

MS NIKOLAI II

TRIM AND

STABILITY

Ship Consulting Ltd

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Ship Consulting Ltd

SHIP'S NAME: NIKOLAI II

SIGNAL LETTERS:

PORT OF REGISTRY: HELSINKI

OWNER:

BUILDERS NAME:

MAIN DIMENSIONS:

Length over all	30.00 m
Length between perp.	27.50 m
Breadth max	6.00 m
Depth mld	3.66 m
Draught mld midship	2.70 m

BLOCK COEFFICIENT 0.596

DISPLACEMENT (1.003 t/m³) ; T = 2.70 m 257 T

Ship Consulting Ltd Oy
Haihentie 15
20460 Turku
Finland

Telephone +358-2-230 2865
Telefax +358-2-230 2866
GSM +358-400-524 773
VAT FI0686836-1

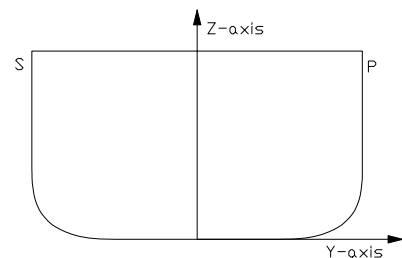
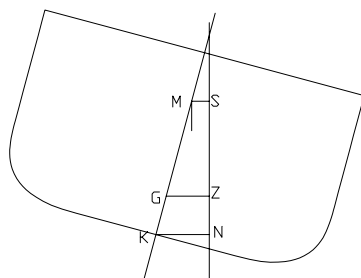
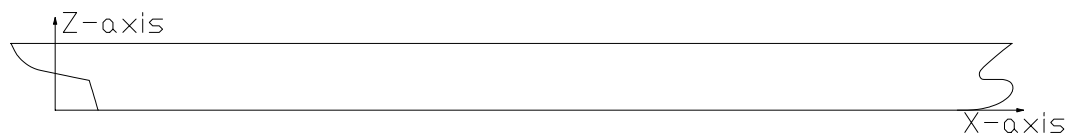
GENERAL

The vessel has been approved to operate only in costal waters and transport 40 passengers onboard.

All doors and hatches on the main deck leading below the main deck MUST be closed and secured at sea. The stability tables (MS) assume that these doors are watertight.

SYMBOLS

L/2	Denotes Lpp/2 (-/+ = aft/forw.)
BL	Base line
CL	Center line
TM	Mean draught
TFP	Draught at fore perpendicular
TAP	Draught at aft perpendicular
Tr	Trim (-/+ = stern/head)
KM	Vertical distance from base line to transverse metacentre
KG	Centre of gravity above base line
GM0	Transverse metacentric height
GMcorr	Free surface correction of GM
GM	Corrected GM
GZ	Righting lever
dGZ	Free surface correction of GZ
phi	Angle of inclination
e(phi)	Dynamic lever
MFS	Moment of free liquid surface
L.C.G.=cgx	Longitudinal centre of gravity from reference point
T.C.G.=cgy	Transversal centre of gravity from CL
V.C.G.=cgz	Vertical centre of gravity from BL
SWBM	Still water bending moment
RHO=DENS	Density



$$GZ = KN - KG \cdot \sin(\phi)$$

$$GZ = MS + GM \cdot \sin(\phi)$$

$$MS = KN - KM \cdot \sin(\phi)$$

LOADING CONDITION LC0, Light ship

LOADING COMPONENTS

Deadweight	0.0	0.00	0.00	0.00	0.0
Lightweight	224.7	13.47	0.00	2.60	
Displacement (rho=1.003)	224.7	13.47	0.00	2.60	0.0

FLOATING POSITION

Draught moulded	2.423 m	KM	2.95 m
Trim	-0.927 m	KG	2.60 m
Heel, (YREF ON)	0.0 deg		
TA	2.886 m	GM0	0.35 m
TF	1.959 m	GMCORR	0.00 m
Trimming moment	-194 tonm	GM	0.35 m

LOADING CONDITION LC0, Light ship

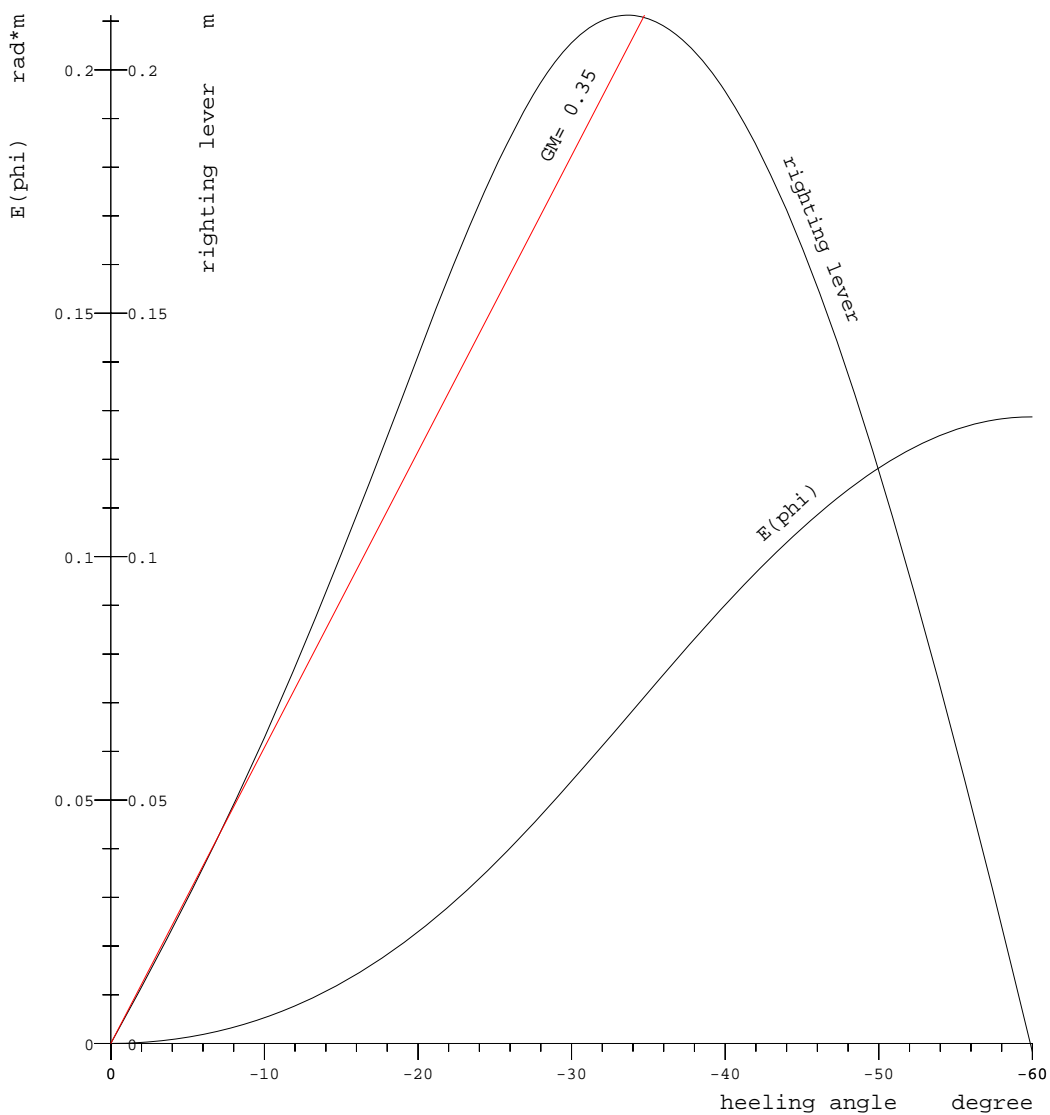
HEEL degree	MS m	HPhi m	EPhi rad*m	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
10.0	0.002	0.06	0.005	0.0	0.000
20.0	0.022	0.14	0.023	0.0	0.000
30.0	0.031	0.21	0.054	0.0	0.000
40.0	-0.028	0.20	0.090	0.0	0.000
50.0	-0.149	0.12	0.118	0.0	0.000
60.0	-0.303	0.00	0.129	0.0	0.000

Loading condition: Light ship

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve .	0.055	0.054	mrاد	NOT MET
AREA40	Area under GZ curve .	0.090	0.090	mrاد	OK
AREA3040	Area under GZ curve .	0.030	0.036	mrاد	OK
GZ0.2	Max GZ > 0.2	0.200	0.211	m	OK
MAXGZ25	Max. GZ at an angle .	25.000	33.643	deg	OK
GM0.15	GM > 0.15 m	0.150	0.348	m	OK
MAXHEEL	Max. heel due to cro.	12.000	11.882	deg	OK
MAXHEEL	Max. heel due to tur.	10.000	4.358	deg	OK

STABILITY CURVES

PROJECT P137/A
DATE 2014-05-29
CONDITION LC0
DISP. 225 TON
DRAUGHT 2.42 M
TRIM -0.93



LOADING CONDITION LC1, 40 passengers at departure

LOADING COMPONENTS

Name	Max. weight	Mass	Center of gravity			Free s. moment
			cgx	cgy	cgz	

Fresh Water, RHO=1.000

FW1P	Fresh water .	3.8	3.8	23.39	0.60	0.94	0.00
FW1S	Fresh water .	3.8	3.8	23.39	-0.60	0.94	0.00
FP	Fore peak	4.4	4.0	26.09	0.00	1.71	1.16
Total of FW		11.9	11.5	24.32	0.00	1.21	1.16

Diesel Oil, RHO=0.840

FO1S	Fuel oil 1P	19.8	7.5	18.08	-1.22	0.87	5.36
FO1P	Fuel oil 1S	19.8	7.5	18.08	1.22	0.87	5.36
Total of DO		39.6	15.0	18.08	0.00	0.87	10.72

PAS

(PAS)	40 passengers	0.0	3.0	14.00	0.00	6.00	0.00
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CRE

(CRE)	Crew and sto.	0.0	2.0	14.00	0.00	4.00	0.00
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Deadweight			31.5	19.72	0.00	1.68	11.9
Lightweight			224.7	13.47	0.00	2.60	
Displacement (rho=1.003)			256.2	14.24	0.00	2.49	11.9

FLOATING POSITION

Draught moulded	2.689	m	KM	2.90	m
Trim	0.014	m	KG	2.49	m
Heel, (YREF ON)	0.0	deg			
TA	2.682	m	GM0	0.41	m
TF	2.696	m	GMCORR	-0.05	m
Trimming moment	3	tonm	GM	0.36	m

LOADING CONDITION LC1, 40 passengers at departure

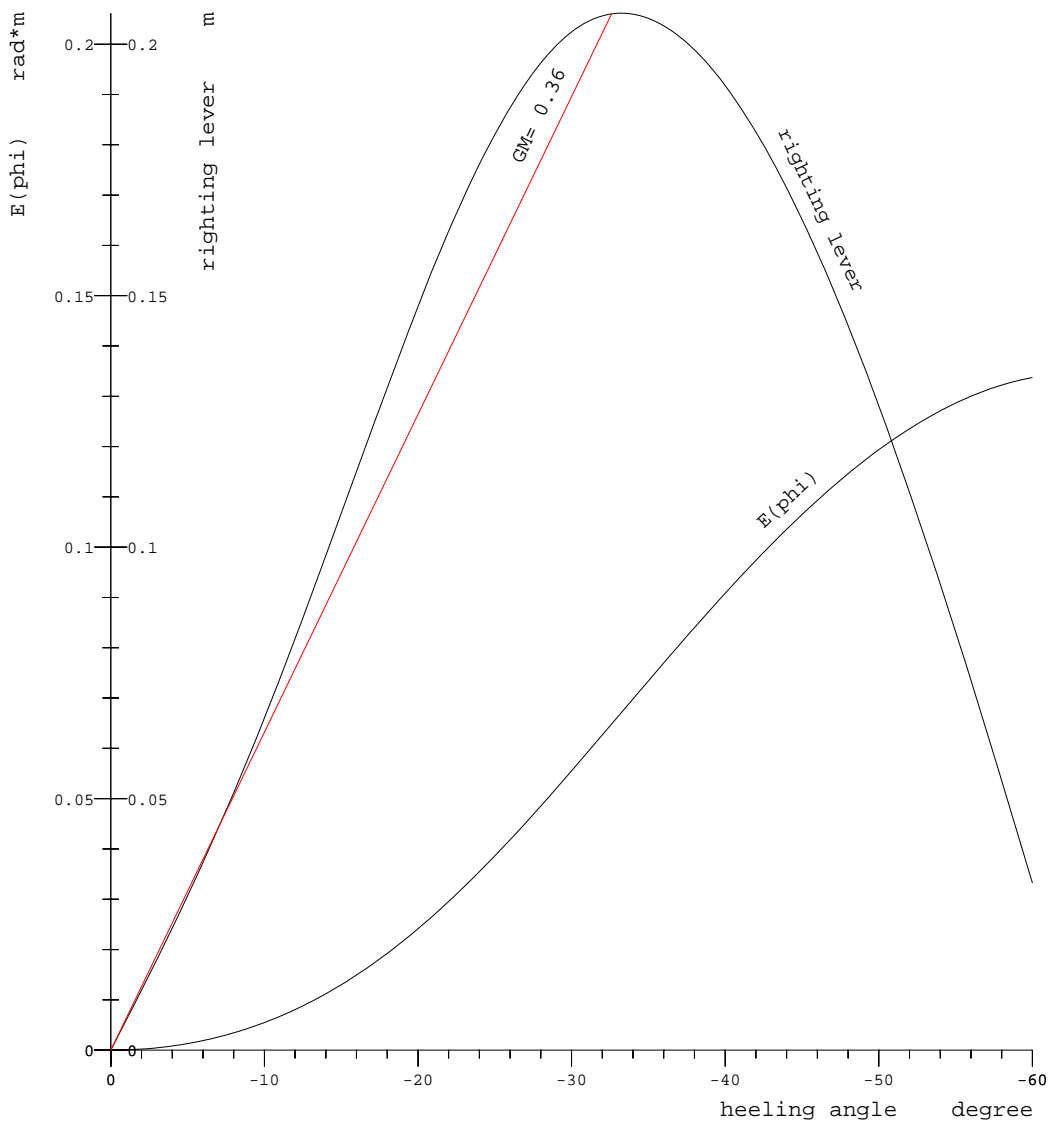
HEEL degree	MS m	HPhi m	EPhi rad*m	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
10.0	0.003	0.07	0.005	2.0	0.008
20.0	0.024	0.15	0.024	4.0	0.016
30.0	0.022	0.20	0.055	6.1	0.024
40.0	-0.038	0.19	0.091	8.5	0.033
50.0	-0.141	0.13	0.119	11.1	0.044
60.0	-0.270	0.03	0.134	12.9	0.050

Loading condition: 40 passengers at departure

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve .	0.055	0.055	mrاد	OK
AREA40	Area under GZ curve .	0.090	0.091	mrاد	OK
AREA3040	Area under GZ curve .	0.030	0.035	mrاد	OK
GZ0.2	Max GZ > 0.2	0.200	0.206	m	OK
MAXGZ25	Max. GZ at an angle .	25.000	33.244	deg	OK
GM0.15	GM > 0.15 m	0.150	0.362	m	OK
MAXHEEL.	Max. heel due to cro.	12.000	10.147	deg	OK
MAXHEEL.	Max. heel due to tur.	10.000	3.526	deg	OK

STABILITY CURVES

PROJECT	P137/A
DATE	2014-05-29
CONDITION	LC1
DISP.	256 TON
DRAUGHT	2.69 M
TRIM	0.01



LOADING CONDITION LC2, 40 passenger arrival

LOADING COMPONENTS

Name		Max. weight	Mass	Center of gravity cgx cgy cgz			Free s. moment
Fresh Water, RHO=1.000							
FW1P	Fresh water .	3.8	0.5	23.21	0.30	0.41	0.18
FW1S	Fresh water .	3.8	0.5	23.21	-0.30	0.41	0.18
FP	Fore peak	4.4	4.0	26.09	0.00	1.71	1.16
Total of FW		11.9	5.0	25.51	0.00	1.45	1.52
Diesel Oil, RHO=0.840							
FO1S	Fuel oil 1P	19.8	19.8	18.11	-1.36	1.68	0.00
FO1P	Fuel oil 1S	19.8	19.8	18.11	1.36	1.68	0.00
Total of DO		39.6	39.6	18.11	0.00	1.68	0.00
Grey water, RHO=1.000							
GW1		5.9	5.5	20.83	0.00	0.70	14.11
PAS							
(PAS)	40 passengers	0.0	3.0	14.00	0.00	6.00	0.00
CRE							
(CRE)	Crew and sto.	0.0	2.0	14.00	0.00	4.00	0.00
Deadweight			55.1	18.68	0.00	1.88	15.6
Lightweight			224.7	13.47	0.00	2.60	
Displacement (rho=1.003)			279.8	14.50	0.00	2.46	15.6

FLOATING POSITION

Draught moulded	2.875	m	KM	2.91	m
Trim	0.411	m	KG	2.46	m
Heel, (YREF ON)	0.0	deg			
TA	2.669	m	GM0	0.45	m
TF	3.080	m	GMCORR	-0.06	m
Trimming moment	90	tonm	GM	0.39	m

LOADING CONDITION LC2, 40 passenger arrival

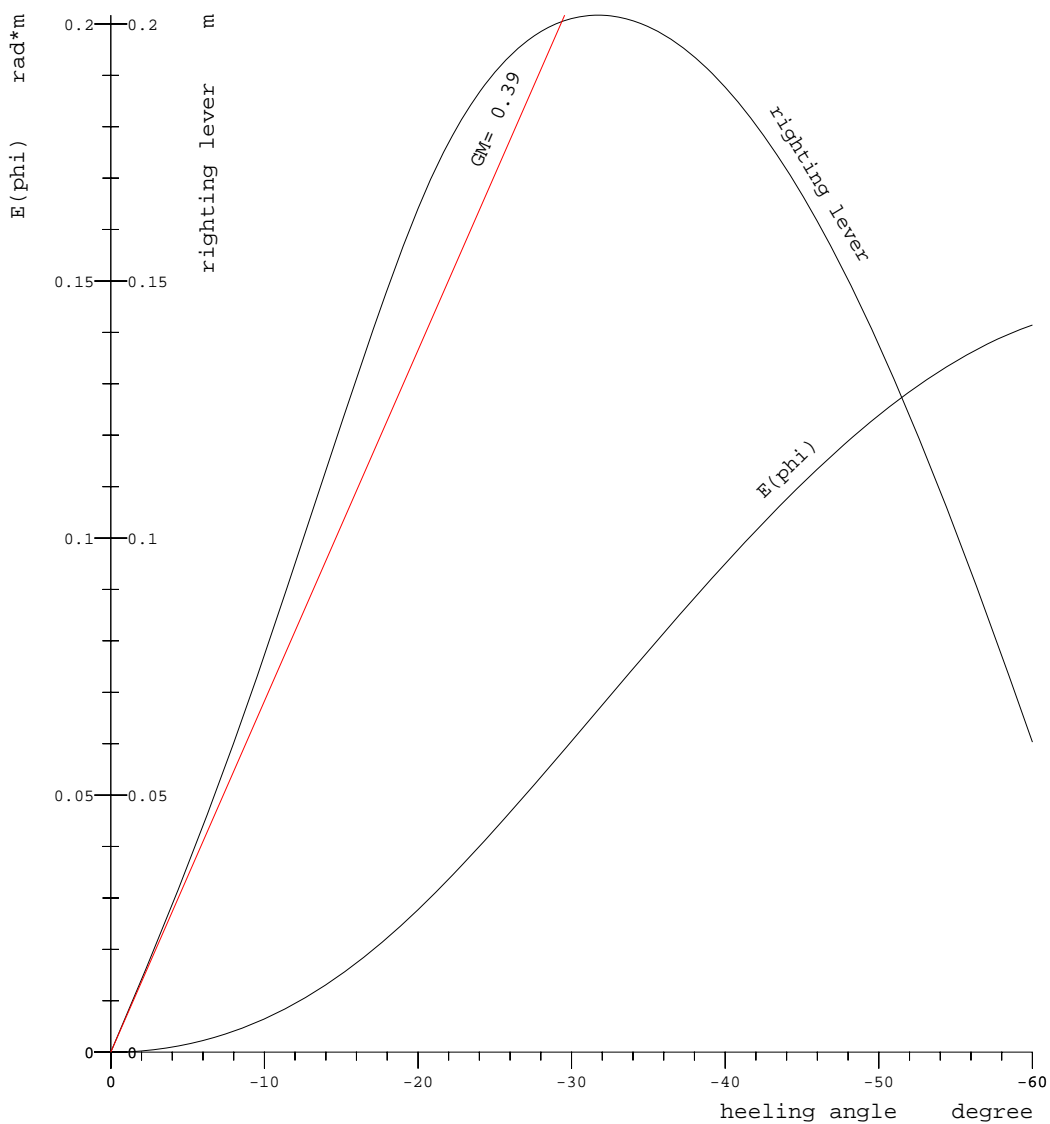
HEEL degree	MS m	HPhi m	EPhi rad*m	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
10.0	0.003	0.08	0.006	0.9	0.003
20.0	0.015	0.16	0.028	1.1	0.004
30.0	-0.018	0.20	0.060	1.3	0.005
40.0	-0.095	0.19	0.095	1.4	0.005
50.0	-0.200	0.14	0.124	1.4	0.005
60.0	-0.322	0.06	0.141	1.3	0.005

Loading condition: 40 passenger arrival

RCR	TEXT	REQ	ATTN	UNIT	STAT
AREA30	Area under GZ curve .	0.055	0.060	mrاد	OK
AREA40	Area under GZ curve .	0.090	0.095	mrاد	OK
AREA3040	Area under GZ curve .	0.030	0.035	mrاد	OK
GZ0.2	Max GZ > 0.2	0.200	0.202	m	OK
MAXGZ25	Max. GZ at an angle .	25.000	31.739	deg	OK
GM0.15	GM > 0.15 m	0.150	0.391	m	OK
MAXHEEL.	Max. heel due to cro.	12.000	8.162	deg	OK
MAXHEEL.	Max. heel due to tur.	10.000	2.690	deg	OK

STABILITY CURVES

PROJECT P137/A
DATE 2014-05-29
CONDITION LC2
DISP. 280 TON
DRAUGHT 2.87 M
TRIM 0.41



LOADING CONDITION LC3, No passengers at departure

LOADING COMPONENTS

Name		Max. weight	Mass	Center of gravity cgx cgy cgz			Free s. moment
Fresh Water, RHO=1.000							
FW1P	Fresh water .	3.8	3.8	23.39	0.60	0.94	0.00
FW1S	Fresh water .	3.8	3.8	23.39	-0.60	0.94	0.00
FP	Fore peak	4.4	4.0	26.09	0.00	1.71	1.16
Total of FW		11.9	11.5	24.32	0.00	1.21	1.16
Diesel Oil, RHO=0.840							
FO1S	Fuel oil 1P	19.8	7.5	18.08	-1.22	0.87	5.36
FO1P	Fuel oil 1S	19.8	7.5	18.08	1.22	0.87	5.36
Total of DO		39.6	15.0	18.08	0.00	0.87	10.72
CRE							
(CRE)	Crew and sto.	0.0	2.0	14.00	0.00	4.00	0.00
Deadweight			28.5	20.32	0.00	1.23	11.9
Lightweight			224.7	13.47	0.00	2.60	
Displacement (rho=1.003)			253.2	14.24	0.00	2.45	11.9

FLOATING POSITION

Draught moulded	2.666	m	KM	2.89	m
Trim	0.008	m	KG	2.45	m
Heel, (YREF ON)	0.0	deg			
TA	2.662	m	GM0	0.45	m
TF	2.670	m	GMCORR	-0.05	m
Trimming moment	2	tonm	GM	0.40	m

LOADING CONDITION LC3, No passengers at departure

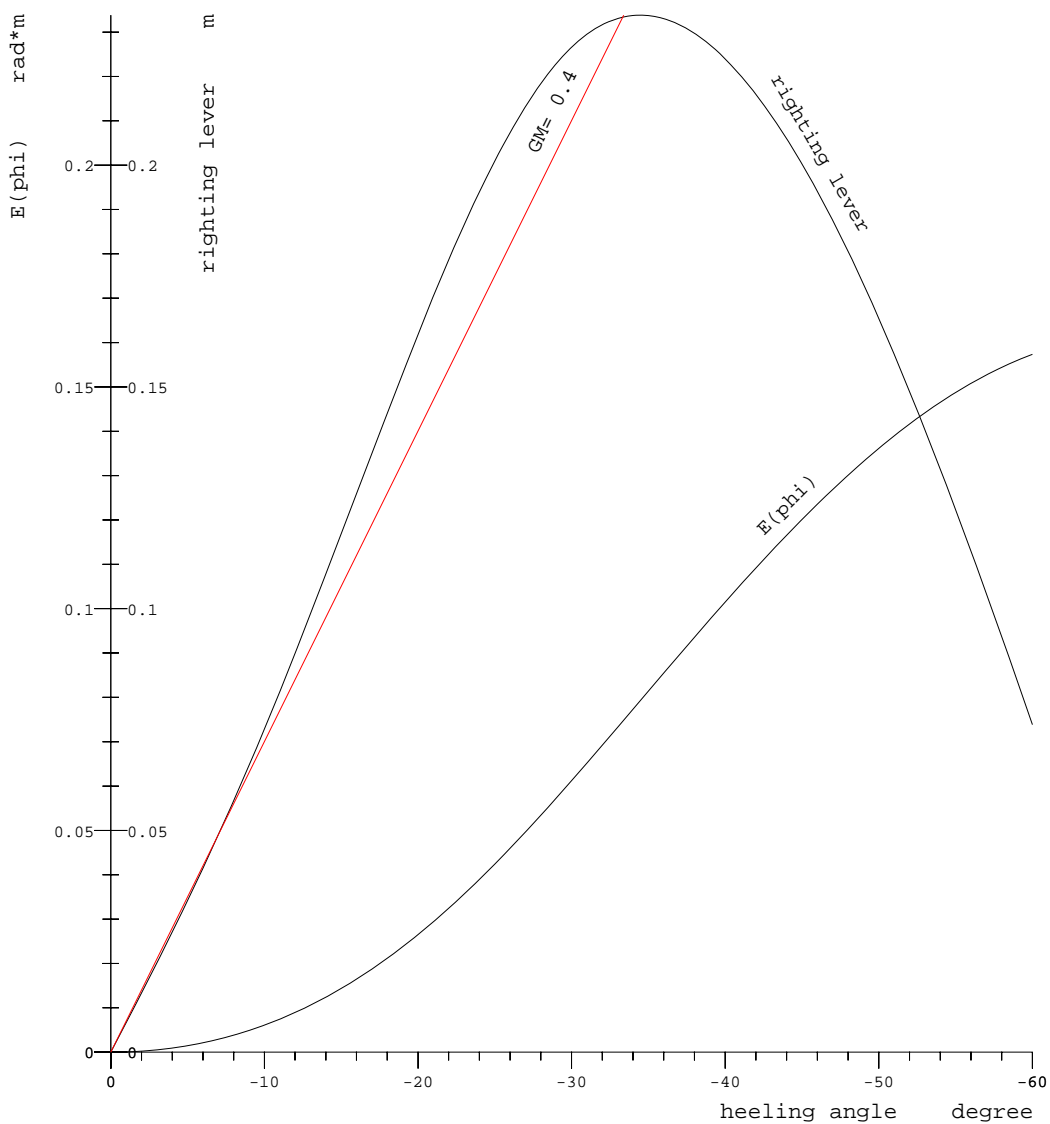
HEEL degree	MS m	HPhi m	EPhi rad*m	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
10.0	0.003	0.07	0.006	2.0	0.008
20.0	0.024	0.16	0.027	4.0	0.016
30.0	0.027	0.23	0.061	6.1	0.024
40.0	-0.031	0.22	0.101	8.5	0.034
50.0	-0.134	0.17	0.136	11.1	0.044
60.0	-0.263	0.07	0.157	12.9	0.051

Loading condition: No passengers at departure

RCR	TEXT	REQ	ATTN	UNIT	STAT
AREA30	Area under GZ curve .	0.055	0.061	mrاد	OK
AREA40	Area under GZ curve .	0.090	0.101	mrاد	OK
AREA3040	Area under GZ curve .	0.030	0.040	mrاد	OK
GZ0.2	Max GZ > 0.2	0.200	0.234	m	OK
MAXGZ25	Max. GZ at an angle .	25.000	34.478	deg	OK
GM0.15	GM > 0.15 m	0.150	0.401	m	OK
MAXHEEL	Max. heel due to cro.	12.000	9.399	deg	OK
MAXHEEL	Max. heel due to tur.	10.000	3.090	deg	OK

STABILITY CURVES

PROJECT	P137/A
DATE	2014-05-29
CONDITION	LC3
DISP.	253 TON
DRAUGHT	2.67 M
TRIM	0.01



LOADING CONDITION LC4, No passengers at arrival

LOADING COMPONENTS

 Name Max. weight Center of gravity Mass cgx cgy cgz Free s. moment

Fresh Water, RHO=1.000

Name	Description	Max. weight	Mass	cgx	cgy	cgz	Free s. moment
FW1P	Fresh water .	3.8	0.5	23.21	0.30	0.41	0.18
FW1S	Fresh water .	3.8	0.5	23.21	-0.30	0.41	0.18
FP	Fore peak	4.4	4.0	26.09	0.00	1.71	1.16
Total of FW		11.9	5.0	25.51	0.00	1.45	1.52

Diesel Oil, RHO=0.840

FO1S	Fuel oil 1P	19.8	2.5	18.05	-0.92	0.49	3.32
FO1P	Fuel oil 1S	19.8	2.5	18.05	0.92	0.49	3.32
Total of DO		39.6	5.0	18.05	0.00	0.49	6.63

Grey water, RHO=1.000

GW1		5.9	5.5	20.83	0.00	0.70	14.11
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CRE

(CRE)	Crew and sto.	0.0	2.0	14.00	0.00	4.00	0.00
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Deadweight			17.5	20.59	0.00	1.23	22.3
Lightweight			224.7	13.47	0.00	2.60	
Displacement (rho=1.003)			242.2	13.98	0.00	2.50	22.3

FLOATING POSITION

Draught moulded	2.574 m	KM	2.90 m
Trim	-0.324 m	KG	2.50 m
Heel, (YREF ON)	0.0 deg		
TA	2.736 m	GM0	0.40 m
TF	2.412 m	GMCORR	-0.09 m
Trimming moment	-68 tonm	GM	0.31 m

LOADING CONDITION LC4, No passengers at arrival

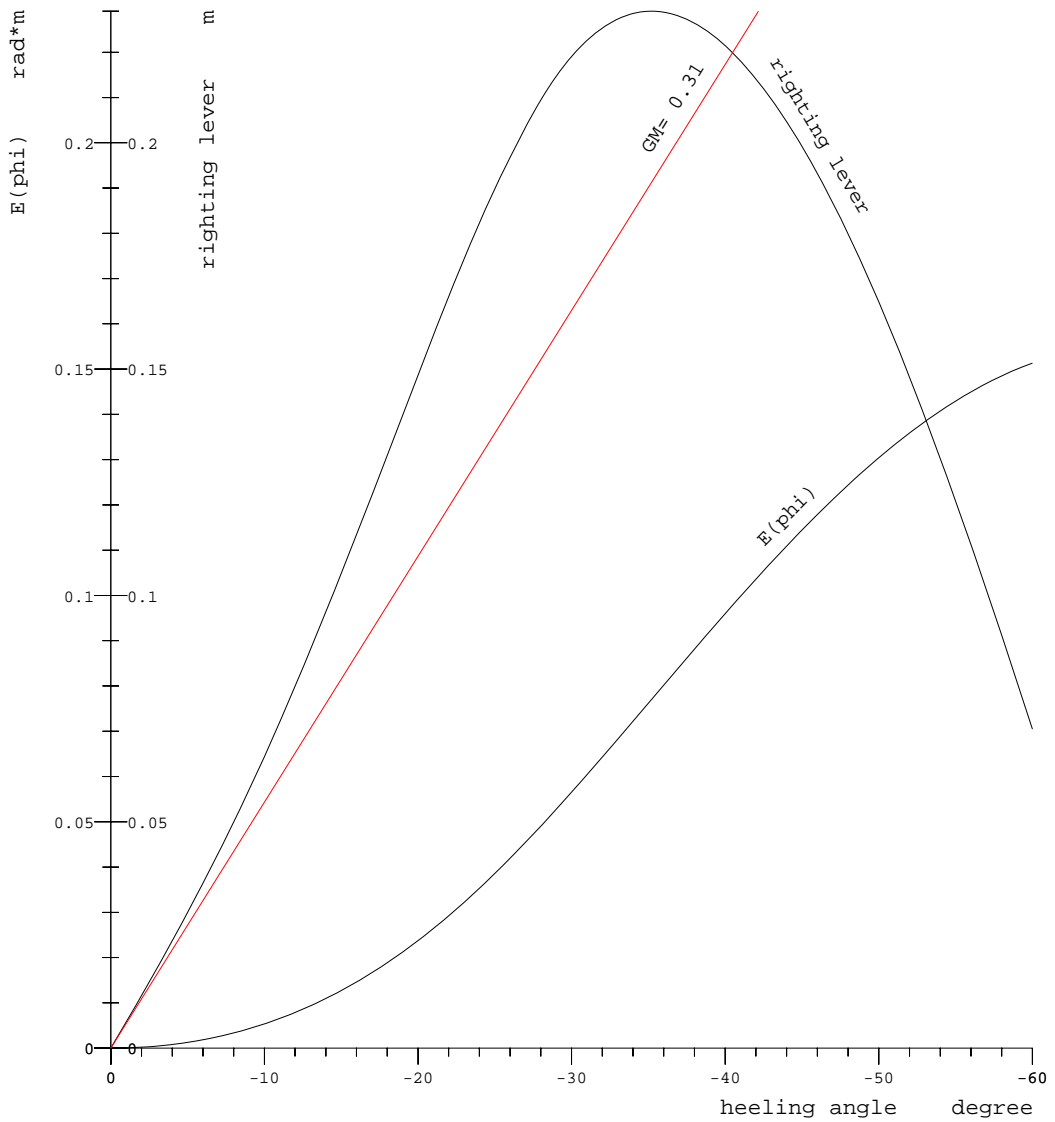
HEEL degree	MS m	HPhi m	EPhi rad*m	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
10.0	0.003	0.06	0.005	2.1	0.009
20.0	0.025	0.15	0.024	3.5	0.015
30.0	0.038	0.22	0.057	4.9	0.020
40.0	-0.014	0.22	0.096	5.7	0.024
50.0	-0.119	0.16	0.130	6.1	0.025
60.0	-0.253	0.07	0.151	6.3	0.026

Loading condition: No passengers at arrival

RCR	TEXT	REQ	ATTN	UNIT	STAT
AREA30	Area under GZ curve .	0.055	0.057	mrاد	OK
AREA40	Area under GZ curve .	0.090	0.096	mrاد	OK
AREA3040	Area under GZ curve .	0.030	0.039	mrاد	OK
GZ0.2	Max GZ > 0.2	0.200	0.229	m	OK
MAXGZ25	Max. GZ at an angle .	25.000	35.202	deg	OK
GM0.15	GM > 0.15 m	0.150	0.311	m	OK
MAXHEEL	Max. heel due to cro.	12.000	10.859	deg	OK
MAXHEEL	Max. heel due to tur.	10.000	3.823	deg	OK

STABILITY CURVES

PROJECT	P137/A
DATE	2014-05-29
CONDITION	LC4
DISP.	242 TON
DRAUGHT	2.57 M
TRIM	-0.32



TK	m	1.800	1.850	1.900	1.950	2.000	2.050	2.100	2.150
T	m	1.794	1.844	1.894	1.944	1.994	2.044	2.094	2.144
VOLM	m3	143	149	155	161	167	173	179	185
DISP	t	144	150	156	162	168	174	180	186
DISP	t	144	150	156	162	168	174	180	186
LCB	m	14.500	14.487	14.474	14.461	14.448	14.434	14.420	14.405
VCB	m	1.104	1.132	1.160	1.188	1.216	1.244	1.272	1.300
KMT	m	3.053	3.028	3.004	2.983	2.964	2.946	2.931	2.918
KML	m	31.076	30.505	29.969	29.472	29.009	28.564	28.154	27.776
WLA	m2	117	118	119	120	121	122	122	123
TCP	t/cm	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
MCT	tm/cm	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.9
CB		0.4985	0.5049	0.5111	0.5172	0.5230	0.5288	0.5343	0.5398
CP		0.6744	0.6769	0.6793	0.6818	0.6843	0.6867	0.6892	0.6916
CW		0.7335	0.7394	0.7451	0.7507	0.7563	0.7615	0.7668	0.7721
CM		0.7393	0.7460	0.7524	0.7585	0.7644	0.7700	0.7753	0.7804
WSA	m2	161	164	167	169	172	175	178	181
LCA	m	14.20	14.16	14.13	14.10	14.06	14.03	13.99	13.95
transv. metac. height m									
-1.500		3.181	3.153	3.128	3.107	3.088	3.071	3.056	3.044
-1.400		3.170	3.142	3.117	3.096	3.077	3.060	3.046	3.033
-1.300		3.160	3.132	3.107	3.085	3.066	3.049	3.035	3.023
-1.200		3.150	3.122	3.097	3.075	3.055	3.039	3.025	3.013
-1.100		3.141	3.112	3.087	3.065	3.045	3.029	3.015	3.003
-1.000		3.132	3.103	3.078	3.055	3.036	3.019	3.005	2.993
-0.900		3.123	3.094	3.069	3.046	3.027	3.010	2.996	2.983
-0.800		3.115	3.086	3.060	3.038	3.018	3.001	2.987	2.974
-0.700		3.107	3.078	3.052	3.029	3.010	2.992	2.978	2.966
-0.600		3.100	3.070	3.044	3.022	3.002	2.985	2.970	2.958
-0.500		3.092	3.063	3.037	3.014	2.994	2.977	2.962	2.950
-0.400		3.084	3.056	3.030	3.008	2.987	2.970	2.955	2.943
-0.300		3.076	3.049	3.024	3.001	2.981	2.963	2.949	2.936
-0.200		3.069	3.041	3.017	2.995	2.975	2.957	2.942	2.930
-0.100		3.062	3.034	3.011	2.989	2.969	2.952	2.936	2.924
0.000		3.053	3.028	3.004	2.983	2.964	2.946	2.931	2.918
0.100		3.046	3.021	2.998	2.977	2.959	2.942	2.926	2.914
0.200		3.038	3.014	2.992	2.971	2.953	2.937	2.922	2.909
0.300		3.031	3.007	2.985	2.966	2.948	2.932	2.918	2.906
0.400		3.024	3.000	2.979	2.960	2.943	2.928	2.914	2.902
0.500		3.017	2.994	2.972	2.954	2.938	2.924	2.911	2.899
0.600		3.010	2.987	2.967	2.948	2.933	2.920	2.908	2.896

TK	m	1.800	1.850	1.900	1.950	2.000	2.050	2.100	2.150
T	m	1.794	1.844	1.894	1.944	1.994	2.044	2.094	2.144
TOTAL DISPLACEMENT		t							
	-1.500	147	154	160	166	172	178	185	191
	-1.400	147	153	159	165	172	178	184	191
	-1.300	147	153	159	165	171	178	184	190
	-1.200	146	152	158	165	171	177	183	190
	-1.100	146	152	158	164	170	177	183	189
	-1.000	146	152	158	164	170	176	183	189
	-0.900	145	151	157	164	170	176	182	189
	-0.800	145	151	157	163	169	176	182	188
	-0.700	145	151	157	163	169	175	182	188
	-0.600	145	151	157	163	169	175	181	188
	-0.500	145	150	157	163	169	175	181	187
	-0.400	144	150	156	162	169	175	181	187
	-0.300	144	150	156	162	168	174	181	187
	-0.200	144	150	156	162	168	174	180	187
	-0.100	144	150	156	162	168	174	180	187
	0.000	144	150	156	162	168	174	180	186
	0.100	144	150	156	162	168	174	180	186
	0.200	144	150	156	162	168	174	180	186
	0.300	144	150	156	162	168	174	180	186
	0.400	144	150	156	162	168	174	180	186
	0.500	144	150	156	162	168	174	180	186
	0.600	145	150	156	162	168	174	180	186
long. centre of buoy.		m							
	-1.500	12.747	12.765	12.781	12.796	12.809	12.820	12.830	12.839
	-1.400	12.866	12.882	12.897	12.909	12.920	12.930	12.939	12.946
	-1.300	12.985	12.999	13.012	13.023	13.032	13.040	13.047	13.052
	-1.200	13.104	13.117	13.127	13.136	13.143	13.150	13.155	13.159
	-1.100	13.223	13.234	13.242	13.249	13.255	13.259	13.263	13.265
	-1.000	13.342	13.350	13.357	13.362	13.366	13.369	13.370	13.371
	-0.900	13.460	13.467	13.471	13.475	13.477	13.478	13.478	13.477
	-0.800	13.578	13.582	13.585	13.587	13.587	13.586	13.585	13.582
	-0.700	13.695	13.698	13.699	13.699	13.697	13.695	13.691	13.687
	-0.600	13.812	13.812	13.811	13.810	13.807	13.802	13.797	13.791
	-0.500	13.928	13.926	13.924	13.920	13.915	13.910	13.903	13.895
	-0.400	14.044	14.040	14.035	14.030	14.023	14.016	14.008	13.999
	-0.300	14.159	14.153	14.146	14.139	14.130	14.121	14.112	14.102
	-0.200	14.273	14.265	14.256	14.247	14.237	14.226	14.215	14.203
	-0.100	14.387	14.377	14.366	14.354	14.343	14.330	14.318	14.305
	0.000	14.500	14.487	14.474	14.461	14.448	14.434	14.420	14.405
	0.100	14.612	14.598	14.583	14.567	14.552	14.536	14.521	14.504
	0.200	14.724	14.707	14.690	14.673	14.656	14.638	14.621	14.603
	0.300	14.835	14.816	14.797	14.778	14.758	14.739	14.720	14.701
	0.400	14.945	14.924	14.903	14.881	14.861	14.840	14.819	14.799
	0.500	15.054	15.031	15.008	14.985	14.962	14.939	14.917	14.895
	0.600	15.162	15.137	15.112	15.087	15.062	15.038	15.014	14.991

TK	m	2.200	2.250	2.300	2.350	2.400	2.450	2.500	2.550
T	m	2.194	2.244	2.294	2.344	2.394	2.444	2.494	2.544
VOLM	m3	191	197	203	210	216	222	229	235
DISP	t	193	199	205	212	218	224	231	237
DISP	t	193	199	205	212	218	224	231	237
LCB	m	14.390	14.375	14.359	14.343	14.326	14.310	14.293	14.276
VCB	m	1.328	1.356	1.384	1.412	1.440	1.468	1.496	1.524
KMT	m	2.908	2.900	2.894	2.890	2.887	2.885	2.885	2.886
KML	m	27.431	27.112	26.813	26.525	26.242	25.955	25.670	25.398
WLA	m2	124	125	126	127	128	128	129	130
TCP	t/cm	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
MCT	tm/cm	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1
CB		0.5451	0.5503	0.5554	0.5603	0.5652	0.5700	0.5747	0.5793
CP		0.6941	0.6965	0.6990	0.7014	0.7038	0.7063	0.7087	0.7111
CW		0.7775	0.7829	0.7883	0.7937	0.7988	0.8037	0.8085	0.8132
CM		0.7853	0.7900	0.7946	0.7989	0.8031	0.8071	0.8109	0.8146
WSA	m2	184	187	190	193	196	199	202	205
LCA	m	13.92	13.88	13.84	13.80	13.76	13.73	13.70	13.66

transv. metac. height m

-1.500	3.033	3.023	3.016	3.010	3.005	3.002	3.000	2.999
-1.400	3.022	3.013	3.005	2.999	2.994	2.991	2.990	2.989
-1.300	3.012	3.003	2.995	2.989	2.984	2.981	2.980	2.979
-1.200	3.002	2.993	2.985	2.979	2.974	2.971	2.970	2.970
-1.100	2.992	2.983	2.976	2.970	2.965	2.962	2.961	2.960
-1.000	2.983	2.974	2.966	2.961	2.956	2.953	2.952	2.952
-0.900	2.973	2.965	2.957	2.952	2.948	2.945	2.943	2.943
-0.800	2.964	2.956	2.949	2.943	2.939	2.937	2.936	2.935
-0.700	2.956	2.947	2.941	2.935	2.931	2.929	2.928	2.928
-0.600	2.948	2.939	2.932	2.927	2.924	2.922	2.921	2.921
-0.500	2.940	2.931	2.925	2.920	2.917	2.915	2.914	2.915
-0.400	2.933	2.924	2.918	2.913	2.910	2.908	2.907	2.908
-0.300	2.925	2.918	2.911	2.906	2.903	2.902	2.901	2.902
-0.200	2.919	2.911	2.905	2.900	2.897	2.896	2.895	2.896
-0.100	2.913	2.905	2.899	2.895	2.892	2.890	2.890	2.891
0.000	2.908	2.900	2.894	2.890	2.887	2.885	2.885	2.886
0.100	2.903	2.895	2.889	2.885	2.882	2.880	2.880	2.881
0.200	2.899	2.891	2.885	2.881	2.878	2.876	2.876	2.877
0.300	2.896	2.888	2.881	2.877	2.874	2.873	2.872	2.874
0.400	2.892	2.884	2.878	2.874	2.871	2.870	2.869	2.870
0.500	2.889	2.881	2.875	2.871	2.868	2.867	2.867	2.868
0.600	2.887	2.879	2.873	2.869	2.866	2.865	2.865	2.866

TK	m	2.200	2.250	2.300	2.350	2.400	2.450	2.500	2.550
T	m	2.194	2.244	2.294	2.344	2.394	2.444	2.494	2.544
TOTAL DISPLACEMENT		t							
	-1.500	198	204	211	217	224	231	237	244
	-1.400	197	204	210	217	223	230	237	244
	-1.300	197	203	210	216	223	229	236	243
	-1.200	196	203	209	216	222	229	236	242
	-1.100	196	202	209	215	222	228	235	242
	-1.000	195	202	208	215	221	228	234	241
	-0.900	195	201	208	214	221	227	234	241
	-0.800	195	201	207	214	220	227	234	240
	-0.700	194	201	207	213	220	227	233	240
	-0.600	194	200	207	213	220	226	233	239
	-0.500	194	200	206	213	219	226	232	239
	-0.400	193	200	206	212	219	225	232	238
	-0.300	193	199	206	212	219	225	232	238
	-0.200	193	199	206	212	218	225	231	238
	-0.100	193	199	205	212	218	225	231	238
	0.000	193	199	205	212	218	224	231	237
	0.100	193	199	205	211	218	224	231	237
	0.200	192	199	205	211	218	224	230	237
	0.300	192	199	205	211	217	224	230	237
	0.400	192	198	205	211	217	224	230	236
	0.500	192	198	205	211	217	223	230	236
	0.600	192	198	205	211	217	223	230	236
long. centre of buoy.		m							
	-1.500	12.846	12.852	12.857	12.861	12.863	12.865	12.866	12.866
	-1.400	12.952	12.956	12.960	12.963	12.964	12.964	12.964	12.963
	-1.300	13.057	13.060	13.063	13.064	13.064	13.063	13.062	13.059
	-1.200	13.162	13.164	13.165	13.165	13.164	13.162	13.159	13.156
	-1.100	13.266	13.267	13.266	13.265	13.263	13.260	13.257	13.252
	-1.000	13.371	13.369	13.368	13.365	13.362	13.358	13.353	13.348
	-0.900	13.475	13.472	13.469	13.465	13.460	13.455	13.449	13.443
	-0.800	13.578	13.574	13.569	13.564	13.558	13.552	13.545	13.537
	-0.700	13.682	13.676	13.670	13.663	13.656	13.648	13.640	13.631
	-0.600	13.785	13.778	13.770	13.761	13.753	13.744	13.734	13.725
	-0.500	13.887	13.878	13.869	13.860	13.850	13.839	13.829	13.818
	-0.400	13.989	13.979	13.968	13.957	13.946	13.934	13.922	13.910
	-0.300	14.091	14.079	14.067	14.054	14.042	14.029	14.016	14.003
	-0.200	14.191	14.178	14.165	14.151	14.137	14.123	14.109	14.094
	-0.100	14.291	14.277	14.262	14.247	14.232	14.217	14.201	14.186
	0.000	14.390	14.375	14.359	14.343	14.326	14.310	14.293	14.276
	0.100	14.488	14.472	14.455	14.438	14.420	14.402	14.384	14.367
	0.200	14.586	14.568	14.550	14.531	14.513	14.494	14.475	14.456
	0.300	14.682	14.663	14.644	14.624	14.605	14.585	14.565	14.545
	0.400	14.778	14.758	14.737	14.717	14.696	14.675	14.654	14.634
	0.500	14.873	14.851	14.830	14.808	14.786	14.765	14.743	14.721
	0.600	14.967	14.944	14.921	14.899	14.876	14.853	14.831	14.808

TK	m	2.600	2.650	2.700	2.750	2.800	2.850	2.900	2.950
T	m	2.594	2.644	2.694	2.744	2.794	2.844	2.894	2.944
VOLM	m3	242	248	255	261	268	275	281	288
DISP	t	244	250	257	264	270	277	284	290
DISP	t	244	250	257	264	270	277	284	290
LCB	m	14.260	14.243	14.226	14.209	14.193	14.176	14.160	14.143
VCB	m	1.552	1.580	1.608	1.636	1.664	1.692	1.720	1.748
KMT	m	2.888	2.892	2.896	2.902	2.908	2.914	2.922	2.930
KML	m	25.126	24.863	24.606	24.357	24.140	23.916	23.711	23.521
WLA	m2	131	131	132	133	133	134	135	135
TCP	t/cm	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4
MCT	tm/cm	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4
CB		0.5838	0.5883	0.5926	0.5969	0.6010	0.6052	0.6092	0.6132
CP		0.7135	0.7160	0.7183	0.7207	0.7231	0.7255	0.7278	0.7302
CW		0.8177	0.8222	0.8265	0.8308	0.8352	0.8393	0.8436	0.8479
CM		0.8182	0.8216	0.8249	0.8281	0.8312	0.8342	0.8370	0.8398
WSA	m2	208	211	214	217	220	223	226	229
LCA	m	13.63	13.60	13.57	13.55	13.52	13.49	13.46	13.43

transv. metac. height m

-1.500	3.000	3.002	3.005	3.009	3.014	3.020	3.027	3.035
-1.400	2.990	2.991	2.995	2.999	3.004	3.010	3.017	3.025
-1.300	2.980	2.982	2.985	2.989	2.995	3.001	3.008	3.016
-1.200	2.971	2.973	2.976	2.980	2.986	2.992	2.999	3.007
-1.100	2.961	2.964	2.967	2.971	2.977	2.983	2.990	2.998
-1.000	2.953	2.955	2.959	2.963	2.969	2.975	2.982	2.990
-0.900	2.945	2.947	2.951	2.955	2.961	2.967	2.974	2.983
-0.800	2.937	2.939	2.943	2.947	2.953	2.960	2.967	2.975
-0.700	2.929	2.932	2.936	2.940	2.946	2.953	2.960	2.968
-0.600	2.923	2.925	2.929	2.933	2.939	2.946	2.954	2.962
-0.500	2.916	2.919	2.922	2.927	2.933	2.939	2.947	2.956
-0.400	2.910	2.913	2.916	2.921	2.927	2.934	2.941	2.950
-0.300	2.904	2.907	2.911	2.916	2.921	2.928	2.936	2.944
-0.200	2.898	2.902	2.906	2.911	2.916	2.923	2.931	2.939
-0.100	2.893	2.897	2.901	2.906	2.912	2.919	2.926	2.935
0.000	2.888	2.892	2.896	2.902	2.908	2.914	2.922	2.930
0.100	2.884	2.887	2.892	2.897	2.904	2.911	2.918	2.927
0.200	2.880	2.883	2.888	2.894	2.900	2.907	2.915	2.923
0.300	2.876	2.880	2.884	2.890	2.897	2.904	2.912	2.920
0.400	2.873	2.877	2.881	2.887	2.894	2.901	2.909	2.918
0.500	2.870	2.874	2.878	2.884	2.891	2.898	2.907	2.915
0.600	2.868	2.872	2.876	2.882	2.889	2.896	2.904	2.913

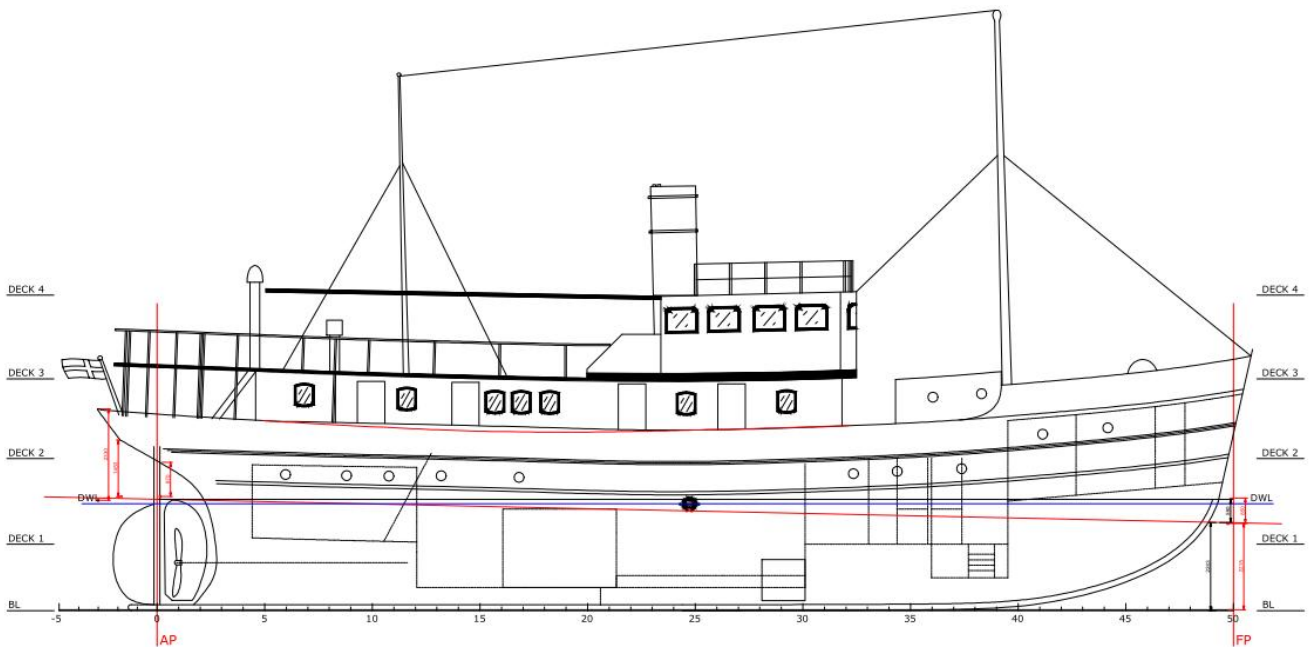
TK	m	2.600	2.650	2.700	2.750	2.800	2.850	2.900	2.950
T	m	2.594	2.644	2.694	2.744	2.794	2.844	2.894	2.944
TOTAL DISPLACEMENT		t							
	-1.500	251	258	265	272	279	286	293	300
	-1.400	250	257	264	271	278	285	292	299
	-1.300	250	256	263	270	277	284	291	298
	-1.200	249	256	263	269	276	283	290	297
	-1.100	248	255	262	269	276	283	290	297
	-1.000	248	255	261	268	275	282	289	296
	-0.900	247	254	261	268	274	281	288	295
	-0.800	247	254	260	267	274	281	288	295
	-0.700	246	253	260	267	273	280	287	294
	-0.600	246	253	259	266	273	280	286	293
	-0.500	245	252	259	266	272	279	286	293
	-0.400	245	252	258	265	272	279	285	292
	-0.300	245	251	258	265	271	278	285	292
	-0.200	244	251	258	264	271	278	284	291
	-0.100	244	251	257	264	271	277	284	291
	0.000	244	250	257	264	270	277	284	290
	0.100	244	250	257	263	270	277	283	290
	0.200	243	250	256	263	270	276	283	290
	0.300	243	250	256	263	269	276	283	289
	0.400	243	249	256	262	269	276	282	289
	0.500	243	249	256	262	269	275	282	289
	0.600	243	249	256	262	269	275	282	289
long. centre of buoy.		m							
	-1.500	12.866	12.864	12.861	12.858	12.854	12.849	12.844	12.837
	-1.400	12.961	12.959	12.956	12.952	12.947	12.942	12.936	12.929
	-1.300	13.057	13.054	13.050	13.045	13.039	13.033	13.027	13.019
	-1.200	13.152	13.148	13.143	13.137	13.131	13.124	13.117	13.109
	-1.100	13.247	13.241	13.235	13.229	13.222	13.215	13.207	13.198
	-1.000	13.342	13.335	13.328	13.320	13.313	13.305	13.296	13.287
	-0.900	13.436	13.428	13.420	13.411	13.403	13.394	13.385	13.375
	-0.800	13.529	13.521	13.512	13.502	13.492	13.483	13.473	13.462
	-0.700	13.622	13.613	13.603	13.593	13.582	13.571	13.560	13.549
	-0.600	13.715	13.704	13.694	13.683	13.671	13.659	13.647	13.635
	-0.500	13.807	13.795	13.784	13.772	13.759	13.747	13.734	13.721
	-0.400	13.898	13.886	13.873	13.860	13.847	13.834	13.820	13.806
	-0.300	13.989	13.976	13.962	13.948	13.934	13.920	13.906	13.891
	-0.200	14.080	14.065	14.051	14.036	14.021	14.006	13.991	13.976
	-0.100	14.170	14.154	14.138	14.123	14.107	14.091	14.076	14.060
	0.000	14.260	14.243	14.226	14.209	14.193	14.176	14.160	14.143
	0.100	14.349	14.331	14.313	14.295	14.278	14.260	14.243	14.226
	0.200	14.437	14.418	14.400	14.381	14.363	14.344	14.326	14.308
	0.300	14.525	14.506	14.486	14.466	14.447	14.428	14.409	14.390
	0.400	14.613	14.592	14.571	14.551	14.531	14.511	14.491	14.471
	0.500	14.700	14.678	14.657	14.635	14.614	14.593	14.572	14.552
	0.600	14.786	14.763	14.741	14.719	14.697	14.675	14.653	14.632

REPORT FOR:

NYBERG/TIMGREN

INCLINING TEST REPORT R.2132.1000.002

August 22, 2013
REVISION 0



NIKOLAI II

NIKOLAI II
INCLINING TEST REPORT
R.2132.1000.002

Project: FS2132
Client: Nyberg/Timgren
Date: 2013-08-22
Revision: 0

REVISION HISTORY

REV.	DATE	DESCRIPTION
0	2013-08-22	Initial revision
-	-	-

Foreship		
Designed	2013-08-22	KN
Checked	2013-08-22	PM

Foreship Ltd.
Hitsajankatu 4 A
00810 HELSINKI
FINLAND

Phone: +358-20-730 9090
Fax: +358-20-730 9091
www.foreship.com

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1 Introduction

This report has been prepared on the request of Paul Nyberg.

The purpose of this report is to show the results of the Inclining Test of the vessel Nikolai II carried out in Helsinki, August 15, 2013.

2 Executive Summary

The lightweight (2013-08-15) and centre of gravity are the following:

- Weight: 224.7 ton
- LCG 13.47 m
- TCG: 0.00 m (portside positive)
- VCG: 2.60 m

Previous (2001-11-01) lightweight and centre of gravity are the following:

- Weight: 203.9 ton
- LCG 12.7 m
- TCG: 0.00 m (portside positive)
- VCG: 2.55 m

3 General

3.1 General Data

Ship's Name	NIKOLAI II
Type of the Ship	Passenger Ship
Flag	Finland
Port of Registry	Helsinki
Owner	Paul Nyberg & Veronica Timgren
Builder	-
Date of Build	1903

3.2 Main Dimensions

Length over all	ca. 30.00 m
Length between perpendiculars	27.50 m
Breadth max. (moulded)	6.00 m
Depth (moulded)	3.66 m
Draught (moulded, max. draught)	2.70 m

3.3 Date and Place of the Test

The inclining test was carried out at August 15th, 2013 in Helsinki, Finland.

Draft survey:

Start of draft survey: August 15, 2012, 11:00

End of draft survey: August 15, 2012, 11:30

The inclining:

Start of inclining: August 15, 2012, 11:30

End of inclining: August 15, 2012, 13:30

3.4 Weather and Sea Conditions

During the test weather and sea conditions were the following:

Wind velocity:	5 m/s
Wind direction:	180 deg. from bow
Sea water condition:	Calm / small waves
Sea water density:	1.005 t/m ³
Sea water temperature:	14 °C
Air temperature:	18 °C

3.5 Persons Attended the Test

The following persons attended the test:

- Mr. Kai Noras, Foreship Ltd., Test leader
- Mr. Pasi Mustonen, Foreship Ltd.
- Mr. Jussi Ketonen, TRAFI surveyor
- Mr. Jari Pietilä, TRAFI surveyor

4 Weight Survey

A detailed list of removed foreign weights (stores, provision, personnel, temporary equipment, etc.), weights to be relocated and weights to be added (missing weights) including centre of gravity were gathered during the weight survey. The result tables are presented below.

4.1 Removed Solid Weights

SUMMARY OF REMOVED WEIGHTS					
DECK	LOCATION / ITEM	WEIGHT [t]	LCG [m]	TCG [m]	VCG [m]
Deck 1	Saloon, #7, Cable and scrap	0.100	3.850	0.000	1.400
Deck 2	Aft Deck, #4, Freezer	0.150	2.200	0.000	4.750
Deck 2	Pantry, #8, Provisions	0.050	4.400	0.000	4.600
Deck 2	Restaurant, #20, Pendulum oil	0.049	10.800	0.000	4.000
Deck 2	Store, #35, Misc. Storage	0.150	19.500	2.200	4.900
Deck 2	Store, #38, Misc. Storage	0.100	20.750	2.200	4.900
Deck 3	Open deck, #0, Flowers	0.420	0.000	0.000	7.000
Deck 3	Open deck, #23, Grill	0.040	12.500	0.000	6.200
Deck 3	Pantry, #26, Cable	0.100	14.500	1.500	6.300
Deck 3	Pantry, #26, Provisions	0.150	14.500	-1.000	6.300
Deck 3	Wheelhouse, #30, Plastic cover and grill	0.050	18.500	0.000	6.100
Deck 2	Restaurant, #15, 2 Persons	0.160	8.250	0.000	4.950
Deck 2	Restaurant, #22, 2 Persons	0.160	12.100	0.000	4.950
Deck 3	Open deck, #13, Inclining Weight W1	0.236	7.150	2.348	6.450
Deck 3	Open deck, #14, Inclining Weight W2	0.236	7.750	2.348	6.450
Deck 3	Open deck, #15, Inclining Weight W3	0.235	8.350	-2.410	6.450
Deck 3	Open deck, #16, Inclining Weight W4	0.228	8.950	-2.410	6.450
Deck 3	Open deck, #17, Inclining Weight W5	0.233	9.550	0.000	6.450
TOTAL		2.847	8.61	0.19	5.86

Table 1 Summary of removed and relocated weights.

4.2 Added Solid Weights

There were no added weights during the test.

4.3 Relocated Solid Weights

There were no relocated weights during the test.

5 Tank Survey

The gathered data during the Tank Survey is presented below with corresponding volumes and centre of gravities.

5.1 Removed Tanks

Removed tanks during the test are presented here. It should be clearly noted that proper tank capacity tables or sounding tables could not be found. Values are based on measurement from the ship, drawings and information presented in previous inclining test report. Free surface effect has been calculated and the correction to the GM is 3.74 tm / 237.7 t = 0.016 m (FSM/Displacement).

Tank Name	Description	Capacity [m3]	Volume [m3]	Density [t/m3]	Weight [t]	LCG [m]	TCG [m]	VCG [m]	FSM [tm]
DIESEL OIL									
FO1P	Fuel Oil 1P	23.57	0	0.840	0.00				0.00
FO1S	Fuel Oil 1S	23.57	0	0.840	0.00				0.00
FO2C	Fuel Oil 2C	1.73	1.4	0.840	1.21	16.23	0.45	2.23	0.43
FOD	Day Tank	0.88	0.6	0.840	0.54	11.35	-1.43	5.00	0.02
FRESH WATER									
FW1P	Fresh Water 1P	3.80	3.8	1.000	3.80	23.39	0.60	0.94	0.00
FW1S	Fresh Water 1S	3.80	3.8	1.000	3.80	23.39	-0.60	0.94	0.00
BALLAST WATER									
FP	Fore Peak	4.40	0.0	0.000	0.00				0.00
Grey Water									
GW1	Gray Water 1C	3.81	0.8	1.000	0.83	16.10	0.00	0.70	3.29
					Weight [t]	LCG [m]	TCG [m]	VCG [m]	FSM [tm]
TOTALS					10.19	21.30	-0.02	1.29	3.74

Table 2 Removed tanks.

6 Draft Survey

6.1 Draft Survey Records

Draft Survey records are shown in figure 1 below. Draft mark readings are measured above the keel plate. Heel to portside is positive. Draft marks located on transom and stem.

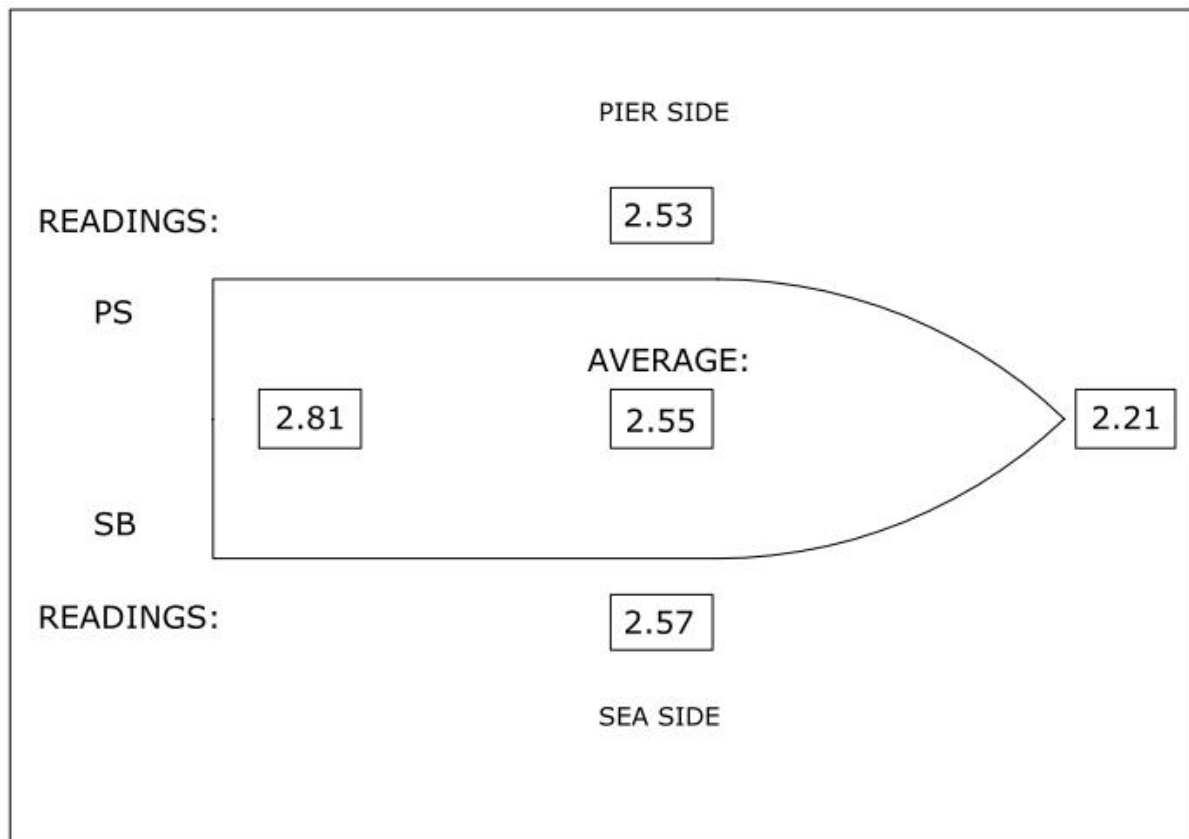


Figure 1 Draft survey readings.

6.2 Location of Draft Readings

- Aft Readings: at #0
- Mid Readings: 13.6 m from AP
- Fore Readings: 0.4 m aft of FP
- Distance between aft and fore Readings: 26.98 m
- Length between perpendiculars: 27.50 m

Notes: Frame #0 locates at the rudder stock. Mid ship readings are located 13.60 m forward of frame #0. Readings in the fore ship are taken from the intersection of design waterline (T=2.70 m) and stem.

6.3 Initial Heeling Angle

$TAN ((T_{SB} - T_{PS}) / \text{Beam}) = \text{Heeling angle} = TAN ((2.57 - 2.53) / 6.0) = -0.385^\circ$
 (Starboard). Heeling angle is calculated from measured difference between the mid ship marks.

6.4 Trim Marks

$$\text{Trim} = T_{\text{FORE}} - T_{\text{AFT}} = 2.21 - 2.81 = -0.57 \text{ m (trim negative by aft)}$$

6.5 Trim LPP

$$\text{Trim} = -0.570 \times 27.50 / 26.98 = -0.581 \text{ m}$$

6.6 Mean Draft at LPP/2

$$T_{\text{MEAN}} = (T_{\text{AFT}} + 4 \times T_{\text{LPP/2}} + T_{\text{FORE}}) / 6 = (2.81 + 4 \times 2.55 + 2.21) / 6 = 2.53 \text{ m (above keel)}$$

6.7 Interpolated Displacement, KM and LCB During the Test

Hydrostatic values refer to baseline. Interpolated hydrostatic values are shown bolded.

(T = 2.494 m, rho=1.005 t/m3), see also appendage 1:

Trim [m]	Displacement [t]	LCB [m]	KMT [m]
-0.500	232.5	13.829	2.914
-0.581	233.3	13.752	2.920
-0.600	233.5	13.734	2.921

Table 3 Interpolated hydrostatic values.

(T = 2.544 m, rho=1.005 t/m3), see also appendage 2:

Trim [m]	Displacement [t]	LCB [m]	KMT [m]
-0.500	239.5	13.818	2.915
-0.581	239.5	13.743	2.920
-0.600	239.5	13.725	2.921

Table 4 Interpolated hydrostatic values.

(T = 2.530 m, rho=1.005 t/m3):

T [m]	Displacement [t]	LCB [m]	KMT [m]
2.494	233.3	13.752	2.920
2.530	237.7	13.745	2.920
2.544	239.5	13.743	2.920

Table 5 Interpolated hydrostatic values.

6.8 Displacement, KMT and LCB During the Test

(T = 2.53 m, rho=1.005t/m3):

- Displacement = 237.7 t
- LCB = 13.745 m
- KMT = 2.920 m

7 Inclining

Inclining was carried out by using fixed weights. Five (5) similar water filled drum weights, abt. 0.23 t each, were used to heel the vessel. In table below, distances are measured from CL to the centre of the inclining weight.

7.1 Inclining Weight Shifts and Total Heeling Moment

Shift	MEASURED MOMENT ARM [m]						TOTAL MOMENTS [tm]
	W1	W2	W3	W4	W5	W6	TOT
0	2.384	2.384	-2.410	-2.410	0.000	0.000	0.01
1	-2.410	-2.410	-2.410	-2.410	0.000	0.000	-2.25
2	-2.410	-2.410	-2.141	-2.410	-2.410	0.000	-2.75
3	2.384	2.384	-2.141	-2.410	-2.410	0.000	-0.49
4	2.384	2.384	-2.141	-2.410	0.000	0.000	0.07
5	2.384	2.384	2.384	2.384	0.000	0.000	2.23
6	2.384	2.384	2.384	2.384	2.384	0.000	2.78
7	2.384	2.384	-2.410	-2.410	2.384	0.000	0.56
8	2.384	2.384	-2.410	-2.410	0.000	0.000	0.01

Table 6 Inclining weight shift and total heeling moment.

7.2 Pendulum arrangement

One pendulum was used. Pendulum line and oil tray was in the restaurant on deck 2 ca. at frame #20. Pendulum was hanging from the washer. Pendulum weight, 2 kg, located at oil tray which was filled with lubricating oil. The following pendulum length was measured:

- Pendulum 1: 3.745 m

7.3 Pendulum readings

Pendulum readings are presented below. A digital angle measurement device was also used during test for quality check. The two readings matched well and so only pendulum readings will be used here.

Pendulum readings - pendulum 1																		
Shifts	Reading		Reading		Reading		Reading		Reading		Reading		Reading		Average	Defl.	Heel	
	P	S	P	S	P	S	P	S	P	S	P	S	P	S	[mm]	[mm]	[angle]	
0	430	470	433	460	438	452	445								447	0.00	-0.385	
1	326	360	315	365	310	350	322	370	335	362	335	370			343	-103.52	-1.969	
2	300	334	300	315	305	290	325	311	324	303	320				312	-135.31	-2.456	
3	401	448	415	449	372	460	382	446	386	447	385	455	388	456	421	-26.14	-0.785	
4	442	454	436	457	436	464	435	460							448	1.14	-0.368	
5	536	575	538	572	549	564	548	567							556	109.27	1.287	
6	556	617	560	618	570	595	570	588							584	137.39	1.718	
7	460	475	468	505	472	489	446	508	460	480					476	29.44	0.065	
8	426	482	418	475	420	468	423	468							448	0.64	-0.375	
Pendulum 1: location behind the mast Pendulum length [mm]: 3745																		

Table 7 Pendulum readings.

8 Test Analysis

8.1 Calculated GM-values and standard deviation (s) calculation

Table below shows individual GM-values for each shift. Standard deviation is also calculated to show the accuracy of the test. Note that the shift number two has been removed from the result calculation. This has been done because of the fairly large deviation from the rest of the recorded points. This is suspected to be an error in measurement.

Calculated GM and KG are based on average method which result is shown on this page. The moment and heel diagram is shown on the next page.

CALCULATED GM-VALUES DURING THE TEST									
Shift [#]	Average heel angle [degree]	Average heel angle [rad]	heel/shift [degree]	heel/shift [rad]	Total Moment [tm]	M Moment/shift [tm]	D Displ. [t]	GM _f M/(D*sinα) [m]	(GM _s -X _i) ²
0	-0.385	-0.007	0.000	0.000	0.01	0.00	237.7		
1	-1.969	-0.034	-1.584	-0.028	-2.25	-2.26	237.7	0.344	0.0005
2	-2.456	-0.043	-0.487	-0.008	-2.75	-0.50	237.7	0.246	0.0056
3	-0.785	-0.014	1.671	0.029	-0.49	2.26	237.7	0.326	0.0000
4	-0.368	-0.006	0.417	0.007	0.07	0.56	237.7	0.324	0.0000
5	1.287	0.022	1.655	0.029	2.23	2.16	237.7	0.314	0.0000
6	1.718	0.030	0.431	0.008	2.78	0.55	237.7	0.310	0.0001
7	0.065	0.001	-1.652	-0.029	0.56	-2.22	237.7	0.324	0.0000
8	-0.375	-0.007	-0.441	-0.008	0.01	-0.56	237.7	0.304	0.0003
Metacentric height during experiment						GM		0.321	m
Free surface correction						GM _C		0.016	m
Corrected metacentric height						GM ₀		0.337	m
Height of metacenter above baseline						KM		2.920	m
Center of gravity above BL						KG		2.583	m
STANDARD DEVIATION CALCULATION									
Standard deviation						$\Sigma(GM_s - X_i)^2$:		0.0010	
						$s = \sqrt{\Sigma(GM_s - X_i)^2 / (n-1)}$:		0.0121	m

Table 8 Calculated GM-values during the test and standard deviation (s).

8.2 Moment vs. Heel Diagram

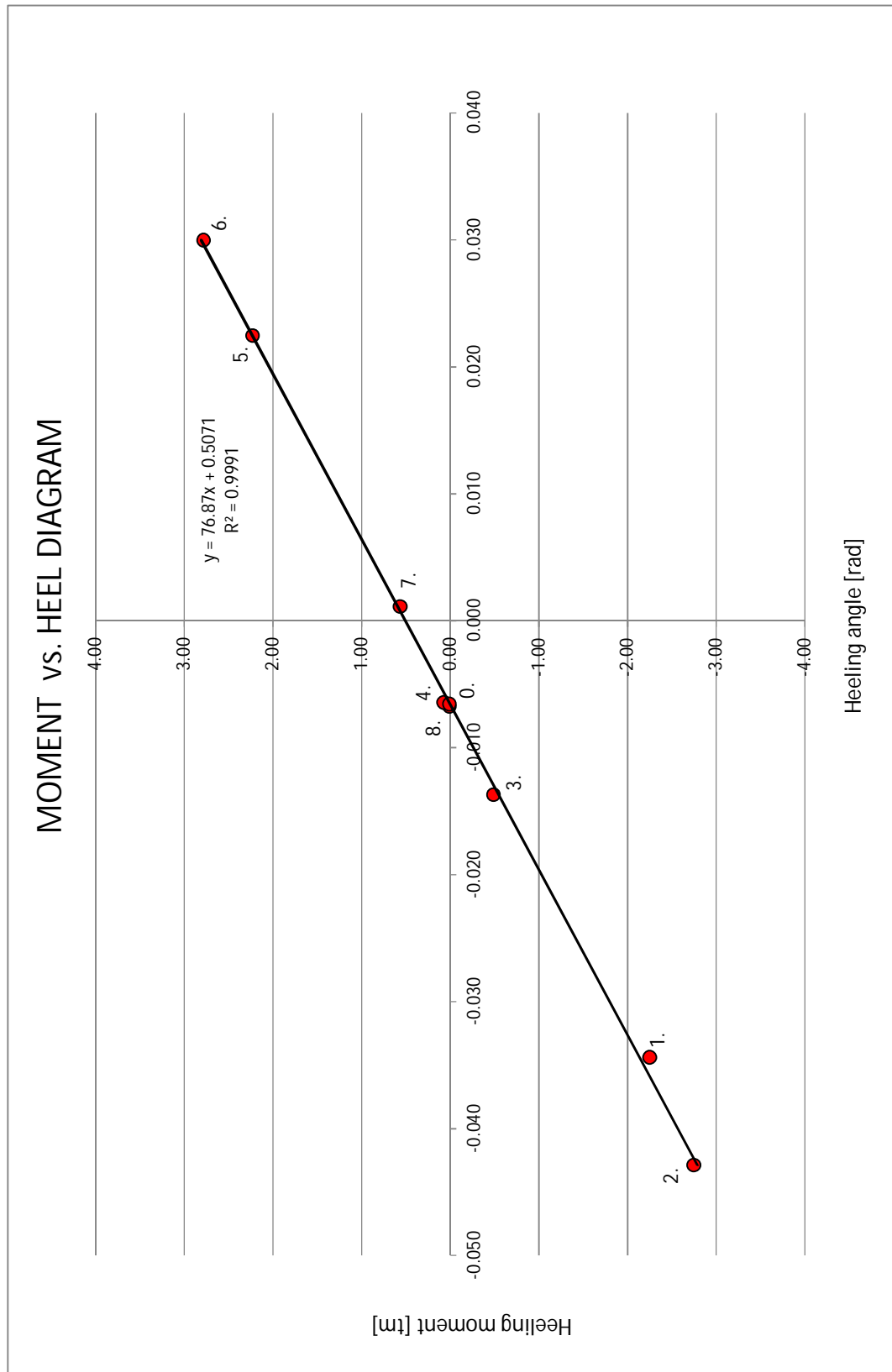


Figure 2 Moment vs. heel diagram.

9 Lightweight calculation

VESSEL'S LIGHTWEIGHT CALCULATION				
Item	Weight [t]	LCG [m]	TCG [m]	VCG [m]
Displacement during the test	237.7	13.75	0.00	2.58
Tanks to be subtracted	-10.2	21.30	-0.02	1.29
Solid weights to be subtracted	-2.8	8.61	0.19	5.86
Solid weights to be relocated	0.0	0.00	0.00	0.00
Solid weights to be added	0.0	0.00	0.00	0.00
LIGHTWEIGHT: 2013-08-15	224.7	13.47	0.00	2.60

Table 9 Lightweight calculation.

10 Appendages

10.1 Vessel's hydrostatic table for Tk = 2.500 – 2.550 m (2 page)

Ship Consulting Nikolai II		HYDROSTATIC BOOK							Page	*
								Page	20	
TK	m	2.200	2.250	2.300	2.350	2.400	2.450	2.500	2.550	
T	m	2.194	2.244	2.294	2.344	2.394	2.444	2.494	2.544	
VOLM	m ³	191	197	203	210	216	222	229	235	
DISP	t	193	199	205	212	218	224	231	237	
DISP	t	193	199	205	212	218	224	231	237	
LCB	m	14.390	14.375	14.359	14.343	14.326	14.310	14.293	14.276	
VCB	m	1.328	1.356	1.384	1.412	1.440	1.468	1.496	1.524	
KMT	m	2.908	2.900	2.894	2.890	2.887	2.885	2.885	2.886	
KML	m	27.431	27.112	26.813	26.525	26.242	25.955	25.670	25.398	
WLA	m ²	124	125	126	127	128	128	129	130	
TCP	t/cm	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
MCT	tm/cm	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	
CB		0.5451	0.5503	0.5554	0.5603	0.5652	0.5700	0.5747	0.5793	
CP		0.6941	0.6965	0.6990	0.7014	0.7038	0.7063	0.7087	0.7111	
CW		0.7775	0.7829	0.7883	0.7937	0.7988	0.8037	0.8085	0.8132	
CM		0.7853	0.7900	0.7946	0.7989	0.8031	0.8071	0.8109	0.8146	
WSA	m ²	184	187	190	193	196	199	202	205	
LCA	m	13.92	13.88	13.84	13.80	13.76	13.73	13.70	13.66	
transv. metac. height m										
-1.500		3.033	3.023	3.016	3.010	3.005	3.002	3.000	2.999	
-1.400		3.022	3.013	3.005	2.999	2.994	2.991	2.990	2.989	
-1.300		3.012	3.003	2.995	2.989	2.984	2.981	2.980	2.979	
-1.200		3.002	2.993	2.985	2.979	2.974	2.971	2.970	2.970	
-1.100		2.992	2.983	2.976	2.970	2.965	2.962	2.961	2.960	
-1.000		2.983	2.974	2.966	2.961	2.956	2.953	2.952	2.952	
-0.900		2.973	2.965	2.957	2.952	2.948	2.945	2.943	2.943	
-0.800		2.964	2.956	2.949	2.943	2.939	2.937	2.936	2.935	
-0.700		2.956	2.947	2.941	2.935	2.931	2.929	2.928	2.928	
-0.600		2.948	2.939	2.932	2.927	2.924	2.922	2.921	2.921	
-0.500		2.940	2.931	2.925	2.920	2.917	2.915	2.914	2.915	
-0.400		2.933	2.924	2.918	2.913	2.910	2.908	2.907	2.908	
-0.300		2.925	2.918	2.911	2.906	2.903	2.902	2.901	2.902	
-0.200		2.919	2.911	2.905	2.900	2.897	2.896	2.895	2.896	
-0.100		2.913	2.905	2.899	2.895	2.892	2.890	2.890	2.891	
0.000		2.908	2.900	2.894	2.890	2.887	2.885	2.885	2.886	
0.100		2.903	2.895	2.889	2.885	2.882	2.880	2.880	2.881	
0.200		2.899	2.891	2.885	2.881	2.878	2.876	2.876	2.877	
0.300		2.896	2.888	2.881	2.877	2.874	2.873	2.872	2.874	
0.400		2.892	2.884	2.878	2.874	2.871	2.870	2.869	2.870	
0.500		2.889	2.881	2.875	2.871	2.868	2.867	2.867	2.868	
0.600		2.887	2.879	2.873	2.869	2.866	2.865	2.865	2.866	

Ship Consulting Nikolai II		HYDROSTATIC BOOK						Page Page	*
								21	
TK	m	2.200	2.250	2.300	2.350	2.400	2.450	2.500	2.550
T	m	2.194	2.244	2.294	2.344	2.394	2.444	2.494	2.544
TOTAL DISPLACEMENT		t							
-1.500		198	204	211	217	224	231	237	244
-1.400		197	204	210	217	223	230	237	244
-1.300		197	203	210	216	223	229	236	243
-1.200		196	203	209	216	222	229	236	242
-1.100		196	202	209	215	222	228	235	242
-1.000		195	202	208	215	221	228	234	241
-0.900		195	201	208	214	221	227	234	241
-0.800		195	201	207	214	220	227	234	240
-0.700		194	201	207	213	220	227	233	240
-0.600		194	200	207	213	220	226	233	239
-0.500		194	200	206	213	219	226	232	239
-0.400		193	200	206	212	219	225	232	238
-0.300		193	199	206	212	219	225	232	238
-0.200		193	199	206	212	218	225	231	238
-0.100		193	199	205	212	218	225	231	238
0.000		193	199	205	212	218	224	231	237
0.100		193	199	205	211	218	224	231	237
0.200		192	199	205	211	218	224	230	237
0.300		192	199	205	211	217	224	230	237
0.400		192	198	205	211	217	224	230	236
0.500		192	198	205	211	217	223	230	236
0.600		192	198	205	211	217	223	230	236
long. centre of buoy.		m							
-1.500		12.846	12.852	12.857	12.861	12.863	12.865	12.866	12.866
-1.400		12.952	12.956	12.960	12.963	12.964	12.964	12.964	12.963
-1.300		13.057	13.060	13.063	13.064	13.064	13.063	13.062	13.059
-1.200		13.162	13.164	13.165	13.165	13.164	13.162	13.159	13.156
-1.100		13.266	13.267	13.266	13.265	13.263	13.260	13.257	13.252
-1.000		13.371	13.369	13.368	13.365	13.362	13.358	13.353	13.348
-0.900		13.475	13.472	13.469	13.465	13.460	13.455	13.449	13.443
-0.800		13.578	13.574	13.569	13.564	13.558	13.552	13.545	13.537
-0.700		13.682	13.676	13.670	13.663	13.656	13.648	13.640	13.631
-0.600		13.785	13.778	13.770	13.761	13.753	13.744	13.734	13.725
-0.500		13.887	13.878	13.869	13.860	13.850	13.839	13.829	13.818
-0.400		13.989	13.979	13.968	13.957	13.946	13.934	13.922	13.910
-0.300		14.091	14.079	14.067	14.054	14.042	14.029	14.016	14.003
-0.200		14.191	14.178	14.165	14.151	14.137	14.123	14.109	14.094
-0.100		14.291	14.277	14.262	14.247	14.232	14.217	14.201	14.186
0.000		14.390	14.375	14.359	14.343	14.326	14.310	14.293	14.276
0.100		14.488	14.472	14.455	14.438	14.420	14.402	14.384	14.367
0.200		14.586	14.568	14.550	14.531	14.513	14.494	14.475	14.456
0.300		14.682	14.663	14.644	14.624	14.605	14.585	14.565	14.545
0.400		14.778	14.758	14.737	14.717	14.696	14.675	14.654	14.634
0.500		14.873	14.851	14.830	14.808	14.786	14.765	14.743	14.721
0.600		14.967	14.944	14.921	14.899	14.876	14.853	14.831	14.808

TK	m	3.000	3.050	3.100	3.150	3.200	3.250	3.300
T	m	2.994	3.044	3.094	3.144	3.194	3.244	3.294
VOLM	m3	295	302	309	316	322	329	336
DISP	t	297	304	311	318	325	332	339
DISP	t	297	304	311	318	325	332	339
LCB	m	14.126	14.110	14.093	14.076	14.059	14.042	14.026
VCB	m	1.776	1.804	1.832	1.860	1.888	1.916	1.944
KMT	m	2.940	2.949	2.960	2.972	2.984	2.996	3.009
KML	m	23.356	23.200	23.053	22.914	22.775	22.647	22.527
WLA	m2	136	137	138	138	139	140	140
TCP	t/cm	1.4	1.4	1.4	1.4	1.4	1.4	1.4
MCT	tm/cm	2.4	2.4	2.5	2.5	2.6	2.6	2.6
CB		0.6171	0.6210	0.6248	0.6286	0.6323	0.6360	0.6396
CP		0.7325	0.7349	0.7372	0.7396	0.7419	0.7442	0.7465
CW		0.8524	0.8568	0.8613	0.8658	0.8702	0.8746	0.8791
CM		0.8425	0.8451	0.8476	0.8500	0.8523	0.8546	0.8568
WSA	m2	232	235	238	241	244	247	250
LCA	m	13.40	13.37	13.33	13.30	13.27	13.24	13.21
transv. metac. height m								
-1.500		3.044	3.054	3.064	3.075	3.086	3.098	3.111
-1.400		3.034	3.044	3.054	3.065	3.077	3.089	3.101
-1.300		3.024	3.034	3.044	3.056	3.067	3.079	3.092
-1.200		3.015	3.025	3.035	3.046	3.058	3.070	3.083
-1.100		3.007	3.017	3.027	3.038	3.050	3.062	3.075
-1.000		2.999	3.008	3.019	3.030	3.041	3.054	3.067
-0.900		2.991	3.001	3.011	3.022	3.034	3.046	3.059
-0.800		2.984	2.994	3.004	3.015	3.027	3.039	3.052
-0.700		2.977	2.987	2.997	3.008	3.020	3.032	3.045
-0.600		2.971	2.981	2.991	3.002	3.014	3.026	3.039
-0.500		2.965	2.975	2.985	2.996	3.008	3.020	3.033
-0.400		2.959	2.969	2.979	2.991	3.002	3.015	3.027
-0.300		2.954	2.964	2.974	2.985	2.997	3.009	3.022
-0.200		2.948	2.959	2.969	2.980	2.992	3.005	3.018
-0.100		2.944	2.954	2.965	2.976	2.988	3.000	3.013
0.000		2.940	2.949	2.960	2.972	2.984	2.996	3.009
0.100		2.936	2.946	2.956	2.968	2.980	2.993	3.006
0.200		2.933	2.942	2.953	2.964	2.976	2.989	3.002
0.300		2.930	2.940	2.950	2.961	2.973	2.986	2.999
0.400		2.927	2.937	2.948	2.959	2.971	2.983	2.996
0.500		2.925	2.935	2.946	2.957	2.969	2.981	2.994
0.600		2.923	2.933	2.944	2.955	2.967	2.979	2.992

TK	m	3.000	3.050	3.100	3.150	3.200	3.250	3.300
T	m	2.994	3.044	3.094	3.144	3.194	3.244	3.294

TOTAL DISPLACEMENT	t							
-1.500	307	314	321	328	336	343	350	
-1.400	306	313	320	328	335	342	349	
-1.300	305	312	319	327	334	341	348	
-1.200	304	311	319	326	333	340	347	
-1.100	304	311	318	325	332	339	347	
-1.000	303	310	317	324	331	338	346	
-0.900	302	309	316	323	330	338	345	
-0.800	301	308	316	323	330	337	344	
-0.700	301	308	315	322	329	336	343	
-0.600	300	307	314	321	328	335	343	
-0.500	300	307	314	321	328	335	342	
-0.400	299	306	313	320	327	334	341	
-0.300	299	306	312	319	326	334	341	
-0.200	298	305	312	319	326	333	340	
-0.100	298	305	311	318	325	332	339	
0.000	297	304	311	318	325	332	339	
0.100	297	304	311	317	324	331	338	
0.200	297	303	310	317	324	331	338	
0.300	296	303	310	317	324	331	337	
0.400	296	303	309	316	323	330	337	
0.500	296	302	309	316	323	330	337	
0.600	295	302	309	316	322	329	336	

long. centre of buoy.	m							
-1.500	12.831	12.823	12.815	12.808	12.800	12.791	12.782	
-1.400	12.921	12.913	12.905	12.896	12.887	12.878	12.869	
-1.300	13.011	13.003	12.994	12.984	12.974	12.964	12.954	
-1.200	13.101	13.092	13.082	13.072	13.061	13.050	13.040	
-1.100	13.189	13.180	13.170	13.159	13.148	13.137	13.125	
-1.000	13.277	13.267	13.257	13.246	13.234	13.222	13.210	
-0.900	13.365	13.354	13.343	13.331	13.319	13.307	13.294	
-0.800	13.451	13.440	13.428	13.416	13.404	13.391	13.378	
-0.700	13.537	13.525	13.513	13.501	13.488	13.475	13.461	
-0.600	13.623	13.610	13.598	13.585	13.571	13.558	13.544	
-0.500	13.708	13.695	13.681	13.668	13.654	13.640	13.626	
-0.400	13.792	13.778	13.764	13.750	13.736	13.722	13.707	
-0.300	13.876	13.862	13.847	13.832	13.818	13.803	13.787	
-0.200	13.960	13.945	13.929	13.914	13.898	13.883	13.868	
-0.100	14.044	14.028	14.011	13.995	13.979	13.963	13.947	
0.000	14.126	14.110	14.093	14.076	14.059	14.042	14.026	
0.100	14.208	14.191	14.174	14.156	14.139	14.121	14.104	
0.200	14.290	14.272	14.254	14.236	14.218	14.200	14.182	
0.300	14.371	14.352	14.334	14.315	14.297	14.278	14.260	
0.400	14.451	14.432	14.413	14.394	14.375	14.356	14.337	
0.500	14.531	14.511	14.492	14.472	14.452	14.433	14.414	
0.600	14.611	14.590	14.570	14.550	14.529	14.509	14.490	

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: -1.50 M UNIT: m
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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.003	0.020	0.045	0.003	-0.114	-0.273
2.100	0.000	0.002	0.021	0.047	0.001	-0.116	-0.272
2.200	0.000	0.003	0.023	0.044	-0.007	-0.124	-0.278
2.300	0.000	0.003	0.024	0.035	-0.022	-0.139	-0.289
2.400	0.000	0.003	0.023	0.021	-0.043	-0.160	-0.307
2.500	0.000	0.003	0.019	0.002	-0.070	-0.187	-0.330
2.600	0.000	0.003	0.012	-0.022	-0.102	-0.219	-0.357
2.700	0.000	0.003	-0.000	-0.050	-0.139	-0.256	-0.390
2.800	0.000	0.003	-0.016	-0.083	-0.180	-0.298	-0.427
2.900	0.000	0.002	-0.038	-0.120	-0.226	-0.345	-0.469
3.000	0.000	-0.004	-0.064	-0.161	-0.275	-0.396	-0.515
3.100	0.000	-0.017	-0.097	-0.207	-0.328	-0.450	-0.566
3.200	0.000	-0.037	-0.136	-0.257	-0.385	-0.508	-0.619

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: -1.25 M UNIT: m
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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.003	0.020	0.049	0.017	-0.094	-0.249
2.100	0.000	0.003	0.022	0.053	0.017	-0.095	-0.249
2.200	0.000	0.003	0.024	0.052	0.010	-0.103	-0.254
2.300	0.000	0.003	0.024	0.045	-0.003	-0.116	-0.265
2.400	0.000	0.003	0.025	0.034	-0.023	-0.136	-0.281
2.500	0.000	0.003	0.023	0.017	-0.048	-0.162	-0.303
2.600	0.000	0.003	0.018	-0.005	-0.079	-0.193	-0.330
2.700	0.000	0.003	0.009	-0.031	-0.113	-0.229	-0.362
2.800	0.000	0.003	-0.004	-0.062	-0.153	-0.270	-0.399
2.900	0.000	0.003	-0.022	-0.096	-0.197	-0.314	-0.439
3.000	0.000	0.001	-0.045	-0.134	-0.244	-0.363	-0.483
3.100	0.000	-0.007	-0.073	-0.177	-0.295	-0.415	-0.531
3.200	0.000	-0.021	-0.108	-0.224	-0.349	-0.471	-0.583

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: -1.00 M UNIT: m

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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.003	0.021	0.052	0.028	-0.077	-0.229
2.100	0.000	0.003	0.023	0.058	0.030	-0.076	-0.227
2.200	0.000	0.003	0.024	0.059	0.024	-0.084	-0.233
2.300	0.000	0.003	0.025	0.054	0.012	-0.097	-0.243
2.400	0.000	0.003	0.026	0.044	-0.006	-0.116	-0.259
2.500	0.000	0.003	0.025	0.029	-0.029	-0.140	-0.280
2.600	0.000	0.003	0.022	0.009	-0.058	-0.170	-0.307
2.700	0.000	0.003	0.015	-0.015	-0.092	-0.205	-0.338
2.800	0.000	0.003	0.004	-0.044	-0.130	-0.244	-0.373
2.900	0.000	0.003	-0.011	-0.076	-0.172	-0.288	-0.413
3.000	0.000	0.002	-0.030	-0.112	-0.218	-0.335	-0.455
3.100	0.000	-0.001	-0.055	-0.152	-0.267	-0.385	-0.502
3.200	0.000	-0.010	-0.085	-0.196	-0.318	-0.439	-0.552

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: -0.75 M UNIT: m

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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.003	0.021	0.053	0.037	-0.062	-0.211
2.100	0.000	0.003	0.024	0.061	0.041	-0.061	-0.209
2.200	0.000	0.003	0.025	0.063	0.037	-0.067	-0.213
2.300	0.000	0.003	0.026	0.060	0.025	-0.080	-0.224
2.400	0.000	0.003	0.026	0.052	0.008	-0.098	-0.240
2.500	0.000	0.003	0.026	0.038	-0.014	-0.122	-0.261
2.600	0.000	0.003	0.024	0.020	-0.042	-0.151	-0.286
2.700	0.000	0.003	0.019	-0.003	-0.074	-0.185	-0.317
2.800	0.000	0.003	0.011	-0.029	-0.111	-0.223	-0.352
2.900	0.000	0.003	-0.002	-0.060	-0.152	-0.265	-0.390
3.000	0.000	0.003	-0.019	-0.094	-0.196	-0.311	-0.432
3.100	0.000	0.001	-0.041	-0.132	-0.243	-0.360	-0.477
3.200	0.000	-0.004	-0.068	-0.173	-0.292	-0.412	-0.525

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: -0.50 M UNIT: m

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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.003	0.021	0.054	0.044	-0.050	-0.195
2.100	0.000	0.004	0.024	0.064	0.050	-0.047	-0.192
2.200	0.000	0.003	0.025	0.067	0.047	-0.053	-0.197
2.300	0.000	0.004	0.026	0.065	0.037	-0.065	-0.207
2.400	0.000	0.003	0.026	0.058	0.020	-0.084	-0.223
2.500	0.000	0.003	0.026	0.045	-0.002	-0.107	-0.244
2.600	0.000	0.003	0.025	0.028	-0.029	-0.136	-0.270
2.700	0.000	0.003	0.022	0.007	-0.060	-0.168	-0.299
2.800	0.000	0.003	0.015	-0.018	-0.096	-0.205	-0.333
2.900	0.000	0.003	0.004	-0.047	-0.135	-0.247	-0.371
3.000	0.000	0.003	-0.011	-0.079	-0.178	-0.291	-0.412
3.100	0.000	0.002	-0.030	-0.115	-0.224	-0.339	-0.456
3.200	0.000	-0.001	-0.054	-0.155	-0.272	-0.390	-0.504

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: -0.25 M UNIT: m

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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.003	0.020	0.054	0.049	-0.041	-0.183
2.100	0.000	0.003	0.024	0.065	0.056	-0.037	-0.179
2.200	0.000	0.004	0.025	0.070	0.055	-0.042	-0.182
2.300	0.000	0.004	0.026	0.068	0.045	-0.054	-0.193
2.400	0.000	0.004	0.026	0.062	0.029	-0.071	-0.209
2.500	0.000	0.003	0.026	0.051	0.008	-0.095	-0.230
2.600	0.000	0.003	0.026	0.035	-0.019	-0.123	-0.256
2.700	0.000	0.003	0.023	0.015	-0.049	-0.155	-0.285
2.800	0.000	0.003	0.018	-0.009	-0.084	-0.192	-0.318
2.900	0.000	0.003	0.009	-0.037	-0.122	-0.232	-0.355
3.000	0.000	0.003	-0.005	-0.068	-0.164	-0.275	-0.396
3.100	0.000	0.003	-0.023	-0.103	-0.208	-0.322	-0.440
3.200	0.000	0.001	-0.045	-0.141	-0.255	-0.372	-0.486

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: 0.00 M UNIT: m

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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.002	0.019	0.053	0.051	-0.035	-0.174
2.100	0.000	0.003	0.023	0.064	0.060	-0.030	-0.169
2.200	0.000	0.004	0.025	0.071	0.059	-0.034	-0.172
2.300	0.000	0.004	0.026	0.070	0.051	-0.045	-0.182
2.400	0.000	0.004	0.026	0.064	0.036	-0.062	-0.198
2.500	0.000	0.004	0.026	0.054	0.015	-0.085	-0.219
2.600	0.000	0.003	0.026	0.039	-0.011	-0.113	-0.244
2.700	0.000	0.003	0.024	0.020	-0.041	-0.145	-0.274
2.800	0.000	0.003	0.019	-0.003	-0.075	-0.181	-0.307
2.900	0.000	0.003	0.011	-0.030	-0.113	-0.221	-0.343
3.000	0.000	0.003	-0.001	-0.060	-0.153	-0.263	-0.383
3.100	0.000	0.003	-0.017	-0.094	-0.197	-0.310	-0.426
3.200	0.000	0.002	-0.038	-0.131	-0.243	-0.359	-0.473

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
 INITIAL TRIM: 0.25 M UNIT: m

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INITIAL DRAUGHT	HEELING ANGLE (DEGREES)						
	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.002	0.019	0.053	0.054	-0.029	-0.165
2.100	0.000	0.003	0.022	0.064	0.062	-0.025	-0.161
2.200	0.000	0.003	0.024	0.070	0.061	-0.029	-0.164
2.300	0.000	0.003	0.025	0.070	0.054	-0.039	-0.174
2.400	0.000	0.003	0.026	0.065	0.039	-0.057	-0.190
2.500	0.000	0.003	0.026	0.055	0.019	-0.079	-0.210
2.600	0.000	0.003	0.026	0.041	-0.006	-0.106	-0.236
2.700	0.000	0.003	0.024	0.023	-0.036	-0.138	-0.266
2.800	0.000	0.003	0.020	-0.000	-0.070	-0.174	-0.299
2.900	0.000	0.003	0.013	-0.026	-0.107	-0.213	-0.335
3.000	0.000	0.003	0.001	-0.056	-0.146	-0.256	-0.375
3.100	0.000	0.003	-0.015	-0.088	-0.189	-0.301	-0.417
3.200	0.000	0.002	-0.034	-0.125	-0.234	-0.349	-0.464

RESIDUARY STABILITY LEVER MS AS A FUNCTION OF DRAUGHT AND HEELING ANGLE
INITIAL TRIM: 0.50 M UNIT: m

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INITIAL	HEELING ANGLE (DEGREES)						
DRAUGHT	0.0	10.0	20.0	30.0	40.0	50.0	60.0
2.000	0.000	0.002	0.019	0.054	0.056	-0.025	-0.158
2.100	0.000	0.003	0.022	0.063	0.062	-0.022	-0.156
2.200	0.000	0.003	0.023	0.069	0.062	-0.026	-0.159
2.300	0.000	0.003	0.024	0.070	0.054	-0.037	-0.169
2.400	0.000	0.003	0.025	0.065	0.040	-0.054	-0.185
2.500	0.000	0.003	0.025	0.055	0.020	-0.075	-0.205
2.600	0.000	0.003	0.025	0.041	-0.004	-0.102	-0.231
2.700	0.000	0.003	0.024	0.023	-0.033	-0.134	-0.260
2.800	0.000	0.003	0.020	0.001	-0.067	-0.170	-0.294
2.900	0.000	0.003	0.013	-0.025	-0.103	-0.209	-0.330
3.000	0.000	0.003	0.002	-0.054	-0.143	-0.251	-0.371
3.100	0.000	0.003	-0.014	-0.086	-0.185	-0.296	-0.414
3.200	0.000	0.003	-0.034	-0.121	-0.230	-0.345	-0.459