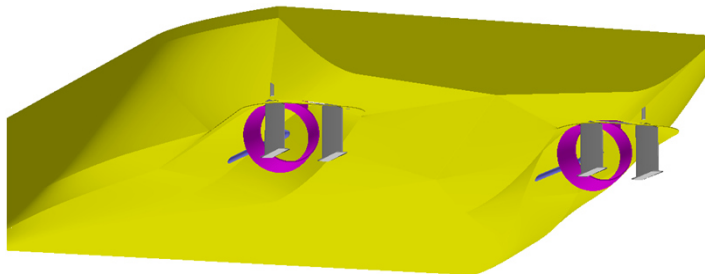
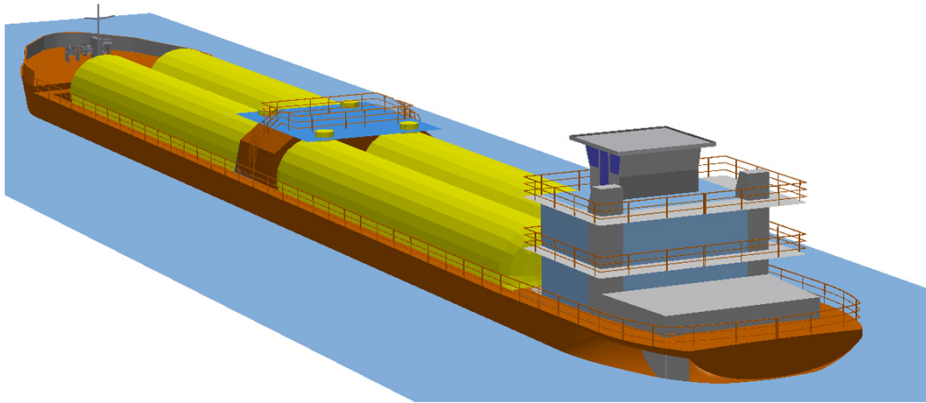
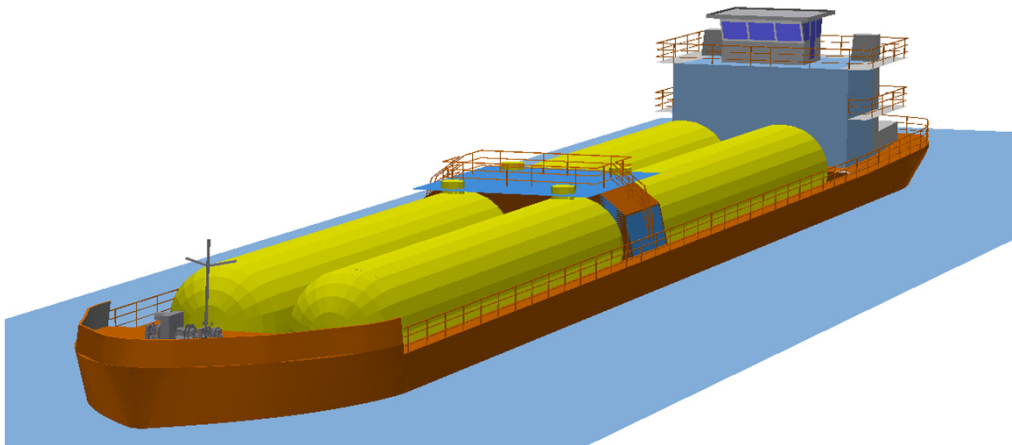


## LNG Carrier LNG2



### Main dimensions

Cargo type		LNG Barge
Hull type		LNG2
Length o.A.	L	92,00 m
Breadth	B	12,00 m
Depth Main Deck	D	3,70 m
Draught max.	T	2,10 m
Lightweight estimate		1389 t
Payload at T = 2.33 m		1095 t

### Applicable regulations

- Vessel built according to Rules and Regulations for the Construction and Classification of Inland Waterways Ships by the Indian Register of Shipping.
- Applicable rules of IWAI for navigation on NW-1, all reaches from Haldia (West Bengal) to Allahabad (Uttar Pradesh).
- "Natural Gas Fueled Vessels for Coastal and Inland Waters" Classification notes, IRClass, July 2017

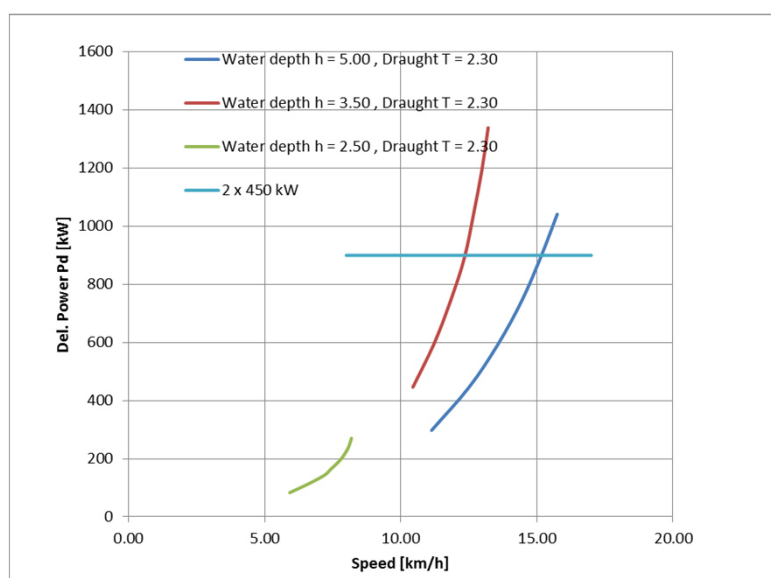
### Powering

Number of Propellers (in nozzles)		2
Propeller diameter	$D_p$	1,45 m
Del. total power	$P_d$	900 kW
Rate of rev.	n [1/min]	390

Reversible gear box

Dual-fuel (Diesel - LNG) marine engine 500 kW in rating A (heavy, uninterrupt

### Estimated speed and power



#### 4 LNG Tanks

Cryogenic tank, double wall vacuum insulated

Outer Length and diameter 30,00 x 5.88 m

Volume inner tank 335 m<sup>3</sup> per tank

LNG capacity in 4 tanks 640 t at rho = 450 kg/m<sup>3</sup>

Valves, loading and unloading devices on deck of a central service room

#### Provisions

Diesel Oil	30 t
Fresh Water	12 t
Lub Oil	1 t
Sludge	2 t
Black Water	8 t

#### Equipment

- Twin rudder blades with high efficiency profiles behind each propeller.
- Bow thruster with vertical propeller shaft, propeller diameter 0.80 m. Diesel engine drive, 150 kW.
- Two bow rudder flaps in dimension of b x h = 2.0 x 1.0 m
- Two bow anchors, each 930 kg
- One stern anchor 465 kg

#### Accommodation

- Accommodation on two decks for crew of max. 12 persons

#### Weight calculation results for major components

Steel weight, longt. Framing	554 t
Accommodation	100 t
Machinery & outfitting	65 t
LNG Tanks, 4 pieces	700 t
<b>Sum</b>	<b>1389 t</b>

#### Electric load requirements

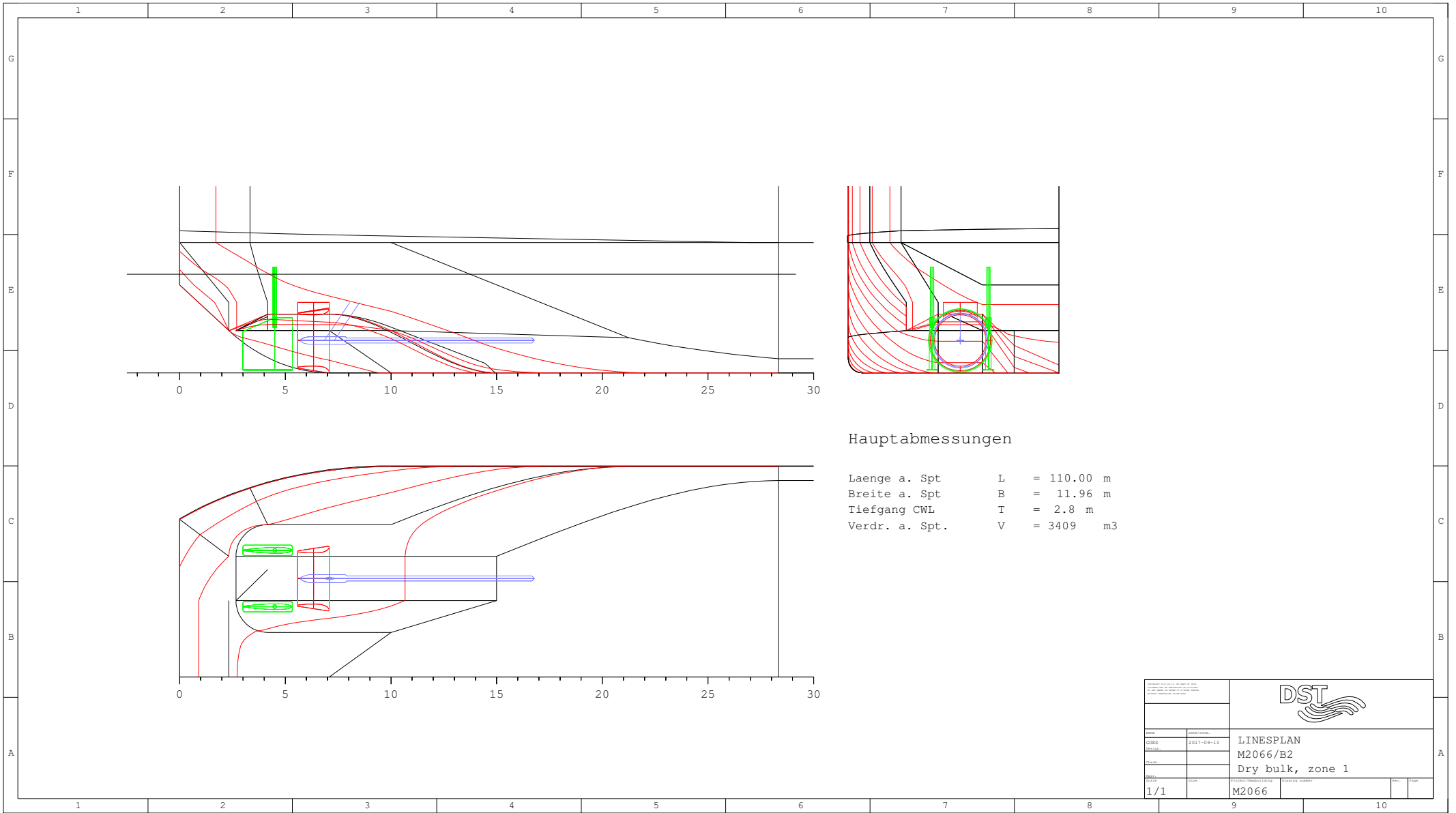
LNG driven genset, 60 kW output

Three-phase AC supply to anchor winches

220 V supply to accomadation


220 V supply to AC accomodation

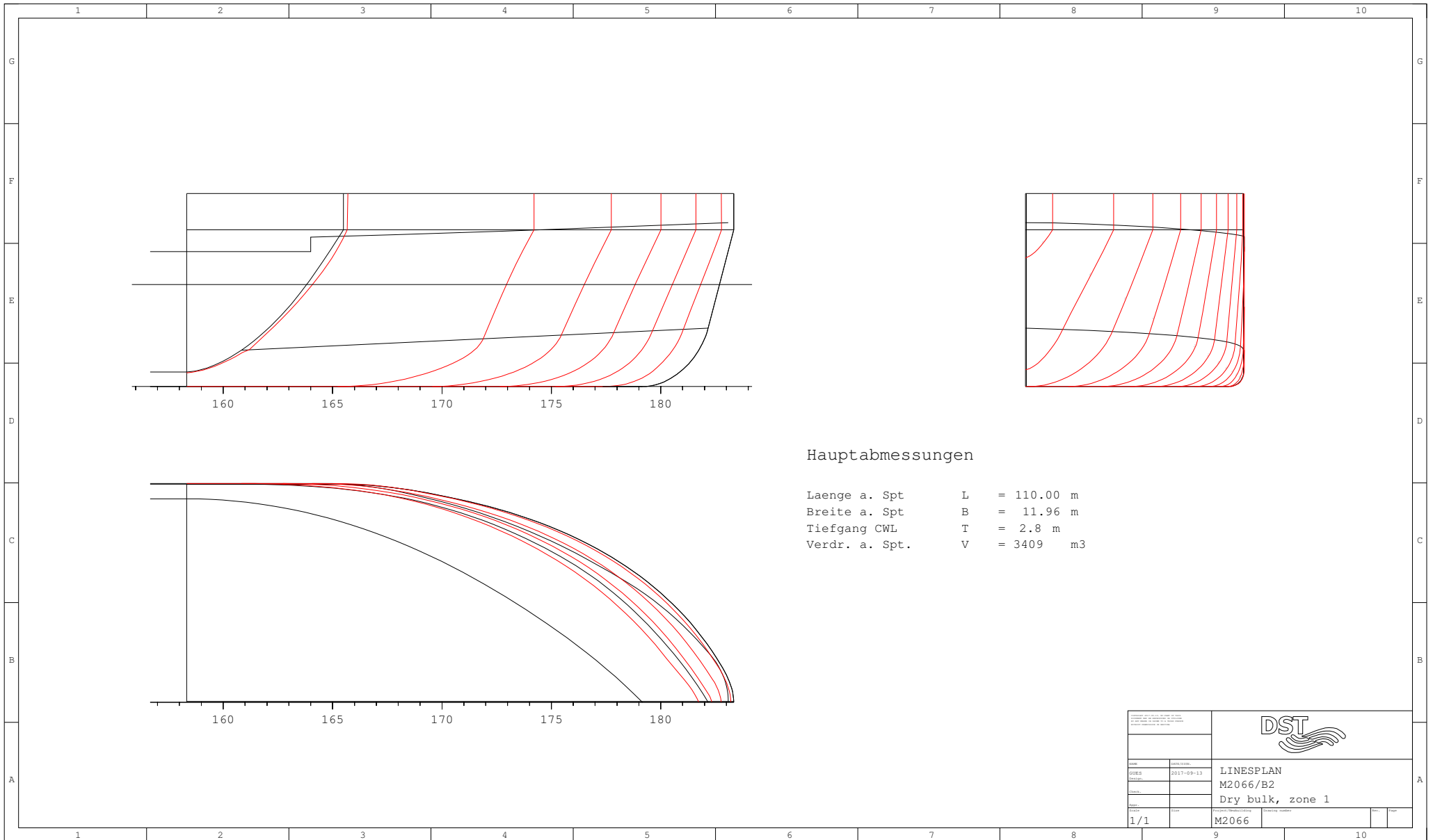
24 V emergency circuit



### Hauptabmessungen


Laenge a. Spt      L    = 110.00 m  
 Breite a. Spt      B    = 11.96 m  
 Tiefgang CWL      T    = 2.8 m  
 Verdr. a. Spt.    V    = 3409 m3

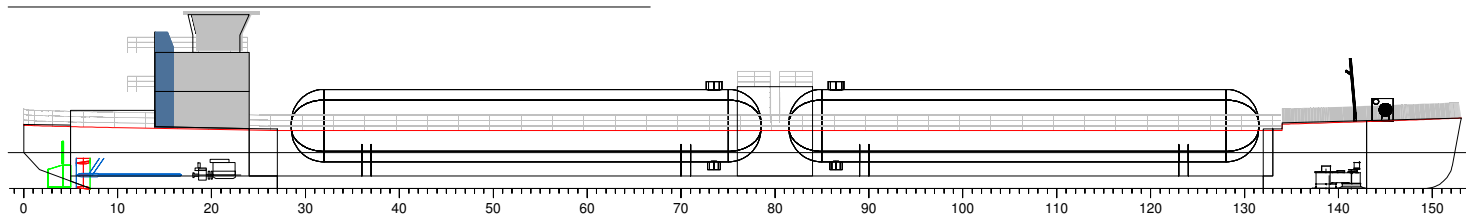
<small>Copyright © 2013 DST. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of DST.</small>			
NOV	DATE/ENG	LINESPLAN	
01/05	2017-09-13	M2066/B2	
PLAN		Dry bulk, zone 1	
NOV	SCALE	PROJECT/NO	Drawing number
1/1	1:1	M2066	



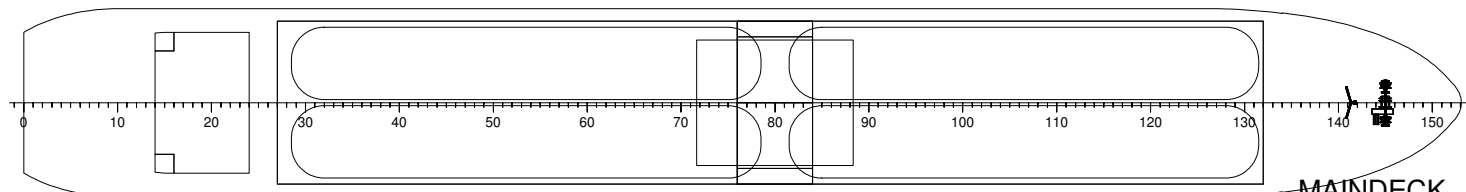
Hauptabmessungen

Laenge a. Spt      L    = 110.00 m  
 Breite a. Spt      B    = 11.96 m  
 Tiefgang CWL      T    = 2.8 m  
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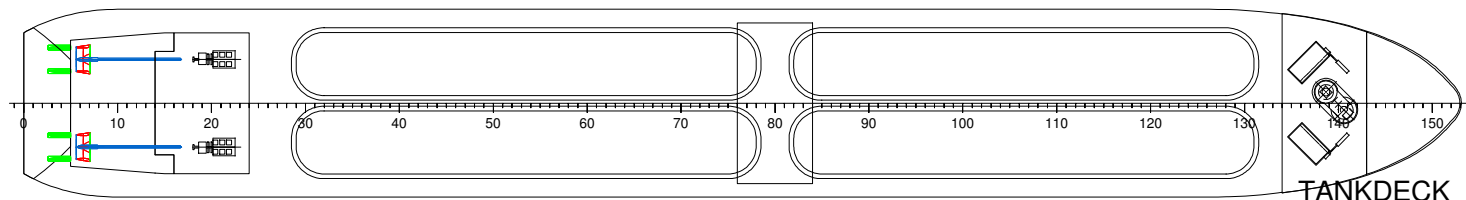
<small>           INSTITUT FÜR SCHIFFBAU UND MASCHINENBAU            UNIVERSITÄT DUISBURG ESSEN            LEHRGEBIET SCHIFFBAU         </small>			
<small>           NAME            DATUM            STATUS            BLATT         </small>	<small>           DPT/1120            2017-09-13            1/1         </small>	<small>           LINESPLAN            M2066/B2            Dry bulk, zone 1         </small>	
<small>           PROJEKTLEITUNG            M2066         </small>	<small>           ANGELEGES DATUM         </small>	<small>           BLATT         </small>	<small>           FROM         </small>



PROFILE



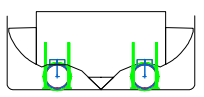
MAINDECK



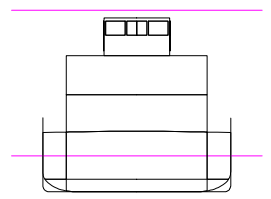
TANKDECK

Main dimensions

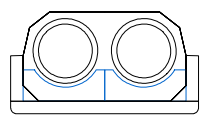
Lenght	L =	92.00 m
Breadth moulded	B =	12.00 m
Breadth oA	BoA =	12.05 m
Draught max	T =	2.80 m



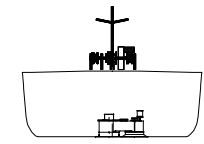
PROP




MRA



HOLD

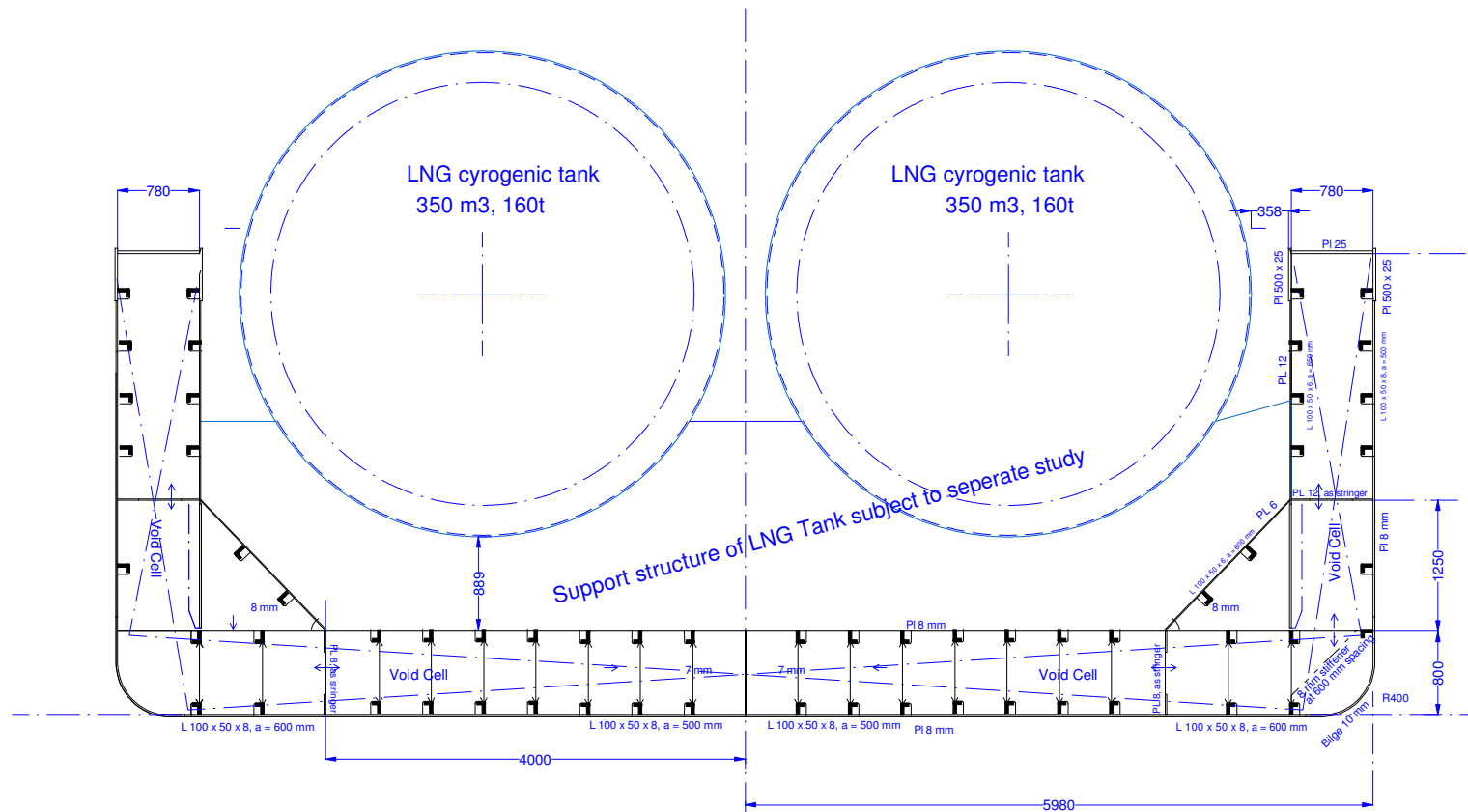


MMF

	
Title: LNG2 NW-1 Date: 2017-05-24 Design: Check: App: Scale: 1/...	Project/Revision: 2017-05-24 Page: 1

# LNG Transport Vessel - Main Frame and Scantling


Frame distance 1800 mm



Main Dimensions

Lenght PP	:	92.000 m
Breadth moulded	:	11.960 m
Breadth o.A.	:	12.010 m
Draught design	:	2.200 m
Navigation zone 1		

30.08.2017

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<b>LNG 2 Transport Vessel Main Section</b>																										
<table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>									<table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>									<table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>								

M2066/LNG2

## PROJECT INFO

L x B = 92.00 x 11.96 m

Project M2066/LNG2

---

T	DISP	DW	MCT	TCP	KMT	TK
m	t	t	t <sub>m</sub> /cm	t/cm	m	m
1.400	1353.68	-17.3	64.3	10.02	9.086	1.410
1.500	1454.13	83.1	65.2	10.06	8.600	1.510
1.600	1555.14	184.1	66.6	10.14	8.198	1.610
1.700	1657.16	286.2	68.6	10.24	7.859	1.710
1.800	1759.76	388.8	69.1	10.27	7.526	1.810
1.900	1862.53	491.5	69.5	10.29	7.233	1.910
2.000	1965.52	594.5	70.0	10.32	6.977	2.010
2.100	2068.74	697.7	70.5	10.34	6.751	2.110
2.200	2172.26	801.3	71.0	10.37	6.551	2.210
2.300	2276.06	905.1	71.5	10.39	6.371	2.310
2.400	2380.10	1009.1	72.0	10.42	6.211	2.410
2.500	2484.39	1113.4	72.5	10.44	6.067	2.510
2.600	2588.88	1217.9	72.8	10.46	5.938	2.610
2.700	2693.57	1322.6	73.2	10.48	5.824	2.710
2.800	2798.44	1427.4	73.6	10.50	5.721	2.810
2.900	2903.48	1532.5	73.9	10.51	5.628	2.910
3.000	3008.70	1637.7	74.2	10.53	5.545	3.010

---



M2066/LNG2

## PROJECT INFO

L x B = 92.00 x 11.96 m

Project M2066/LNG2, 2017-09-13

## LOADING CASES

NAME	TEXT	DISP t	MASS t	MASS t	T m	TR m
1-LIGHTSHIP		1386.32	0.00	0.00	1.459	-0.317
2-MIN_TA	Min. draught aft	1444.32	12.73	45.27	1.520	-0.004
3-LNG	LNG at 95%	2022.67	636.34	0.00	2.093	-0.002
4-PART_LOAD	Aft tanks empty	1710.86	324.54	0.00	1.791	0.610

M2066/LNG2

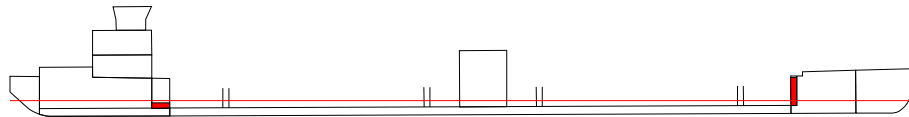
LOADING CONDITION 1-LIGHTSHIP

LOADING COMPONENTS

Name		Max. weight	Mass	Center of gravity cgx cgy cgz			Free s. moment
-----							
Diesel Oil, RHO=0.860							
-----							
DOA	Diesel oil a.	26.0	5.00	15.30	0.00	1.07	26.93
DOF	Diesel oil f.	4.3	4.32	79.50	0.00	2.22	0.00
-----							
Total of DO		30.3	9.32	45.07	0.00	1.61	26.93
-----							
Fresh Water, RHO=1.000							
-----							
FW	Side Tanks a.	14.7	6.00	13.50	0.00	1.37	0.00
Deadweight			15.3	32.71	0.00	1.52	26.9
Lightweight			1371.0	45.23	0.00	3.22	
Displacement (rho=1.000)			1386.3	45.09	0.00	3.20	26.9

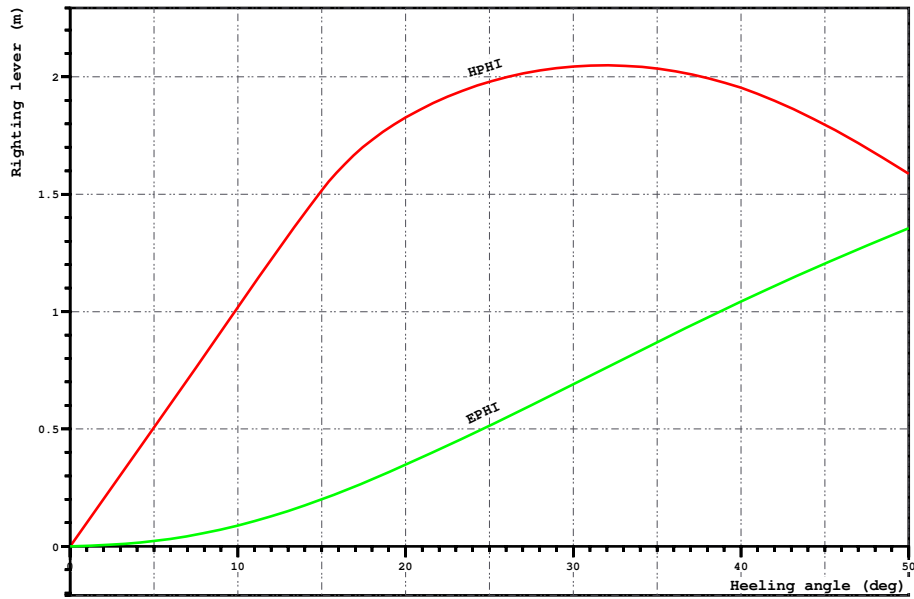
FLOATING POSITION

Draught moulded	1.432 m	KM	8.99 m
Trim	-0.373 m	KG	3.20 m
Heel, PS=+	0.0 deg		
TA	1.619 m	GM0	5.80 m
TF	1.245 m	GMCORR	-0.02 m
Trimming moment	-2459 tonm	GM	5.78 m



Height of the wheelhouse top above waterline: 9.59 m

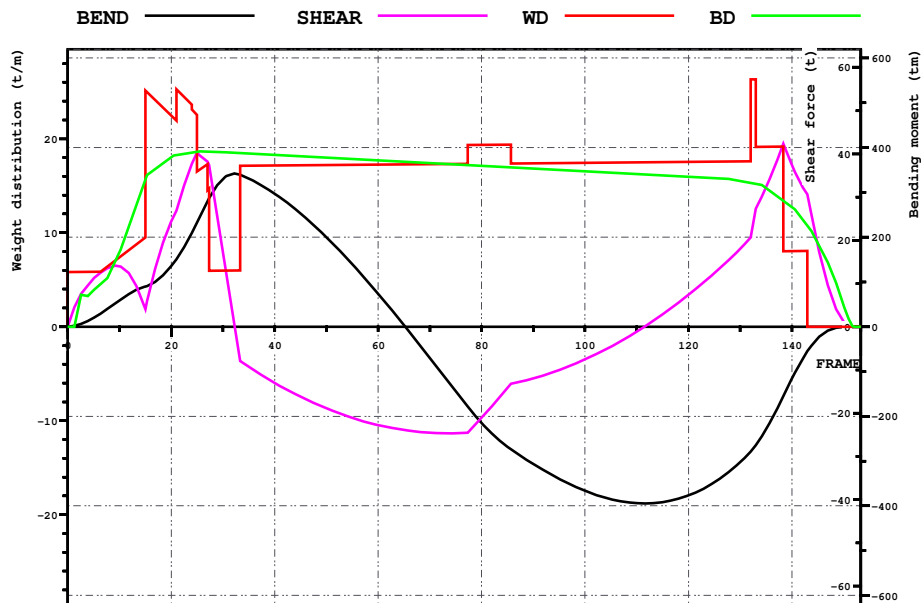
Loading case1 1-LIGHTSHIP,



LOADING CONDITION 1-LIGHTSHIP

HEEL deg	MS m	HPHI m	EPII mrad	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
5.0	0.002	0.51	0.022	2.4	0.002
10.0	0.015	1.02	0.088	4.7	0.003
15.0	0.021	1.52	0.199	7.2	0.005
20.0	-0.148	1.83	0.347	9.8	0.007
30.0	-0.843	2.04	0.690	15.3	0.011
40.0	-1.760	1.95	1.043	17.7	0.013
50.0	-2.840	1.59	1.355	18.0	0.013

Loading case1 1-LIGHTSHIP,



LOADING CONDITION 1-LIGHTSHIP

X m	FR #	BEND tm	SHEAR t	WD t/m	BD t/m
0.000	0.00	0	0	5.83	0.00
6.000	10.00	59	14	7.41	7.98
12.000	20.00	136	24	22.44	18.03
18.000	30.00	330	17	5.98	18.58
24.000	40.00	297	-13	17.14	18.30
30.000	50.00	200	-19	17.19	18.00
36.000	60.00	74	-23	17.24	17.71
42.000	70.00	-70	-25	17.29	17.42
48.000	80.00	-215	-21	19.34	17.13
54.000	90.00	-307	-12	17.39	16.83
60.000	100.00	-366	-8	17.44	16.54
66.000	110.00	-394	-1	17.49	16.25
72.000	120.00	-377	7	17.54	15.96
78.000	130.00	-302	18	17.59	15.50
84.000	140.00	-115	37	8.05	12.73
90.000	150.00	0	1	0.00	2.22

M2066/LNG2

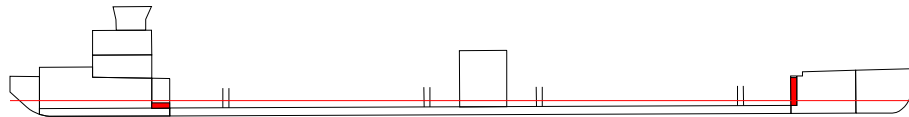
LOADING CONDITION 1-LIGHTSHIP

LOADING COMPONENTS

Name		Max. weight	Mass	Center of gravity cgx cgy cgz			Free s. moment
-----							
Diesel Oil, RHO=0.860							
-----							
DOA	Diesel oil a.	26.0	5.00	15.30	0.00	1.07	26.93
DOF	Diesel oil f.	4.3	4.32	79.50	0.00	2.22	0.00
-----							
Total of DO		30.3	9.32	45.07	0.00	1.61	26.93
-----							
Fresh Water, RHO=1.000							
-----							
FW	Side Tanks a.	14.7	6.00	13.50	0.00	1.37	0.00
-----							
Deadweight			15.3	32.71	0.00	1.52	26.9
Lightweight			1371.0	45.23	0.00	3.22	
Displacement (rho=1.000)			1386.3	45.09	0.00	3.20	26.9

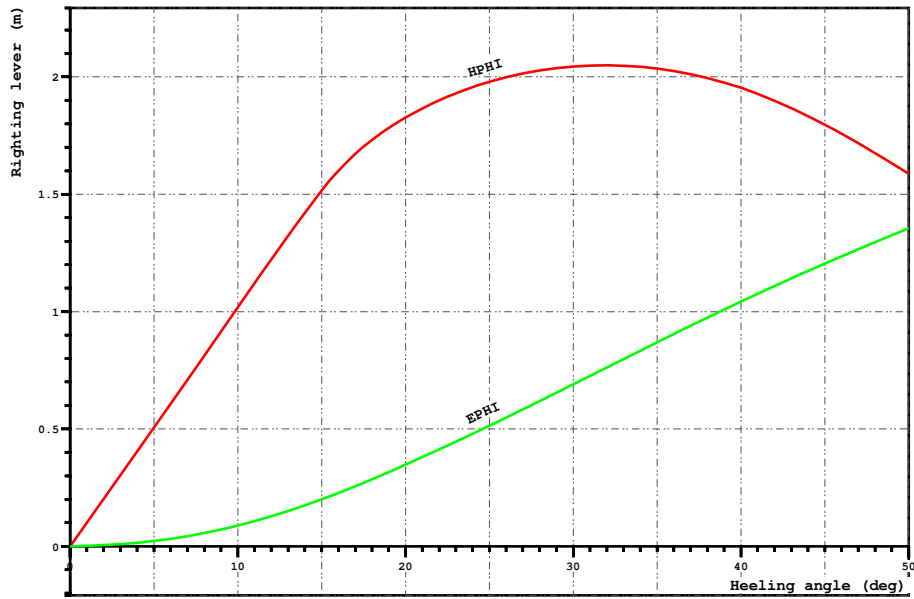
FLOATING POSITION

Draught moulded	1.432 m	KM	8.99 m
Trim	-0.373 m	KG	3.20 m
Heel, PS=+	0.0 deg		
TA	1.619 m	GM0	5.80 m
TF	1.245 m	GMCORR	-0.02 m
Trimming moment	-2459 tonm	GM	5.78 m



Height of the wheelhouse top above waterline: 9.59 m

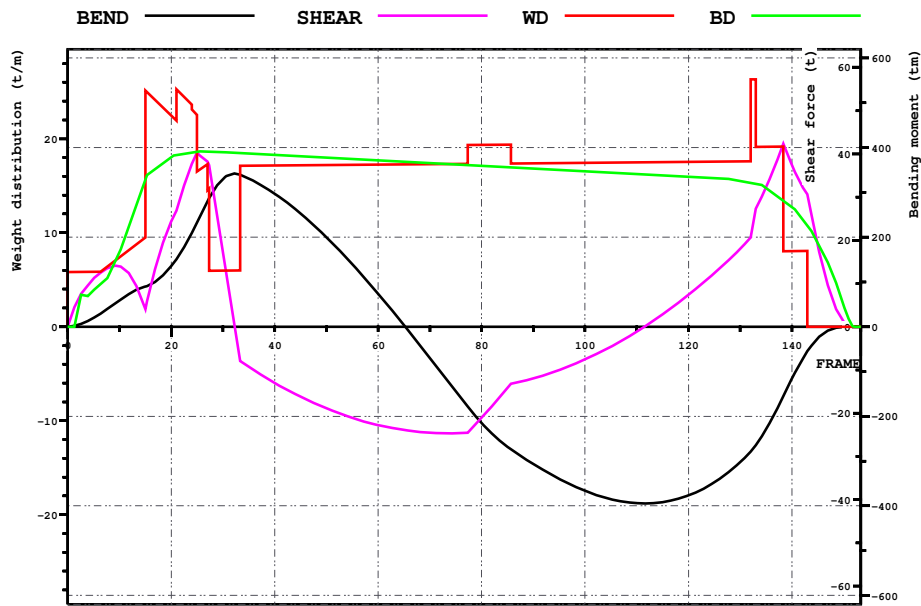
Loading case1 2-MNI\_TA,



LOADING CONDITION 1-LIGHTSHIP

HEEL deg	MS m	HPHI m	EPII mrad	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
5.0	0.002	0.51	0.022	2.4	0.002
10.0	0.015	1.02	0.088	4.7	0.003
15.0	0.021	1.52	0.199	7.2	0.005
20.0	-0.148	1.83	0.347	9.8	0.007
30.0	-0.843	2.04	0.690	15.3	0.011
40.0	-1.760	1.95	1.043	17.7	0.013
50.0	-2.840	1.59	1.355	18.0	0.013

Loading case1 2-MNI\_TA,



LOADING CONDITION 1-LIGHTSHIP

X	FR	BEND	SHEAR	WD	BD
m	#	tm	t	t/m	t/m
0.000	0.00	0	0	5.83	0.00
6.000	10.00	59	14	7.41	7.98
12.000	20.00	136	24	22.44	18.03
18.000	30.00	330	17	5.98	18.58
24.000	40.00	297	-13	17.14	18.30
30.000	50.00	200	-19	17.19	18.00
36.000	60.00	74	-23	17.24	17.71
42.000	70.00	-70	-25	17.29	17.42
48.000	80.00	-215	-21	19.34	17.13
54.000	90.00	-307	-12	17.39	16.83
60.000	100.00	-366	-8	17.44	16.54
66.000	110.00	-394	-1	17.49	16.25
72.000	120.00	-377	7	17.54	15.96
78.000	130.00	-302	18	17.59	15.50
84.000	140.00	-115	37	8.05	12.73
90.000	150.00	0	1	0.00	2.22

M2066/LNG2

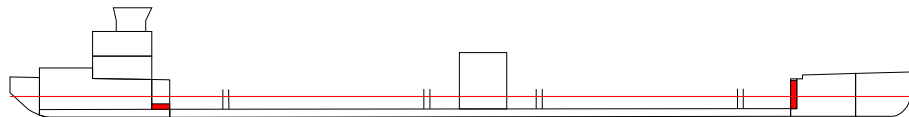
LOADING CONDITION 3-LNG, LNG at 95%

LOADING COMPONENTS

Name		Max. weight	Mass	Center of gravity			Free s. moment
				cgx	cgy	cgz	
-----							
Diesel Oil, RHO=0.860							
-----							
DOA	Diesel oil a.	26.0	5.00	15.30	0.00	1.07	26.93
DOF	Diesel oil f.	4.3	4.32	79.50	0.00	2.22	0.00
-----							
Total of DO		30.3	9.32	45.07	0.00	1.61	26.93
-----							
Fresh Water, RHO=1.000							
-----							
FW	Side Tanks a.	14.7	6.00	13.50	0.00	1.37	0.00
-----							
Liquid cargo, RHO=0.450							
-----							
R.LNG1	LNG fore PS	159.1	159.09	63.90	2.51	4.01	0.00
R.LNG2	LNG fore SB	159.1	159.09	63.90	-2.50	4.01	0.00
R.LNG3	LNG, aft PS	159.1	159.09	32.10	2.51	4.01	0.00
R.LNG4	LNG, aft SB	159.1	159.09	32.10	-2.50	4.01	0.00
-----							
Total of CAL		636.3	636.34	48.00	0.00	4.01	0.00
-----							
Deadweight			651.7	47.64	0.00	3.96	26.9
Lightweight			1371.0	45.23	0.00	3.22	
Displacement (rho=1.000)			2022.7	46.00	0.00	3.45	26.9

FLOATING POSITION

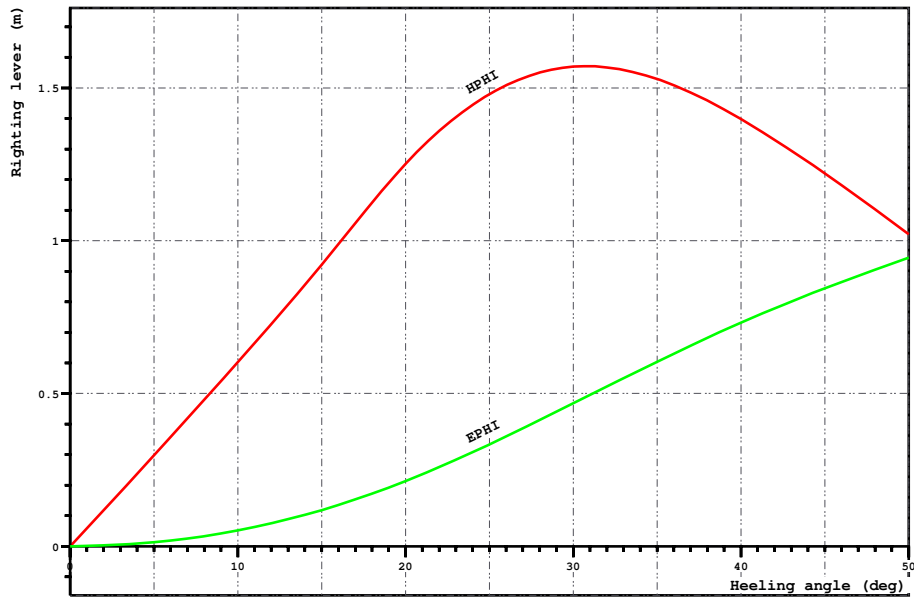
Draught moulded	2.054	m	KM	6.86	m
Trim	-0.120	m	KG	3.45	m
Heel, PS=+	0.0	deg			
TA	2.114	m	GM0	3.40	m
TF	1.994	m	GMCORR	-0.01	m
Trimming moment	-840	tonm	GM	3.39	m



Height of the wheelhouse top above waterline: 9.05 m



Loading case1 3-LNG, LNG at 95%

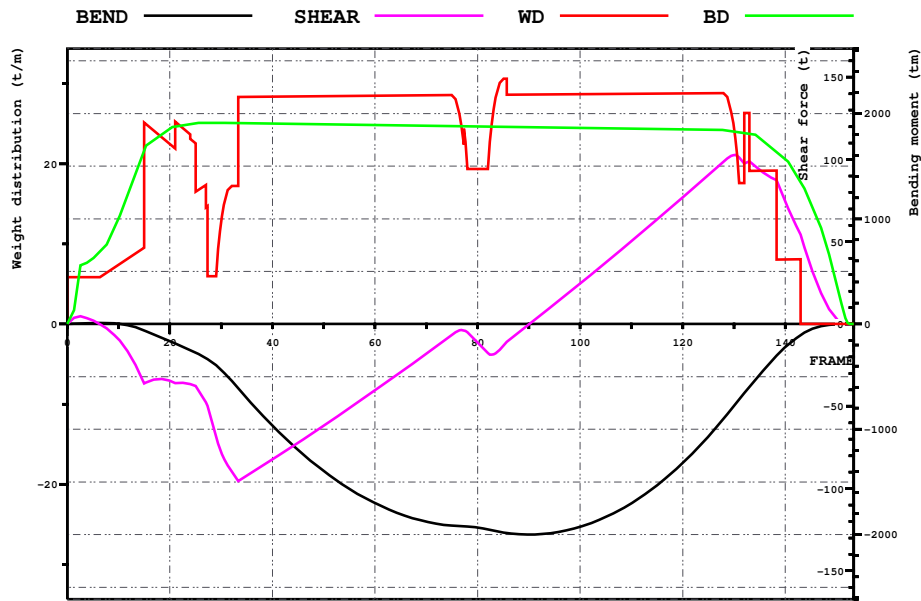


LOADING CONDITION 3-LNG, LNG at 95%

HEEL deg	MS m	HPHI m	EPhi mrad	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
5.0	0.002	0.30	0.013	2.4	0.001
10.0	0.014	0.60	0.052	4.7	0.002
15.0	0.045	0.92	0.118	7.2	0.004
20.0	0.093	1.25	0.213	9.8	0.005
30.0	-0.123	1.57	0.468	15.3	0.008
40.0	-0.779	1.40	0.732	17.7	0.009
50.0	-1.576	1.02	0.944	18.0	0.009

M2066/LNG2

Loading case 3-LNG, LNG at 95%



LOADING CONDITION 3-LNG, LNG at 95%

X m	FR #	BEND tm	SHEAR t	WD t/m	BD t/m
0.000	0.00	0	0	5.83	0.00
6.000	10.00	2	-9	7.41	13.21
12.000	20.00	-164	-34	22.44	24.35
18.000	30.00	-435	-78	12.72	25.11
24.000	40.00	-965	-82	28.38	25.02
30.000	50.00	-1397	-62	28.43	24.93
36.000	60.00	-1703	-40	28.48	24.84
42.000	70.00	-1878	-18	28.53	24.74
48.000	80.00	-1933	-11	19.34	24.65
54.000	90.00	-2000	0	28.63	24.55
60.000	100.00	-1927	25	28.68	24.46
66.000	110.00	-1702	50	28.73	24.37
72.000	120.00	-1320	77	28.78	24.27
78.000	130.00	-777	103	24.33	24.00
84.000	140.00	-220	74	8.05	20.55
90.000	150.00	-2	3	0.00	4.89

M2066/LNG2

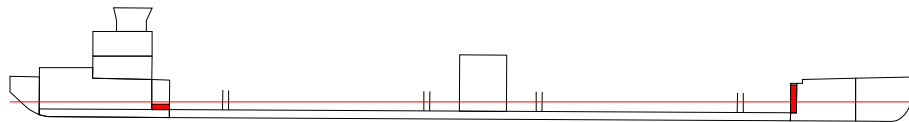
LOADING CONDITION 4-PART\_LOAD, Aft tanks empty

LOADING COMPONENTS

Name		Max. weight	Mass	Center of gravity			Free s. moment
				cgx	cgy	cgz	
-----							
Diesel Oil, RHO=0.860							
-----							
DOA	Diesel oil a.	26.0	5.00	15.30	0.00	1.07	26.93
DOF	Diesel oil f.	4.3	4.32	79.50	0.00	2.22	0.00
-----							
Total of DO		30.3	9.32	45.07	0.00	1.61	26.93
-----							
Fresh Water, RHO=1.000							
-----							
FW	Side Tanks a.	14.7	6.00	13.50	0.00	1.37	0.00
-----							
Liquid cargo, RHO=0.450							
-----							
R.LNG1	LNG fore PS	159.1	159.09	63.90	2.51	4.01	0.00
R.LNG2	LNG fore SB	159.1	159.09	63.90	-2.50	4.01	0.00
R.LNG3	LNG, aft PS	159.1	3.18	32.10	2.51	2.13	5.97
R.LNG4	LNG, aft SB	159.1	3.18	32.10	-2.51	2.13	5.97
-----							
Total of CAL		636.3	324.54	63.28	0.00	3.98	11.94
-----							
Deadweight			339.9	61.90	0.00	3.87	38.9
Lightweight			1371.0	45.23	0.00	3.22	
Displacement (rho=1.000)			1710.9	48.54	0.00	3.35	38.9

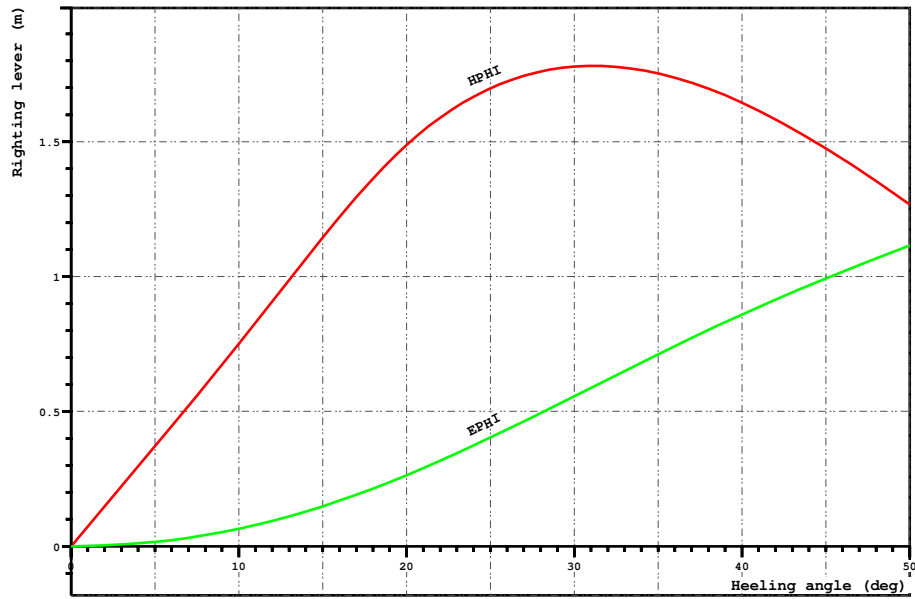
FLOATING POSITION

Draught moulded	1.754	m	KM	7.59	m
Trim	0.486	m	KG	3.35	m
Heel, PS=+	0.0	deg			
TA	1.511	m	GM0	4.25	m
TF	1.997	m	GMCORR	-0.02	m
Trimming moment	3187	tonm	GM	4.23	m



Height of the wheelhouse top above waterline: 9.56 m

Loading case1 4-PART\_LOAD, Aft tanks empty

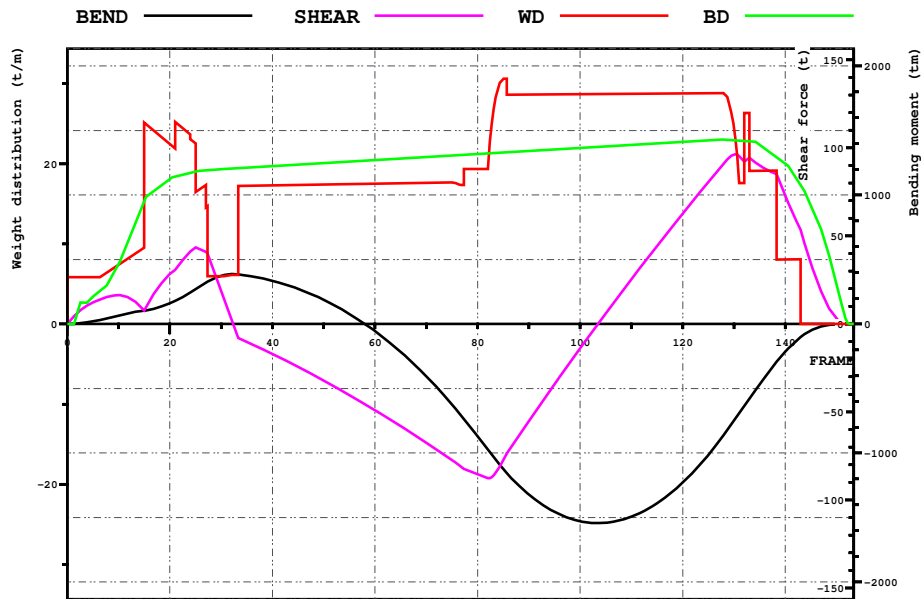


LOADING CONDITION 4-PART\_LOAD, Aft tanks empty

HEEL deg	MS m	HPHI m	EPhi mrad	FSMOM tm	DGZ m
0.0	0.000	0.00	0.000	0.0	0.000
5.0	0.003	0.37	0.016	3.4	0.002
10.0	0.017	0.75	0.065	6.8	0.004
15.0	0.052	1.15	0.148	10.3	0.006
20.0	0.043	1.49	0.263	13.9	0.008
30.0	-0.333	1.78	0.556	21.3	0.012
40.0	-1.071	1.64	0.860	25.4	0.015
50.0	-1.971	1.27	1.116	27.2	0.016

M2066/LNG2

Loading case 4-PART\_LOAD, Aft tanks empty



LOADING CONDITION 4-PART\_LOAD, Aft tanks empty

X m	FR #	BEND tm	SHEAR t	WD t/m	BD t/m
0.000	0.00	0	0	5.83	0.00
6.000	10.00	65	16	7.41	7.49
12.000	20.00	162	28	22.44	18.08
18.000	30.00	374	19	5.98	19.30
24.000	40.00	335	-17	17.31	19.69
30.000	50.00	187	-32	17.41	20.07
36.000	60.00	-56	-49	17.51	20.45
42.000	70.00	-406	-67	17.61	20.83
48.000	80.00	-869	-85	19.34	21.21
54.000	90.00	-1321	-55	28.63	21.59
60.000	100.00	-1528	-14	28.68	21.98
66.000	110.00	-1493	25	28.73	22.36
72.000	120.00	-1229	63	28.78	22.74
78.000	130.00	-748	96	24.33	22.94
84.000	140.00	-214	73	8.05	20.01
90.000	150.00	-1	3	0.00	4.85