JEIS2002 General Arrangement Technical Appendix **2025**

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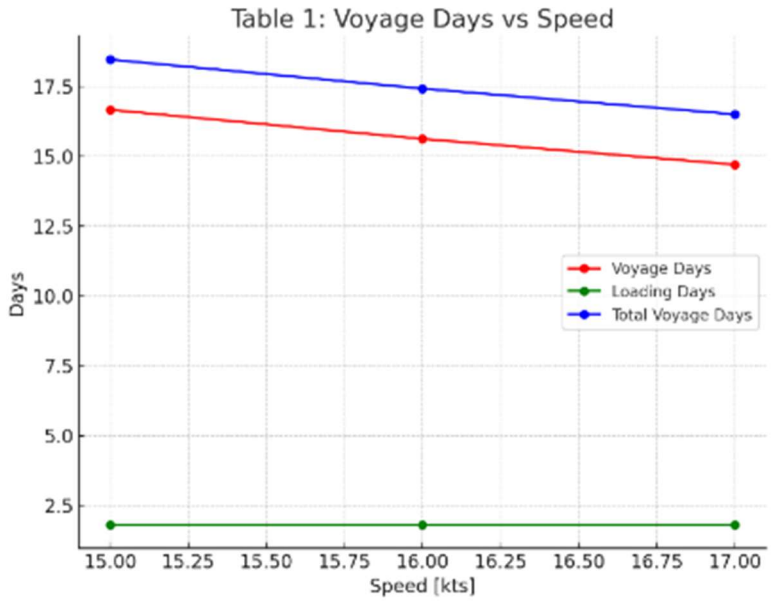
Techno-Economic Study

Table 1: Base Calculations

Speed, V [kts]	Voyage Days	Loading Days	Total Voyage Days	Voyages per Year	Sea Days per Year
15	16.6666667	1.8	18.46666667	18.95	315.88
16	15.625	1.8	17.425	20.08	313.85
17	14.7058824	1.8	16.50588235	21.20	311.83



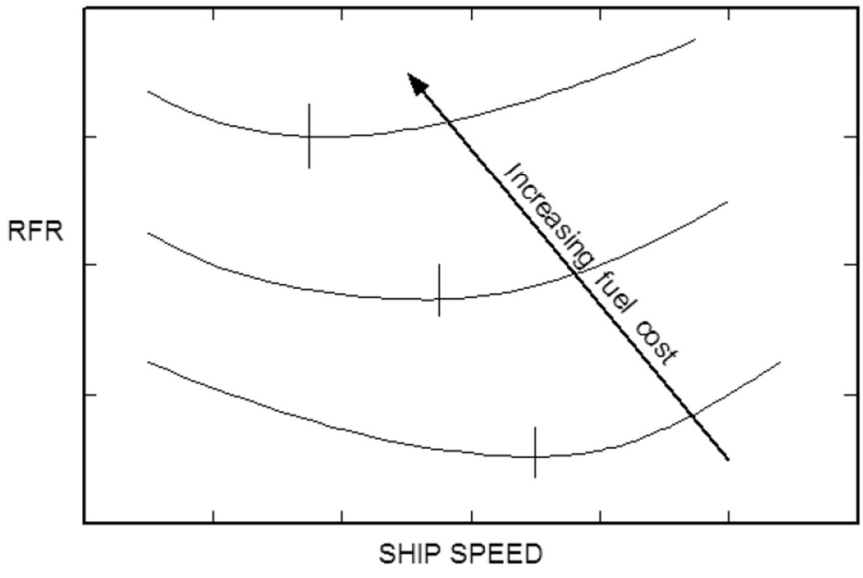
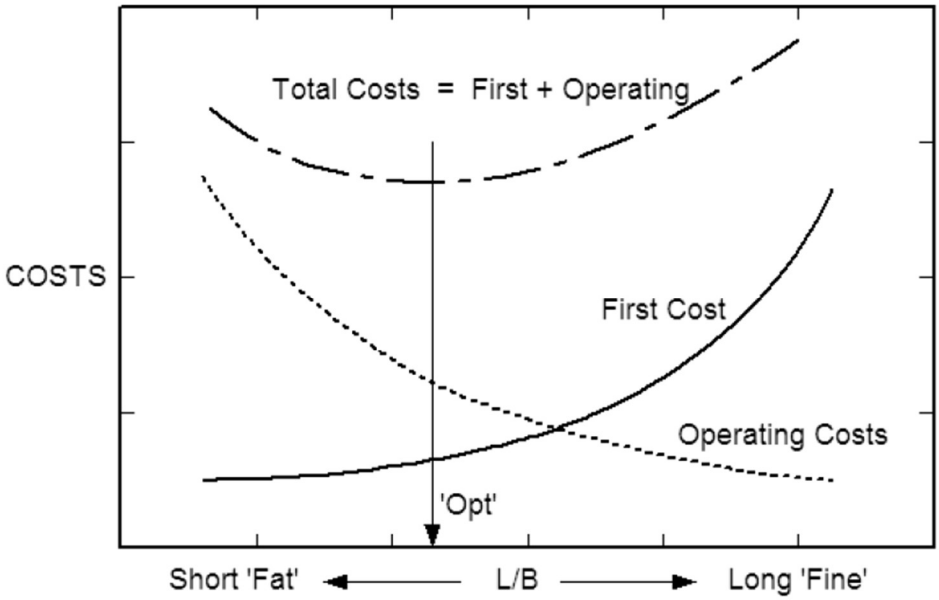


Figure 1: Influence on RFR of varying ship speed and fuel costs



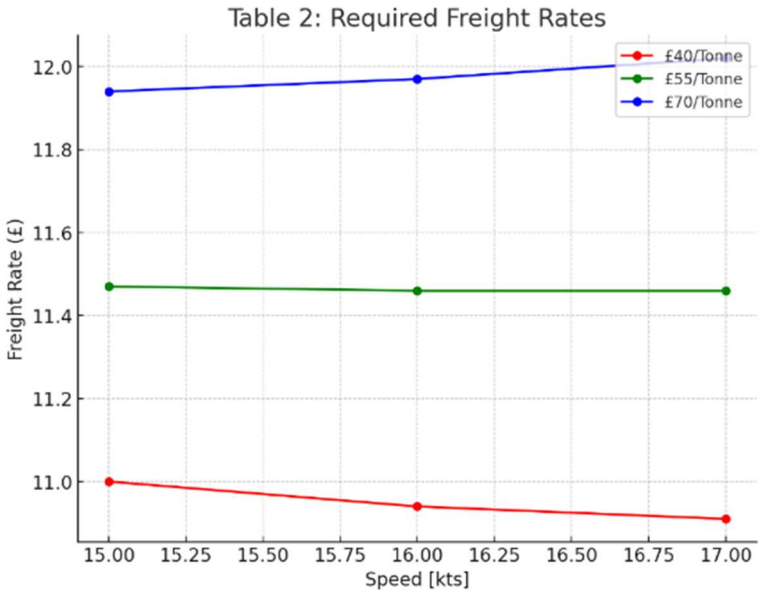
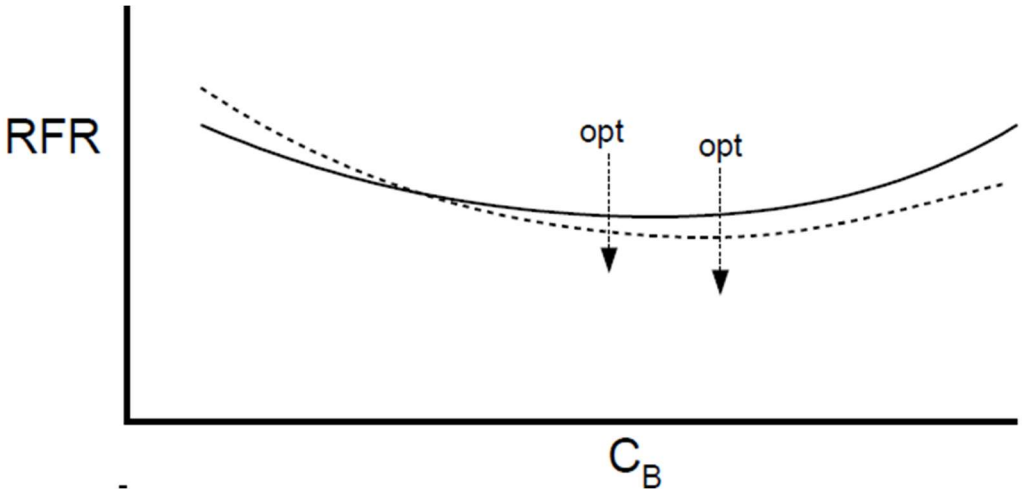


Figure 2: Influence of L/B on ship costs.



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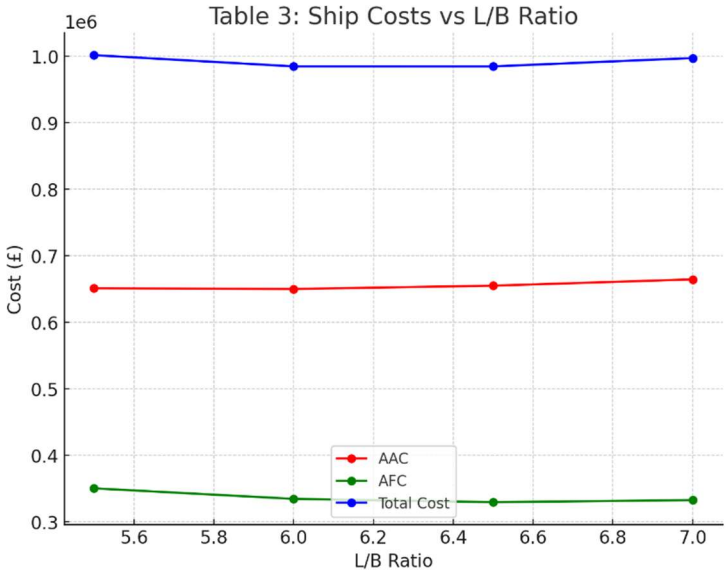


Figure 3: Required Freight Rate against CB

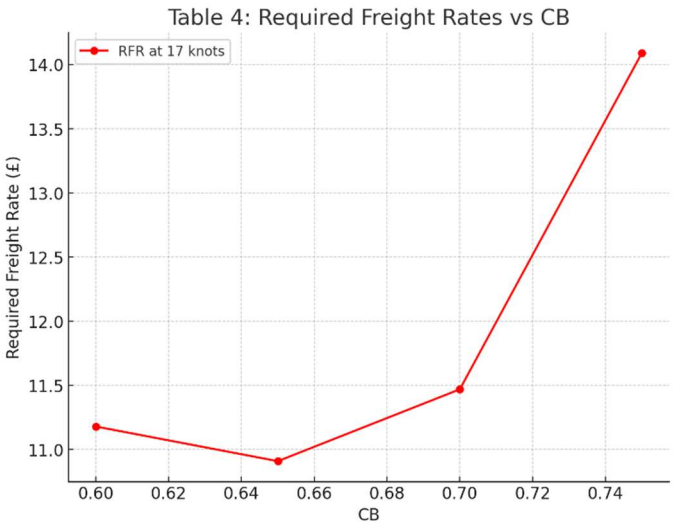


Table 2: Ship Dimensions

	ShipDes	Maxsurf	% Difference
LBP [m]	135.4	137.785	1.730957651
B mld [m]	20.83	20.774	-0.269567729
D mld [m]	12.92	13.08	1.22324159
D mid deck [m]	7.5	7.5	0
T (load) [m]	9.05	9.050	0
C_B (load)	0.653	0.653	0
Displacement [tonnes]	17074	17185	0.645912133
Cargo DW[tonnes]	10500		
Total DW[tonnes]	11749		
Machinery Mass [tonnes]	726		
Outfit Mass [tonnes]	1156		
Steel Mass [tonnes]	3338		
Lightship Mass [tonnes]	5325		
$(C_w)_f$ at depth D_1		0.788	
Service Speed [knots]	17		
Endurance [nm]	12000		
Range [nm]	6000		
Installed Power [kW]	7116		
Service Power [kW]	5474		

APPENDIX A – Techno-Economics

Table 3: Required Freight Rates for a range of ship speeds and fuel prices

Speed	£40/Tonne	£55/Tonne	£70/Tonne
15	11.00	11.47	11.94
16	10.94	11.46	11.97
17	10.91	11.46	12.02

Table 4: Ship costs for a range of L/B ratios.

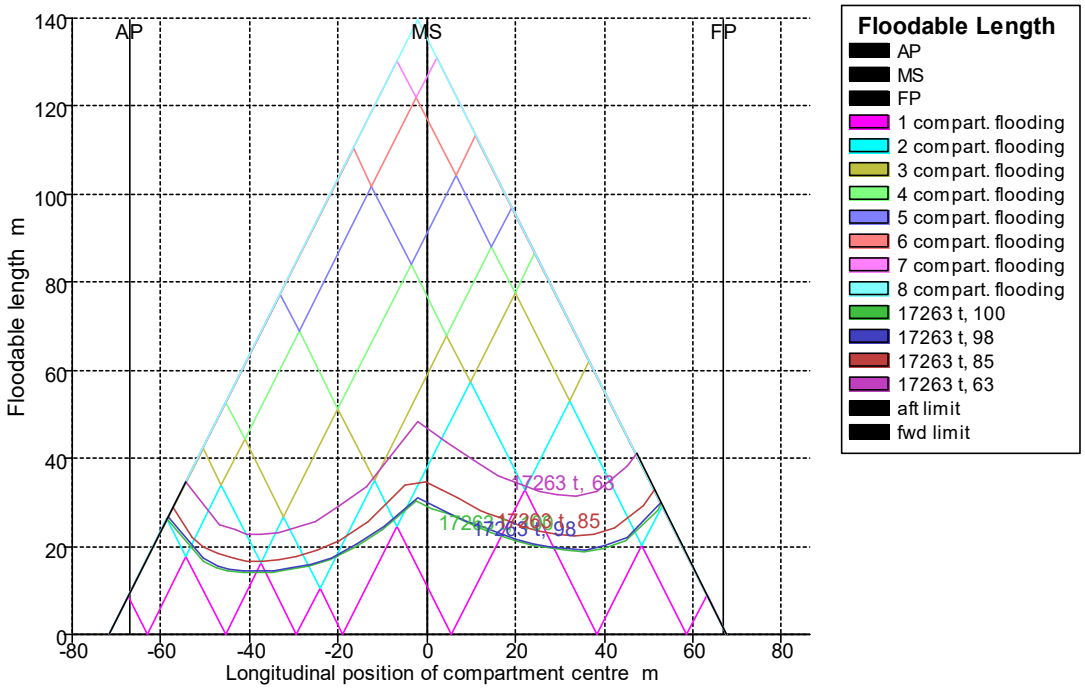
L/B	AAC	AFC	Total Cost
5.5	651194.97	350446.66	1001641.6
6.0	650129.66	334629.99	984759.65
6.5	655073.67	329631.26	984704.93
7.0	664567.42	332738.99	997306.41

Table 5: Required freight rates for a range of C_B values at the optimum L/B ratio.

C_B	RFR
0.60	11.18
0.65	10.91

0.70	11.47
0.75	14.09
0.80	Out of range
0.85	Out of range

APPENDIX B – Floodable Length Curve (Please plot graph rather than use screenshot)



APPENDIX C – EEDI

Table C1: Main and Auxiliary Engine Data

Installed Power MPP [kW]	**6990**
PME [kW]	**5242.5**
PAE [kW]	**262.125**
SFC ME [g/KWh]	**171**
SFC AE [g/KWh]	**215**
CF HFO	**3.114**
CF DO	**3.206**
Ship Design Speed [knots]	**16**

Table C2: Deadweight components

Cargo DWT	**10500**
OF [t]	**950**
DO [t]	**150**
LO [t]	**50**
FW [t]	**200**
Stores [t]	**100**
Crew/PX/Sundries [t]	**50**
Swimming Pool Water [t]	**43.4**
Total DWT	**12043.4**

Table C3: EEDI values

Install power = 6990kW (6 cylinder type satisfy 6690kw requirement)

P_{ME} = 6990 × 0.75 = 5242.5 kW

P_{AE} = P_{ME} · 0.05 = 262.125 kW

SFC_{AE} = 215 SFC_{ME} = 171 CF_{HFO} = 3.144 CF_{DO} = 3.206

V = 16knot

DWT = 12043.4 t

According to the formula,

$$EEDI = \frac{5242.5 \times 3.144 \times 171 + 262.125 \times 3.206 \times 215}{12043.4 \times 16}$$

= 15.564

Type, cargo, So a = 107.48 c = 0.216

So $EEDI_{ref}$ = $107.48 \times 12043.4^{-0.216}$

= 14.122

not satisfy. So we add more ballast water to increase DWT to 13700

EEDI = 13.68

$EEDI_{ref}$ = 13.734 13734

SO we need extra about 1700 ton ballast water or cargo or other things to increase the DWT to make EEDI < $EEDI_{ref}$

EEDI [g/t-nm]	**13.68**
Reference EEDI [g/t-nm]	**13.734**

APPENDIX D – Tonnage

$$GT = K_1 V$$

$$NT = K_2 V_c \left(\frac{4T}{3D}\right)^2 + K_3 \left[N_1 + \frac{N_2}{10}\right]$$

Table D1: Ship volumes

Underdeck Volume [m^3]	**19181.015**
Forecastle volume [m^3]	**1166.956**
Superstructure volume Deck1 [m^3]	1168.75
Superstructure volume Deck2 [m^3]	1111.15
Superstructure volume Deck3 [m^3]	**894.1**
Superstructure volume Deck4 [m^3]	772.9
Superstructure volume Deck5 [m^3]	580.75
Total Superstructure volume [m^3]	**4527.65**

Table D2: Values used in tonnage calcs

K1 = 0.2 + 0.02 log10V

K_2 = 0.2 + 0.02 log10 V_c

K_1	**0.3079**
V	**24875.621**
K_2	**0.30623**
V_c	**20499.621**
$\left(\frac{4T}{3D}\right)$	**0.97222**
K_3	**1.25**
N_1	**46**
N_2	**0**

Table D3: Tonnage Values

GT	**7659.588**
NT	**5990.91**

APPENDIX E – Freeboard

Ship Type	B
Tabular Freeboard [mm]	1979
Correction to the freeboard for ships under 100 m in length	0
Correction for block coefficient	1.032
Correction for depth	766.75
Correction for position of deck line	0
Correction for recess in freeboard deck	0
Correction for Superstructure and Trunks	-328.49
Correction for Sheer	356.3
Minimum Summer freeboard [mm]	2836.888
Minimum Bow Height [mm]	5806.74

d_1 **[m]**	10.2
$C_B@d_1$	0.724
C_{wf}	0.768
Width of Superstructure [m]	18
Length of Superstructure on main deck [m]	26.6
Forecastle height [m]	2.63
Forecastle length [m]	27.3
Effective Superstructure Length [m]	53.2

Station	Factor	Ideal	Actual	Ideal *Factor	Actual *factor	Ideal	Actual	Deficit	Average	Sheer Corr
AP	1	1366.67	0	1366.67	0	3646.22	0	455.78	549.73	356.3
1/6L from AP	3	606.8	0	1820.34	0					
1/3L from AP	3	153.07	0	459.21	0					
Amidships	1	0	0	0	0					
Amidships	1	0	0	0	0	7292.52	1423.09	733.68		
1/3L from FP	3	306.133	0	918.39	0					
1/6L from FP	3	1213.6	141.03	3640.8	423.09					
FP	1	2733.33	1000	2733.33	1000					

APPENDIX F – General Arrangement Results (Engine Room Length, Capacities, Water ballast CG)

Figure F1: Plot of Engine Room Length against Power

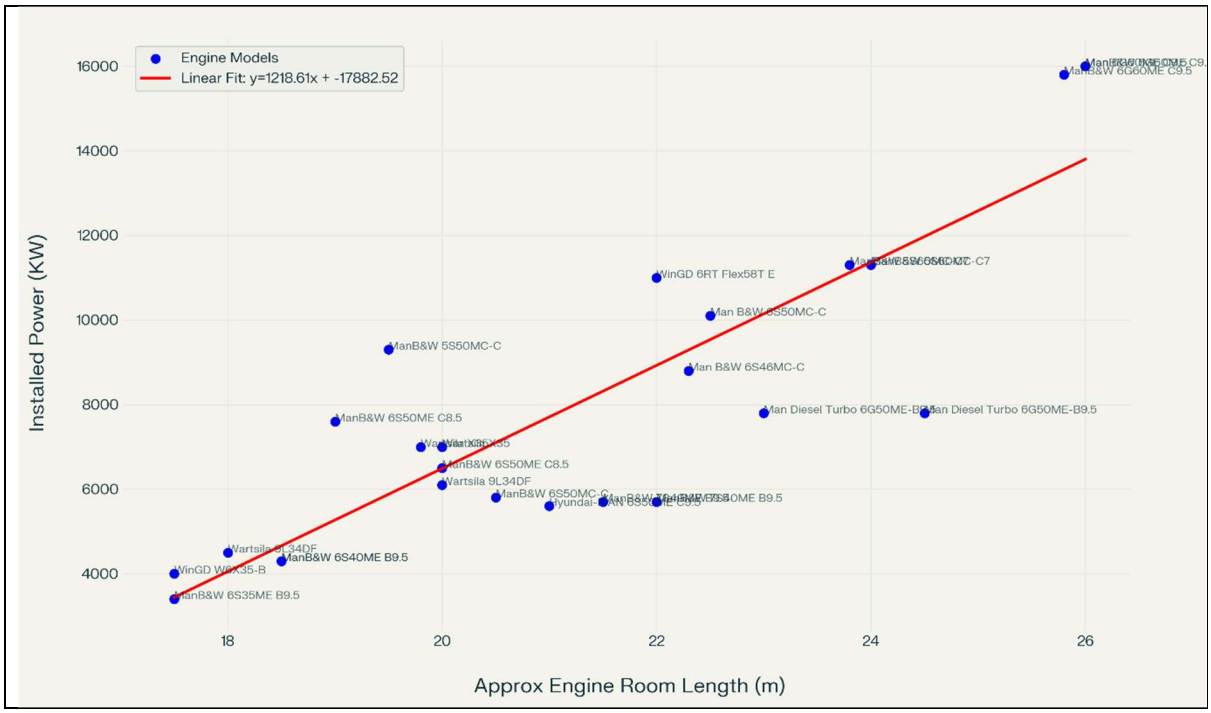


Figure F2: Engine Layout Diagram showing required power.

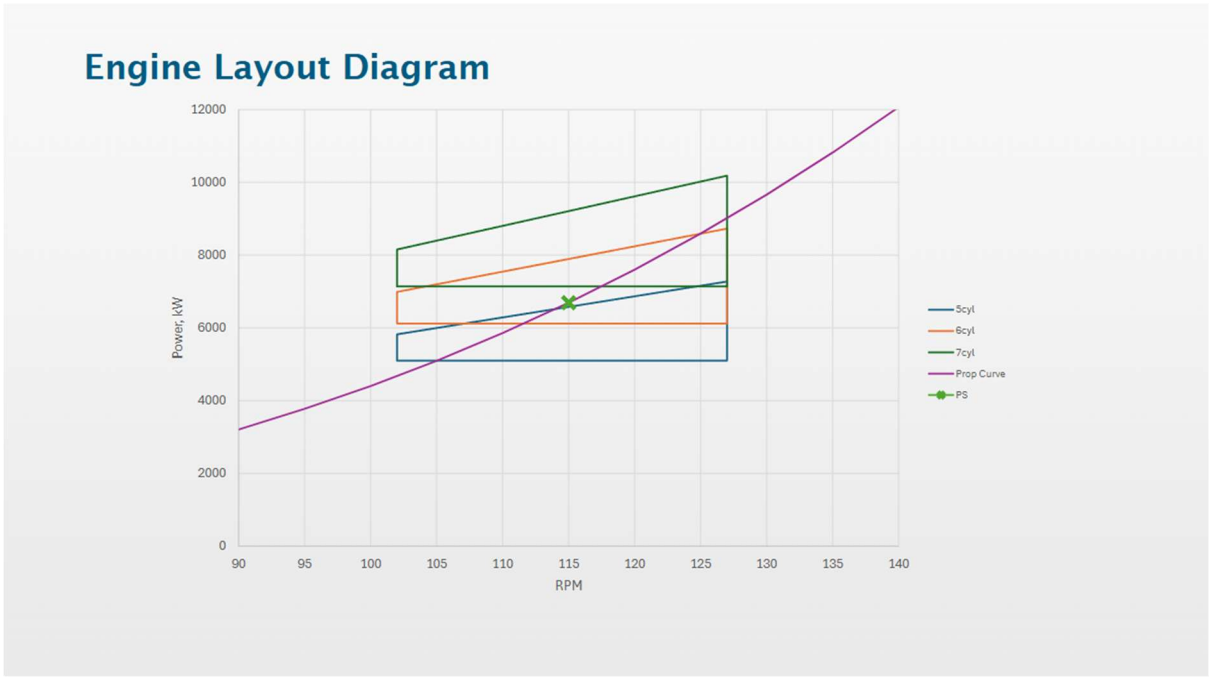


Table F0 – Frame spacing

Ship length	Lloyds req. frame spacing (m)	Chosen frame spacing -l (m)	Number of frames - n at spacing - l	n x l
FP to .05L	0. 6	0. 6	12. 0000	7. 2
.05L to .2 L from FP	0. 693	0. 6	32	19. 2
.2L to .25L from FP	0. 0733	0. 7	10	7
.25L from FP to .15L from AP	0. 0733	0. 7	115	80. 5
.15L to .05L from AP	0. 733	0. 7	19	13. 3
.05L to AP	0. 6	0. 6	12	7. 2
			TOTAL	134.4

Table F1: Bulkheads

Name	Location
1	-63.200
2	-45.500
3	-29.400
4	-18.900
5	5.600
6	38.500
7	58.600

Table F2: Room Definitions

	Name	Type	Intact Perm. %	Damaged Perm. %	Specific gravity	Fluid type	Boundary Surfaces	Aft m	Fore m	F.Port m	F.Stbd. m	F.Top m	F.Bott. m	A.Port m	A.Stbd. m	A.Top m	A.Bott. m	Formed	Calibrated
1	ER	Compartm	85	85			none	-45.500	-29.400	-10.500	10.500	12.000	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	No
2	Shaft Tunnel	Compartm	85	85			none	-63.200	-45.500	-2.000	2.000	4.000	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	No
3	STL	Compartm	85	85			none	-63.200	-45.500	-10.500	-2.000	4.000	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	No
4	STR	Compartm	85	85			none	-63.200	-45.500	2.000	10.500	4.000	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	No
5	Fore peak	Tank	98	98	1.025		none	58.600	67.000	-10.500	10.500	8.750	0.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
6	Aft peak	Tank	98	98	1.025		none	-67.000	-63.200	-10.500	10.500	8.750	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
7	hold1	Tank	90	63	0.625		none	38.500	58.600	-10.500	10.500	12.000	3.500	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
8	hold2	Tank	91	63	0.625		none	5.600	38.500	-10.500	10.500	12.000	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
9	FO	Tank	98	98	0.93		none	-29.400	-18.900	-3.000	3.000	10.800	3.300	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
10	FO-L	Tank	98	98	0.93		none	-29.400	-18.900	-7.000	-3.000	10.800	3.300	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
11	FO-R	Tank	98	98	0.93		none	-29.400	-18.900	3.000	7.000	10.800	3.300	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
12	LO	Tank	98	98	0.9		none	-29.400	-18.900	-1.000	1.000	3.300	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
13	LO-L	Tank	98	98	0.9		none	-29.400	-18.900	-2.000	-1.000	3.300	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
14	LO-R	Tank	98	98	0.9		none	-29.400	-18.900	1.000	2.000	3.300	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
15	DO	Tank	98	98	0.85		none	-29.400	-18.900	-4.000	4.000	12.000	10.800	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
16	DOL	Tank	98	98	0.85		none	-29.400	-18.900	-8.000	-4.000	12.000	10.800	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
17	DOR	Tank	98	98	0.85		none	-29.400	-18.900	4.000	8.000	12.000	10.800	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
18	FWL	Tank	98	98	1		none	-29.400	-18.900	-10.500	-8.500	10.000	3.300	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
19	FWR	Tank	98	98	1		none	-29.400	-18.900	8.500	10.500	10.000	3.300	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
20	hold4	Tank	95	63	0.625		none	-63.200	-45.500	-10.500	10.500	12.000	4.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
21	hold3	Tank	95	63	0.625		none	-18.900	5.600	-10.500	10.500	13.000	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
22	DB3	Tank	98	98	1.025		none	-14.700	5.600	-10.500	10.500	1.200	0.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
23	DB2	Tank	98	98	1.025		none	5.600	38.500	-10.500	10.500	1.200	0.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
24	DB1	Tank	98	98	1.025		none	38.500	58.600	-10.500	10.500	3.500	0.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
25	Steering Gear	Compartm	85	85			none	-71.759	-63.200	-10.500	10.500	12.000	8.750	Prismatic	Prismatic	Prismatic	Prismatic	Yes [16 sects]	No
26	Chain Locker	Compartm	85	85			none	58.600	67.711	-10.500	10.500	16.000	8.750	Prismatic	Prismatic	Prismatic	Prismatic	Yes [17 sects]	No
27	DBBT	Tank	98	98	1.025		none	-29.400	-18.900	-10.500	10.500	1.200	0.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
28	DBER	Tank	98	98	1.025		none	-45.500	-29.400	-10.500	10.500	1.200	0.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
29	DBH4	Tank	98	98	1.025		none	-51.800	-45.500	-10.500	10.500	1.200	0.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
30	DBSL	Tank	98	98	1.025		none	-29.400	-18.900	-10.500	-2.000	3.300	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
31	DBSR	Tank	98	98	1.025		none	-29.400	-18.900	2.000	10.500	3.300	1.200	Prismatic	Prismatic	Prismatic	Prismatic	Yes [13 sects]	Yes
32	forecastle	Tank	91	63	0.63		none	5.600	58.600	-10.500	10.500	16.000	12.000	Prismatic	Prismatic	Prismatic	Prismatic	Yes [16 sects]	Yes

Table F3: Fluid Volumes

Name	Total Mass tonne	Total Vol. m^3	Long. Arm m	Trans. Arm m	Vert. Arm m
Fore peak	134.857	131.568	61.135	0	5.745
DB1	539.083	525.935	46.007	0	2.036
DB2	609.712	594.841	20.905	0	0.667
DB3	409.663	399.671	-4.442	0	0.666

Aft Tank	24.525	23.927	-63.52	0	1.2
Total Fixed	**1717.84**	**1675.942**	24.675	0.000	1.595
DBBT	168.619	164.506	-23.894	0	0.674
DBER	152.532	148.811	-36.309	0	0.689
DBH4	27.941	27.259	-48.37	0	0.713
DBSR	157.704	153.857	-23.97	5.586	2.286
DBSL	157.704	153.857	-23.97	-5.586	2.286
Total Trimming	**664.5**	**648.29**	-27.809	0.000	1.444
FO	430.637	463.05	-24.15	0	7.05
FO-L	287.091	308.7	-24.15	-5	7.05
FO-R	287.091	308.7	-24.15	5	7.05
Total FO	**1004.819**	**1080.45**	-24.150	0.000	7.050
DO	83.966	98.784	-24.15	0	11.4
DOL	41.983	49.392	-24.15	-6	11.4
DOR	41.983	49.392	-24.15	6	11.4
Total DO	**167.932**	**197.568**	-24.150	0.000	11.400
LO	38.896	43.218	-24.15	0	2.25
LO-L	19.448	21.609	-24.15	-1.5	2.25
LO-R	19.448	21.609	-24.15	1.5	2.25
Total LO	**77.792**	**86.436**	-24.150	0.000	2.250
FWL	122.957	122.957	-23.92	-9.411	6.857
FWR	122.957	122.957	-23.92	9.411	6.857
Total FW	**245.914**	**245.914**	-23.929	0.000	6.857

1500T ballast water CG in 25.9m

	Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Unit Volume m^3	Total Volume m^3	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m	FSM Type
1	Lightship	0	5162.440	0.000			-8.500	0.000	10.010	0.000	User Specifie
2	Fore peak	100%	134.857	134.857	131.568	131.568	61.135	0.000	5.745	0.000	Maximum
3	Aft peak	0%	24.525	0.000	23.927	0.000	-63.522	0.000	1.200	0.000	Maximum
4	hold1	0%	1187.668	0.000	1900.268	0.000	46.545	0.000	3.500	0.000	Maximum
5	hold2	0%	4076.668	0.000	6522.669	0.000	21.118	0.000	1.200	0.000	Maximum
6	FO	0%	430.637	0.000	463.050	0.000	-24.150	0.000	3.300	0.000	Maximum
7	FO-L	0%	287.091	0.000	308.700	0.000	-24.150	-5.000	3.300	0.000	Maximum
8	FO-R	0%	287.091	0.000	308.700	0.000	-24.150	5.000	3.300	0.000	Maximum
9	LO	0%	38.896	0.000	43.218	0.000	-24.150	0.000	1.200	0.000	Maximum
10	LO-L	0%	19.448	0.000	21.609	0.000	-24.150	-1.500	1.200	0.000	Maximum
11	LO-R	0%	19.448	0.000	21.609	0.000	-24.150	1.500	1.200	0.000	Maximum
12	DO	0%	83.966	0.000	98.784	0.000	-24.150	0.000	10.800	0.000	Maximum
13	DOL	0%	41.983	0.000	49.392	0.000	-24.150	-6.000	10.800	0.000	Maximum
14	DOR	0%	41.983	0.000	49.392	0.000	-24.150	6.000	10.800	0.000	Maximum
15	FWL	0%	122.957	0.000	122.957	0.000	-23.346	-9.157	3.300	0.000	Maximum
16	FWR	0%	122.957	0.000	122.957	0.000	-23.346	9.157	3.300	0.000	Maximum
17	hold4	0%	957.864	0.000	1532.583	0.000	-51.597	0.000	4.000	0.000	Maximum
18	hold3	0%	3306.808	0.000	5290.892	0.000	-6.511	0.000	1.200	0.000	Maximum
19	DB3	100%	409.663	409.663	399.671	399.671	-4.442	0.000	0.666	0.000	Maximum
20	DB2	100%	609.712	609.712	594.841	594.841	20.905	0.000	0.667	0.000	Maximum
21	DB1	100%	539.083	539.083	525.935	525.935	46.007	0.000	2.036	0.000	Maximum
22	DBBT	0%	168.619	0.000	164.506	0.000	-26.318	0.000	0.000	0.000	Maximum
23	DBER	0%	152.532	0.000	148.811	0.000	-39.543	0.000	0.000	0.000	Maximum
24	DBH4	0%	27.941	0.000	27.259	0.000	-47.581	0.000	0.000	0.000	Maximum
25	DBSR	0%	157.704	0.000	153.857	0.000	-23.886	5.138	1.200	0.000	Maximum
26	DBSL	0%	157.704	0.000	153.857	0.000	-23.886	-5.138	1.200	0.000	Maximum
27	forecastle	0%	735.182	0.000	1166.956	0.000	29.292	0.000	12.000	0.000	Maximum
28	**Total Loadcase**			**1693.315**	**20347.971**	**1652.015**	**25.968**	**0.000**	**1.507**	**0.000**	
29	**FS correction**								**0.000**		
30	**VCG fluid**								**1.507**		

Table F4: Cargo Capacity

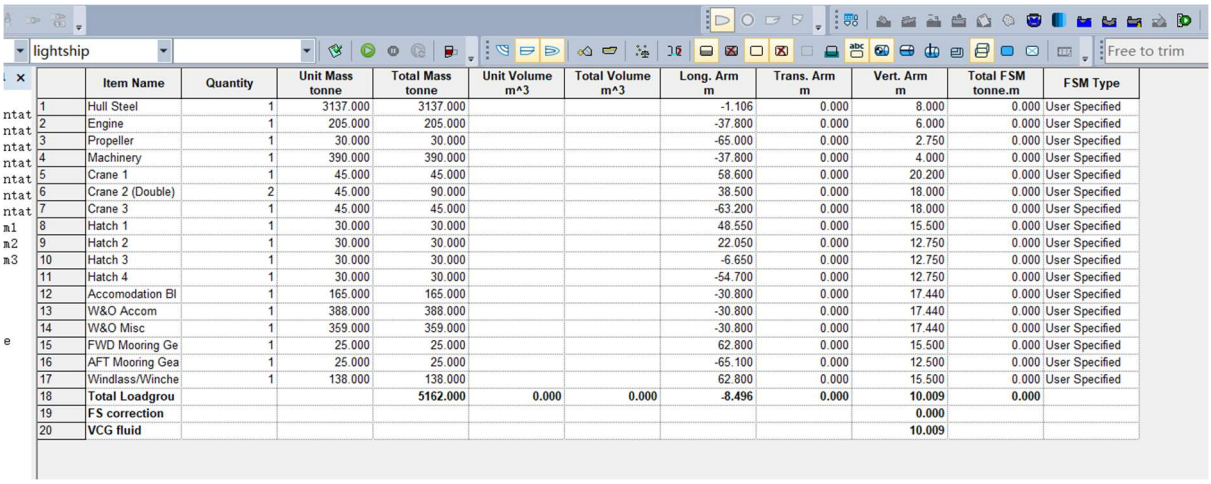
Name	Total Mass tonne	Total Vol. m^3	Long. Arm m	Trans. Arm m	Vert. Arm m
Hold 1	1187.668	1900.268	46.938	0	7.942
Hold 2	4076.668	6522.669	21.628	0	6.666
Hold 3	3306.808	5290.892	-6.622	0	6.675
Hold 4	957.864	1532.583	-52.87	0	8.715
Forecastle	735.182	1166.956	41.836	0	13.207
Total Cargo	10264.19	16413.368	9.950	0.000	7.476

NEED (10500-0.9*10264.19)/12 =106 CONTAINER in the deck

APPENDIX G Intact and Damage Stability

Lightship VCG and LCG

Table G1 – Lightship Loadcase (including CoGs)



	Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Unit Volume m^3	Total Volume m^3	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m	FSM Type
1	Hull Steel	1	3137.000	3137.000			-1.106	0.000	8.000	0.000	User Specified
2	Engine	1	205.000	205.000			-37.800	0.000	6.000	0.000	User Specified
3	Propeller	1	30.000	30.000			-65.000	0.000	2.750	0.000	User Specified
4	Machinery	1	390.000	390.000			-37.800	0.000	4.000	0.000	User Specified
5	Crane 1	1	45.000	45.000			58.600	0.000	20.200	0.000	User Specified
6	Crane 2 (Double)	2	45.000	90.000			38.500	0.000	18.000	0.000	User Specified
7	Crane 3	1	45.000	45.000			-63.200	0.000	18.000	0.000	User Specified
8	Hatch 1	1	30.000	30.000			48.550	0.000	15.500	0.000	User Specified
9	Hatch 2	1	30.000	30.000			22.050	0.000	12.750	0.000	User Specified
10	Hatch 3	1	30.000	30.000			-6.650	0.000	12.750	0.000	User Specified
11	Hatch 4	1	30.000	30.000			-54.700	0.000	12.750	0.000	User Specified
12	Accomodation Bl	1	165.000	165.000			-30.800	0.000	17.440	0.000	User Specified
13	W&O Accom	1	388.000	388.000			-30.800	0.000	17.440	0.000	User Specified
14	W&O Misc	1	359.000	359.000			-30.800	0.000	17.440	0.000	User Specified
15	FWD Mooring Ge	1	25.000	25.000			62.800	0.000	15.500	0.000	User Specified
16	AFT Mooring Gea	1	25.000	25.000			-65.100	0.000	12.500	0.000	User Specified
17	Windlass/Winche	1	138.000	138.000			62.800	0.000	15.500	0.000	User Specified
18	**Total Loadgrou**			**5162.000**	**0.000**	**0.000**	**-8.496**	**0.000**	**10.009**	**0.000**	
19	**FS correction**								**0.000**		
20	**VCG fluid**								**10.009**		

Load cases (Full load and Ballast) – Hydrostatics (inc Trim)

Table G2 – Full Load Loadcase (including CoGs)

fullload

	Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Unit Volume m^3	Total Volume m^3	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m	FSM Type
1	Lightship	1	5162.440	5162.440			-8.500	0.000	10.010	0.000	User Specified
2	Fore peak	0%	134.857	0.000	131.568	0.000	58.648	0.000	0.317	0.000	Maximum
3	Aft peak	100%	24.525	24.525	23.927	23.927	-64.597	0.000	7.673	0.000	Maximum
4	hold1	100%	1187.668	1187.668	1900.268	1900.268	46.938	0.000	7.942	0.000	Maximum
5	hold2	100%	4076.668	4076.668	6522.669	6522.669	21.628	0.000	6.666	0.000	Maximum
6	FO	100%	430.637	430.637	463.050	463.050	-24.150	0.000	7.050	0.000	Maximum
7	FO-L	100%	287.091	287.091	308.700	308.700	-24.150	-5.000	7.050	0.000	Maximum
8	FO-R	100%	287.091	287.091	308.700	308.700	-24.150	5.000	7.050	0.000	Maximum
9	LO	100%	38.896	38.896	43.218	43.218	-24.150	0.000	2.250	0.000	Maximum
10	LO-L	100%	19.448	19.448	21.609	21.609	-24.150	-1.500	2.250	0.000	Maximum
11	LO-R	100%	19.448	19.448	21.609	21.609	-24.150	1.500	2.250	0.000	Maximum
12	DO	100%	83.966	83.966	98.784	98.784	-24.150	0.000	11.400	0.000	Maximum
13	DOL	100%	41.983	41.983	49.392	49.392	-24.150	-6.000	11.400	0.000	Maximum
14	DOR	100%	41.983	41.983	49.392	49.392	-24.150	6.000	11.400	0.000	Maximum
15	FWL	100%	122.957	122.957	122.957	122.957	-23.929	-9.411	6.857	0.000	Maximum
16	FWR	100%	122.957	122.957	122.957	122.957	-23.929	9.411	6.857	0.000	Maximum
17	hold4	100%	957.864	957.864	1532.583	1532.583	-52.870	0.000	8.715	0.000	Maximum
18	hold3	100%	3306.808	3306.808	5290.892	5290.892	-6.622	0.000	6.675	0.000	Maximum
19	DB3	0%	409.663	0.000	399.671	0.000	5.485	0.000	0.000	0.000	Maximum
20	DB2	0%	609.712	0.000	594.841	0.000	38.313	0.000	0.000	0.000	Maximum
21	DB1	0%	539.083	0.000	525.935	0.000	55.495	0.000	0.000	0.000	Maximum
22	DBBT	100%	168.619	168.619	164.506	164.506	-23.894	0.000	0.674	0.000	Maximum
23	DBER	100%	152.532	152.532	148.811	148.811	-36.309	0.000	0.689	0.000	Maximum
24	DBH4	0%	27.941	0.000	27.259	0.000	-45.536	0.000	0.000	0.000	Maximum
25	DBSR	100%	157.704	157.704	153.857	153.857	-23.970	5.586	2.286	0.000	Maximum
26	DBSL	100%	157.704	157.704	153.857	153.857	-23.970	-5.586	2.286	0.000	Maximum
27	forecastle	100%	735.182	735.182	1166.956	1166.956	41.836	0.000	13.207	0.000	Maximum
28	**Total Loadcase**			**17584.172**	**20347.971**	**18668.696**	**0.197**	**0.000**	**7.985**	**0.000**	
29	**FS correction**								**0.000**		
30	**VCG fluid**								**7.985**		

Table G3 – Ballast Loadcase (including CoGs)

ballast-in-mid

	Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Unit Volume m^3	Total Volume m^3	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m	FSM Type
1	lightship	1	5162.000	5162.000			-8.496	0.000	10.009	0.000	
2	Fore peak	100%	134.857	134.857	131.568	131.568	61.135	0.000	5.745	0.000	Maximum
3	Aft peak	0%	24.525	0.000	23.927	0.000	-63.222	0.000	1.200	0.000	Maximum
4	hold1	0%	1187.668	0.000	1900.268	0.000	58.486	0.000	3.500	0.000	Maximum
5	hold2	0%	4076.668	0.000	6522.669	0.000	38.313	0.000	1.200	0.000	Maximum
6	FO	50%	430.637	215.318	463.050	231.525	-24.046	0.000	5.177	175.929	Maximum
7	FO-L	50%	287.091	143.545	308.700	154.350	-24.046	-5.000	5.177	52.127	Maximum
8	FO-R	50%	287.091	143.545	308.700	154.350	-24.046	5.000	5.177	52.127	Maximum
9	LO	50%	38.896	19.448	43.218	21.609	-23.778	0.000	1.733	6.306	Maximum
10	LO-L	50%	19.448	9.724	21.609	10.804	-23.778	-1.500	1.733	0.788	Maximum
11	LO-R	50%	19.448	9.724	21.609	10.804	-23.778	1.500	1.733	0.788	Maximum
12	DO	50%	83.966	41.983	98.784	49.392	-23.498	0.000	11.114	381.145	Maximum
13	DOL	50%	41.983	20.992	49.392	24.696	-23.498	-6.000	11.114	47.643	Maximum
14	DOR	50%	41.983	20.992	49.392	24.696	-23.498	6.000	11.114	47.643	Maximum
15	FWL	50%	122.957	61.479	122.957	61.479	-23.661	-9.347	5.233	6.900	Maximum
16	FWR	50%	122.957	61.479	122.957	61.479	-23.661	9.347	5.233	6.900	Maximum
17	hold4	0%	957.864	0.000	1532.583	0.000	-45.601	0.000	4.000	0.000	Maximum
18	hold3	0%	3306.808	0.000	5290.892	0.000	5.461	0.000	1.200	0.000	Maximum
19	DB3	100%	409.663	409.663	399.671	399.671	-4.442	0.000	0.666	0.000	Maximum
20	DB2	100%	609.712	609.712	594.841	594.841	20.905	0.000	0.667	0.000	Maximum
21	DB1	100%	539.083	539.083	525.935	525.935	46.007	0.000	2.036	0.000	Maximum
22	DBBT	0%	168.619	0.000	164.506	0.000	-18.960	0.000	0.000	0.000	Maximum
23	DBER	0%	152.532	0.000	148.811	0.000	-29.491	0.000	0.000	0.000	Maximum
24	DBH4	100%	27.941	27.941	27.259	27.259	-48.370	0.000	0.713	0.000	Maximum
25	DBSR	100%	157.704	157.704	153.857	153.857	-23.970	5.586	2.286	0.000	Maximum
26	DBSL	100%	157.704	157.704	153.857	153.857	-23.970	-5.586	2.286	0.000	Maximum
27	forecastle	0%	735.182	0.000	1166.956	0.000	57.873	0.000	12.000	0.000	Maximum
28	**Total Loadcase**			**7946.893**	**20347.971**	**2792.173**	**-3.358**	**0.000**	**7.450**	**778.296**	
29	**FS correction**								**0.098**		
30	**VCG fluid**								**7.548**		

Table G4 – Equilibrium draught and trim for Full load and Ballast loadcases (with comments if unable to meet requirements)

Results

fullload - Intact

1	Draft Amidships m	8.928
2	Displacement t	17584
3	Heel deg	0.0
4	Draft at FP m	8.870
5	Draft at AP m	8.986
6	Draft at LCF m	8.930
7	Trim (+ve by stern)	0.116
8	WL Length m	137.43
9	Beam max extents	21.072
10	Wetted Area m^2	3912.2
11	Waterpl. Area m^2	2269.6
12	Prismatic coeff. (Cp	0.685
13	Block coeff. (Cb)	0.660
14	Max Sect. area coef	0.971
15	Waterpl. area coeff.	0.784
16	LCB from zero pt. (	0.194
17	LCF from zero pt. (+	-2.798
18	KB m	4.823
19	KG fluid m	7.985
20	BMt m	4.042
21	BML m	142.38
22	GMt corrected m	0.881
23	GML m	139.22
24	KMt m	8.866
25	KML m	147.20
26	Immersion (TPc) ton	23.264
27	MTc tonne.m	182.69
28	RM at 1deg = GMt.	270.48
29	Max deck inclinatio	0.0497
30	Trim angle (+ve by s	0.0497

Results

ballast-in-mid - Intact

1	Draft Amidships m	4.527
2	Displacement t	7947
3	Heel deg	0.0
4	Draft at FP m	3.051
5	Draft at AP m	6.003
6	Draft at LCF m	4.539
7	Trim (+ve by stern)	2.952
8	WL Length m	129.70
9	Beam max extents	21.156
10	Wetted Area m^2	2684.2
11	Waterpl. Area m^2	2024.6
12	Prismatic coeff. (Cp	0.638
13	Block coeff. (Cb)	0.478
14	Max Sect. area coef	0.928
15	Waterpl. area coeff.	0.738
16	LCB from zero pt. (	-3.487
17	LCF from zero pt. (+	-0.548
18	KB m	2.514
19	KG fluid m	7.547
20	BMt m	7.730
21	BML m	231.00
22	GMt corrected m	2.696
23	GML m	225.96
24	KMt m	10.243
25	KML m	233.46
26	Immersion (TPc) ton	20.753
27	MTc tonne.m	134.01
28	RM at 1deg = GMt.	373.93
29	Max deck inclinatio	1.2622
30	Trim angle (+ve by s	1.2622

GZ curve (intact)

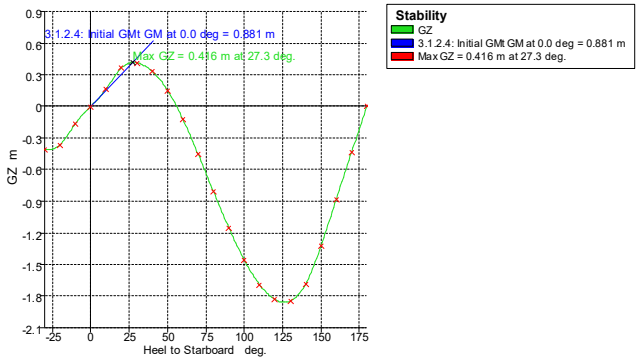
Table G5 – Large Angle Stability in Full Load against IMO criteria.

fullload | Intact | Free to trim

fullload - Intact

	Heel to Starboard deg	-30.0	-20.0	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0
1	GZ m	-0.413	-0.366	-0.162	0.000	0.162	0.366	0.413	0.332	0.152	-0.122	-0.456	-0.809	-1.152	-1.456	-1.691	-1.833	-1.846	-1.684	-1.325	-0.880	-0.432	0.000
2	Area under GZ curv	7.4648	3.4591	0.7588	0.0000	0.7605	3.4524	7.4896	11.298	13.800	14.015	11.155	4.8308	-4.9937	-18.075	-33.876	-51.590	-70.110	-87.928	-103.10	-114.15	-120.70	-122.85
3	Displacement t	17583	17583	17584	17584	17584	17584	17584	17584	17584	17584	17584	17584	17584	17584	17584	17583	17584	17584	17584	17584	17584	17585
4	Draft at FP m	9.092	8.931	8.883	8.869	8.883	8.932	9.092	9.396	9.935	10.811	12.453	17.256	n/a	2.233	-2.544	-4.189	-5.071	-5.569	-5.828	-5.871	-5.857	-5.845
5	Draft at AP m	9.009	8.821	8.941	8.986	8.941	8.822	9.009	9.627	10.737	12.630	16.348	27.241	n/a	15.070	4.171	0.470	-1.416	-2.674	-3.498	-3.899	-4.075	-4.123
6	WL Length m	137.48	137.24	137.38	137.43	137.38	137.24	137.48	138.05	138.71	138.82	137.99	136.69	132.55	128.24	128.14	126.73	130.27	130.48	130.57	130.58	130.57	130.57
7	Beam max extents	20.492	21.475	21.385	21.072	21.385	21.473	20.491	18.113	16.722	15.779	15.073	14.721	14.686	15.048	15.798	16.974	18.884	20.264	21.746	21.887	21.374	21.126
8	Wetted Area m^2	4237.6	4017.8	3916.8	3912.2	3916.8	4018.0	4237.7	4384.7	4485.6	4542.5	4580.8	4611.7	4634.1	4648.7	4657.6	4657.0	4667.9	4706.0	4690.6	4693.6	4707.0	4710.9
9	Waterpl. Area m^2	2058.6	2277.7	2301.4	2269.6	2301.4	2277.6	2058.6	1904.0	1762.1	1628.4	1540.2	1492.9	1484.1	1526.0	1594.1	1712.2	1861.5	2034.1	2109.2	2084.6	2038.2	2019.7
10	Prismatic coeff. (Cp	0.704	0.690	0.687	0.685	0.687	0.690	0.704	0.723	0.740	0.755	0.771	0.787	0.819	0.849	0.847	0.853	0.823	0.811	0.806	0.800	0.796	0.795
11	Block coeff. (Cb)	0.507	0.525	0.581	0.660	0.581	0.525	0.507	0.535	0.549	0.566	0.593	0.620	0.641	0.612	0.570	0.538	0.486	0.483	0.477	0.513	0.581	0.636
12	LCB from zero pt. (	0.198	0.199	0.195	0.194	0.195	0.199	0.198	0.193	0.186	0.176	0.165	0.156	0.150	0.151	0.153	0.157	0.162	0.170	0.176	0.181	0.183	0.183
13	LCF from zero pt. (+	0.253	-2.023	-2.722	-2.798	-2.723	-2.023	0.253	1.921	3.020	3.950	4.671	4.951	4.935	5.084	4.551	2.912	1.676	1.143	1.483	1.549	1.576	1.581
14	Max deck inclinatio	30.000	20.000	10.000	0.0497	10.000	20.000	30.000	40.000	50.000	60.000	70.001	80.000	90.000	99.998	109.99	119.99	129.99	139.99	149.98	159.98	169.97	179.26
15	Trim angle (+ve by s	-0.0353	-0.0470	0.0247	0.0497	0.0248	-0.0470	-0.0355	0.0991	0.3433	0.7777	1.6649	4.2613	n/a	5.4722	2.8690	1.9913	1.5623	1.2380	0.9962	0.8431	0.7617	0.7363

Figure G1 – GZ curve for full load



Probabilistic Damage Results

Table G6 – Damage Stability Results for Full Load (with comments if failed to meet requirements)

	Description	Status	Case type	Damage (room indices)	pi	v factor	pi.v	stab. range deg	GZ max. m	Equi. angle deg	Immersion angle deg	Angle of vanishing stab. deg	DF angle deg	GZmax. angle deg	K	s factor	A factor	R (requ	Pass/F
1	*Deepest subdivision draft (s*																		
2	**fullload: Z1; H3; Alt.1/3 (stb**	GZ curve comple	Final stage*	6,25	0.0373	0.1612	0.0060	55.0	0.414	0.0	16.7 (P	55.0	n/a	27.3	1.000	1.0000	0.0060		
3	fullload: Z1; H3; Alt.2/3 (stb	GZ curve comple	Final stage	6,25				55.0	0.414	0.0	16.7 (P	55.0	n/a	27.3	1.000	1.0000			
4	fullload: Z1; H3; Alt.3/3 (stb	GZ curve comple	Final stage	6,25				55.0	0.414	0.0	16.7 (P	55.0	n/a	27.3	1.000	1.0000			
5	**fullload: Z1; Hx; Alt.1/4 (stb**	GZ curve comple	Final stage*	6,25	0.0373	0.8387	0.0313	55.0	0.414	0.0	16.7 (P	55.0	n/a	27.3	1.000	1.0000	0.0313		
6	fullload: Z1; Hx; Alt.2/4 (stb	GZ curve comple	Final stage	6,25				55.0	0.414	0.0	16.7 (P	55.0	n/a	27.3	1.000	1.0000			
7	fullload: Z1; Hx; Alt.3/4 (stb	GZ curve comple	Final stage	6,25				55.0	0.414	0.0	16.7 (P	55.0	n/a	27.3	1.000	1.0000			
8	fullload: Z1; Hx; Alt.4/4 (stb	GZ curve comple	Final stage	25				55.0	0.413	0.0	16.7 (P	55.0	n/a	27.3	1.000	1.0000			
9	**fullload: Z2; Hx; Alt.1/3 (stb**	GZ curve comple	Final stage*	2,4,20,29	0.0629	1.0000	0.0629	56.1	0.430	0.4	17.1 (P	56.5	n/a	29.1	1.000	1.0000	0.0629		
10	fullload: Z2; Hx; Alt.2/3 (stb	GZ curve comple	Final stage	2,4,20				55.9	0.427	0.4	17.1 (P	56.3	n/a	29.1	1.000	1.0000			
11	fullload: Z2; Hx; Alt.3/3 (stb	GZ curve comple	Final stage	20				56.1	0.423	0.0	17.1 (P	56.1	n/a	30.0	1.000	1.0000			
12	**fullload: Z3; Hx; Alt.1/2 (stb**	GZ curve comple	Final stage*	1,28	0.0616	1.0000	0.0616	33.7	0.194	0.0	3.0 (Pa	33.7	n/a	16.4	1.000	1.0000	0.0616		
13	fullload: Z3; Hx; Alt.2/2 (stb	GZ curve comple	Final stage	1				33.7	0.192	0.0	3.0 (Pa	33.7	n/a	16.4	1.000	1.0000			
14	**fullload: Z4; Hx; Alt.1/2 (stb**	GZ curve comple	Final stage*	9,11,12,14,15,17	0.0269	1.0000	0.0269	56.0	0.461	-4.1	17.4 (P	56.0	n/a	27.3	1.000	1.0000	0.0269		
15	fullload: Z4; Hx; Alt.2/2 (stb	GZ curve comple	Final stage	9,11,12,14,15,17				56.1	0.457	-4.1	17.4 (P	56.1	n/a	27.3	1.000	1.0000			
16	**fullload: Z5; Hx; Alt.1/2 (stb**	GZ curve comple	Final stage*	21,22,27	0.1122	1.0000	0.1122	50.2	0.308	0.0	17.1 (P	50.2	n/a	26.4	1.000	1.0000	0.1122		
17	fullload: Z5; Hx; Alt.2/2 (stb	GZ curve comple	Final stage	21				46.4	0.222	0.0	18.3 (P	46.4	n/a	26.4	1.000	1.0000			
18	**fullload: Z6; Hx; Alt.1/2 (stb**	GZ curve comple	Final stage*	8,23	0.1709	1.0000	0.1709	49.1	0.300	0.0	16.4 (P	49.1	n/a	25.5	1.000	1.0000	0.1709		
19	fullload: Z6; Hx; Alt.2/2 (stb	GZ curve comple	Final stage	8				40.9	0.166	0.0	17.1 (P	40.9	n/a	24.5	1.000	1.0000			
20	**fullload: Z7; Hx; Alt.1/2 (stb**	GZ curve comple	Final stage*	7,24	0.0827	1.0000	0.0827	58.6	0.471	0.0	15.6 (P	58.6	n/a	28.2	1.000	1.0000	0.0827		
21	fullload: Z7; Hx; Alt.2/2 (stb	GZ curve comple	Final stage	7				54.8	0.407	0.0	16.2 (P	54.8	n/a	27.3	1.000	1.0000			
22	**fullload: Z8; Hx; Alt.1/2 (stb**	GZ curve comple	Final stage*	5,26	0.0393	1.0000	0.0393	55.4	0.418	0.0	16.4 (P	55.4	n/a	27.3	1.000	1.0000	0.0393		
23	fullload: Z8; Hx; Alt.2/2 (stb	GZ curve comple	Final stage	26				55.3	0.415	0.0	16.8 (P	55.3	n/a	27.3	1.000	1.0000			
24	**Attained partial index As**						0.5942										0.5942	0.5031	Pass
25																			
26	*Partial subdivision draft Loa*																		
27	**ballast-in-mid: Z1; H3; Alt.1/**	GZ curve comple	Final stage*	6,25	0.0373	0.6126	0.0228	81.1	1.658	0.0	35.7 (P	81.1	n/a	42.7	1.000	1.0000	0.0228		
28	ballast-in-mid: Z1; H3; Alt.2/	GZ curve comple	Final stage	6,25				81.1	1.658	0.0	35.7 (P	81.1	n/a	42.7	1.000	1.0000			
29	ballast-in-mid: Z1; H3; Alt.3/	GZ curve comple	Final stage	6,25				81.1	1.658	0.0	35.7 (P	81.1	n/a	42.7	1.000	1.0000			
30	**ballast-in-mid: Z1; Hx; Alt.1/**	GZ curve comple	Final stage*	6,25	0.0373	0.3873	0.0144	81.1	1.658	0.0	35.7 (P	81.1	n/a	42.7	1.000	1.0000	0.0144		
31	ballast-in-mid: Z1; Hx; Alt.2/	GZ curve comple	Final stage	6,25				81.1	1.658	0.0	35.7 (P	81.1	n/a	42.7	1.000	1.0000			
32	ballast-in-mid: Z1; Hx; Alt.3/	GZ curve comple	Final stage	6,25				81.1	1.658	0.0	35.7 (P	81.1	n/a	42.7	1.000	1.0000			
33	ballast-in-mid: Z1; Hx; Alt.4/	GZ curve comple	Final stage	25				81.1	1.657	0.0	35.7 (P	81.1	n/a	42.7	1.000	1.0000			
34	**ballast-in-mid: Z2; H2; Alt.1/**	GZ curve comple	Final stage*	2,4,29	0.0629	0.0485	0.0030	81.0	1.765	0.3	34.0 (P	81.2	n/a	42.7	1.000	1.0000	0.0030		
35	ballast-in-mid: Z2; H2; Alt.2/	GZ curve comple	Final stage	2,4				81.2	1.759	0.3	34.0 (P	81.5	n/a	42.7	1.000	1.0000			
36	**ballast-in-mid: Z2; Hx; Alt.1/**	GZ curve comple	Final stage*	2,4,20,29	0.0629	0.9514	0.0598	77.9	1.687	0.3	30.7 (P	78.2	n/a	40.9	1.000	1.0000	0.0598		
37	ballast-in-mid: Z2; Hx; Alt.2/	GZ curve comple	Final stage	2,4,20				78.1	1.682	0.3	30.7 (P	78.3	n/a	40.9	1.000	1.0000			
38	ballast-in-mid: Z2; Hx; Alt.3/	GZ curve comple	Final stage	20				77.8	1.593	0.0	33.1 (P	77.8	n/a	40.9	1.000	1.0000			
39	**ballast-in-mid: Z3; Hx; Alt.1/**	GZ curve comple	Final stage*	1,28	0.0616	1.0000	0.0616	79.0	1.641	0.0	26.4 (P	79.0	n/a	40.9	1.000	1.0000	0.0616		
40	ballast-in-mid: Z3; Hx; Alt.2/	GZ curve comple	Final stage	1				78.2	1.539	0.0	27.6 (P	78.2	n/a	40.9	1.000	1.0000			
41	**ballast-in-mid: Z4; Hx; Alt.1/**	GZ curve comple	Final stage*	9,11,12,14,15,17	0.0269	1.0000	0.0269	81.0	1.802	-2.3	35.2 (P	81.0	n/a	42.7	1.000	1.0000	0.0269		
42	ballast-in-mid: Z4; Hx; Alt.2/	GZ curve comple	Final stage	9,11,12,14,15,17				80.4	1.725	-2.6	36.1 (P	80.4	n/a	42.7	1.000	1.0000			
43	**ballast-in-mid: Z5; Hx; Alt.1/**	GZ curve comple	Final stage*	21,22,27	0.1122	1.0000	0.1122	75.5	1.209	0.0	28.4 (P	75.5	n/a	40.9	1.000	1.0000	0.1122		
44	ballast-in-mid: Z5; Hx; Alt.2/	GZ curve comple	Final stage	21				78.3	1.192	0.0	29.2 (P	78.3	n/a	42.7	1.000	1.0000			
45	**ballast-in-mid: Z6; Hx; Alt.1/**	GZ curve comple	Final stage*	8,23	0.1709	1.0000	0.1709	73.6	0.968	0.0	30.1 (P	73.6	n/a	42.7	1.000	1.0000	0.1709		
46	ballast-in-mid: Z6; Hx; Alt.2/	GZ curve comple	Final stage	8				79.8	1.046	0.0	30.1 (P	79.8	n/a	45.5	1.000	1.0000			
47	**ballast-in-mid: Z7; Hx; Alt.1/**	GZ curve comple	Final stage*	7,24	0.0827	1.0000	0.0827	75.3	1.531	0.0	35.6 (P	75.3	n/a	40.9	1.000	1.0000	0.0827		
48	ballast-in-mid: Z7; Hx; Alt.2/	GZ curve comple	Final stage	7				80.4	1.602	0.0	36.2 (P	80.4	n/a	42.7	1.000	1.0000			
49	**ballast-in-mid: Z8; H1 (stbd)**	GZ curve comple	Final stage*	5	0.0393	0.4331	0.0170	80.7	1.657	0.0	35.1 (P	80.7	n/a	42.7	1.000	1.0000	0.0170		
50	**ballast-in-mid: Z8; Hx; Alt.1/**	GZ curve comple	Final stage*	5,26	0.0393	0.5668	0.0222	80.7	1.657	0.0	35.1 (P	80.7	n/a	42.7	1.000	1.0000	0.0222		
51	ballast-in-mid: Z8; Hx; Alt.2/	GZ curve comple	Final stage	26				81.2	1.657	0.0	35.7 (P	81.2	n/a	42.7	1.000	1.0000			
52	**Attained partial index Ap**						0.5942										0.5942	0.5031	Pass
53																			