	4.730	5.735	6.638	7.491	8.261	9.507	10.288
13.950	1.189	2.381	3.579	4.726	5.726	6.627	7.478	8.245	9.489	10.273
14.000	1.189	2.381	3.580	4.721	5.717	6.616	7.465	8.228	9.471	10.259





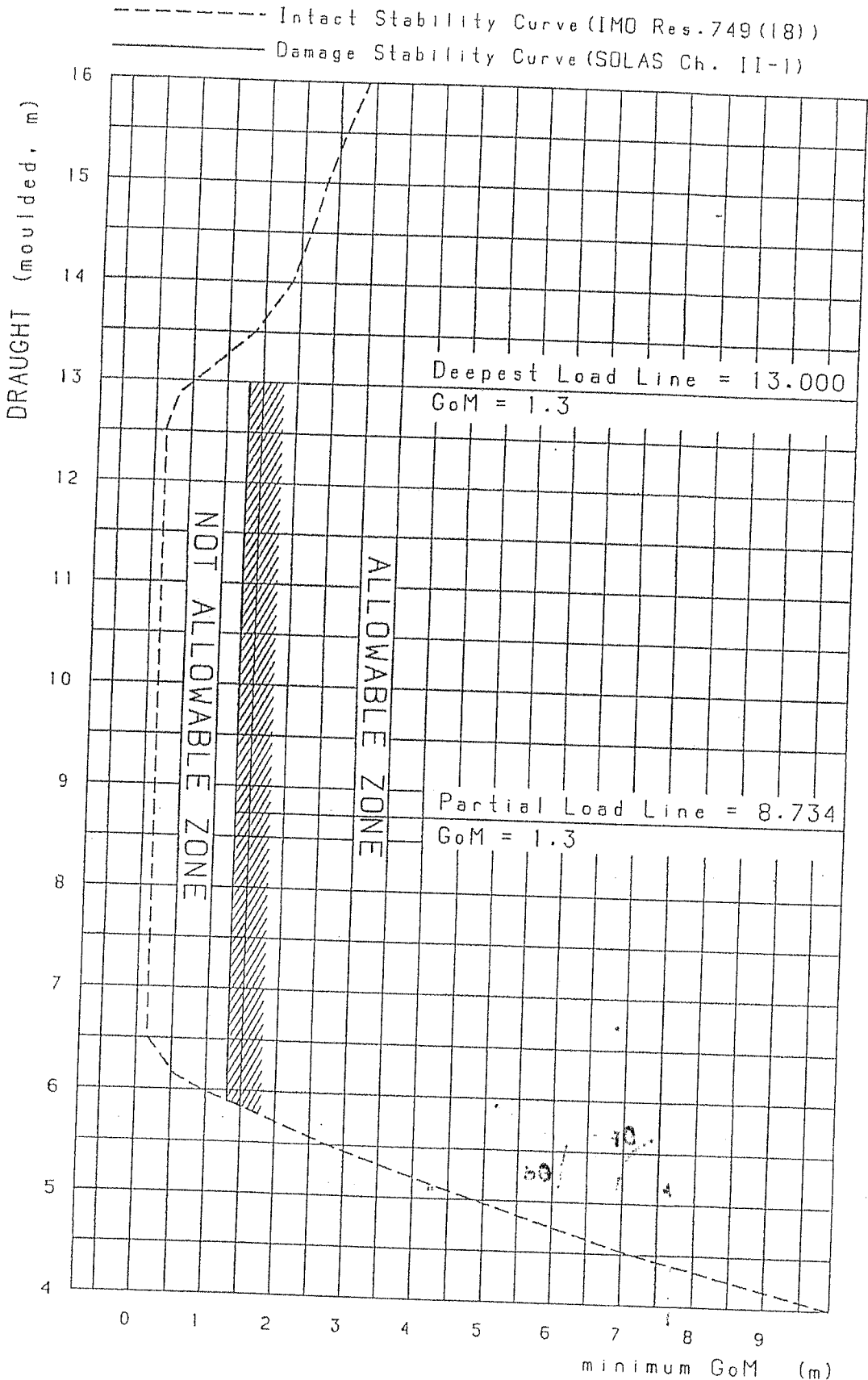
3.7 Down flooding angle diagram



CRITICAL POINT

No.	Position	X (m)	Y (m)	Z (m)
1	B-DECK DOOR	14.100	5.325	25.750
2	DECK EDGE	91.650	16.130	18.500

X ; DISTANCE FROM A.P.  
 Y ; DISTANCE FROM CENTER LINE  
 Z ; DISTANCE FROM BASE LINE  
 $\theta_f$  ; DOWN FLOODING ANGLE  
 $\theta_d$  ; DECK EDGE IMMERSION ANGLE



D2007-MINGOFT

### 3.9 Example of Intact stability Calculation

The purpose of the KN data is to enable static stability curves to be drawn for the ship in any sailing condition.

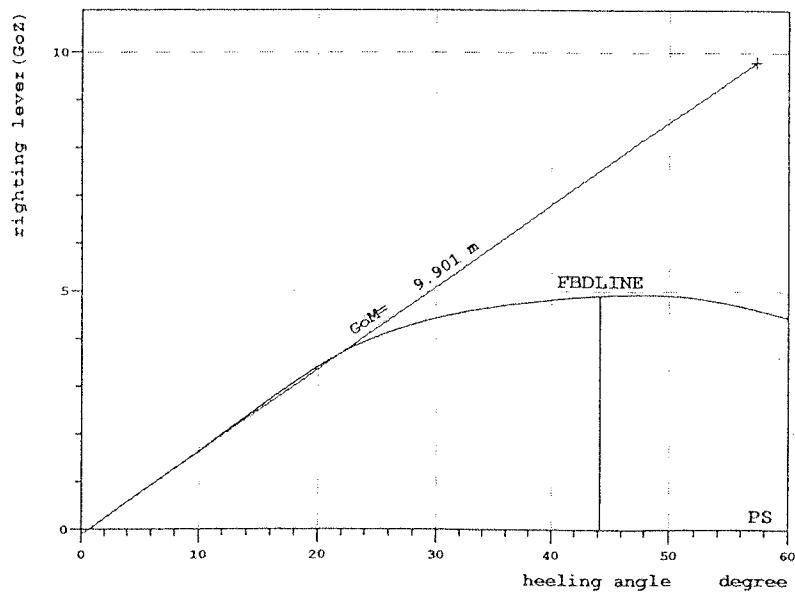
Example :	LOADING CONDITION	:	NORMAL BALLAST ARRIVAL CONDITION
	DRAFT(mid)	:	5.411 M above keel bottom
	TRIM	:	-2.434 M
	KMT	:	18.759 M above base line
	VCG(=KG)	:	8.384 M above base line
	GGo	:	0.474 M
	KGo(=KG+GGo)	:	8.858 M

#### INTACT STABILITY CALCULATION ACCORING TO GENERAL INTACT STABILITY CRITERIA OF IMO RES. A.749(18)

- 1) Obtain the KN value at each angle of heel and trim for the actual draft from KN TABLE, and then calculate the righting arm(GoZ) by using the formula  $GoZ = KN - KGo \cdot \sin(\Theta)$ .

Heel angle (deg.)	KN (m)	$KGo \cdot \sin(\Theta)$ (m)	GoZ (m)
0	-0.106	0.000	-0.106
5	1.534	0.772	0.762
10	3.184	1.538	1.646
15	4.846	2.293	2.553
20	6.447	3.029	3.417
25	7.784	3.743	4.041
30	8.860	4.429	4.431
35	9.753	5.081	4.672
40	10.514	5.694	4.820
50	11.698	6.785	4.913
60	12.117	7.671	4.446

- 2) Plot the GoZ curve



Draw a tangent line to the GoZ curve at the origin and a vertical line at heeling angle of 57.3 deg. (1 radian).

The intersection point of these two straight lines has GoZ ordinate (distance from horizontal axis) equal to the initial metacentric height GoM.

3) Check to ensure that the GoZ curve meets all the elements of the appropriate criteria.

a) Where the area under the GoZ curve from 0 deg. to 30 deg. is required, the calculation is carried out as follows:

Heel angle (deg.)	GoZ (m)	S.M.	f(A)
0	-0.106	1	-0.106
5	0.762	4	3.046
10	1.646	2	3.291
15	2.553	4	10.213
20	3.417	2	6.835
25	4.041	4	16.163
30	4.431	1	4.431

$$F(A) = 43.875$$

$$\text{Area} = 1/3 * 5 * F(A) * \pi/180 = 1.276 \text{ m-rad}$$

b) Where the area under the GoZ curve from 0 deg. to 40 deg. or from 0 to (Theta)f is required, the calculation is carried out as follows:

Heel angle (deg.)	GoZ (m)	S.M.	f(A)
0	-0.106	1	-0.106
5	0.762	4	3.046
10	1.646	2	3.291
15	2.553	4	10.213
20	3.417	2	6.835
25	4.041	4	16.163
30	4.431	2	8.863
35	4.672	4	18.690
40	4.820	1	4.820

$$F(A) = 71.815$$

$$\text{Area} = 1/3 * 5 * F(A) * \pi/180 = 2.089 \text{ m-rad}$$

If flooding angle is less than 40 deg., calculate the area under the GoZ curve from (Theta)f to 40 deg. and subtract this area from the area under the GoZ curve from 0 deg. to 40 deg.

#Flooding angle = \*\*\* deg. < 40 deg.

Therefore, Area = -99998 m-rad

c) Where the area under the GoZ curve from 30 deg. to 40 deg., or from 30 deg. to (Theta)f, if (Theta)f is less than 40 deg., is required, it is calculated as follows :

# flooding angle = \*\*\* deg.

$$\begin{aligned} \text{AREA} &= \text{Area}(0 \text{ deg.} - (\text{Theta})f) - \text{Area}(0 \text{ deg.} - 30 \text{ deg.}) \\ &= 0.000 - @\text{fmt}(\text{Area0303},5) \\ &= @\text{fmt}((\text{area0flo}-\text{Area030}),3,6) \text{ m-rad} \end{aligned}$$

d) Where the maximum rihing arm(GoZ) at an angle of heel of 25 deg. or greater is required, it is to be taken from the GoZ curve :

MAX. Goz = 4.932 m  
at (Theta) = 47.5 deg.

e) Where the angle of heel at which maximum GoZ occurs is required, it is to be taken from the GoZ curve :

GoZ at 30 deg. = 4.431 m

f) The initial fluid GoM is calculated as follow :

$$\begin{aligned} \text{GoM} &= \text{KMT} - \text{KG} - \text{GGo} = 18.759 - 8.384 - 0.474 \\ &= 9.901 \text{ m} \end{aligned}$$

Compare these values with the required criterion value.

INTACT STABILITY CALCULATION ACCORDING TO SPECIAL INTACT STABILITY CRITERIA  
OF IMO RES. A.749(18) - SEVERE WIND AND ROOLING CRITERION

Example :	LOADING CONDITION	:	NORMAL BALLAST ARRIVAL CONDITION	
	DISPLACEMENT		25781.9 Ton	
	d (mld)		5.391 M	- Mean moulded draft of the ship
	B (mld)		32.260 M	- Moulded breadth of the ship
	L W.L		180.86 M	- Water line length of the ship
	Cb		0.8082	- Block coefficient
	Ak		25.52 M <sup>2</sup>	- Total overall area of bilge keels
	VCG		8.384 M	- Vertical center of gravity
	GoM		9.901 M	- Metacentric height corrected for free surface effects
	LW1		0.0696 M	- Wind heeling lever
	LW2		0.1045 M	- 1.5 * LW1

Angle of roll  $\theta_1$  calculation

$$\theta_1 = 109k * X1 * X2 * (r * s)^{1/2} : 26.27 \text{ DEG.}$$

$$X1 \text{ (factor as show in table 1) : } B/d = 5.985, \quad X1 = 0.800$$

$$X2 \text{ (factor as show in table 2) : } Cb = 0.8082, \quad X2 = 1.000$$

$$k \text{ (factor as show in table 3) : } (Ak*100)/(L*B) = 0.437, \quad k = 0.991$$

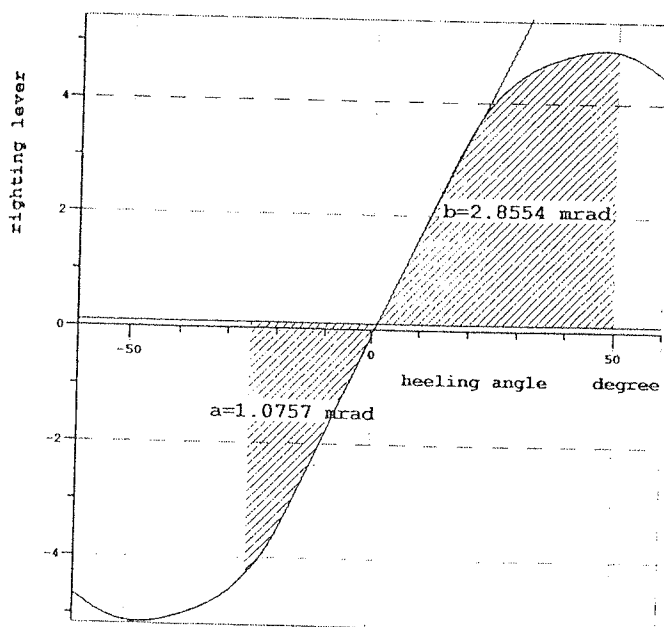
$$r = 0.73 + 0.6 \text{ OG} / d : r = 1.063,$$

Distance between the center of gravity and the water line(OG) = 2.994

$$s \text{ (factor as show in table 4) : } s = 0.087$$

$$\text{Rolling period } T = 2 * C * B / (Gom^{1/2}) = 8.876$$

$$\text{Where, } C = 0.373 + 0.023 * B/d - 0.043 * L/100 = 0.433$$



$$\begin{aligned} \theta_1 &= 26.27 \text{ Deg.} \\ \theta_f &= -99998 \\ \theta_0 &= 1.01 \text{ Deg.} \\ \theta_C &= 60.00 \text{ Deg. over} \\ \theta_2 &= -99998 \text{ Deg.} \end{aligned}$$

$\theta_2$  is determined of  $\theta_f$ ,  
50 Deg. or  $\theta_C$  which is less.

In this conditon ;

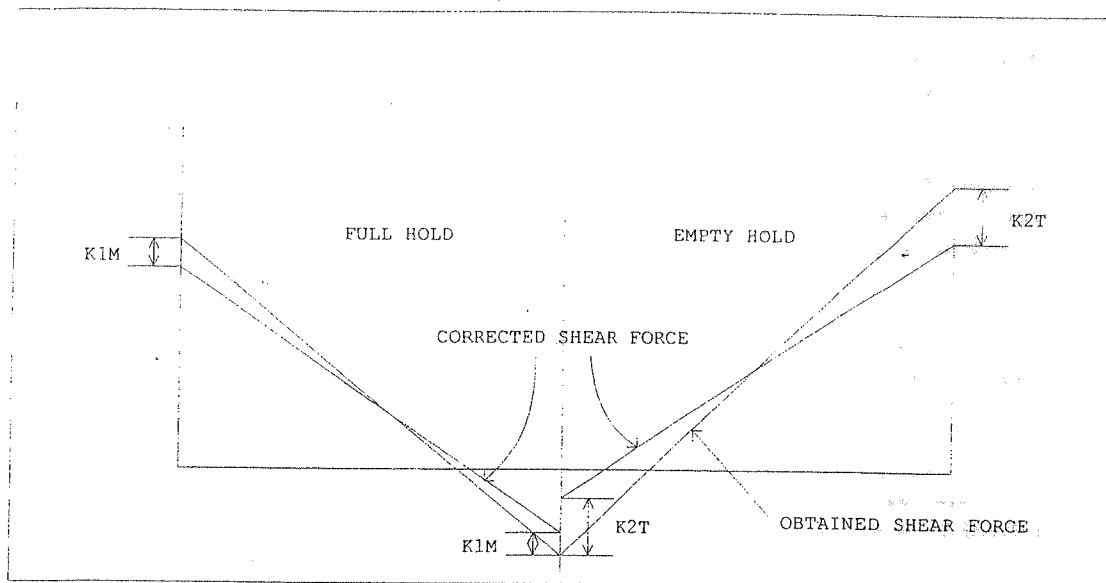
Area "b" is greater then area "a"  
-->  $b > a$  : Good

$\theta_0$  is 1.01 Deg.  
-->  $\theta_0 < 16 \text{ Deg.}$  or  $80^\circ e$  : Good

$\theta_e = 44.2 \text{ Deg.}$   
: deck edge immersion angle

## 3.10 Method of shear force correction in alternate loading

The shear force correction obtained as follows;



$\Delta Q_c$  = Shear Force Correction

$$\Delta Q_c = \frac{K1M - K2T}{LcBc}$$

$$= \alpha \frac{M}{LcBc} - PT$$

$$\alpha = g \frac{LoBo}{Lo + \phi Bo}$$

$$\phi = 1.38 + 1.55 \frac{Lo}{Bo} < 3.7$$

$Lo, Bo$  = Length and breadth, respectively, in m, of the flat portion of the double bottom in way of the hold considered;  $Bo$  is to be measured on the hull transverse section at the middle of the hold

$Lc$  = Length, in m, of the hold considered, measured between the middle of the transverse corrugated bulkheads depth

$Bc$  = Ship's breadth, in m, measured at the level of inner bottom on the hull transverse section at the middle of the hold considered

$M$  = Total mass of cargo, in t, in the hold of the section considered

$T$  = Draught, in m, measured vertically on the hull transverse section at the middle of the hold considered, from the moulded baseloine to the waterline in the loading condition considered

## 4 Loading calculation

## 4.1 Notes for loading condition

(1) The loading conditions included in this booklet are regarded as recommendable ones for actual operation in service and also used for the design of the vessel.  
Should other loading conditions be utilized, it should be ensured that the conditions fully comply with various criteria in terms of trim, intact/damage stability, longitudinal/local strength and propeller immersion, etc.

(2) LIGHTSHIP/DOCKING/<sup>OR J25 CONDITIONS</sup> ~~MARPOL 25A/PROPELLER REPAIR/~~ are not allowed for sea going condition.

(3) In heavy weather condition, the forward draft is not to be less than;  
~~5.95M (MLD) WHEN NO. 1&2 W.B.TK IS EMPTY AND~~  
~~6.85M (MLD) WHEN NO. 1&2 W.B.TK IS FULL~~ 3.8M (MLD.)

Cargo volume and Max. cargo weight is as follows.

HOLD NO.	1	2	3	4	5
CARGO VOLUME (M3)	13620.0	14872.1	14308.3	14875.1	14291.5
MAX. CARGO WEIGHT (TON)	18170	14869	19050	14852	19150

If, in the opinion of the master, sea conditions are likely to cause regular slamming, then other appropriate measures such as change in speed, heading or an increase in draft forward may also need to be taken.

(4) Minimum draft at AP related to be operation of em'cy fire pump ; -  
The special attention should be drawn to be keeping of min. draft at APP at any condition.  
The master has to keep to 3.8 m draft at AP capable of the operation of em'cy fire pump.

<sup>3</sup>  
(5) NO. 4 CARGO TANKS are designed for dual purpose of cargo loading and water ballast loading in case of emergency ballast condition.



## 4.2 Allowable longitudinal strength

Allowable still water bending moment and shear force was assigned by the Class's register. The still water bending moment and shear force in operational conditions should not exceed the following values.

### 4.2.1 At Sea

ITEM FRAME	Shear Force (MT)		Bending moments (MT-M)	
	Positive	Negative	Hogging	Sagging
#35	2976	-2604	62798	-58653
#71	7558	-3600	141488	-142712
#107	3110	-6430	141488	-142712
#143	5485	-3661	141488	-142712
#161	4270	-5340	141488	-142712
#179	3081	-7020	116667	-88175
#215	1241	-1790	35823	-33459

### 4.2.2 In Port

ITEM FRAME	Shear Force (MT)		Bending moments (MT-M)	
	Positive	Negative	Hogging	Sagging
#35	3917	-3587	96771	-94106
#71	8958	-5062	242357	-247976
#107	4222	-7542	242357	-247976
#143	6715	-4874	242357	-247976
#161	5215	-6255	242357	-247976
#179	4670	-8543	145287	-142394
#215	1756	-2284	49806	-48052

### 4.2.3 In Flooded

ITEM FRAME	Shear Force (MT)		Bending moments (MT-M)	
	Positive	Negative	Hogging	Sagging
#35	3221	-5838	74122	-74988
#71	9840	-5326	219286	-215627
#107	4340	-7380	219286	-215627
#143	7721	-4380	219286	-215627
#161	6255	-7490	219286	-215627
#179	4753	-10600	191641	-142712
#215	2167	-1910	40484	-38323

## 4.3 Basis of loading condition

## 4.3.1 Loading standard of Consumables

Item	Departure	Arrival
H.F.O.	98%	10% of Departure
M.D.O. (M.G.O.)	98%	10% of Departure
LUB.O.	98%	50% of Departure
Fresh W.	100%	10% of Departure
Provisions	98%	10% of Departure

## 4.3.2 Provisions - Departure condition

provision ; 25 Crews x 4.5Kg x 49 Days

ITEM	WEIGHT mt	V.C.G from B.L m	L.C.G from A.P. m	T.C.G from C.L m
Provision	5.513	20.750	11.700	-8.670

## 4.3.3 Constant weights

- 1) Crew & Effects : 25 Crews x 150Kg = 3.8 mt
- 2) Store : 0.25% of G/T = 75.1 mt
- 3) Water & Oil in E/R

ITEM	WEIGHT 50% FULL mt	V.C.G from B.L m	L.C.G from A.P. m	T.C.G from C.L m
M.E.AIR C.CHEM.CLEAN.TK	0.280	6.984	19.612	4.056
L.T.F.W.EXP.TK	0.500	19.421	10.350	5.070
SOOT DRAIN TK	0.398	12.398	12.300	4.995
L.T.F.W.EXP.TK	0.370	16.824	16.295	-3.600
H.T.F.W.EXP.TK	0.495	15.246	10.350	5.060
S.T.L.O. GRAVITY TK	0.140	13.694	9.385	5.044
EM/CY G.E. M.G.O. TK	0.299	19.242	9.300	10.765
WASTE O.SER.TK FOR INC.	0.500	14.209	9.040	3.476
S/T C.W.TK	1.337	4.676	6.768	0.000
CASCADE WITH OBS.TK	1.142	7.501	16.300	8.742
S/T C.W.TK	13.692	3.180	6.768	0.000
WATER in PIPE (50%)	25.940	0.900	91.838	0.000
SUBTOTAL	45.092	2.813	56.283	0.498

ITEM	WEIGHT mt	V.C.G from B.L m	L.C.G from A.P. m	T.C.G from C.L m
Crew & Effects	3.750	27.240	21.459	0.000
Stores	75.000	18.667	93.570	0.000
Water & oil in E/R	45.092	2.813	56.283	0.498
Total constant weight	123.842	13.154	77.810	0.181

## 4.4 Light weight distribution

Long. center of gravity(from midship) -7.322 m  
 Transv. center of gravity(from center line) 0.000 m  
 Vertical center of gravity(from base line) 12.000 m

## WEIGHT ELEMENTS LIST

NAME	WEIGHT t	XMIN m	XMAX m	LENGTH m	LCG m
E1	270.000	-3.00	8.00	11.00	2.750
E2	755.000	8.00	27.90	19.90	19.050
E3	2005.000	27.90	79.73	51.83	54.470
E4	1920.000	79.73	122.33	42.60	101.260
E5	1990.000	122.33	173.70	51.37	147.200
E6	449.000	173.70	187.00	13.30	179.250
E7	365.000	7.70	26.90	19.20	18.390
E8	26.000	31.82	51.50	19.68	41.660
E9	26.000	61.34	81.02	19.68	71.180
E10	27.000	90.86	110.54	19.68	100.700
E11	26.000	120.38	140.06	19.68	130.220
E12	26.000	149.90	167.94	18.04	158.920
E13	80.000	31.82	51.50	19.68	41.660
E14	80.000	61.34	81.02	19.68	71.180
E15	83.000	90.86	110.54	19.68	100.700
E16	80.000	120.38	140.06	19.68	130.220
E17	82.000	149.90	167.94	18.04	158.920
E18	190.000	-3.00	187.00	190.00	81.650
E19	65.000	-3.00	187.00	190.00	81.650
E20	57.000	-3.00	26.90	29.90	11.200
E21	85.000	26.90	174.50	147.60	96.260
E22	83.000	174.50	187.00	12.50	180.000
E23	65.000	55.60	58.06	2.46	56.830
E24	65.000	85.12	87.58	2.46	86.350
E25	65.000	113.82	116.28	2.46	115.050
E26	65.000	143.34	145.80	2.46	144.570
E27	40.000	-3.00	27.72	30.72	12.830
E28	140.000	27.72	176.60	148.88	94.400
E29	180.000	7.70	26.90	19.20	18.500
E30	215.000	14.90	22.90	8.00	18.400
E31	190.000	7.70	26.90	19.20	17.000
E32	120.000	7.70	26.90	19.20	18.920
E33	115.000	-3.00	8.50	11.50	2.460
E34	70.000	7.70	26.90	19.20	18.150
TOTAL	10100.000				84.328

## 4.5 Loading Conditions

CONDITION ITEMS	LOAD1	LOAD2	LOAD3	LOAD4	LOAD5	LOAD6
	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)
Heavy fuel oil total	0.0	199.6	199.6	1996.2	199.6	1996.2
Diesel oil total	0.0	11.7	11.7	117.4	11.7	117.4
Gas oil total	0.0	0.0	0.0	0.0	0.0	0.0
Fresh water total	0.0	33.3	33.3	333.2	33.3	333.2
Lubricate oil total	0.0	59.0	59.0	118.0	59.0	118.0
Misc. tanks total	0.0	39.1	39.1	39.1	39.1	39.1
Dwt constant	0.0	0.0	0.0	0.0	0.0	0.0
Provision	0.0	0.6	0.6	5.5	0.6	5.5
Ballast water total	0.0	4812.5	7597.9	15755.2	15214.8	27918.9
Cargo total	0.0	0.0	0.0	0.0	0.0	0.0
Dwt total	0.0	5279.6	8065.0	18488.4	15681.9	30652.1
Lightweight	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement	10100.0	15379.6	18165.0	28588.4	25781.9	40752.1
Draft						
DRAFT mean(m)	2.335	3.278	3.666	5.931	5.411	8.205
DRAFT fore (m)	0.713	3.282	5.490	4.987	4.193	7.252
DRAFT aft (m)	3.958	3.273	1.841	6.875	6.628	9.158
DRAFT equiv.(m)	2.207	3.278	3.834	5.872	5.330	8.177
trim and stability						
TRIM (m)	-3.245	0.009	3.649	-1.887	-2.434	-1.905
LCB (m)	-7.383	8.655	19.429	3.968	2.527	3.895
LCF (m)	5.973	7.989	9.187	5.241	5.464	2.094
LCG (m)	-7.322	8.658	19.332	4.023	2.589	3.957
MTC (tm/cm)	504.1	540.9	538.1	616.6	605.5	695.1
TPC (t/cm)	48.6	49.9	49.7	52.5	52.1	54.7
KMT (m)	37.904	26.634	23.050	17.584	18.759	14.924
KG (m)	12.000	9.820	9.717	8.920	8.384	9.701
GM (m)	25.904	16.814	13.333	8.664	10.374	5.224
GG0 (m)	0.000	0.893	0.188	0.490	0.474	0.057
GoM (m)	25.904	15.921	13.146	8.174	9.901	5.167
Propeller immer.(%)	57.9	47.6	24.9	106.9	102.6	145.0
Invisible length (m)	463.4 n/a	299.5 ok	204.1 ok	325.2 ok	358.7 ok	285.2 ok
longitudinal strength						
Max.SWSF (ton)	1827.4	2262.8	2441.6	2304.5	2204.1	3684.4
Percent (%)	44.7	55.4	62.3	77.4	74.1	50.8
Position (m)	27.90	27.90	26.90	26.90	26.90	115.01
Min.SWSF (ton)	-950.8	-2047.4	-2032.4	-2173.1	-1610.5	-4752.6
Percent (%)	11.5	42.0	24.0	22.7	28.7	74.9
Position (m)	143.3	115.5	144.5	144.5	115.0	86.8
Max.SWBM (ton-m)	71432.5	92146.2	125408.8	109039.0	96037.0	62323.0
Percent (%)	29.5	38.0	51.7	77.1	67.9	51.8
Position (m)	75.0	76.1	89.5	85.9	71.2	48.5
Min.SWBM (ton-m)	-0.9	-0.1	-0.0	-0.8	-2.6	-72756.9
Percent (%)	0.0	0.0	0.0	0.0	0.0	51.0
Position (m)	187.0	187.0	187.1	186.5	186.5	102.6
LOAD1 :	LIGHT SHIP CONDITION					
LOAD2 :	DOCKING CONDITION WITH ARRIVAL CONSUMABLE					
LOAD3 :	STERN SURVEY CONDITION WITH ARRIVAL CONSUMABLE					
LOAD4 :	NORMAL BALLAST DEPARTURE CONDITION					
LOAD5 :	NORMAL BALLAST ARRIVAL CONDITION					
LOAD6 :	HEAVY BALLAST DEPARTURE CONDITION WITH NO.3 FLOODABLE HOLD					

CONDITION ITEMS	LOAD7	LOAD8	LOAD9	LOAD10	LOAD11	LOAD12
	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)
Heavy fuel oil total	199.6	1996.2	199.6	1996.2	199.6	1996.2
Diesel oil total	11.7	117.4	11.7	117.4	11.7	117.4
Gas oil total	0.0	0.0	0.0	0.0	0.0	0.0
Fresh water total	33.3	333.2	33.3	333.2	33.3	333.2
Lubricate oil total	59.0	118.0	59.0	118.0	59.0	118.0
Misc. tanks total	39.1	39.1	39.1	39.1	39.1	39.1
Dwt constant	0.0	0.0	0.0	0.0	0.0	0.0
Provision	0.6	5.5	0.6	5.5	0.6	5.5
Ballast water total	27918.9	0.0	0.0	0.0	2257.7	1475.5
Cargo total	0.0	44145.7	44148.3	54962.3	54962.3	30460.0
Dwt total	28386.0	46878.9	44615.5	57695.6	57687.2	34668.7
Lightweight	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement	38486.0	56978.9	54715.5	67795.6	67787.2	44768.7

## Draft

DRAFT mean(m)	7.754	11.098	10.715	13.015	13.013	8.935
DRAFT fore (m)	7.720	10.170	10.504	12.871	12.868	8.001
DRAFT aft (m)	7.789	12.025	10.925	13.159	13.157	9.870
DRAFT equiv.(m)	7.753	11.120	10.718	13.020	13.019	8.920

## trim and stability

TRIM (m)	-0.069	-1.855	-0.421	-0.287	-0.289	-1.868
LCB (m)	7.130	2.707	4.934	3.651	3.649	3.734
LCF (m)	3.956	-2.399	-1.632	-3.080	-3.079	0.668
LCG (m)	7.140	2.772	4.959	3.669	3.667	3.773
MTC (tm/cm)	648.0	786.4	762.9	797.0	797.0	728.3
TPC (t/cm)	53.4	57.0	56.4	57.3	57.3	55.5
KMT (m)	15.063	13.785	13.777	13.579	13.579	14.485
KG (m)	9.340	11.099	10.903	11.025	10.606	7.682
GM (m)	5.723	2.686	2.874	2.554	2.972	6.803
GG0 (m)	0.014	0.041	0.010	0.171	0.144	0.347
GoM (m)	5.709	2.645	2.864	2.383	2.828	6.456
Propeller immer.(%)	122.8	192.8	174.9	212.2	212.2	156.9
Invisible length (m)	234.1 ok	231.8 ok	197.8 ok	158.9 ok	159.0 ok	270.8 ok

## longitudinal strength

Max.SWSF (ton)	3876.7	833.0	868.6	1139.4	1139.0	964.1
Percent (%)	55.1	58.3	59.8	81.2	81.2	0.0
Position (m)	115.01	174.50	174.50	174.50	174.50	26.85
Min.SWSF (ton)	-4895.5	-583.1	-682.8	-1593.9	-2445.0	-799.6
Percent (%)	77.1	22.4	26.2	61.2	93.9	11.4
Position (m)	86.8	26.9	26.9	26.9	26.9	145.0
Max.SWBM (ton-m)	53454.9	2945.7	3224.1	64.3	17.4	31177.6
Percent (%)	46.4	4.7	5.1	0.1	0.0	22.0
Position (m)	46.6	15.7	18.3	9.7	0.0	57.3
Min.SWBM (ton-m)	-86768.0	-19480.9	-26355.8	-55221.3	-56503.7	-6645.0
Percent (%)	60.8	13.7	18.5	38.7	39.6	10.7
Position (m)	102.6	125.6	105.6	78.6	67.9	159.1

LOAD7 : HEAVY BALLAST ARRIVAL CONDITION WITH NO.3 FLOODABLE HOLD  
LOAD8 : HOMO.DESIGN LOADING DEPARTURE CONDITION  
LOAD9 : HOMO.DESIGN LOADING ARRIVAL CONDITION  
LOAD10 : HOMO.SCANTLING LOADING DEPARTURE CONDITION  
LOAD11 : HOMO.SCANTLING LOADING ARRIVAL CONDITION  
LOAD12 : STEEL COIL LOADING DEPARTURE CONDITION

CONDITION ITEMS	LOAD13	LOAD14	LOAD15	LOAD16	LOAD17	LOAD18
	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)
Heavy fuel oil total	199.6	1996.2	199.6	1996.2	199.6	1996.2
Diesel oil total	11.7	117.4	11.7	117.4	11.7	117.4
Gas oil total	0.0	0.0	0.0	0.0	0.0	0.0
Fresh water total	33.3	333.2	33.3	333.2	33.3	333.2
Lubricate oil total	59.0	118.0	59.0	118.0	59.0	118.0
Misc. tanks total	39.1	39.1	39.1	39.1	39.1	39.1
Dwt constant	0.0	0.0	0.0	0.0	0.0	0.0
Provision	0.6	5.5	0.6	5.5	0.6	5.5
Ballast water total	1475.5	0.0	0.0	0.0	2380.0	0.0
Cargo total	0.0	54962.3	54962.3	51643.6	51643.6	46951.3
Dwt total	32402.6	57695.5	55429.4	54376.8	54490.7	49684.5
Lightweight	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement	42502.6	67795.5	65529.4	64476.8	64590.7	59784.5

## Draft

DRAFT mean(m)	8.505	12.983	12.612	12.427	12.445	11.595
DRAFT fore (m)	8.418	11.922	12.229	12.040	12.016	10.866
DRAFT aft (m)	8.592	14.043	12.994	12.815	12.873	12.324
DRAFT equiv.(m)	8.502	13.020	12.624	12.440	12.460	11.615

## trim and stability

TRIM (m)	-0.174	-2.121	-0.765	-0.774	-0.856	-1.458
LCB (m)	6.617	1.491	3.304	3.395	3.283	2.983
LCF (m)	2.802	-3.390	-3.044	-2.973	-2.996	-2.680
LCG (m)	6.628	1.545	3.332	3.426	3.313	3.034
MTC (tm/cm)	671.7	803.2	794.2	792.2	792.9	787.6
TPC (t/cm)	54.1	57.5	57.3	57.2	57.2	57.1
KMT (m)	14.551	13.631	13.594	13.600	13.602	13.691
KG (m)	5.610	10.784	10.610	11.045	10.610	11.077
GM (m)	8.941	2.847	2.984	2.554	2.992	2.613
GG0 (m)	0.323	0.034	0.008	0.180	0.152	0.194
GoM (m)	8.618	2.813	2.976	2.375	2.840	2.420
Propeller immer.(%)	136.1	226.3	209.3	206.3	207.3	197.9
Invisible length (m)	225.5 ok	206.0 ok	176.1 ok	179.3 ok	181.0 ok	211.1 ok

## longitudinal strength

Max.SWSF (ton)	801.8	1908.7	2050.5	1046.7	1044.4	915.1
Percent (%)	41.5	59.4	63.8	74.3	74.2	64.5
Position (m)	163.43	143.34	143.34	174.50	174.50	174.50
Min.SWSF (ton)	-1026.3	-2219.6	-2280.7	-1281.5	-2176.9	-844.0
Percent (%)	17.0	85.2	87.6	49.2	83.6	32.4
Position (m)	90.1	26.9	26.9	26.9	26.9	26.9
Max.SWBM (ton-m)	17949.7	8.6	35.0	715.4	53.8	1977.2
Percent (%)	17.6	0.0	0.1	1.1	0.1	3.1
Position (m)	41.7	-1.2	0.7	10.8	1.8	14.1
Min.SWBM (ton-m)	-18115.2	-95705.6	-100771	-43668.8	-45951.1	-27697.1
Percent (%)	22.9	67.1	70.6	30.6	34.6	19.4
Position (m)	149.9	94.1	97.4	78.6	52.9	97.4

LOAD13 : STEEL COIL LOADING ARRIVAL CONDITION  
LOAD14 : GRAIN[S.F=45]LOADING DEPARTURE CONDITION  
LOAD15 : GRAIN[S.F=45]LOADING ARRIVAL CONDITION  
LOAD16 : GRAIN[S.F=50]LOADING DEPARTURE CONDITION  
LOAD17 : GRAIN[S.F=50]LOADING ARRIVAL CONDITION  
LOAD18 : GRAIN[S.F=55]LOADING DEPARTURE CONDITION

CONDITION ITEMS	LOAD19 weight (ton)	LOAD20 weight (ton)	LOAD21 weight (ton)	LOAD22 weight (ton)	LOAD23 weight (ton)	LOAD24 weight (ton)
Heavy fuel oil total	199.6	1996.2	199.6	998.1	199.6	1996.2
Diesel oil total	11.7	117.4	11.7	58.7	11.7	117.4
Gas oil total	0.0	0.0	0.0	0.0	0.0	0.0
Fresh water total	33.3	333.2	33.3	166.6	33.3	333.2
Lubricate oil total	59.0	118.0	59.0	88.3	59.0	118.0
Misc. tanks total	39.1	39.1	39.1	39.1	39.1	39.1
Dwt constant	0.0	0.0	0.0	0.0	0.0	0.0
Provision	0.6	5.5	0.6	2.8	0.6	5.5
Ballast water total	2380.0	0.0	2380.0	0.0	952.0	0.0
Cargo total	46951.3	43036.3	43036.3	54962.3	54962.3	54962.3
Dwt total	49798.4	45769.5	45883.4	56439.7	56381.4	57695.5
Lightweight	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement	59898.4	55869.5	55983.4	66539.7	66481.4	67795.5

## Draft

DRAFT mean(m)	11.613	10.901	10.919	12.808	12.801	13.018
DRAFT fore (m)	10.843	9.896	9.874	13.035	13.146	12.954
DRAFT aft (m)	12.382	11.907	11.965	12.580	12.457	13.082
DRAFT equiv.(m)	11.636	10.923	10.944	12.801	12.790	13.020

## trim and stability

TRIM (m)	-1.539	-2.010	-2.091	0.455	0.689	-0.128
LCB (m)	2.865	2.587	2.463	4.660	4.944	3.838
LCF (m)	-2.704	-2.245	-2.272	-2.837	-2.772	-3.046
LCG (m)	2.914	2.657	2.529	4.672	4.956	3.850
MTC (tm/cm)	788.5	786.7	787.9	791.3	790.2	796.4
TPC (t/cm)	57.1	57.0	57.0	57.2	57.1	57.3
KMT (m)	13.692	13.831	13.832	13.560	13.554	13.575
KG (m)	10.608	11.108	10.606	7.162	6.959	7.341
GM (m)	3.084	2.723	3.226	6.397	6.595	6.234
GG0 (m)	0.164	0.207	0.175	0.161	0.147	0.171
GoM (m)	2.921	2.516	3.051	6.236	6.447	6.063
Propeller immer.(%)	198.9	190.8	191.7	202.8	200.8	211.0
Invisible length (m)	213.2ok	240.4ok	242.8ok	146.9ok	142.6ok	155.5ok

## longitudinal strength

Max.SWSF (ton)	912.7	798.8	796.2	6806.1	6902.3	6626.1
Percent (%)	64.4	55.7	55.6	77.5	78.7	76.1
Position (m)	174.50	174.50	174.50	56.87	56.87	56.87
Min.SWSF (ton)	-1738.4	-480.6	-1374.1	-6764.2	-6682.8	-6774.8
Percent (%)	66.8	18.5	52.8	96.3	95.2	96.4
Position (m)	26.9	26.9	26.9	144.5	145.0	144.5
Max.SWBM (ton-m)	291.2	3417.5	847.0	126114.2	122861.9	126411.8
Percent (%)	0.5	5.4	1.3	89.1	86.8	89.3
Position (m)	6.5	16.9	10.8	125.6	127.5	125.6
Min.SWBM (ton-m)	-32124.1	-17175.9	-21230.3	-17355.4	-24683.4	-19357.8
Percent (%)	26.2	12.0	18.5	21.8	28.5	23.6
Position (m)	49.3	127.8	46.6	34.3	36.7	35.1

LOAD19 : GRAIN[S.F=55]LOADING ARRIVAL CONDITION  
LOAD20 : GRAIN[S.F=60]LOADING DEPARTURE CONDITION  
LOAD21 : GRAIN[S.F=60]LOADING ARRIVAL CONDITION  
LOAD22 : SHORT VOYAGE[S.F=12]WITH HALF BUNKER DEPARTURE CONDITION  
LOAD23 : SHORT VOYAGE[S.F=12] ARRIVAL CONDITION  
LOAD24 : ALT.HEAVY CARGO[S.F=12] DEPARTURE CONDITION

CONDITION ITEMS	LOAD25	LOAD26	LOAD27	LOAD28	LOAD29	LOAD30
	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)
Heavy fuel oil total	199.6	1996.2	199.6	1996.2	998.1	199.6
Diesel oil total	11.7	117.4	11.7	117.4	58.7	11.7
Gas oil total	0.0	0.0	0.0	0.0	0.0	0.0
Fresh water total	33.3	333.2	33.3	333.2	166.6	33.3
Lubricate oil total	59.0	118.0	59.0	118.0	88.3	59.0
Misc. tanks total	39.1	39.1	39.1	39.1	39.1	39.1
Dwt constant	0.0	0.0	0.0	0.0	0.0	0.0
Provision	0.6	5.5	0.6	5.5	2.8	0.6
Ballast water total	1428.0	0.0	2118.2	3152.5	714.0	2118.2
Cargo total	54962.3	54962.3	54962.3	32245.4	54962.3	54962.3
Dwt total	56857.4	57695.5	57547.6	38131.2	57153.8	57547.7
Lightweight	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement	66957.4	67795.5	67647.6	48231.2	67253.8	67647.7
Draft						
DRAFT mean(m)	12.880	13.016	12.992	9.555	12.923	12.990
DRAFT fore (m)	13.082	12.899	12.917	8.581	12.872	12.890
DRAFT aft (m)	12.678	13.133	13.066	10.528	12.974	13.089
DRAFT equiv.(m)	12.874	13.020	12.994	9.553	12.925	12.994
trim and stability						
TRIM (m)	0.405	-0.235	-0.149	-1.947	-0.102	-0.199
LCB (m)	4.554	3.712	3.828	3.343	3.924	3.769
LCF (m)	-2.875	-3.069	-3.043	-0.662	-3.010	-3.052
LCG (m)	4.566	3.723	3.839	3.417	3.938	3.785
MTC (tm/cm)	792.6	796.8	796.2	759.6	795.2	796.4
TPC (t/cm)	57.2	57.3	57.3	56.3	57.3	57.3
KMT (m)	13.561	13.577	13.575	14.218	13.573	13.576
KG (m)	6.927	6.021	5.589	11.001	10.807	10.604
GM (m)	6.634	7.557	7.986	3.216	2.767	2.972
GG0 (m)	0.146	0.171	0.145	0.548	0.380	0.364
GoM (m)	6.488	7.386	7.841	2.668	2.386	2.608
Propeller immer.(%)	204.4	211.8	210.7	167.8	209.2	211.1
Invisible length (m)	146.9 ok	157.8 ok	156.3 ok	262.5 ok	156.4 ok	157.4 ok
longitudinal strength						
Max.SWSF (ton)	7060.6	1392.1	1397.4	4398.4	1138.9	1141.2
Percent (%)	81.5	68.8	69.0	55.7	81.7	81.4
Position (m)	56.87	161.93	161.93	56.87	174.50	174.50
Min.SWSF (ton)	-6711.8	-1835.5	-2376.7	-3510.8	-1711.0	-2394.6
Percent (%)	95.5	61.6	91.3	35.5	65.7	92.0
Position (m)	144.5	38.0	26.9	144.5	26.9	26.9
Max.SWBM (ton-m)	123956.7	91.0	21.4	129203.6	22.7	20.3
Percent (%)	87.6	0.1	0.0	91.3	0.0	0.0
Position (m)	127.5	9.7	0.0	74.9	0.0	0.0
Min.SWBM (ton-m)	-28053.3	-68873.4	-69841.0	-4174.8	-49673.4	-56618.4
Percent (%)	32.4	48.3	48.9	9.8	34.8	39.7
Position (m)	36.7	79.7	73.1	169.6	77.7	69.8
LOAD25	: ALT.HEAVY CARGO[S.F=12] ARRIVAL CONDITION					
LOAD26	: HOMO.HEAVY CARGO[S.F=12]AT SCANTLING DRAFT DEPARTURE CONDITI					
LOAD27	: HOMO.HEAVY CARGO[S.F=12]AT SCANTLING DRAFT ARRIVAL CONDITION					
LOAD28	: MULTIPLE PORT LOADING DEPARTURE CONDITION[1ST PORT]					
LOAD29	: MULTIPLE PORT LOADING WITH HALF BUNKER CONDITION[2ND PORT]					
LOAD30	: MULTIPLE PORT LOADING ARRIVAL CONDITION					



CONDITION ITEMS	LOAD31	LOAD32	LOAD33	LOAD34	LOAD35	LOAD36
	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)
Heavy fuel oil total	1996.2	998.1	199.6	1996.2	199.6	1996.2
Diesel oil total	117.4	58.7	11.7	117.4	11.7	117.4
Gas oil total	0.0	0.0	0.0	0.0	0.0	0.0
Fresh water total	333.2	166.6	33.3	333.2	33.3	333.2
Lubricate oil total	118.0	88.3	59.0	118.0	59.0	118.0
Misc. tanks total	39.1	39.1	39.1	39.1	39.1	39.1
Dwt constant	0.0	0.0	0.0	0.0	0.0	0.0
Provision	5.5	2.8	0.6	5.5	0.6	5.5
Ballast water total	0.0	3638.8	3638.8	16410.4	16410.4	31076.4
Cargo total	54962.3	32245.4	32245.4	0.0	0.0	0.0
Dwt total	57695.6	37361.6	36351.3	19143.6	16877.5	33809.6
Lightweight	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement	67795.6	47461.6	46451.3	29243.6	26977.5	43909.6

## Draft

DRAFT mean(m)	13.015	9.415	9.238	6.082	5.589	8.777
DRAFT fore (m)	12.871	8.086	8.336	4.640	5.188	7.993
DRAFT aft (m)	13.159	10.745	10.140	7.524	5.989	9.561
DRAFT equiv.(m)	13.020	9.413	9.229	5.998	5.561	8.762

## trim and stability

TRIM (m)	-0.287	-2.659	-1.804	-2.883	-0.800	-1.569
LCB (m)	3.651	2.265	3.714	1.871	6.303	4.273
LCF (m)	-3.080	-0.883	0.123	4.506	6.120	1.216
LCG (m)	3.669	2.358	3.780	1.954	6.328	4.324
MTC (tm/cm)	797.0	769.1	740.4	631.3	598.0	714.3
TPC (t/cm)	57.3	56.5	55.8	52.9	51.9	55.2
KMT (m)	13.579	14.340	14.336	17.495	18.056	14.536
KG (m)	11.025	10.738	10.654	8.983	8.408	9.504
GM (m)	2.554	3.603	3.681	8.512	9.647	5.032
GG0 (m)	0.474	0.660	0.654	0.080	0.020	0.053
GoM (m)	2.079	2.943	3.028	8.433	9.627	4.979
Propeller immer.(%)	212.2	171.2	161.4	117.4	92.5	151.8
Invisible length (m)	158.9 ok	292.1 ok	263.2 ok	367.5 ok	290.4 ok	263.2 ok

## longitudinal strength

Max.SWSF (ton)	1139.4	3683.7	3442.7	2777.4	2334.2	5026.0
Percent (%)	81.2	45.6	41.7	93.3	78.4	91.7
Position (m)	174.50	56.87	56.87	26.90	26.90	115.02
Min.SWSF (ton)	-1593.9	-3925.1	-3772.7	-2407.7	-2104.6	-5934.1
Percent (%)	61.2	55.8	53.6	26.1	21.7	77.1
Position (m)	26.9	144.5	144.5	144.5	144.5	86.4
Max.SWBM (ton-m)	64.3	94968.0	85098.1	129358.9	112461.4	52619.6
Percent (%)	0.1	67.1	60.1	91.4	79.5	48.3
Position (m)	9.7	71.2	71.2	82.3	79.6	44.2
Min.SWBM (ton-m)	-55221.3	-3380.5	-3699.3	-2.5	-0.2	-125947
Percent (%)	38.7	7.9	8.7	0.0	0.0	88.3
Position (m)	78.6	169.6	169.6	186.5	187.0	101.5

LOAD31 : MULTIPLE PORT UNLOADING DEPARTURE CONDITION[1ST PORT]  
LOAD32 : MULTIPLE PORT UNLOADING WITH HALF BUNKER CONDITION[2ND PORT]  
LOAD33 : MULTIPLE PORT UNLOADING ARRIVAL CONDITION  
LOAD34 : [UR S25]NORMAL BALLAST DEPARTURE CONDITION  
LOAD35 : [UR S25]NORMAL BALLAST ARRIVAL CONDITION[STRENGTH CHECK ONLY  
LOAD36 : [UR S25]HEAVY BALLAST DEPARTURE CONDITION[STRENGTH CHECK ONL

CONDITION ITEMS	LOAD37	LOAD38	LOAD39	LOAD40	LOAD41	LOAD42
	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)	weight (ton)
Heavy fuel oil total	199.6	1996.2	199.6	1996.2	199.6	998.1
Diesel oil total	11.7	117.4	11.7	117.4	11.7	58.7
Gas oil total	0.0	0.0	0.0	0.0	0.0	0.0
Fresh water total	33.3	333.2	33.3	333.2	33.3	166.6
Lubricate oil total	59.0	118.0	59.0	118.0	59.0	88.3
Misc. tanks total	39.1	39.1	39.1	39.1	39.1	39.1
Dwt constant	0.0	0.0	0.0	0.0	0.0	0.0
Provision	0.6	5.5	0.6	5.5	0.6	2.8
Ballast water total	31076.4	0.0	0.0	0.0	0.0	0.0
Cargo total	0.0	54962.2	54962.2	54962.3	54962.3	56218.1
Dwt total	31543.5	57695.4	55429.3	57695.5	55429.4	57695.5
Lightweight	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement	41643.5	67795.4	65529.3	67795.5	65529.4	67795.5

## Draft

DRAFT mean(m)	8.338	13.018	12.642	13.016	12.641	13.028
DRAFT fore (m)	8.437	12.954	13.258	12.899	13.198	13.272
DRAFT aft (m)	8.240	13.082	12.027	13.133	12.083	12.783
DRAFT equiv.(m)	8.343	13.020	12.624	13.020	12.624	13.020

## trim and stability

TRIM (m)	0.197	-0.127	1.231	-0.235	1.114	0.488
LCB (m)	7.281	3.838	5.705	3.713	5.565	4.560
LCF (m)	3.256	-3.046	-2.547	-3.069	-2.583	-2.903
LCG (m)	7.286	3.850	5.716	3.723	5.585	4.561
MTC (tm/cm)	660.6	796.4	784.9	796.8	785.5	794.3
TPC (t/cm)	53.8	57.3	57.0	57.3	57.0	57.3
KMT (m)	14.618	13.575	13.542	13.577	13.544	13.561
KG (m)	9.160	7.332	7.038	6.015	5.675	10.910
GM (m)	5.458	6.243	6.504	7.563	7.869	2.651
GG0 (m)	0.013	0.034	0.008	0.034	0.008	0.022
GoM (m)	5.445	6.209	6.496	7.529	7.861	2.629
Propeller immer.(%)	130.4	211.0	193.9	211.8	194.8	206.2
Invisible length (m)	218.4 ok	155.5 ok	135.1 ok	157.8 ok	137.2 ok	143.1 ok

## longitudinal strength

Max.SWSF (ton)	5202.0	6626.5	6565.7	1393.0	1482.6	1183.0
Percent (%)	94.9	76.1	74.2	68.8	73.2	84.5
Position (m)	115.02	56.87	56.87	161.93	161.93	174.50
Min.SWSF (ton)	-6095.6	-6775.0	-6636.6	-1836.5	-1902.9	-1590.7
Percent (%)	80.7	96.5	94.4	61.7	64.8	61.1
Position (m)	86.4	145.0	144.5	38.0	36.7	26.9
Max.SWBM (ton-m)	45573.1	126370.4	121158.1	91.0	488.9	27.1
Percent (%)	43.9	89.3	85.6	0.1	0.8	0.0
Position (m)	42.3	125.6	127.5	9.7	8.7	0.7
Min.SWBM (ton-m)	-138842	-19368.7	-17997.8	-68902.8	-72972.8	-54395.4
Percent (%)	97.3	23.6	21.9	48.3	51.1	38.1
Position (m)	101.5	35.1	35.1	79.7	95.8	94.1

LOAD37 : [UR S25]HEAVY BALLAST ARRIVAL CONDITION[STRENGTH CHECK ONLY]  
LOAD38 : [UR S25]HOMO.ALT.HEAVY CARGO LOADING DEPARTURE CONDITION[S.G  
LOAD39 : [UR S25]HOMO.ALT.HEAVY CARGO LOADING ARRIVAL CONDITION[S.G=3  
LOAD40 : [UR S25]HOMO.HEAVY CARGO LOADING DEPARTURE CONDITION[S.G=3.0  
LOAD41 : [UR S25]HOMO.HEAVY CARGO LOADING ARRIVAL CONDITION[S.G=3.0]  
LOAD42 : [CSR]HOMO.SCANTLING LOADING WITH HALF BUNKER CONDITION

## CONSUMABLE ARRIVAL CONDITION

WEIGHT ITEM	FILL %	S.G t/m3	WEIGHT t	V.C.G m	L.C.G m	T.C.G m	FRSM tm
H.F.O.STOR.TK(S)	33.5	0.980	62.4	8.214	-66.933	13.223	37.55
H.F.O.SETT.TK	98.0	0.980	35.7	15.565	-70.350	-12.930	5.65
H.F.O.SERV.TK	98.0	0.980	35.7	15.565	-67.150	-12.930	5.65
H.F.O.LOW SULP.SET.	98.0	0.980	32.9	15.565	-68.550	-7.870	11.25
H.F.O.LOW SULP.SER.	98.0	0.980	32.9	15.565	-66.550	-7.870	11.25
TOTAL HEAVY FUEL OILS			199.6	13.266	-67.787	-3.084	71.35
M.D.O.SERV.TK	40.0	0.850	11.7	14.408	-66.350	12.730	3.10
TOTAL DIESEL OILS			11.7	14.408	-66.350	12.730	3.10
M.E.L.O.SUMP TK	49.0	0.900	7.9	1.119	-73.721	0.000	7.60
M.E.L.O.STOR.TK	49.0	0.900	11.8	14.231	-71.347	13.809	14.42
M.E.L.O.SETT.TK	49.0	0.900	11.6	14.240	-73.344	13.753	14.34
CYL.O.STOR.TK	49.0	0.900	13.9	14.241	-75.146	12.459	39.28
LOW TBN CYL.O.STOR.	49.0	0.900	6.9	14.225	-74.350	8.300	1.08
G.E.L.O.STOR.TK	49.0	0.900	3.4	14.225	-73.550	6.640	0.54
G.E.L.O.SETT.TK	49.0	0.900	3.4	14.225	-75.150	6.640	0.54
TOTAL LUB. OILS			59.0	12.468	-73.654	10.148	77.81
F.W.TK(P)	10.0	1.000	16.7	13.968	-85.949	-9.145	173.66
F.W.TK(S)	10.0	1.000	16.7	13.968	-85.949	9.145	173.66
TOTAL FRESH WATERS			33.3	13.968	-85.949	0.000	347.32
BILGE HOLDING TK	50.0	1.000	14.9	0.658	-81.164	0.000	25.88
OILY BILGE TK	50.0	1.000	8.7	0.898	-74.526	-2.538	4.73
S/T L.O.DRAIN TK	50.0	1.000	1.0	1.469	-79.545	1.247	1.09
F.O.OVERFLOW TK	50.0	1.000	5.7	1.112	-66.852	-4.727	3.46
SLUDGE TK	50.0	1.000	5.8	7.670	-69.150	-9.115	2.57
SEWAGE HOLDING TK	50.0	1.000	3.0	8.850	-75.150	-9.930	0.54
TOTAL MISCELLANEOUS TKS			39.1	2.476	-75.308	-3.347	38.26
PROVISION			0.6	20.750	-79.950	-8.670	0.00
DWT CONSTANT			123.8	13.150	-13.840	0.180	0.00
TOTAL BUNKERING			467.1	12.318	-56.134	0.041	537.84

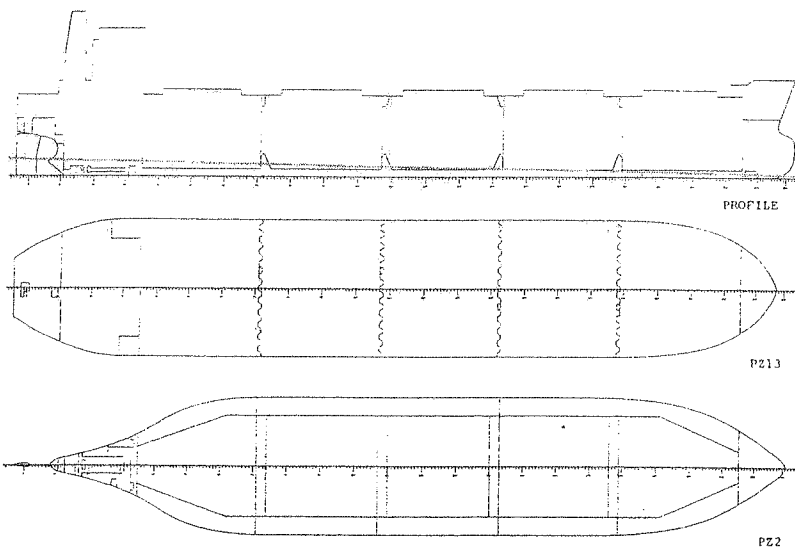
## 4.5.1 LIGHT SHIP CONDITION

WEIGHT ITEM	FILL %	S.G t/m3	WEIGHT t	V.C.G m	L.C.G m	T.C.G m	FRSM tm
TOTAL DEADWEIGHT			0.0				
LIGHTSHIP			10100.0	12.000	-7.322		
TOTAL DISPLACEMENT			10100.0	12.000	-7.322	0.000	0.0

DRAFT MEAN = 2.335 m  
 DRAFT FORE = 0.713 m  
 DRAFT AFT = 3.958 m  
 DRAFT EQUIV. = 2.207 m  
 TOTAL TRIM = -3.245 m  
 KMT = 37.904 m  
 KG = 12.000 m  
 GM = 25.904 m  
 GGo = 0.000 m  
 GoM = 25.904 m

WATER DENSITY = 1.025  
 L.C.B = -7.383 m  
 L.C.F = 5.973 m  
 M.T.C = 504.1 TM/CM  
 T.P.C = 48.6 T/CM  
 HEEL.ANG. = 0.0 DEG  
 PROP. IMMER. = 57.9 %

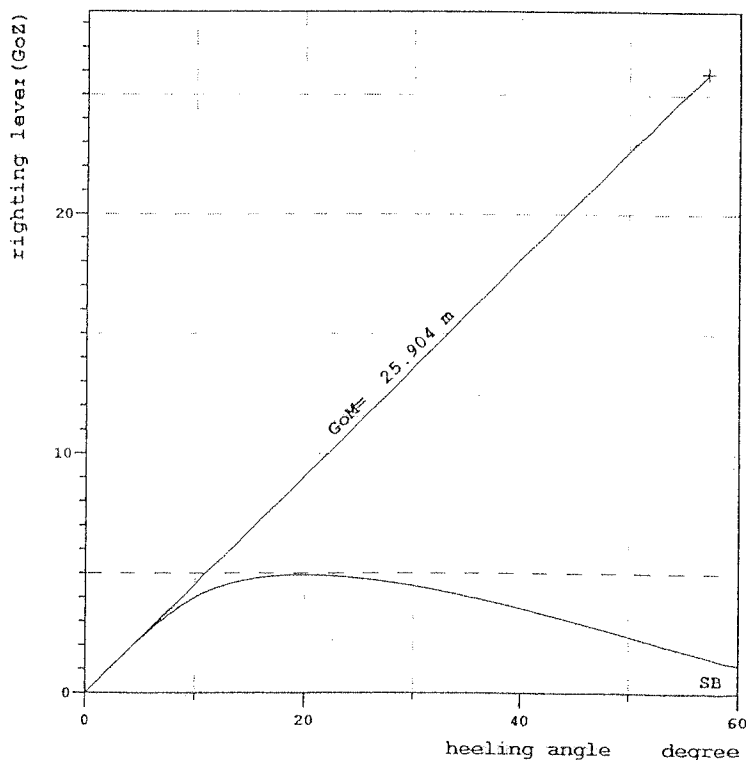
LOAD1 : LIGHT SHIP CONDITION



STABILITY CALCULATION

Heel angle (deg.)	0	5	10	15	20	25	30	35	40	50	60
KN (m)	0.000	3.274	6.062	7.853	9.025	9.858	10.477	10.933	11.257	11.569	11.569
KGo $\cdot$ sin $\theta$ (m)	0.000	1.046	2.084	3.106	4.104	5.071	6.000	6.883	7.713	9.193	10.392
GoZ (M)	0.000	2.228	3.978	4.747	4.921	4.787	4.477	4.051	3.544	2.376	1.176
Area (m-rad)	0.000	0.098	0.376	0.762	1.187	1.612	2.017	2.390	2.722	3.240	3.550

CRITERIA	REQUIRED	ACTUAL	STATUS
Initial metacentric height (m)	0.150	25.904	OK
GoZ at angle of equal to or greater than 30 deg. (m)	0.200	4.477	OK
Heel angle at Max GoZ value (deg.)	25.0	19.8	NOT MET
under curve, 0 - 30 deg. (m-rad)	0.055	2.017	OK
Area under curve, 0 - 40 deg. or $\theta$ is less (m-rad)	0.090	2.722	OK
Area under curve, 30 - 40 deg. or $\theta$ is less (m-rad)	0.030	0.705	OK
Flooding angle (deg.)	30.0	60 Over	OK

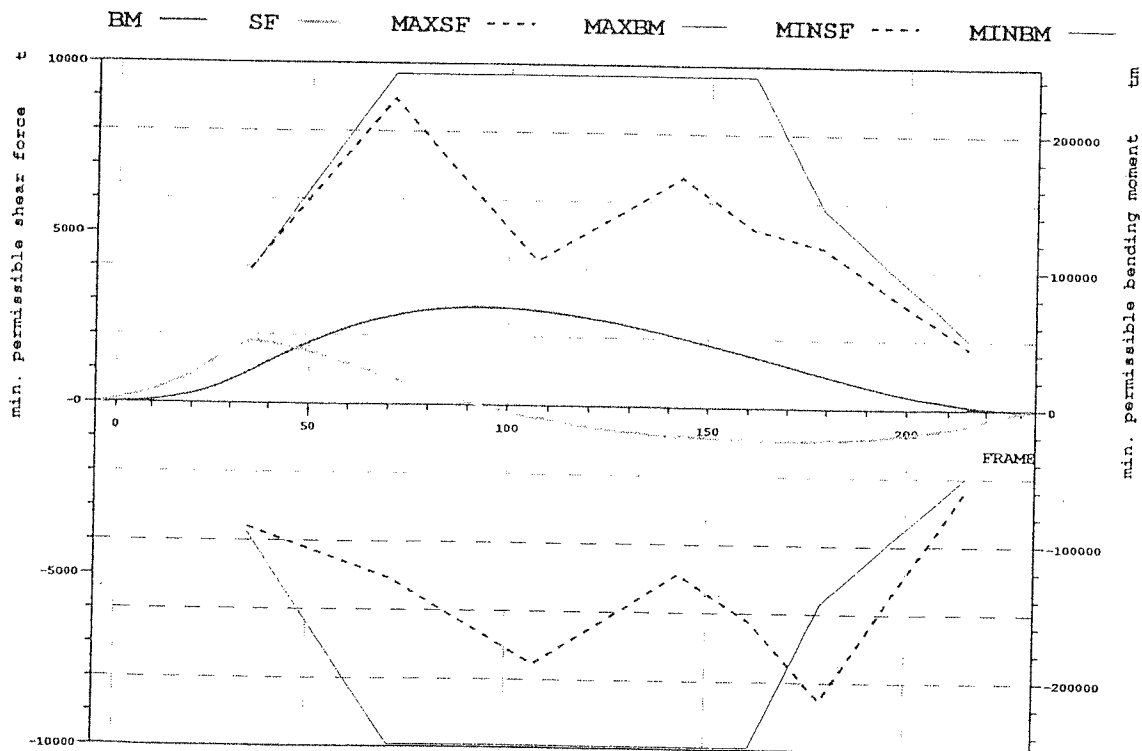


LIGHT SHIP CONDITION

LONGITUDINAL STRENGTH VALUES ON THE BULKHEADS.

FR	X m	SF t	SF-PCT %	BM tm	BM-PCT %
35.0	26.90	1825.0	46.6	23264.0	24.0
71.0	56.42	752.3	8.4	64552.7	26.6
107.0	85.94	-362.1	4.8	69343.1	28.6
143.0	115.46	-834.0	17.1	50601.6	20.9
161.0	130.22	-921.7	14.7	37779.6	15.6
179.0	144.98	-911.3	10.7	24109.1	16.6
215.0	174.50	-456.1	20.0	2407.5	4.8

		POSITION			
			X	Frame	
Maximum Shear Force.....	1827.4 ton	44.7 %	27.9 m	36.2	
Maximum Bending Moment.....	71432.5 tonm	29.5 %	75.0 m	93.6	
Minimum Shear Force.....	-950.8 ton	11.5 %	143.3 m	177.0	
Minimum Bending Moment.....	-0.9 tonm	0.0 %	187.0 m	232.9	
BM - Critical Position	Fr. 93.6	29.5 %			
SF - Critical Position	Fr. 35.0	46.6 %			



DOCKING CONDITION WITH ARRIVAL CONSUMABLE

# PLAN HISTORY

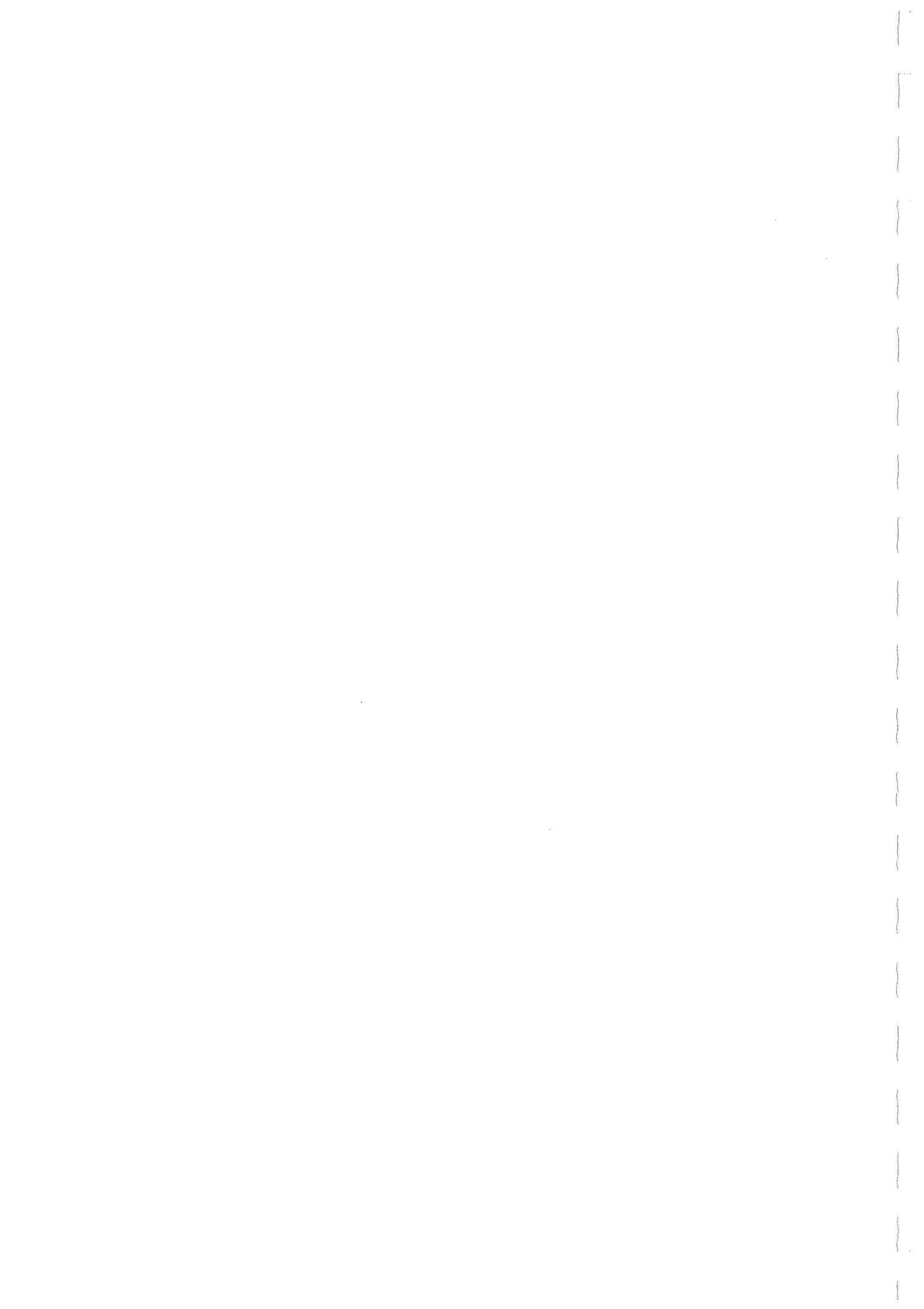
DATE	REV.	PAGE	DESCRIPTION	DWN.	CHKD.	MGR.
2009.02.10	△		DRAWN BY BASIC RESEARCH TEAM	C.W. JANG	<i>[Signature]</i>	<i>[Signature]</i> 2/10

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	TYPE	57,700 DWT BULK CARRIER			
MANAGER	<i>C. J. Kim</i>		TITLE		
CHECKED	<i>[Signature]</i>		PROVISIONAL		
DRAWN	C.W. JANG (정치원)		<b>GRAIN STABILITY CALCULATION</b>		
TEL. NO.	055) 548 - 3192				
DEP'T	BASIC RESEARCH TEAM	SCALE	DATE	DWG. NO.	REV. NO.
		-	2009.02.10	B0140000	△
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# PLAN HISTORY

DATE	REV.	PAGE	DESCRIPTION	DWN.	CHKD.	MR.
2009.02.10	△		DRAWN BY BASIC RESEARCH TEAM	C.W. JANG	02/10	2/10

This plan has been examined and given the appraisal status as shown in the Design Appraisal Document numbered below :  
 BDSO **151166**  
 Date : **10 JUN. 2009.** Signature : *[Signature]*  
 Busan Design Support Office  
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<b>stx</b>	MODEL NO.	<b>D2007/2016</b>				
	TYPE	<b>57,700 DWT BULK CARRIER</b>				
MANAGER	<i>C. J. Kim</i>	TITLE				PROVISIONAL <b>GRAIN STABILITY CALCULATION</b>
CHECKED	<i>[Signature]</i>					
DRAWN	C.W. JANG ( 장 치 원 )					
TEL. NO.	055) 548 - 3192					
DEP'T	BASIC RESEARCH TEAM	SCALE	DATE	DWG. NO.	REV. NO.	
		-	2009.02.10	B0140000	△	

## STX Shipbuilding Co., Ltd.

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18 GRAIN LOADING CALCULATION . . . . .67

## 14 Example of Intact stability Calculation

- a) The purpose of the KN data is to enable static stability curves to be drawn for the ship in any sailing condition.
- b) The corrected righting arm (corrected goz at Theta) and the transverse metacentric height (gom) can be obtained as follows:

$$\begin{aligned} \text{CORRECTED GoZ} &= \text{KN} - \text{KGo} \times \sin(\theta) \\ \text{KGo} &= \text{KG} + \text{KGo} \\ \theta &= \text{ANGLE OF INCLINATION} \\ \text{GoM} &= \text{KM} - \text{KGo} \end{aligned}$$

- c) Example (refer to calculation sheet)

CONDITION	:	GRAIN [S.F=45] LOADING DEPARTURE TRIMMED CONDITION
DRAFT(mid)	:	12.983 M above keel bottom
TRIM	:	-2.121 M
KMT	:	13.631 M above base line
VCG(=KG)	:	10.784 M above base line
GGo	:	0.034 M
KGo	:	10.818 M

### CALCULATION OF GRAIN HEELING MOMENT AND STABILITY

The preferred method of ensuring the ship meets the intact stability requirements is by comparing the actual grain heeling moment with the allowable heeling moment. Provided the actual grain heeling moment is less than the allowable heeling moment, the intact stability requirements are met.

.Actual heeling moment [ton\*m]

$$\begin{aligned} &= \text{S.G} \times \text{VOLUMETRIC HEELING MOMENT (M4)} - (\text{filled holds, trimmed/untrimmed}) \\ &= \text{S.G} \times \text{VOLUMETRIC HEELING MOMENT (M4)} \times 1.12 - (\text{partly filled holds}) \end{aligned}$$

(The volumetric heeling moment of each cargo holds shall be taken from curve or table described in page 54 to 63.)

$$\text{Total actual grain heeling moment} = 20543.2$$

.Allowable heeling moment [ton\*m]

= The values of moment shall be taken from the table of allowable heeling moment. (page 64 to 65)

$$\text{Allowable grain heeling moment} = 43885.5$$

.Heeling arm at 0 deg.:

$$\lambda_0 = \frac{\text{ACTUAL HEELING MOMENT}}{\text{DISPLACEMENT}} = \frac{20543.2}{67795.5} = 0.303$$

.Heeling arm at 40 deg.:

$$\begin{aligned} \lambda_{40} &= 0.8 \times \lambda_0 \\ &= 0.8 \times 0.303 \\ &= 0.242 \end{aligned}$$

Where the area between the heeling and righting arm curve up to the angle of heel of maximum difference between the ordinate or flooding( $\theta$ .f), whichever is the least angle.

In this loading condition ; more than 60 degrees.

i) Pick up KN data at draft

DEGREE =	0.0	5.0	10.0	12.0	15.0	20.0	30.0	40.0	50.0	60.0
KN =	0.000	1.177	2.371	2.850	3.573	4.777	6.850	8.556	9.822	10.546
KGo*SIN =	0.000	0.943	1.879	2.249	2.800	3.700	5.409	6.954	8.287	9.369
GZ =	0.000	0.234	0.492	0.601	0.773	1.077	1.441	1.602	1.535	1.177
AREA =	0.000	0.010	0.041	0.060	0.096	0.177	0.401	0.669	0.947	1.187

$$GoZ = KN - KGo \times \sin(\theta)$$

ii) Drawing GoZ curve at heeling angle

iii) GoM can be obtained value of ordinate at 1 radian(57.3 deg.)

AREA UNDER CURVE 0deg. ~ 40deg.

Heel angle (deg.)	GoZ (m)	S.M.	f(A)
0	0.000	1	0.000
5	0.234	4	0.936
10	0.492	2	0.984
15	0.773	4	3.092
20	1.077	2	2.154
25	1.259	4	5.037
30	1.441	2	2.883
35	1.522	4	6.087
40	1.602	1	1.602

$$F(A) = 22.775$$

$$\text{Area} = \frac{1}{3} \times 5 \times F(A) \times \frac{\pi}{180} = 0.663 \text{ m-rad}$$

Intersection point between GZ curve and heeling arm curve = 6.2 deg.

Heeling arm at 0 deg. Heeling ; 0.303 M

Heeling arm at 6.2 deg. Heeling ; 0.294 M

Heeling arm at 40 deg. Heeling ; 0.242 M

Area under the heeling arm curve 0 deg. to 40 deg. is calculated as follows.

Area under the gz curve from 0 deg. to 6.2 deg.  
 =  $1/2 \times (0.294 \times 6.2 / 57.3) = 0.016 \text{ m-rad}$

And from 6.2 deg. to 40 deg.  
 =  $1/2 \times (0.294 + 0.242) \times (40 - 6.2) / 57.3$   
 =  $0.158 \text{ m-rad}$

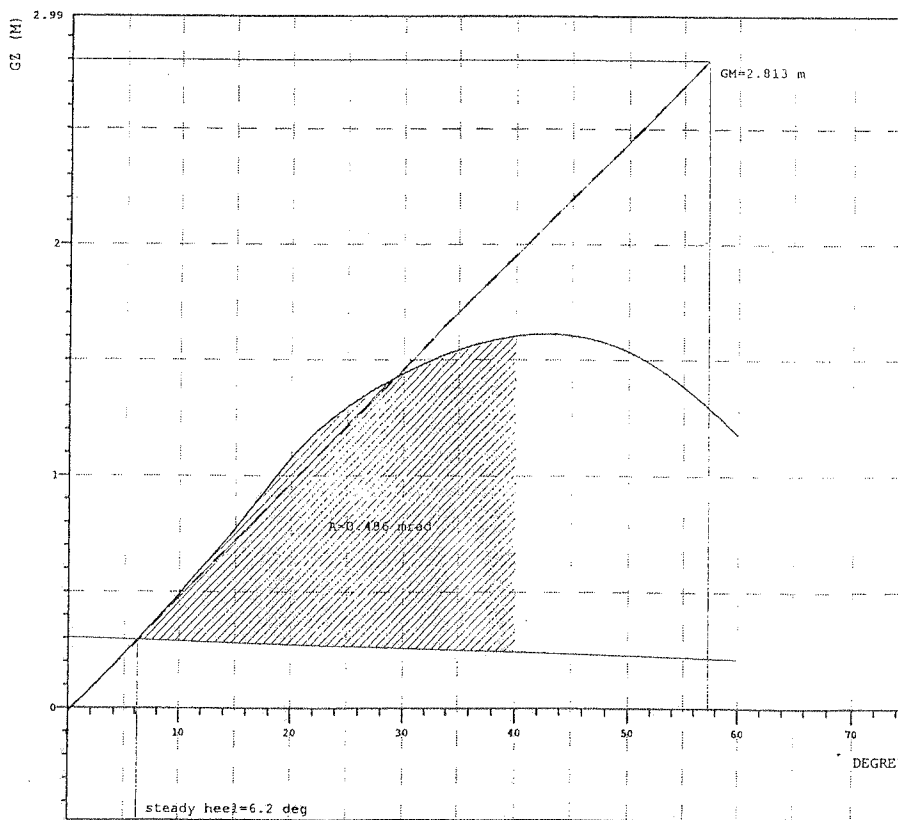
Total area under the heeling gz curve and heeling arm curve  
 =  $0.663 - 0.016 - 0.158$   
 =  $0.488 \text{ m-rad}$

Result is as follows :

STABILITY RULE

MIN. GoM	:	2.813	0.300 M
RESID. STABILITY	:	0.496	0.075 M-RAD
HEELING ANGLE	:	6.2	<del>0.300 M</del> / 2 DEG
ALLOWABLE HEELING MOMENT	:	43885 T-M	
ACTUAL HEELING MOMENT	:	20543 T-M	
LAMDA 0	:	0.303 M	
LAMDA 40	:	0.242 M	

ANGLE AT WHICH MAX. GoZ OCCURS : 42.7 DEG.  
 FLOODING ANGLE OCCURS AT : 60.0 DEG. OVER



So, this loading condition is stable.

Busan Design Support Office  
 Lloyd's Register Asia

## 15 Grain Shift Moment

## 15.1 NO.1 CARGO HOLD

(1) Filled and Trimmed Grain Heeling Moment

VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
13620.0	158.586	10.789	1033

(2) Filled and Untrimmed Grain Heeling Moment

VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
13127.0	158.586	10.789	3484

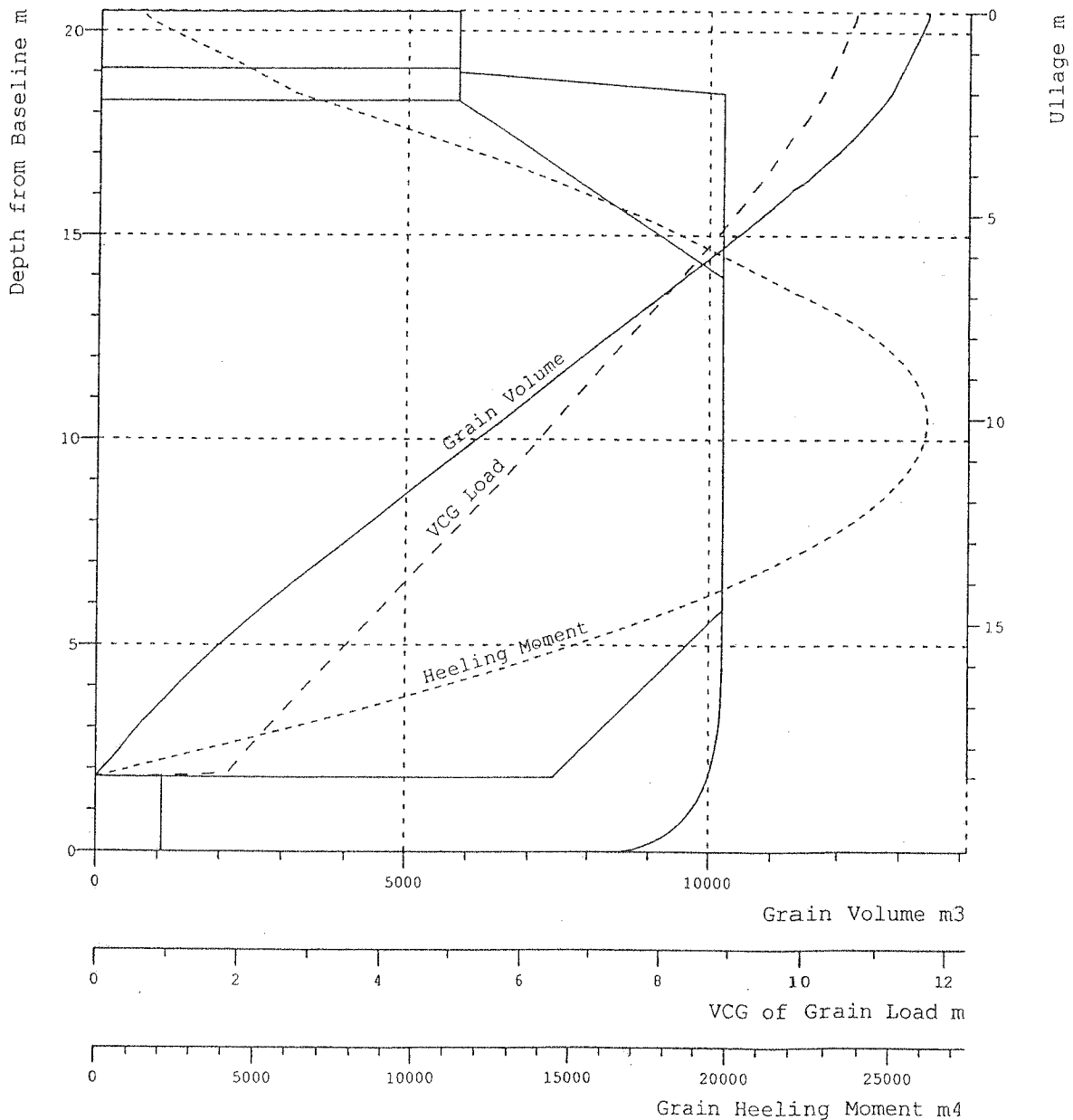
(3) Partial Grain Heeling Moment

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m3	m	m	m4
1.8	18.7	0.0	0.000	0.000	0
2.3	18.2	266.9	157.260	2.052	2567
2.8	17.7	549.6	157.331	2.310	5149
3.3	17.2	848.1	157.398	2.571	7623
3.8	16.7	1162.3	157.461	2.836	9985
4.3	16.2	1492.4	157.521	3.105	12209
4.8	15.7	1839.4	157.570	3.378	14294
5.3	15.2	2205.9	157.604	3.655	16259
5.8	14.7	2590.3	157.629	3.936	18072
6.3	14.2	2989.4	157.659	4.218	19699
6.8	13.7	3400.1	157.705	4.497	21128
7.3	13.2	3818.9	157.760	4.776	22352
7.8	12.7	4242.8	157.822	5.053	23401
8.3	12.2	4671.8	157.886	5.328	24296
8.8	11.7	5105.0	157.949	5.602	25023
9.3	11.2	5538.6	158.002	5.872	25572
9.8	10.7	5972.2	158.048	6.139	25940
10.3	10.2	6405.6	158.088	6.403	26118
10.8	9.7	6838.9	158.122	6.666	26101
11.3	9.2	7272.1	158.152	6.927	25876
11.8	8.7	7705.4	158.179	7.187	25435
12.3	8.2	8138.7	158.203	7.446	24780
12.8	7.7	8572.2	158.225	7.704	23909
13.3	7.2	9005.9	158.245	7.962	22841
13.8	6.7	9440.2	158.264	8.219	21646
14.3	6.2	9873.4	158.283	8.474	20387
14.8	5.7	10298.5	158.309	8.725	19067



DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m <sup>3</sup>	m	m	m <sup>4</sup>
15.3	5.2	10708.6	158.339	8.967	17700
15.8	4.7	11103.0	158.372	9.201	16177
16.3	4.2	11475.0	158.406	9.425	14534
16.8	3.7	11824.0	158.442	9.637	12760
17.3	3.2	12150.4	158.477	9.836	10869
17.8	2.7	12453.6	158.508	10.023	8900
18.3	2.2	12735.4	158.535	10.200	6868
18.8	1.7	12934.7	158.560	10.372	5380
19.3	1.2	13098.4	158.576	10.519	4119
19.8	0.7	13262.1	158.580	10.629	2750
20.3	0.2	13425.8	158.584	10.743	1494
20.5	0.0	13442.2	158.586	10.789	1375

(4) Diagram for Partial Loads



## 15.2 NO.2 CARGO HOLD

(1) Filled and Trimmed Grain Heeling Moment

VOLUME	L.C.G	V.C.G	GRAIN HEELING
m3	m	m	MOMENT m4
14872.1	129.711	10.513	1027

(2) Filled and Untrimmed Grain Heeling Moment

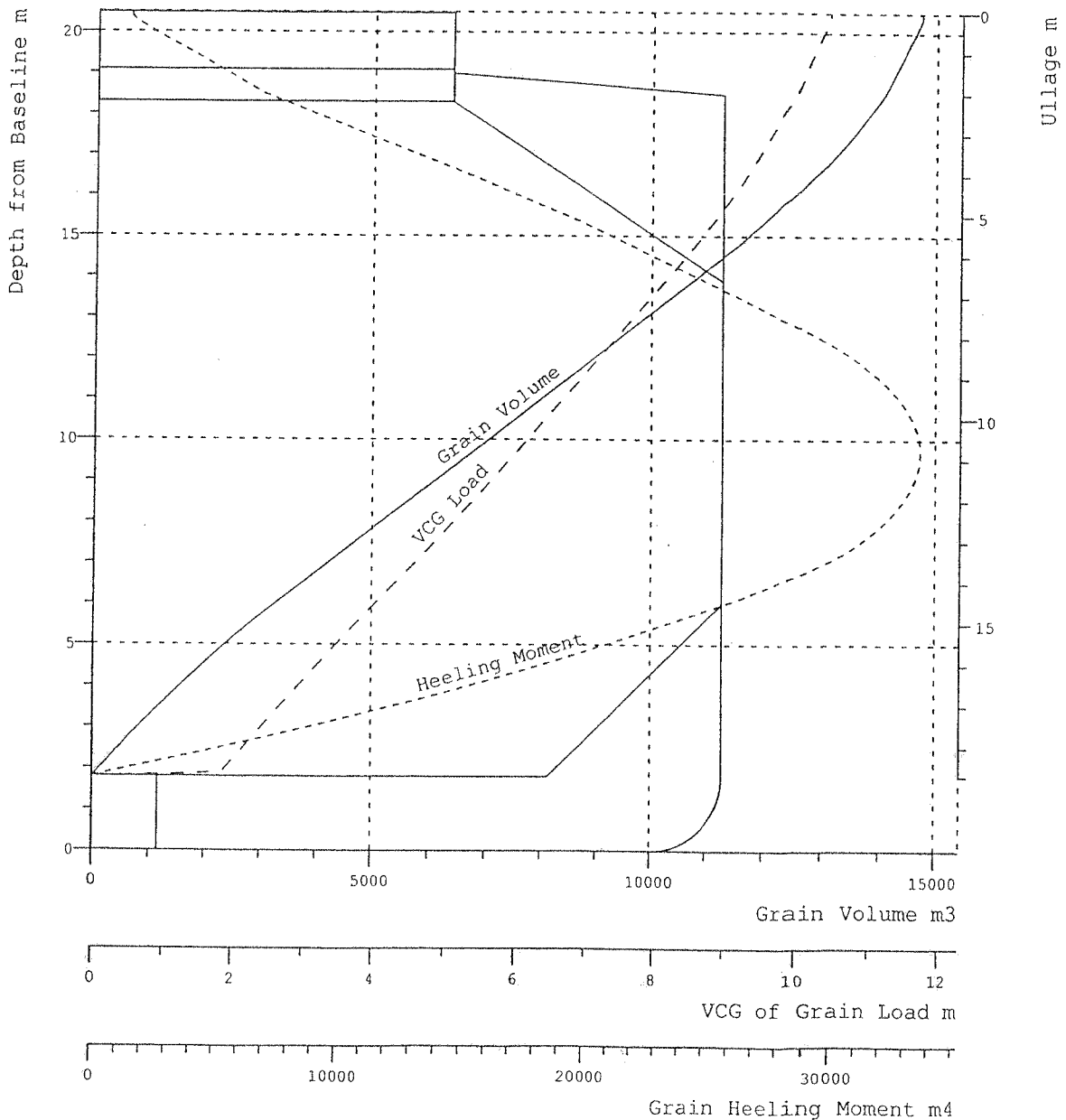
VOLUME	L.C.G	V.C.G	GRAIN HEELING
m3	m	m	MOMENT m4
14534.8	129.711	10.513	3022

(3) Partial Grain Heeling Moment

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING
m	m	m3	m	m	MOMENT m4
1.8	18.7	0.0	0.000	0.000	0
2.3	18.2	328.9	129.380	2.052	3815
2.8	17.7	672.8	129.382	2.307	7497
3.3	17.2	1031.6	129.383	2.566	10929
3.8	16.7	1405.3	129.383	2.828	14130
4.3	16.2	1793.9	129.383	3.093	17098
4.8	15.7	2198.5	129.380	3.362	19850
5.3	15.2	2623.2	129.373	3.635	22429
5.8	14.7	3075.6	129.406	3.917	24920
6.3	14.2	3547.8	129.454	4.201	27192
6.8	13.7	4021.1	129.491	4.477	29109
7.3	13.2	4494.4	129.520	4.748	30661
7.8	12.7	4967.6	129.544	5.015	31781
8.3	12.2	5440.9	129.563	5.278	32606
8.8	11.7	5914.2	129.579	5.540	33180
9.3	11.2	6387.5	129.593	5.800	33503
9.8	10.7	6860.8	129.605	6.059	33575
10.3	10.2	7334.1	129.616	6.316	33393
10.8	9.7	7807.3	129.625	6.573	32960
11.3	9.2	8280.6	129.633	6.828	32274
11.8	8.7	8753.9	129.640	7.084	31330
12.3	8.2	9227.2	129.647	7.338	30132
12.8	7.7	9700.5	129.653	7.592	28685
13.3	7.2	10173.8	129.658	7.846	27040
13.8	6.7	10647.1	129.663	8.100	25340
14.3	6.2	11112.9	129.668	8.349	23603
14.8	5.7	11555.9	129.672	8.586	21818

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m <sup>3</sup>	m.	m	m <sup>4</sup>
15.3	5.2	11975.6	129.676	8.813	20023
15.8	4.7	12372.0	129.679	9.028	18049
16.3	4.2	12737.4	129.682	9.234	16066
16.8	3.7	13076.5	129.685	9.426	14013
17.3	3.2	13393.0	129.687	9.606	11906
17.8	2.7	13685.0	129.689	9.777	9773
18.3	2.2	13956.1	129.691	9.938	7623
18.8	1.7	14167.4	129.692	10.095	5907
19.3	1.2	14346.0	129.696	10.235	4427
19.8	0.7	14524.6	129.702	10.349	2852
20.3	0.2	14703.2	129.708	10.466	1481
20.5	0.0	14721.1	129.711	10.513	1351

(4) Diagram for Partial Loads



## 15.3 NO.3 CARGO HOLD

(1) Filled and Trimmed Grain Heeling Moment

VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
14308.3	100.698	10.543	1037

(2) Filled and Untrimmed Grain Heeling Moment

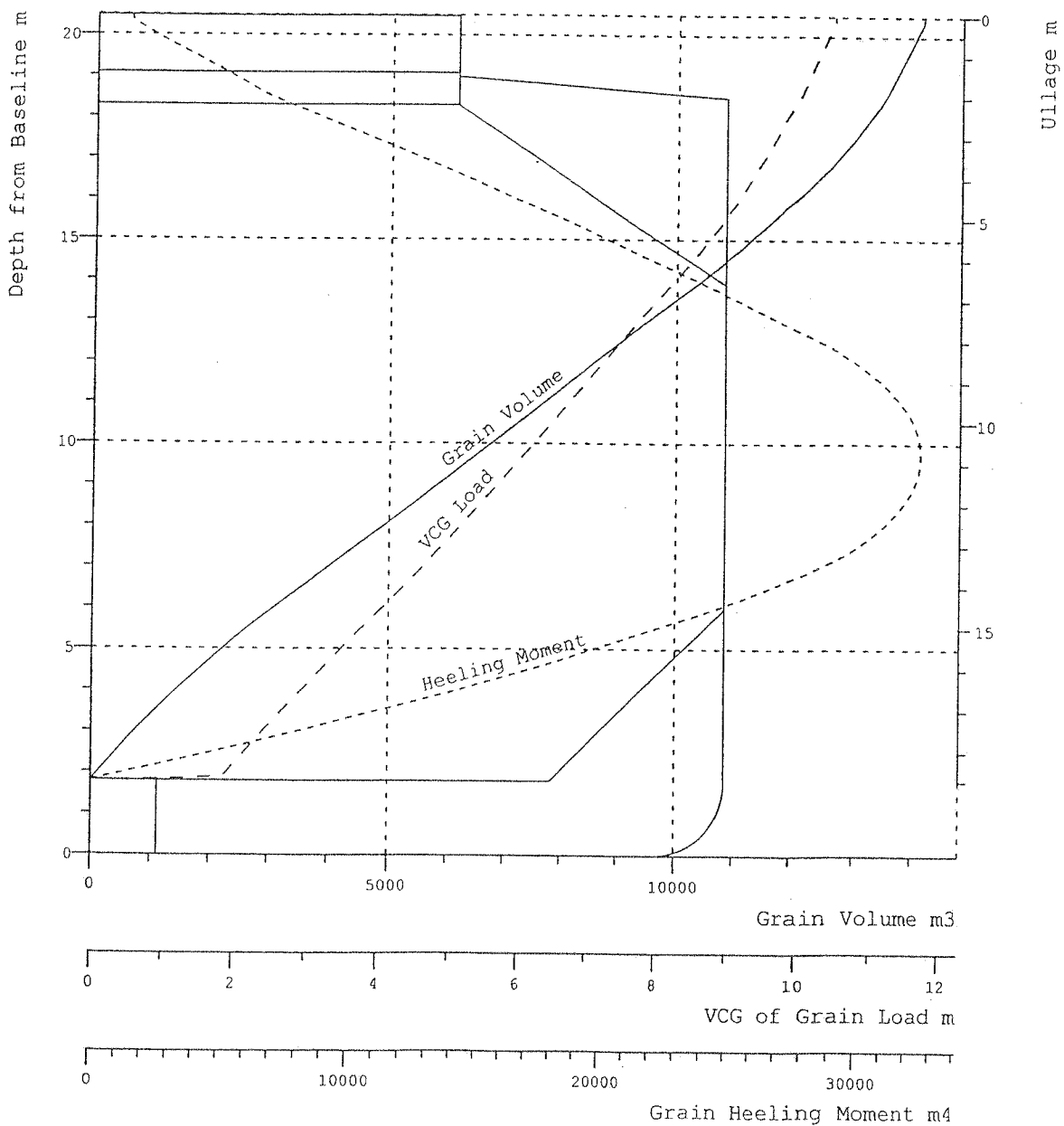
VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
14041.6	100.698	10.543	2448

(3) Partial Grain Heeling Moment

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m3	m	m	m4
1.8	18.7	0.0	0.000	0.000	0
2.3	18.2	298.4	100.700	2.052	3461
2.8	17.7	610.5	100.700	2.307	6802
3.3	17.2	936.0	100.700	2.566	9916
3.8	16.7	1292.8	100.700	2.839	13049
4.3	16.2	1667.1	100.700	3.111	15987
4.8	15.7	2055.8	100.699	3.384	18693
5.3	15.2	2461.8	100.697	3.660	21203
5.8	14.7	2897.8	100.702	3.945	23678
6.3	14.2	3355.6	100.702	4.231	25968
6.8	13.7	3814.5	100.701	4.510	27905
7.3	13.2	4273.3	100.701	4.782	29485
7.8	12.7	4732.2	100.700	5.050	30641
8.3	12.2	5191.1	100.700	5.315	31499
8.8	11.7	5650.0	100.700	5.577	32098
9.3	11.2	6108.8	100.699	5.838	32439
9.8	10.7	6567.7	100.699	6.097	32523
10.3	10.2	7026.6	100.699	6.355	32357
10.8	9.7	7485.5	100.699	6.612	31946
11.3	9.2	7944.3	100.699	6.868	31284
11.8	8.7	8403.2	100.699	7.124	30361
12.3	8.2	8862.1	100.699	7.378	29182
12.8	7.7	9321.0	100.699	7.633	27753
13.3	7.2	9779.8	100.698	7.887	26125
13.8	6.7	10238.7	100.698	8.141	24432
14.3	6.2	10690.3	100.698	8.390	22702
14.8	5.7	11119.8	100.698	8.628	20934

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING
m	m	m <sup>3</sup>	m	m	MOMENT m <sup>4</sup>
15.3	5.2	11526.7	100.698	8.855	19149
15.8	4.7	11911.0	100.698	9.071	17198
16.3	4.2	12257.9	100.698	9.276	15318
16.8	3.7	12575.7	100.698	9.466	13427
17.3	3.2	12872.3	100.698	9.640	11483
17.8	2.7	13145.5	100.698	9.806	9521
18.3	2.2	13399.1	100.698	9.962	7542
18.8	1.7	13604.5	100.698	10.115	5887
19.3	1.2	13783.1	100.698	10.254	4407
19.8	0.7	13961.7	100.698	10.372	2833
20.3	0.2	14140.3	100.698	10.493	1461
20.5	0.0	14158.1	100.698	10.543	1331

(4) Diagram for Partial Loads



## 15.4 NO.4 CARGO HOLD

(1) Filled and Trimmed Grain Heeling Moment

VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
14875.1	71.689	10.513	1048

(2) Filled and Untrimmed Grain Heeling Moment

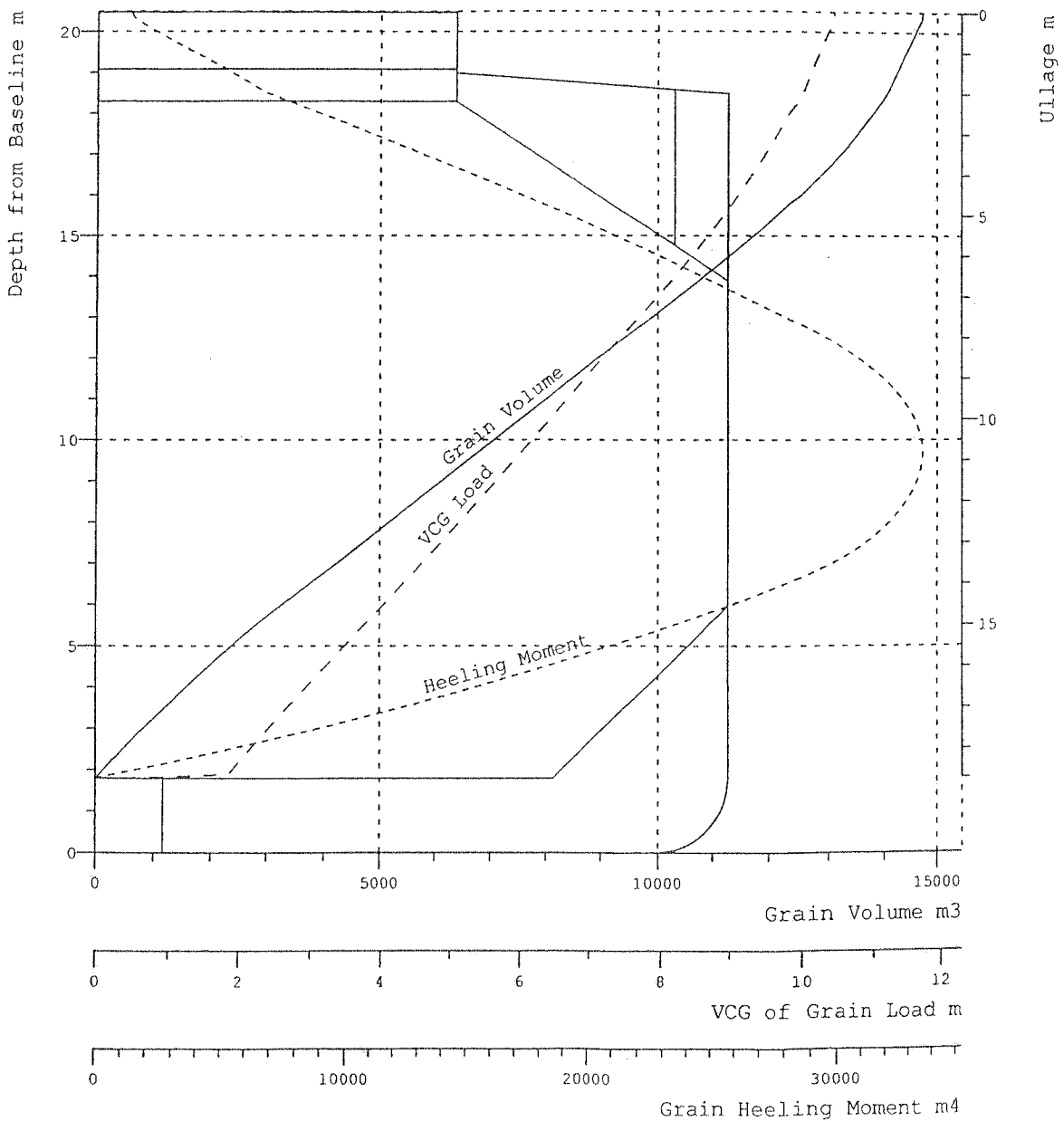
VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
14537.8	71.689	10.513	3029

(3) Partial Grain Heeling Moment

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m3	m	m	m4
1.8	18.7	0.0	0.000	0.000	0
2.3	18.2	328.9	72.020	2.052	3815
2.8	17.7	672.8	72.018	2.307	7497
3.3	17.2	1031.6	72.017	2.566	10929
3.8	16.7	1405.3	72.017	2.828	14130
4.3	16.2	1793.9	72.017	3.093	17098
4.8	15.7	2198.5	72.020	3.362	19850
5.3	15.2	2623.2	72.029	3.636	22429
5.8	14.7	3075.6	71.999	3.917	24921
6.3	14.2	3547.8	71.950	4.201	27193
6.8	13.7	4021.1	71.912	4.477	29110
7.3	13.2	4494.4	71.882	4.748	30663
7.8	12.7	4967.7	71.858	5.015	31785
8.3	12.2	5441.0	71.839	5.279	32608
8.8	11.7	5914.3	71.822	5.540	33184
9.3	11.2	6387.6	71.808	5.800	33508
9.8	10.7	6860.9	71.795	6.059	33576
10.3	10.2	7334.2	71.785	6.316	33395
10.8	9.7	7807.5	71.775	6.573	32962
11.3	9.2	8280.9	71.767	6.829	32276
11.8	8.7	8754.2	71.760	7.084	31331
12.3	8.2	9227.5	71.753	7.339	30133
12.8	7.7	9700.8	71.747	7.593	28685
13.3	7.2	10174.1	71.742	7.847	27037
13.8	6.7	10647.4	71.737	8.100	25337
14.3	6.2	11113.2	71.732	8.349	23601
14.8	5.7	11556.2	71.727	8.587	21817

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m <sup>3</sup>	m	m	m <sup>4</sup>
15.3	5.2	11975.9	71.723	8.813	20021
15.8	4.7	12372.3	71.720	9.029	18050
16.3	4.2	12737.7	71.717	9.234	16067
16.8	3.7	13076.8	71.714	9.426	14018
17.3	3.2	13393.3	71.712	9.607	11912
17.8	2.7	13685.0	71.710	9.777	9785
18.3	2.2	13955.6	71.709	9.938	7639
18.8	1.7	14166.9	71.707	10.095	5924
19.3	1.2	14345.5	71.704	10.235	4443
19.8	0.7	14524.1	71.697	10.349	2868
20.3	0.2	14702.7	71.691	10.466	1497
20.5	0.0	14720.6	71.689	10.513	1368

(4) Diagram for Partial Loads



## 15.5 NO.5 CARGO HOLD

(1) Filled and Trimmed Grain Heeling Moment

VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
14291.5	42.347	10.844	1046

(2) Filled and Untrimmed Grain Heeling Moment

VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m3	m	m	m4
13896.1	42.347	10.844	3382

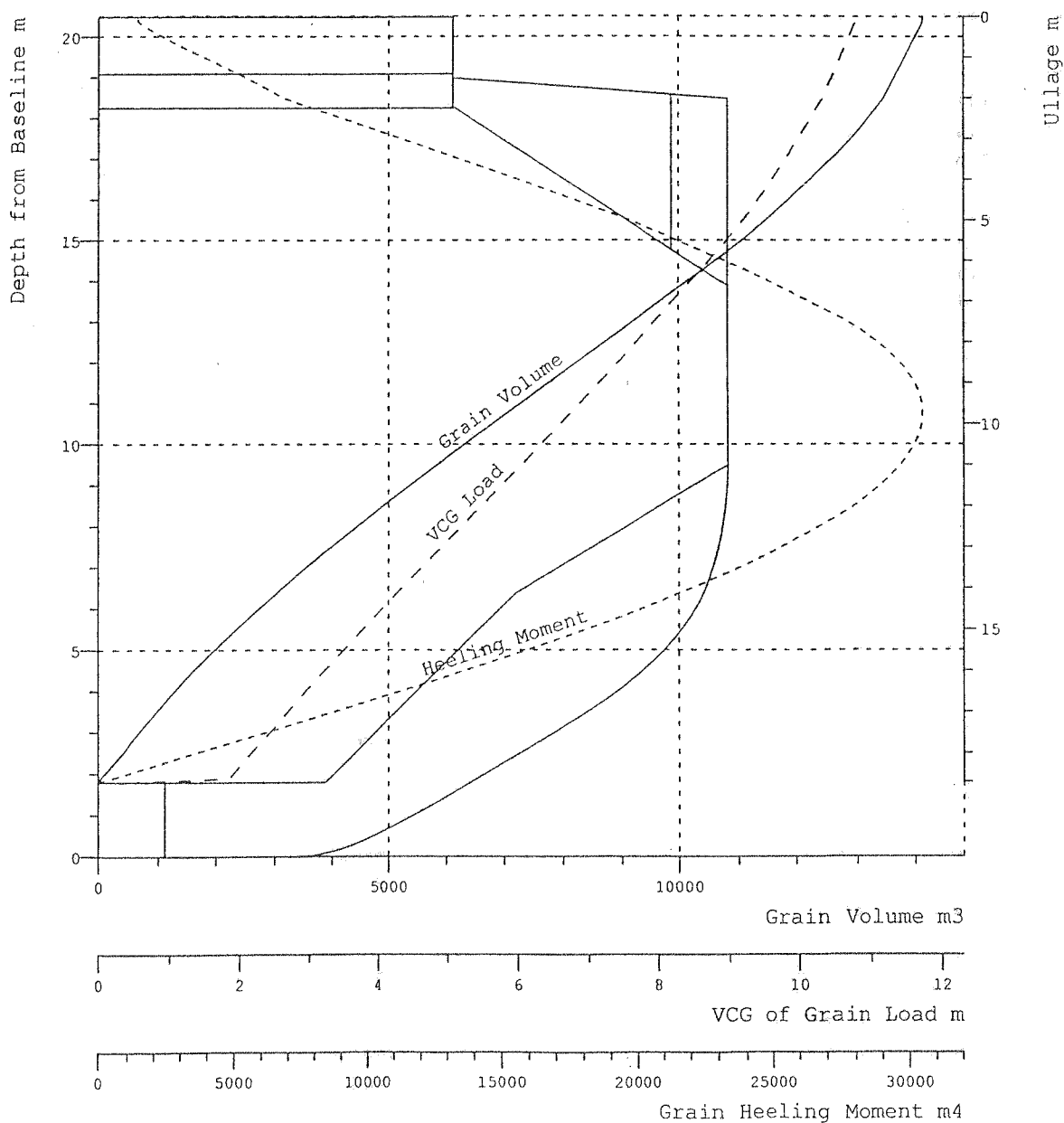
(3) Partial Grain Heeling Moment

DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m3	m	m	m4
1.8	18.7	0.0	0.000	0.000	0
2.3	18.2	264.7	43.937	2.052	2484
2.8	17.7	545.2	43.872	2.310	5071
3.3	17.2	841.5	43.810	2.571	7665
3.8	16.7	1153.5	43.752	2.836	10222
4.3	16.2	1481.3	43.697	3.105	12672
4.8	15.7	1826.0	43.654	3.378	15010
5.3	15.2	2190.2	43.629	3.656	17256
5.8	14.7	2572.3	43.606	3.937	19367
6.3	14.2	2969.5	43.582	4.219	21307
6.8	13.7	3380.7	43.541	4.503	23080
7.3	13.2	3810.1	43.478	4.788	24696
7.8	12.7	4257.0	43.400	5.075	26153
8.3	12.2	4712.9	43.313	5.361	27423
8.8	11.7	5175.9	43.221	5.647	28490
9.3	11.2	5645.9	43.129	5.930	29339
9.8	10.7	6122.3	43.041	6.211	29958
10.3	10.2	6602.1	42.958	6.490	30328
10.8	9.7	7082.5	42.885	6.765	30437
11.3	9.2	7563.0	42.822	7.036	30283
11.8	8.7	8043.5	42.766	7.306	29857
12.3	8.2	8524.0	42.716	7.573	29155
12.8	7.7	9004.6	42.671	7.838	28171
13.3	7.2	9485.1	42.631	8.101	26906
13.8	6.7	9965.6	42.595	8.364	25459
14.3	6.2	10438.5	42.563	8.621	23882
14.8	5.7	10888.3	42.534	8.865	22199



DEPTH	ULLAGE	VOLUME	L.C.G	V.C.G	GRAIN HEELING MOMENT
m	m	m <sup>3</sup>	m	m	m <sup>4</sup>
15.3	5.2	11314.4	42.509	9.098	20447
15.8	4.7	11716.8	42.487	9.319	18484
16.3	4.2	12091.7	42.468	9.529	16450
16.8	3.7	12441.4	42.448	9.728	14314
17.3	3.2	12767.9	42.428	9.914	12129
17.8	2.7	13070.5	42.410	10.091	9905
18.3	2.2	13351.8	42.394	10.258	7656
18.8	1.7	13563.7	42.380	10.421	5933
19.3	1.2	13742.3	42.368	10.564	4452
19.8	0.7	13920.9	42.359	10.679	2878
20.3	0.2	14099.5	42.350	10.796	1507
20.5	0.0	14117.3	42.347	10.844	1377

(4) Diagram for Partial Loads



## 16 Allowable Grain Shifting Moments

T	DISP	Allowable Heeling Moment for V.C.G					
		8.00	9.00	10.00	11.00	12.00	13.00
m	t	tm	tm	tm	tm	tm	tm
5.00	24191.1	61400.5	56049.6	50698.7	45347.8	39996.9	34646.0
5.10	24704.2	61300.7	55836.3	50371.9	44907.5	39443.1	33978.8
5.20	25218.0	61205.9	55627.9	50049.8	44471.8	38893.7	33315.6
5.30	25732.7	61117.9	55426.0	49734.1	44042.3	38350.4	32658.5
5.40	26248.0	61038.4	55232.5	49426.6	43620.8	37814.9	32009.0
5.50	26764.1	60968.3	55048.3	49128.2	43208.2	37288.2	31368.1
5.60	27280.9	60908.0	54873.6	48839.3	42804.9	36770.5	30736.2
5.70	27798.5	60857.0	54708.2	48559.3	42410.5	36261.6	30112.7
5.80	28316.7	60815.2	54551.7	48288.2	42024.7	35761.2	29497.7
5.90	28835.8	60782.2	54403.9	48025.6	41647.3	35269.0	28890.7
6.00	29355.5	60758.0	54264.7	47771.4	41278.1	34784.8	28291.5
6.10	29876.0	60742.3	54133.9	47525.5	40917.1	34308.7	27700.3
6.20	30397.2	60735.2	54011.5	47287.8	40564.1	33840.4	27116.7
6.30	30919.1	60736.6	53897.4	47058.3	40219.1	33380.0	26540.8
6.40	31441.7	60746.5	53791.7	46836.9	39882.2	32927.4	25972.7
6.50	31965.2	60764.8	53694.3	46623.8	39553.3	32482.7	25412.2
6.60	32489.4	60791.8	53605.3	46418.8	39232.3	32045.8	24859.3
6.70	33014.3	60827.4	53524.8	46222.3	38919.6	31617.0	24314.4
6.80	33540.1	60873.1	53454.2	46035.2	38616.3	31197.4	23778.5
6.90	34066.7	60930.2	53394.8	45859.4	38324.0	30788.6	23253.2
7.00	34594.0	60997.4	53345.4	45693.4	38041.3	30389.3	22737.2
7.10	35122.2	61074.7	53305.8	45536.9	37768.1	29999.2	22230.3
7.20	35651.1	61163.9	53278.1	45392.2	37506.3	29620.4	21734.5
7.30	36180.9	61264.0	53261.0	45257.9	37254.9	29251.8	21248.8
7.40	36711.4	61374.3	53253.9	45133.5	37013.1	28892.7	20772.3
7.50	37242.7	61495.5	53257.6	45019.6	36781.7	28543.8	20305.8
7.60	37774.8	61627.4	53271.8	44916.1	36560.5	28204.9	19849.3
7.70	38307.7	61769.3	53295.8	44822.3	36348.8	27875.3	19401.8
7.80	38841.4	61923.8	53332.2	44740.7	36149.1	27557.6	18965.9
7.90	39375.9	62089.9	53380.1	44670.3	35960.5	27250.7	18540.9
8.00	39911.2	62267.0	53438.7	44610.6	35782.3	26954.2	18126.0
8.10	40447.3	62455.1	53508.3	44561.5	35614.8	26667.9	17721.2
8.20	40984.2	62654.0	53588.5	44522.9	35457.4	26391.9	17326.3
8.30	41521.2	62864.3	53680.0	44495.7	35311.3	26127.0	16942.7
8.40	42059.9	63087.3	53783.8	44480.4	35176.9	25873.4	16569.9
8.50	42599.4	63322.6	53899.8	44477.0	35054.2	25631.4	16208.6
8.60	43139.8	63567.9	54025.5	44483.2	34940.8	25398.5	15856.2
8.70	43681.0	63824.9	54162.8	44500.8	34838.7	25176.7	15514.6
8.80	44223.2	64093.9	54311.9	44529.9	34748.0	24966.0	15184.0
8.90	44766.4	64375.0	54472.9	44570.7	34668.6	24766.4	14864.3
9.00	45310.5	64669.9	54647.5	44625.0	34602.5	24580.0	14557.5
9.10	45855.7	64975.9	54832.8	44689.8	34546.7	24403.6	14260.5
9.20	46401.9	65293.8	55029.9	44766.1	34502.2	24238.3	13974.4
9.30	46949.3	65623.6	55238.6	44853.7	34468.7	24083.8	13698.7
9.40	47497.9	65966.3	55460.0	44953.7	34447.4	23941.1	13434.8
9.50	48047.5	66320.6	55692.8	45064.9	34437.0	23809.2	13181.3
9.60	48598.0	66687.0	55937.3	45187.8	34438.1	23688.5	12938.8
9.70	49149.7	67065.0	56193.3	45321.7	34450.0	23578.4	12706.7
9.80	49701.3	67451.9	56458.2	45464.6	34471.0	23477.3	12483.7

T	DISP	Allowable Heeling Moment for V.C.G					
		8.00	9.00	10.00	11.00	12.00	13.00
m	t	tm	tm	tm	tm	tm	tm
9.90	50255.6	67853.0	56736.7	45620.5	34504.2	23388.1	12271.8
10.00	50810.5	68265.7	57026.8	45787.8	34548.9	23309.9	12070.9
10.10	51366.4	68690.2	57328.3	45966.4	34604.5	23242.5	11880.6
10.20	51923.2	69126.5	57641.4	46156.4	34671.3	23186.3	11701.2
10.30	52481.1	69573.7	57965.3	46356.9	34748.5	23140.0	11531.5
10.40	53040.0	70032.1	58300.0	46567.9	34835.9	23103.8	11371.8
10.50	53601.4	70503.7	58647.5	46791.3	34935.1	23079.0	11222.8
10.60	54162.4	70984.1	59003.9	47023.6	35043.3	23063.0	11082.8
10.70	54724.3	71475.1	59370.6	47266.2	35161.6	23057.1	10952.6
10.80	55286.9	71976.7	59747.7	47518.7	35289.8	23060.8	10831.9
10.90	55850.2	72488.5	60135.0	47781.4	35427.9	23074.4	10720.9
11.00	56414.2	73010.5	60532.3	48054.0	35575.8	23097.5	10619.3
11.10	56978.9	73542.8	60939.7	48336.6	35733.4	23130.3	10527.1
11.20	57544.2	74085.3	61357.2	48629.0	35900.9	23172.7	10444.6
11.30	58110.0	74638.0	61784.7	48931.4	36078.2	23224.9	10371.6
11.40	58676.3	75200.7	62222.3	49243.8	36265.2	23286.7	10308.2
11.50	59243.1	75773.8	62670.0	49566.1	36462.2	23358.3	10254.5
11.60	59810.4	76357.1	63127.8	49898.5	36669.2	23439.8	10210.5
11.70	60378.1	76950.6	63595.7	50240.9	36886.0	23531.1	10176.2
11.80	60946.3	77554.5	64074.0	50593.5	37112.9	23632.3	10151.8
11.90	61515.0	78168.8	64562.5	50956.1	37349.8	23743.5	10137.2
12.00	62084.1	78793.4	65061.3	51329.1	37596.9	23864.8	10132.6
12.10	62653.5	79428.5	65570.4	51712.4	37854.2	23996.2	10138.0
12.20	63223.4	80074.3	66090.1	52106.0	38121.9	24137.7	10153.6
12.30	63793.7	80730.6	66620.4	52510.1	38399.9	24289.6	10179.3
12.40	64364.3	81397.7	67161.3	52924.7	38688.3	24451.9	9697.5
12.50	64935.3	82075.6	67712.8	53350.1	38987.4	24624.6	8442.5
12.60	65506.6	82764.3	68275.2	53786.2	39297.0	24807.9	7109.9
12.70	66078.4	83464.0	68848.5	54232.9	39617.4	25001.9	4811.1
12.80	66650.4	84174.8	69432.8	54690.6	39948.6	25206.5	3514.0
12.90	67222.8	84896.6	70027.9	55159.3	40290.7	25422.0	1386.6
13.00	67795.5	85629.5	70634.2	55638.9	40643.6	25648.3	286.0

## 17 Allowable longitudinal strength

Allowable still water bending moment and shear force was assigned by the Class's register. The still water bending moment and shear force in operational conditions should not exceed the following values.

## 17.1 At Sea

ITEM FRAME	Shear Force (MT)		Bending moments (MT-M)	
	Positive	Negative	Hogging	Sagging
#35	2976	-2604	62798	-58653
#71	7558	-3600	141488	-142712
#107	3110	-6430	141488	-142712
#143	5485	-3661	141488	-142712
#161	4270	-5340	141488	-142712
#179	3081	-7020	116667	-88175
#215	1241	-1790	35823	-33459

## 17.2 In Port

ITEM FRAME	Shear Force (MT)		Bending moments (MT-M)	
	Positive	Negative	Hogging	Sagging
#35	3917	-3587	96771	-94106
#71	8958	-5062	242357	-247976
#107	4222	-7542	242357	-247976
#143	6715	-4874	242357	-247976
#161	5215	-6255	242357	-247976
#179	4670	-8543	145287	-142394
#215	1756	-2284	49806	-48052

## 17.3 Flooded

ITEM FRAME	Shear Force (MT)		Bending moments (MT-M)	
	Positive	Negative	Hogging	Sagging
#35	3221	-5838	74122	-74988
#71	9840	-5326	219286	-215627
#107	4340	-7380	219286	-215627
#143	7721	-4380	219286	-215627
#161	6255	-7490	219286	-215627
#179	4753	-10600	191641	-142712
#215	2167	-1910	40484	-38323

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Lloyd's Register

## 18 GRAIN LOADING CALCULATION

Summary Table of Grain Loading Calculation

CONDITION ITEMS	NO.1	NO.2	NO.3	NO.4	NO.5	NO.6
	G.45-DEP-T	G.45-ARR-T	G.50-DEP-T	G.50-ARR-T	G.55-DEP-T	G.55-ARR-T
Heavy fuel oil (ton)	1996.2	199.6	1996.2	199.6	1996.2	199.6
Diesel oil (ton)	117.4	11.7	117.4	11.7	117.4	11.7
Lubricate oil (ton)	118.0	59.0	118.0	59.0	118.0	59.0
Fresh water (ton)	333.2	33.3	333.2	33.3	333.2	33.3
Misc. tanks (ton)	39.1	39.1	39.1	39.1	39.1	39.1
Provision (ton)	5.5	0.6	5.5	0.6	5.5	0.6
Dwt constant (ton)	0.0	0.0	0.0	0.0	0.0	0.0
Ballast water (ton)	0.0	0.0	0.0	2380.0	0.0	2380.0
Cargo (ton)	54962.3	54962.3	51643.6	51643.6	46951.3	46951.3
Deadweight (ton)	57695.5	55429.4	54376.8	54490.7	49684.5	49798.4
Lightweight (ton)	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement (ton)	67795.5	65529.4	64476.8	64590.7	59784.5	59898.4
DRAFT mean (m)	12.983	12.612	12.427	12.445	11.595	11.613
DRAFT fore (m)	11.922	12.230	12.040	12.017	10.866	10.847
DRAFT aft (m)	14.043	12.994	12.815	12.872	12.324	12.379
DRAFT equiv. (m)	13.020	12.624	12.440	12.460	11.615	11.636
TRIM (m)	-2.121	-0.764	-0.774	-0.855	-1.458	-1.532
LCB (m)	1.491	3.305	3.395	3.285	2.983	2.874
LCF (m)	-3.390	-3.044	-2.973	-2.996	-2.680	-2.703
LCG (m)	1.545	3.334	3.426	3.315	3.034	2.916
MTC (tm/cm)	803.2	794.2	792.2	792.9	787.6	788.5
TPC (t/cm)	57.5	57.3	57.2	57.2	57.1	57.1
KMT (m)	13.631	13.594	13.600	13.601	13.691	13.692
KG (m)	10.784	10.854	11.045	10.610	11.077	10.608
GM (m)	2.847	2.740	2.554	2.992	2.613	3.084
GG0 (m)	0.034	0.008	0.180	0.152	0.194	0.164
GoM (m)	2.813	2.732	2.375	2.840	2.420	2.921
Propeller immer.(%)	226.3	209.3	206.3	207.2	197.9	198.8
Max.SWSF(+) (ton)	1908.7	2050.2	1046.7	1044.3	915.1	912.6
Percent (%)	59.4	63.8	84.3	84.1	73.7	73.5
Max.SWSF(-) (ton)	-2219.6	-2281.0	-1281.5	-2176.8	-844.0	-1738.4
Percent (%)	85.2	87.6	49.2	83.6	32.4	66.8
Max.SWBM(+) (ton)	8.5	36.3	716.2	53.8	1977.3	291.3
Percent (%)	0.0	0.1	1.1	0.1	3.1	0.5
Max.SWBM(-) (ton)	-95705.5	-100771	-43668.8	-45950.9	-27697.3	-32123.6
Percent (%)	67.1	70.6	30.6	34.6	19.4	26.2
Heeling angle (deg)	5.9	6.0	1.7	2.0	1.7	2.0
Res. Stabil. (m*rad)	0.5040	0.5215	0.5781	0.6682	0.6398	0.7371
Allow. H.M. (ton*m)	43352	41657	34933	39757	33041	37867
Actual H.M. (ton*m)	19506	19506	3725	3725	3386	3386

CONDITION ITEMS	NO.7	NO.8	NO.9	NO.10	NO.11	NO.12
	G.60-DEP-T	G.60-ARR-T	G.45-DEP-UT	G.45-ARR-UT	G.50-DEP-UT	G.50-ARR-UT
Heavy fuel oil (ton)	1996.2	199.6	1876.0	199.6	1996.2	199.6
Diesel oil (ton)	117.4	11.7	100.4	11.7	117.4	11.7
Lubricate oil (ton)	118.0	59.0	59.0	59.0	118.0	59.0
Fresh water (ton)	333.2	33.3	33.3	33.3	333.2	33.3
Misc. tanks (ton)	39.1	39.1	39.1	39.1	39.1	39.1
Provision (ton)	5.5	0.6	0.5	0.5	5.5	0.5
Dwt constant (ton)	0.0	0.0	0.0	0.0	0.0	0.0
Ballast water (ton)	0.0	2380.0	0.0	0.0	0.0	2380.0
Cargo (ton)	43036.3	43036.3	53896.4	53896.4	50304.7	50304.7
Deadweight (ton)	45769.5	45883.4	56128.5	54363.5	53038.0	53151.8
Lightweight (ton)	10100.0	10100.0	10100.0	10100.0	10100.0	10100.0
Displacement (ton)	55869.5	55983.4	66228.5	64463.5	63138.0	63251.8
DRAFT mean (m)	10.901	10.919	12.717	12.427	12.189	12.206
DRAFT fore (m)	9.897	9.874	11.940	12.081	11.675	11.652
DRAFT aft (m)	11.906	11.964	13.494	12.772	12.703	12.761
DRAFT equiv. (m)	10.923	10.944	12.746	12.437	12.205	12.225
TRIM (m)	-2.009	-2.089	-1.554	-0.691	-1.028	-1.109
LCB (m)	2.590	2.465	2.288	3.499	3.212	3.099
LCF (m)	-2.245	-2.272	-3.222	-2.956	-2.922	-2.945
LCG (m)	2.659	2.531	2.317	3.526	3.250	3.136
MTC (tm/cm)	786.7	787.8	798.9	791.8	790.9	791.6
TPC (t/cm)	57.0	57.0	57.4	57.2	57.2	57.2
KMT (m)	13.831	13.832	13.616	13.597	13.620	13.622
KG (m)	11.108	10.606	10.750	10.609	11.053	10.609
GM (m)	2.723	3.226	2.866	2.988	2.567	3.013
GG0 (m)	0.207	0.175	0.035	0.008	0.183	0.155
GoM (m)	2.516	3.051	2.831	2.979	2.383	2.858
Propeller immer.(%)	190.8	191.7	217.4	205.6	204.4	205.3
Max.SWSF(+) (ton)	798.7	796.1	1850.2	1885.9	1006.4	1004.1
Percent (%)	64.4	64.2	57.6	58.7	81.1	80.9
Max.SWSF(-) (ton)	-480.6	-1374.1	-2301.7	-2103.6	-1175.1	-2070.3
Percent (%)	18.5	52.8	88.4	80.8	45.1	79.5
Max.SWBM(+) (ton)	3417.7	847.2	16.3	62.0	985.5	81.8
Percent (%)	5.4	1.3	0.0	0.1	1.6	0.1
Max.SWBM(-) (ton)	-17171.3	-21229.6	-96816.6	-94231.6	-41639.1	-43161.6
Percent (%)	12.0	18.5	67.8	66.0	29.2	31.8
Heeling angle (deg)	1.6	1.9	8.4	7.3	4.4	4.3
Res. Stabil. (m*rad)	0.6958	0.8001	0.4605	0.5381	0.5276	0.6190
Allow. H.M. (ton*m)	32049	36873	40014	44518	34464	39181
Actual H.M. (ton*m)	3104	3104	25664	25664	11025	11025

CONDITION ITEMS	NO.13	NO.14	NO.15	NO.16		
	G.55-DEP-UT	G.55-ARR-UT	G.60-DEP-UT	G.60-ARR-UT		
Heavy fuel oil (ton)	1996.2	199.6	1996.2	199.6		
Diesel oil (ton)	117.4	11.7	117.4	11.7		
Lubricate oil (ton)	118.0	59.0	118.0	59.0		
Fresh water (ton)	333.2	33.3	333.2	33.3		
Misc. tanks (ton)	39.1	39.1	39.1	39.1		
Provision (ton)	5.5	0.5	5.5	0.5		
Dwt constant (ton)	0.0	0.0	0.0	0.0		
Ballast water (ton)	0.0	2380.0	0.0	2380.0		
Cargo (ton)	45734.1	45734.1	41920.6	41920.6		
Deadweight (ton)	48467.3	48581.2	44653.8	44767.7		
Lightweight (ton)	10100.0	10100.0	10100.0	10100.0		
Displacement (ton)	58567.3	58681.2	54753.8	54867.7		
DRAFT mean (m)	11.379	11.396	10.703	10.721		
DRAFT fore (m)	10.536	10.513	9.598	9.575		
DRAFT aft (m)	12.221	12.279	11.809	11.867		
DRAFT equiv. (m)	11.401	11.421	10.725	10.746		
TRIM (m)	-1.685	-1.765	-2.211	-2.291		
LCB (m)	2.796	2.676	2.396	2.270		
LCF (m)	-2.579	-2.604	-2.105	-2.134		
LCG (m)	2.854	2.731	2.472	2.342		
MTC (tm/cm)	787.4	788.3	787.2	788.3		
TPC (t/cm)	57.1	57.1	57.0	57.0		
KMT (m)	13.730	13.731	13.886	13.887		
KG (m)	11.086	10.607	11.117	10.605		
GM (m)	2.644	3.125	2.769	3.283		
GG0 (m)	0.198	0.167	0.212	0.179		
GoM (m)	2.447	2.958	2.558	3.104		
Propeller immer.(%)	196.1	197.1	189.1	190.0		
Max.SWSF(+) (ton)	876.8	874.4	760.5	757.9		
Percent (%)	70.7	70.5	61.3	61.1		
Max.SWSF(-) (ton)	-748.0	-1642.2	-392.5	-1285.8		
Percent (%)	28.7	63.1	15.1	49.4		
Max.SWBM(+) (ton)	2316.6	400.2	3884.9	1043.5		
Percent (%)	3.7	0.6	6.2	1.7		
Max.SWBM(-) (ton)	-26717.1	-29488.7	-16585.5	-18789.9		
Percent (%)	18.7	24.1	11.6	16.4		
Heeling angle (deg)	4.3	4.1	4.0	3.9		
Res. Stabil. (m <sup>2</sup> rad)	0.5898	0.6895	0.6489	0.7556		
Allow. H.M. (ton*m)	32684	37510	31900	36721		
Actual H.M. (ton*m)	10023	10023	9188	9188		

## CON1 : CONSUMABLE DEPARTURE CONDITION

WEIGHT ITEM	FILL %	S.G t/m3	WEIGHT t	V.C.G m	L.C.G m	T.C.G m	FRSM tm
NO.1 H.F.O.TK(P)	98.0	0.980	353.4	17.418	-20.470	-12.627	417.02
NO.1 H.F.O.TK(S)	98.0	0.980	353.4	17.418	-20.470	12.627	417.02
NO.2 H.F.O.TK(P)	98.0	0.980	353.4	17.418	-49.990	-12.627	417.02
NO.2 H.F.O.TK(S)	98.0	0.980	353.4	17.418	-49.990	12.627	417.02
H.F.O.STOR.TK(P)	98.0	0.980	262.7	11.936	-68.044	-13.877	55.61
H.F.O.STOR.TK(S)	98.0	0.980	182.6	11.638	-67.069	13.920	37.55
H.F.O.SETT.TK	98.0	0.980	35.7	15.565	-70.350	-12.930	5.65
H.F.O.SERV.TK	98.0	0.980	35.7	15.565	-67.150	-12.930	5.65
H.F.O.LOW SULP.SET.	98.0	0.980	32.9	15.565	-68.550	-7.870	11.25
H.F.O.LOW SULP.SER.	98.0	0.980	32.9	15.565	-66.550	-7.870	11.25
TOTAL HEAVY FUEL OIL			1996.2	16.041	-44.725	-1.274	1795.06
M.D.O.TK(P)	98.0	0.850	26.6	1.153	-68.664	-2.538	14.12
M.D.O.TK(S)	98.0	0.850	47.7	1.257	-70.088	2.943	48.06
M.D.O.SETT.TK	98.0	0.850	14.3	15.737	-68.750	12.772	1.55
M.D.O.SERV.TK	98.0	0.850	28.7	15.737	-66.350	12.772	3.10
TOTAL DIESEL OIL			117.4	6.543	-68.688	5.305	66.83
M.E.L.O.SUMP TK	98.0	0.900	15.9	1.340	-73.746	0.002	7.60
M.E.L.O.STOR.TK	98.0	0.900	23.6	14.984	-71.349	13.819	14.42
M.E.L.O.SETT.TK	98.0	0.900	23.2	14.993	-73.346	13.783	14.34
CYL.O.STOR.TK	98.0	0.900	27.9	14.994	-75.147	12.510	39.28
LOW TBN CYL.O.STOR.	98.0	0.900	13.7	14.980	-74.350	8.300	1.08
G.E.L.O.STOR.TK	98.0	0.900	6.9	14.980	-73.550	6.640	0.54
G.E.L.O.SETT.TK	98.0	0.900	6.9	14.980	-75.150	6.640	0.54
TOTAL LUB. OIL			118.0	13.150	-73.659	10.168	77.81
F.W.TK(P)	100.0	1.000	166.6	16.314	-85.971	-9.459	173.66
F.W.TK(S)	100.0	1.000	166.6	16.314	-85.971	9.459	173.66
TOTAL FRESH WATER			333.2	16.314	-85.971	0.000	347.32
BILGE HOLDING TK	50.0	1.000	14.9	0.658	-81.164	0.000	25.88
OILY BILGE TK	50.0	1.000	8.7	0.898	-74.526	-2.538	4.73
S/T L.O.DRAIN TK	50.0	1.000	1.0	1.469	-79.545	1.247	1.09
F.O.OVERFLOW TK	50.0	1.000	5.7	1.112	-66.852	-4.727	3.46
SLUDGE TK	50.0	1.000	5.8	7.670	-69.150	-9.115	2.57
SEWAGE HOLDING TK	50.0	1.000	3.0	8.850	-75.150	-9.930	0.54
TOTAL MISCELLANEOUS			39.1	2.476	-75.308	-3.347	38.26
PROVISION			5.5	20.750	-79.950	-8.670	0.00
DWT CONSTANT			123.8	13.150	-13.840	0.180	0.00
TOTAL BUNKERING			2733.2	15.226	-51.141	-0.321	2325.28



## CON2 : CONSUMABLE HALF CONDITION

WEIGHT ITEM	FILL %	S.G t/m3	WEIGHT t	V.C.G m	L.C.G m	T.C.G m	FRSM tm
NO.2 H.F.O.TK(P)	57.6	0.980	207.8	16.802	-49.990	-13.125	417.02
NO.2 H.F.O.TK(S)	57.6	0.980	207.8	16.802	-49.990	13.125	417.02
H.F.O.STOR.TK(P)	98.0	0.980	262.7	11.936	-68.044	-13.877	55.61
H.F.O.STOR.TK(S)	98.0	0.980	182.6	11.638	-67.069	13.920	37.55
H.F.O.SETT.TK	98.0	0.980	35.7	15.565	-70.350	-12.930	5.65
H.F.O.SERV.TK	98.0	0.980	35.7	15.565	-67.150	-12.930	5.65
H.F.O.LOW SULP.SET.	98.0	0.980	32.9	15.565	-68.550	-7.870	11.25
H.F.O.LOW SULP.SER.	98.0	0.980	32.9	15.565	-66.550	-7.870	11.25
TOTAL HEAVY FUEL OIL			998.1	14.406	-60.366	-2.549	961.01
M.D.O.TK(S)	32.2	0.850	15.7	0.569	-69.717	2.596	48.06
M.D.O.SETT.TK	98.0	0.850	14.3	15.737	-68.750	12.772	1.55
M.D.O.SERV.TK	98.0	0.850	28.7	15.737	-66.350	12.772	3.10
TOTAL DIESEL OIL			58.7	11.686	-67.836	10.055	52.70
M.E.L.O.SUMP TK	73.0	0.900	11.8	1.226	-73.665	0.000	7.60
M.E.L.O.STOR.TK	73.0	0.900	17.6	14.586	-71.348	13.816	14.42
M.E.L.O.SETT.TK	74.0	0.900	17.5	14.610	-73.345	13.770	14.34
CYL.O.STOR.TK	73.0	0.900	20.8	14.597	-75.146	12.485	39.28
LOW TBN CYL.O.STOR.	74.0	0.900	10.3	14.595	-74.350	8.300	1.08
G.E.L.O.STOR.TK	73.0	0.900	5.1	14.580	-73.550	6.640	0.54
G.E.L.O.SETT.TK	73.0	0.900	5.1	14.580	-75.150	6.640	0.54
TOTAL LUB. OIL			88.3	12.803	-73.648	10.166	77.81
F.W.TK(P)	50.0	1.000	83.3	15.686	-85.964	-9.452	173.66
F.W.TK(S)	50.0	1.000	83.3	15.686	-85.964	9.452	173.66
TOTAL FRESH WATER			166.6	15.686	-85.964	0.000	347.32
BILGE HOLDING TK	50.0	1.000	14.9	0.658	-81.164	0.000	25.88
OILY BILGE TK	50.0	1.000	8.7	0.898	-74.526	-2.538	4.73
S/T L.O.DRAIN TK	50.0	1.000	1.0	1.469	-79.545	1.247	1.09
F.O.OVERFLOW TK	50.0	1.000	5.7	1.112	-66.852	-4.727	3.46
SLUDGE TK	50.0	1.000	5.8	7.670	-69.150	-9.115	2.57
SEWAGE HOLDING TK	50.0	1.000	3.0	8.850	-75.150	-9.930	0.54
TOTAL MISCELLANEOUS			39.1	2.476	-75.308	-3.347	38.26
PROVISION			2.8	20.750	-79.950	-8.670	0.00
DWT CONSTANT			123.8	13.150	-13.840	0.180	0.00
TOTAL BUNKERING			1477.4	13.937	-60.876	-0.804	1477.11

## CON3 : CONSUMABLE ARRIVAL CONDITION

WEIGHT ITEM	FILL %	S.G t/m3	WEIGHT t	V.C.G m	L.C.G m	T.C.G m	FRSM tm
H.F.O.STOR.TK(S)	33.5	0.980	62.4	8.214	-66.933	13.223	37.55
H.F.O.SETT.TK	98.0	0.980	35.7	15.565	-70.350	-12.930	5.65
H.F.O.SERV.TK	98.0	0.980	35.7	15.565	-67.150	-12.930	5.65
H.F.O.LOW SULP.SET.	98.0	0.980	32.9	15.565	-68.550	-7.870	11.25
H.F.O.LOW SULP.SER.	98.0	0.980	32.9	15.565	-66.550	-7.870	11.25
TOTAL HEAVY FUEL OIL			199.6	13.266	-67.787	-3.084	71.35
M.D.O.SERV.TK	40.0	0.850	11.7	14.408	-66.350	12.730	3.10
TOTAL DIESEL OIL			11.7	14.408	-66.350	12.730	3.10
M.E.L.O.SUMP TK	49.0	0.900	7.9	1.119	-73.721	0.000	7.60
M.E.L.O.STOR.TK	49.0	0.900	11.8	14.231	-71.347	13.809	14.42
M.E.L.O.SETT.TK	49.0	0.900	11.6	14.240	-73.344	13.753	14.34
CYL.O.STOR.TK	49.0	0.900	13.9	14.241	-75.146	12.459	39.28
LOW TBN CYL.O.STOR.	49.0	0.900	6.9	14.225	-74.350	8.300	1.08
G.E.L.O.STOR.TK	49.0	0.900	3.4	14.225	-73.550	6.640	0.54
G.E.L.O.SETT.TK	49.0	0.900	3.4	14.225	-75.150	6.640	0.54
TOTAL LUB. OIL			59.0	12.468	-73.654	10.148	77.81
F.W.TK(P)	10.0	1.000	16.7	13.968	-85.949	-9.145	173.66
F.W.TK(S)	10.0	1.000	16.7	13.968	-85.949	9.145	173.66
TOTAL FRESH WATER			33.3	13.968	-85.949	0.000	347.32
BILGE HOLDING TK	50.0	1.000	14.9	0.658	-81.164	0.000	25.88
OILY BILGE TK	50.0	1.000	8.7	0.898	-74.526	-2.538	4.73
S/T L.O.DRAIN TK	50.0	1.000	1.0	1.469	-79.545	1.247	1.09
F.O.OVERFLOW TK	50.0	1.000	5.7	1.112	-66.852	-4.727	3.46
SLUDGE TK	50.0	1.000	5.8	7.670	-69.150	-9.115	2.57
SEWAGE HOLDING TK	50.0	1.000	3.0	8.850	-75.150	-9.930	0.54
TOTAL MISCELLANEOUS			39.1	2.476	-75.308	-3.347	38.26
PROVISION			0.6	20.750	-79.950	-8.670	0.00
DWT CONSTANT			123.8	13.150	-13.840	0.180	0.00
TOTAL BUNKERING			467.1	12.318	-56.134	0.041	537.84

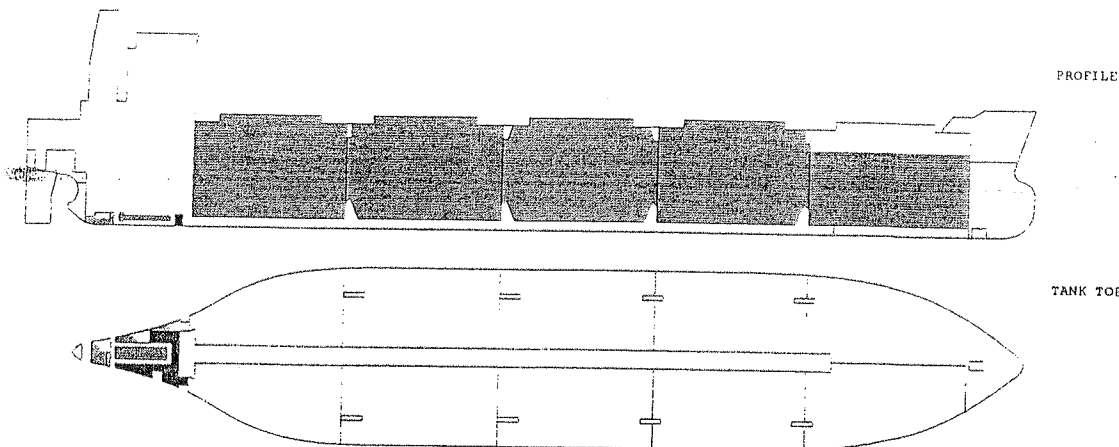
## 18.1 GRAIN [S.F=45] LOADING DEPARTURE TRIMMED CONDITION

WEIGHT ITEM	FILL %	S.G t/m3	WEIGHT t	V.C.G m	L.C.G m	T.C.G m	FRSM tm
CONTENTS=Grain load							
NO.1 CARGO HOLD	77.7	0.7974	8436.4	8.894	66.679	-0.004	0.0
NO.2 CARGO HOLD	100.0	0.7974	11859.0	10.513	38.061	-0.004	0.0
NO.3 CARGO HOLD	100.0	0.7974	11409.4	10.543	9.048	-0.001	0.0
NO.4 CARGO HOLD	100.0	0.7974	11861.4	10.513	-19.961	0.003	0.0
NO.5 CARGO HOLD	100.0	0.7974	11396.0	10.844	-49.303	0.003	0.0
TOTAL CARGOES			54962.3	10.339	5.795	-0.000	0.0
BUNKERING			2733.2	15.225	-51.141	-0.321	2325.3
TOTAL DEADWEIGHT			57695.5	10.571	3.098	-0.015	2325.3
LIGHTSHIP			10100.0	12.000	-7.322		
TOTAL DISPLACEMENT			67795.5	10.784	1.545	-0.013	2325.3

DRAFT MEAN = 12.983 m  
 DRAFT FORE = 11.922 m  
 DRAFT AFT = 14.043 m  
 DRAFT EQUIV. = 13.020 m  
 TOTAL TRIM = -2.121 m  
 KMT = 13.631 m  
 KG = 10.784 m  
 GM = 2.847 m  
 GGo = 0.034 m  
 GoM = 2.813 m

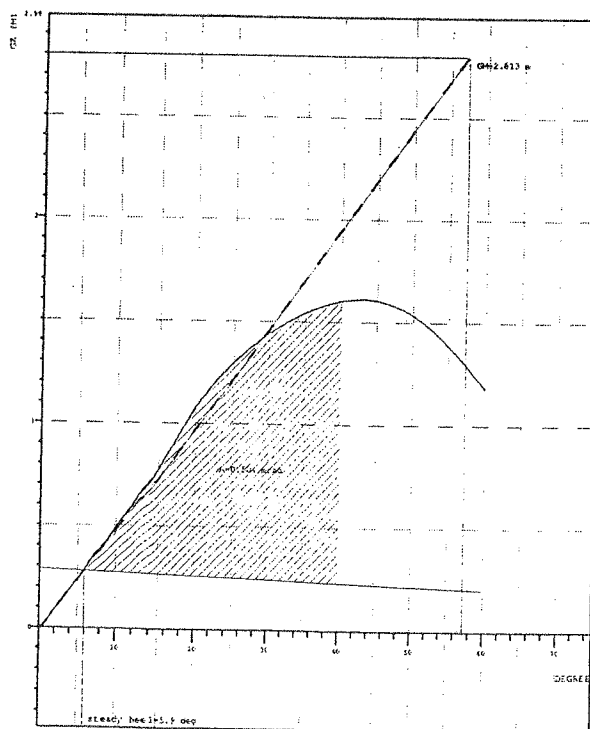
WATER DENSITY = 1.025  
 L.C.B = 1.491 m  
 L.C.F = -3.390 m  
 M.T.C = 803.2 TM/CM  
 T.P.C = 57.5 T/CM  
 HEEL.ANG. = -0.3 DEG  
 PROP. IMMER. = 226.3 %

GRAIN [S.F=45] LOADING DEPARTURE TRIMMED CONDITION



DEGREE	=	0.0	5.0	10.0	12.0	15.0	20.0	30.0	40.0	50.0	60.0
KN	=	0.000	1.177	2.371	2.850	3.573	4.777	6.850	8.556	9.822	10.546
KGo*SIN	=	0.000	0.943	1.879	2.249	2.800	3.700	5.409	6.954	8.287	9.369
GZ	=	0.000	0.234	0.492	0.601	0.773	1.077	1.441	1.602	1.535	1.177
AREA	=	0.000	0.010	0.041	0.060	0.096	0.177	0.401	0.669	0.947	1.187

STABILITY CURVE



CARGO HOLDS	HEELING MOM (TON-M)
NO.1 CARGO HOLD	16191
NO.2 CARGO HOLD	819
NO.3 CARGO HOLD	827
NO.4 CARGO HOLD	835
NO.5 CARGO HOLD	834
ACTUAL HEELING MOMENT	19506
ALLOWABLE HEELING MOMENT	43885

STABILITY CRITERION	ACTUAL	REQ
ANGLE OF HEEL DUE TO THE SHIFT OF GRAIN (DEG.)	5.9	12
RESIDUAL AREA (M-RAD)	0.504	0.075
INITIAL METACENTRIC HEIGHT GOM (M)	2.813	0.3
AREA 0 - 30	0.401	M-RAD
AREA 0 - 40	0.669	M-RAD
AREA 30 - 40	0.268	M-RAD
MAX. GZ	1.612	M
MAX. GZ OCCURS AT	42.7	DEG.
FLOODING ANGLE IS	60.0	DEG. OVER

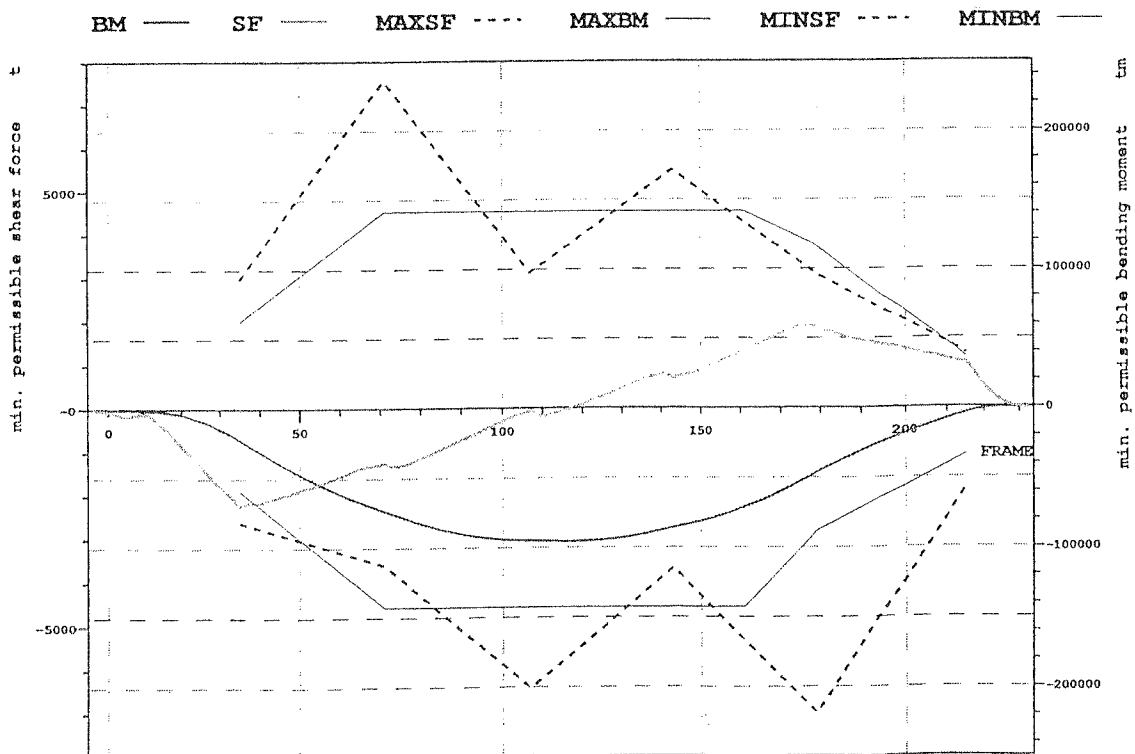
HEELING ARM AT 0 HEEL IS 0.288  
 HEELING ARM AT 40 DEG. IS 0.230

## GRAIN [S.F=45] LOADING DEPARTURE TRIMMED CONDITION

LONGITUDINAL STRENGTH VALUES ON THE BULKHEADS.

FR	X m	SF t	SF-PCT %	BM tm	BM-PCT %
35	26.90	-2219.6	85.2	-22025.0	37.6
71	56.42	-1237.9	34.4	-73300.7	51.4
107	85.94	-50.7	0.8	-94924.4	66.5
143	115.46	686.7	12.5	-85948.7	60.2
161	130.22	1324.3	31.0	-71307.8	50.0
179	144.98	1832.5	59.5	-46299.4	52.5
215	174.50	1038.0	83.6	-4088.1	12.2

			POSITION		
			X		Frame
Maximum Shear Force (+).....	1908.7 ton	59.4 %	143.3 m		177.0
Maximum Bending Moment (+).....	8.5 tonm	0.0 %	-1.2 m		-1.7
Maximum Shear Force (-).....	-2219.6 ton	85.2 %	26.9 m		35.0
Maximum Bending Moment (-).....	-95705.5 tonm	67.1 %	94.1 m		117.0
BM - Critical Position	Fr. 117.0	67.1 %			
SF - Critical Position	Fr. 35.0	85.2 %			



## 18.2 GRAIN [S.F=45] LOADING ARRIVAL TRIMMED CONDITION

WEIGHT ITEM	FILL %	S.G t/m3	WEIGHT t	V.C.G m	L.C.G m	T.C.G m	FRSM tm
CONTENTS=Grain load							
NO.1 CARGO HOLD	77.7	0.7974	8436.4	10.789	66.679	-0.004	0.0
NO.2 CARGO HOLD	100.0	0.7974	11859.0	10.513	38.061	-0.004	0.0
NO.3 CARGO HOLD	100.0	0.7974	11409.4	10.543	9.048	-0.001	0.0
NO.4 CARGO HOLD	100.0	0.7974	11861.4	10.513	-19.961	0.003	0.0
NO.5 CARGO HOLD	100.0	0.7974	11396.0	10.844	-49.303	0.003	0.0
TOTAL CARGOES			54962.3	10.630	5.795	-0.000	0.0
BUNKERING			467.1	12.318	-55.872	0.041	537.8
TOTAL DEADWEIGHT			55429.4	10.645	5.275	0.000	537.8
LIGHTSHIP			10100.0	12.000	-7.322		
TOTAL DISPLACEMENT			65529.4	10.854	3.334	0.000	537.8

DRAFT MEAN = 12.612 m  
 DRAFT FORE = 12.230 m  
 DRAFT AFT = 12.994 m  
 DRAFT EQUIV. = 12.624 m  
 TOTAL TRIM = -0.764 m  
 KMT = 13.594 m  
 KG = 10.854 m  
 GM = 2.740 m  
 GGo = 0.008 m  
 GoM = 2.732 m

WATER DENSITY = 1.025  
 L.C.B = 3.305 m  
 L.C.F = -3.044 m  
 M.T.C = 794.2 TM/CM  
 T.P.C = 57.3 T/CM  
 HEEL.ANG. = 0.0 DEG  
 PROP. IMMER. = 209.3 %