



UNIVERSIDADE DA CORUÑA



Escola Politécnica Superior

Trabajo Fin de Grado
CURSO 2017/18

BULKCARRIER NEOPANAMAX 120.000 TPM

Grado en Ingeniería Naval y Oceánica

ALUMNA/O

Diego Carral Amenedo

TUTORAS/ES

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FECHA

JULIO 2018

GRADO EN INGENIERÍA NAVAL Y OCEÁNICA
TRABAJO FIN DE GRADO

PROYECTO NÚMERO: 18-12

TIPO DE BUQUE: Bulkcarrier tipo “NEOPANAMAX” de 120.000 TPM adaptado a la operación en terminales graneleras del golfo de México y Asia.

CLASIFICACIÓN, COTA Y REGLAMENTOS DE APLICACIÓN: AMERICAN BUREAU OF SHIPPING, SOLAS, MARPOL y EXIGENCIAS DE LA ACP (Autoridad del Canal de Panamá).

CARACTERÍSTICAS DE LA CARGA: 120.000 T.P.M. grano, mineral, carbón

VELOCIDAD Y AUTONOMÍA: 14 nudos en condiciones de servicio, 85% de MCR + 15% de margen de mar. 12.000 millas a la velocidad de servicio.

SISTEMAS Y EQUIPOS DE CARGA / DESCARGA: Escotillas de accionamiento hidráulico.

PROPULSIÓN: Un motor diesel acoplado a una hélice de paso fijo, motores auxiliares de tipo dual (FUEL-GNL).

TRIPULACIÓN Y PASAJE: 30 tripulantes en camarotes individuales.

OTROS EQUIPOS E INSTALACIONES: Los habituales en este tipo de buques y posibilidad de interconexión del cuadro eléctrico del buque con la corriente de tierra.

Ferrol, 30 Octubre 2017

ALUMNO/A: **D. DIEGO CARRAL AMENEDO**



UNIVERSIDADE DA CORUÑA



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**TRABAJO FIN DE GRADO/MÁSTER
CURSO 2017/18**

BULKCARRIER NEOPANAMAX 120.000 TPM

Grado en Ingeniería Naval y Oceánica

Cuaderno 4

“CÁLCULOS DE ARQUITECTURA NAVAL”

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2 INTRODUCCIÓN

En este Cuaderno llevaremos a cabo el compartimentado de nuestro buque, así como el cálculo de las tablas hidrostáticas y las curvas de brazos de adrizamiento del mismo.

Las dimensiones y coeficientes de nuestro Buque Proyecto, obtenidas en el Cuaderno 3 “Coeficientes y Plano de Formas”, son las siguientes:

DIMENSIONES, COEFICIENTES y CARACTERÍSTICAS		
Eslora total (LOA)	250	m
Eslora entre perpendiculares (Lpp)	245,5	m
Manga (B)	42,4	m
Calado (T)	14,9	m
Puntal (D)	21,55	m
Desplazamiento (Δ)	142652	Tn
Superficie Mojada (m ²)	16380	m ²
Coeficiente Bloque (Cb)	0,897	
Coeficiente Prismático (Cp)	0,901	
Coeficiente de la Maestra (Cm)	0,996	
Coeficiente de Flotación (Cf)	0,957	
Velocidad (knots)	14	knots
Potencia (kW)	21660	kW

3 CÁLCULO DE HIDROSTÁTICAS

En este apartado calcularemos las tablas hidrostáticas del buque a través del software Maxsurf mediante dos métodos:

En primer lugar mediante la **variación de desplazamiento**:

Como desplazamiento mínimo hemos seleccionado 21000 Tn (por debajo del rosca) y como desplazamiento máximo 150.000 Tn (por encima del desplazamiento real del buque) obteniendo 16 desplazamientos distintos con sus calados, con una variación de 8900 Tn entre cada uno de ellos.

En segundo lugar mediante la **variación de calado**:

Como calado mínimo hemos tomado 2,5m (coincidiendo algo por debajo del rosca) y mediante variaciones de 0,86m hasta 15,4m, obteniendo así 16 condiciones de calado distintas con sus correspondientes desplazamientos.

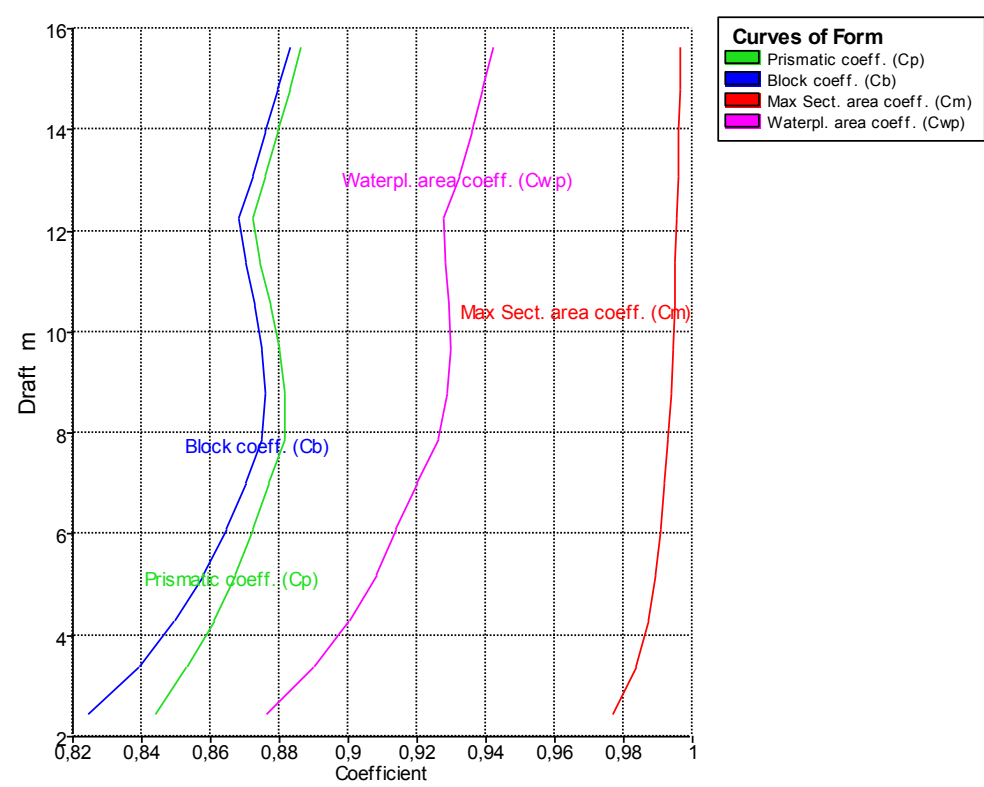
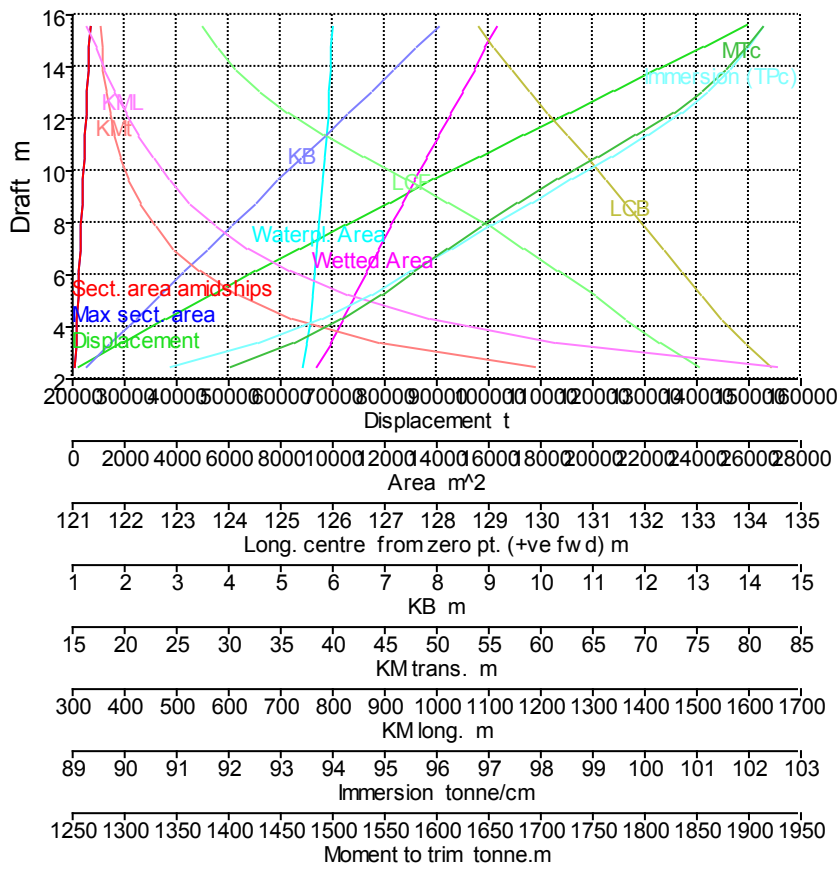
Calcularemos las hidrostáticas para 3 casos de trimado:

- Trimado 0
- Trimado positivo correspondiente a un +0,8% de la eslora entre perpendiculares, o lo que es lo mismo, un trimado de 2m.
- Trimado negativo correspondiente a un -0,8% de la eslora entre perpendiculares, o lo que es lo mismo, un trimado de -2m.

A continuación adjunto las tablas hidrostáticas y sus curvas correspondientes

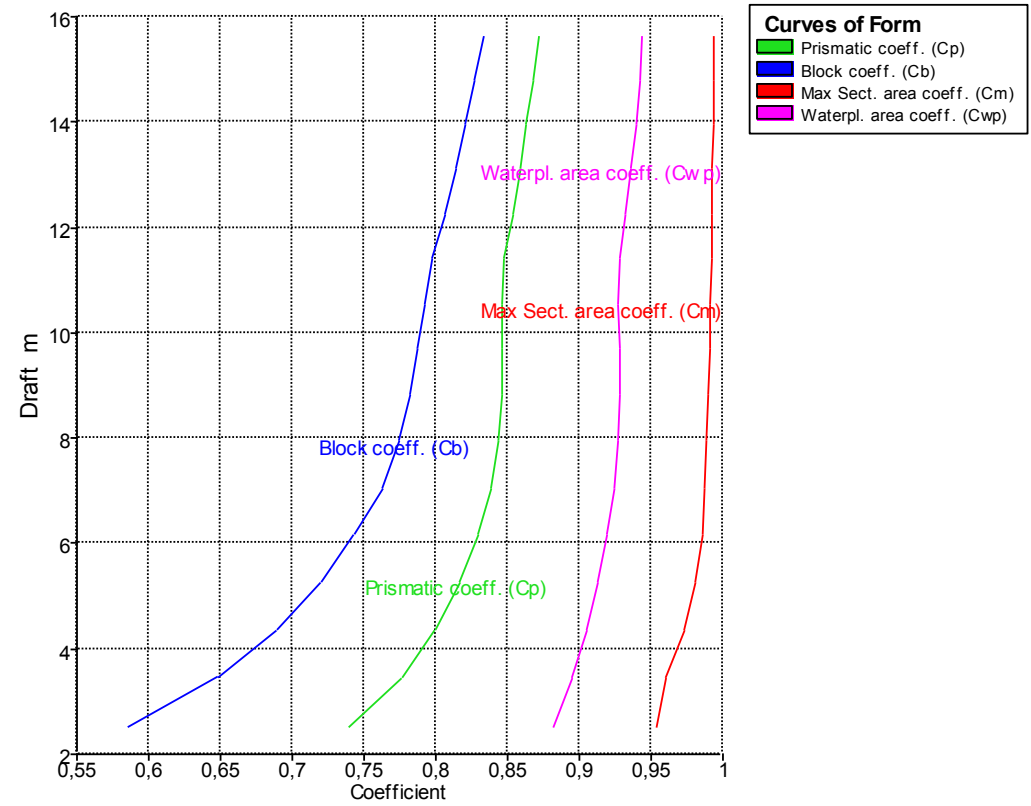
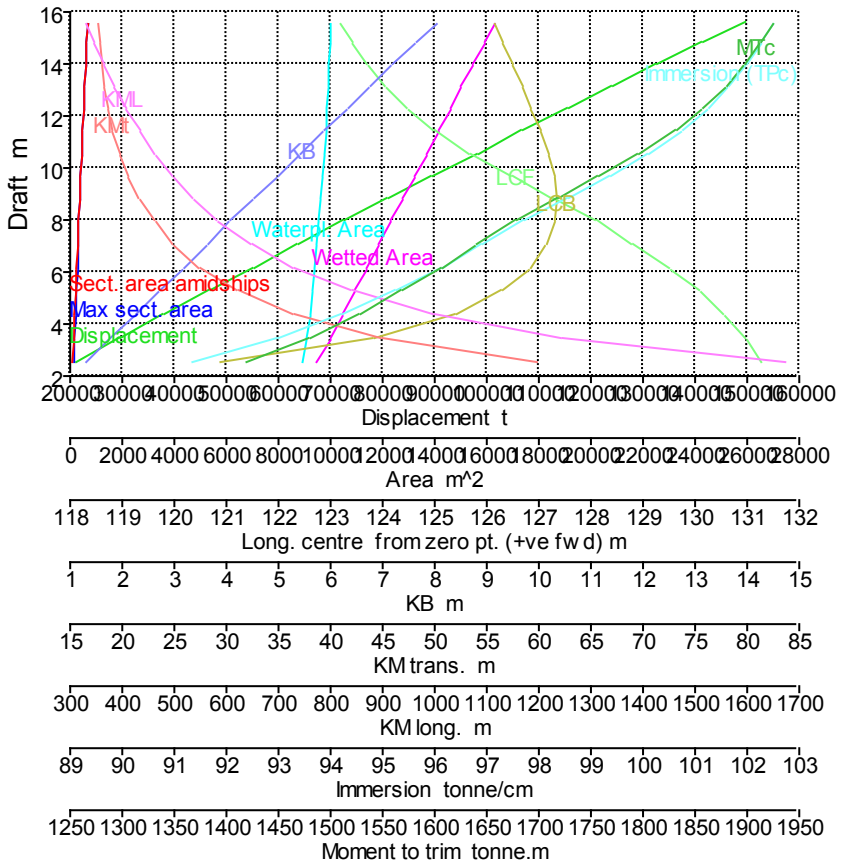
3.1 Trimado 0 (Por Desplazamientos)

Trimado 0																
Draft Amidships m	2,455	3,392	4,314	5,226	6,13	7,026	7,915	8,797	9,673	10,541	11,403	12,26	13,111	13,959	14,804	15,646
Displacement t	21000	29600	38200	46800	55400	64000	72600	81200	89800	98400	107000	115600	124200	132800	141400	150000
Heel deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Draft at FP m	2,455	3,392	4,314	5,226	6,13	7,026	7,915	8,797	9,673	10,541	11,403	12,26	13,111	13,959	14,804	15,646
Draft at AP m	2,455	3,392	4,314	5,226	6,13	7,026	7,915	8,797	9,673	10,541	11,403	12,26	13,111	13,959	14,804	15,646
Draft at LCF m	2,455	3,392	4,314	5,226	6,13	7,026	7,915	8,797	9,673	10,541	11,403	12,26	13,111	13,959	14,804	15,646
Trim (+ve by stern) m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WL Length m	238,619	239,232	239,715	240,172	240,567	240,896	241,175	242,457	244,142	246,125	248,093	249,893	249,856	249,856	249,856	249,856
Beam max extents on WL m	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,401	42,401
Wetted Area m ²	9409,428	9924,102	10411,2	10884,51	11339,58	11801,08	12259,37	12706,21	13165,53	13625,8	14083,43	14539,66	14990,21	15435,68	15878	16290,99
Waterpl. Area m ²	8867,274	9031,837	9151,339	9246,915	9321,445	9397,651	9471,635	9545,21	9622,791	9696,075	9764,429	9827,034	9876,624	9916,517	9949,762	9979,989
Prismatic coeff. (Cp)	0,844	0,853	0,861	0,867	0,872	0,877	0,881	0,882	0,88	0,877	0,875	0,872	0,876	0,88	0,883	0,886
Block coeff. (Cb)	0,825	0,839	0,85	0,858	0,864	0,87	0,875	0,876	0,875	0,873	0,87	0,868	0,872	0,876	0,88	0,883
Max Sect. area coeff. (Cm)	0,977	0,983	0,987	0,989	0,991	0,992	0,993	0,994	0,994	0,995	0,995	0,995	0,996	0,996	0,996	0,997
Waterpl. area coeff. (Cwp)	0,876	0,89	0,9	0,908	0,914	0,92	0,926	0,928	0,93	0,929	0,928	0,927	0,932	0,936	0,939	0,942
LCB from zero pt. (+ve fwd) m	134,43	133,907	133,468	133,082	132,706	132,339	131,978	131,616	131,25	130,876	130,5	130,124	129,757	129,406	129,074	128,763
LCF from zero pt. (+ve fwd) m	133,025	132,264	131,626	131,025	130,301	129,647	128,946	128,208	127,383	126,585	125,823	125,115	124,562	124,127	123,777	123,509
KB m	1,264	1,747	2,221	2,69	3,154	3,615	4,072	4,526	4,977	5,426	5,872	6,316	6,757	7,196	7,633	8,069
KG m	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9
BMt m	58,217	42,682	33,801	28,04	24,008	21,03	18,747	16,939	15,466	14,232	13,178	12,267	11,473	10,777	10,162	9,616
BML m	1653,622	1226,868	983,085	824,665	711,449	629,62	567,104	518,07	479,511	447,459	420,313	396,784	375,008	354,958	336,674	320,174
GMt m	44,581	29,529	21,123	15,83	12,262	9,745	7,919	6,565	5,543	4,758	4,15	3,683	3,33	3,073	2,895	2,785
GML m	1639,987	1213,715	970,406	812,455	699,703	618,334	556,276	507,696	469,588	437,985	411,285	388,2	366,865	347,254	329,407	313,342
KMt m	59,481	44,429	36,023	30,73	27,162	24,645	22,819	21,465	20,443	19,658	19,05	18,583	18,23	17,973	17,795	17,685
KML m	1654,887	1228,615	985,306	827,355	714,603	633,234	571,176	522,596	484,488	452,885	426,185	403,1	381,765	362,154	344,307	328,242
Immersion (TPc) tonne/cm	90,89	92,576	93,801	94,781	95,545	96,326	97,084	97,838	98,634	99,385	100,085	100,727	101,235	101,644	101,985	102,295
MTc tonne.m	1402,82	1463,364	1509,947	1548,784	1578,955	1611,937	1645,022	1679,21	1717,668	1755,494	1792,55	1827,924	1855,977	1878,41	1897,264	1914,502
RM at 1deg = GMt.Disp.sin(1) ton	16338,85	15254,14	14081,99	12929,57	11855,89	10884,27	10033,46	9303,938	8687,107	8171,306	7750,175	7430,256	7218,18	7123,364	7144,512	7289,6
Max deck inclination deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trim angle (+ve by stern) deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



3.2 Trimado positivo (Por Desplazamientos)

Trimado +0,8% Lpp																
Draft Amidships m	2,532	3,464	4,382	5,29	6,188	7,079	7,962	8,838	9,707	10,569	11,425	12,276	13,124	13,969	14,811	15,65
Displacement t	21000	29600	38200	46800	55400	64000	72600	81200	89800	98400	107000	115600	124200	132800	141400	150000
Heel deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Draft at FP m	1,532	2,464	3,382	4,29	5,188	6,079	6,962	7,838	8,707	9,569	10,425	11,276	12,124	12,969	13,811	14,65
Draft at AP m	3,532	4,464	5,382	6,29	7,188	8,079	8,962	9,838	10,707	11,569	12,425	13,276	14,124	14,969	15,811	16,65
Draft at LCF m	2,462	3,397	4,319	5,23	6,133	7,03	7,919	8,801	9,677	10,545	11,407	12,262	13,114	13,961	14,805	15,647
Trim (+ve by stern) m	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WL Length m	238,203	238,974	239,645	240,212	240,694	241,152	242,626	244,483	246,52	248,532	249,864	249,864	249,864	249,864	249,864	249,864
Beam max extents on WL m	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,401
Wetted Area m ²	9456,506	9968,301	10452,79	10925,95	11393,16	11845,84	12297,13	12759,46	13221,01	13680,27	14136,8	14585,86	15031,21	15473,52	15885,97	16320,44
Waterpl. Area m ²	8910,342	9073,891	9194,257	9293,216	9381,5	9456,515	9536,545	9619,101	9695,749	9767,176	9830,082	9878,348	9917,844	9950,382	9977,884	10002,58
Prismatic coeff. (Cp)	0,739	0,777	0,8	0,817	0,829	0,839	0,844	0,846	0,846	0,846	0,848	0,853	0,858	0,863	0,868	0,872
Block coeff. (Cb)	0,585	0,648	0,69	0,72	0,744	0,762	0,774	0,782	0,788	0,792	0,797	0,806	0,814	0,821	0,827	0,833
Max Sect. area coeff. (Cm)	0,954	0,961	0,973	0,98	0,985	0,987	0,988	0,989	0,99	0,991	0,992	0,992	0,993	0,993	0,994	0,994
Waterpl. area coeff. (Cwp)	0,882	0,895	0,905	0,912	0,919	0,925	0,927	0,928	0,928	0,927	0,928	0,932	0,936	0,939	0,942	0,944
LCB from zero pt. (+ve fwd) m	120,868	123,85	125,405	126,309	126,857	127,164	127,312	127,347	127,298	127,189	127,038	126,865	126,683	126,5	126,32	126,146
LCF from zero pt. (+ve fwd) m	131,278	130,954	130,538	130,062	129,508	128,772	128,06	127,239	126,443	125,671	124,978	124,455	124,034	123,691	123,407	123,159
KB m	1,32	1,788	2,254	2,718	3,178	3,636	4,091	4,544	4,994	5,441	5,886	6,329	6,769	7,208	7,644	8,079
KG m	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9
BMt m	58,551	42,949	34,025	28,237	24,188	21,198	18,899	17,071	15,573	14,315	13,244	12,32	11,518	10,815	10,194	9,642
BML m	1673,061	1241,263	995,128	835,829	724,452	640,788	578,347	530,114	490,613	457,724	429,273	403,232	379,756	358,588	339,464	322,284
GMt m	44,955	29,847	21,402	16,084	12,499	9,971	8,128	6,752	5,704	4,893	4,265	3,782	3,42	3,153	2,968	2,849
GML m	1659,465	1228,16	982,504	823,676	712,764	629,56	567,575	519,795	480,744	448,301	420,294	394,695	371,658	350,926	332,238	315,491
KMt m	59,868	44,736	36,279	30,954	27,365	24,834	22,989	21,614	20,566	19,756	19,129	18,648	18,287	18,022	17,838	17,721
KML m	1674,325	1243,009	997,349	838,519	727,606	644,402	582,419	534,64	495,59	463,15	435,145	409,548	386,513	365,784	347,097	330,353
Immersion (TPc) tonne/cm	91,331	93,007	94,241	95,255	96,16	96,929	97,75	98,596	99,381	100,114	100,758	101,253	101,658	101,991	102,273	102,526
MTc tonne.m	1419,484	1480,779	1528,774	1570,171	1608,426	1641,202	1678,436	1719,231	1758,473	1796,847	1831,816	1858,51	1880,226	1898,278	1913,568	1927,631
RM at 1deg = GMt.Disp.sin(1) ton	16476,07	15418,39	14268,19	13137,33	12085,02	11136,67	10297,93	9568,562	8938,844	8402,815	7964,706	7630,741	7413,518	7308,782	7324,33	7458,954
Max deck inclination deg	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668
Trim angle (+ve by stern) deg	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668

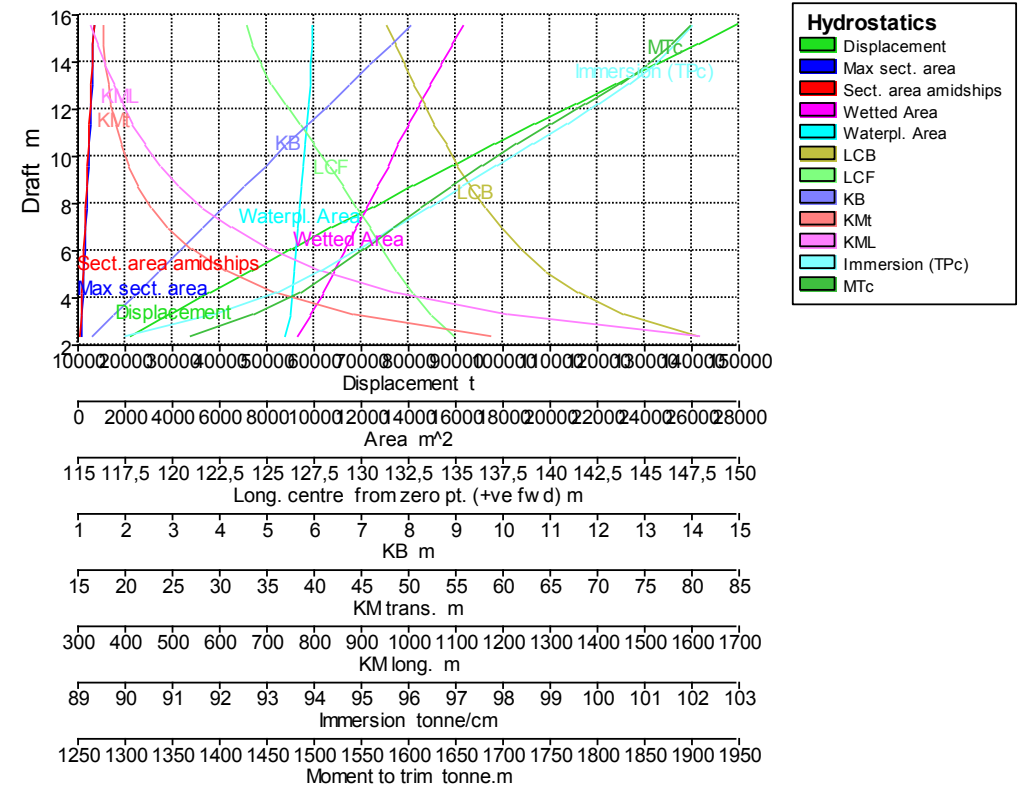
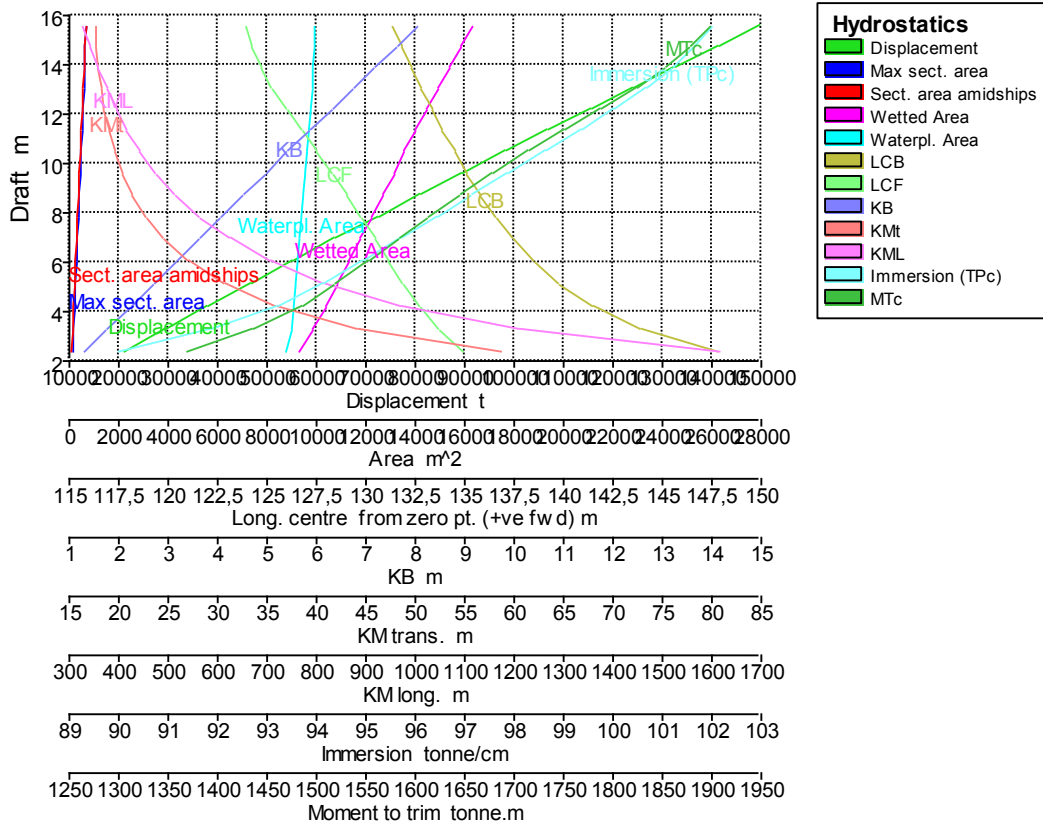


3.3 Trimado negativo (Por Desplazamientos)

Cuaderno 4: Cálculos de Arquitectura Naval

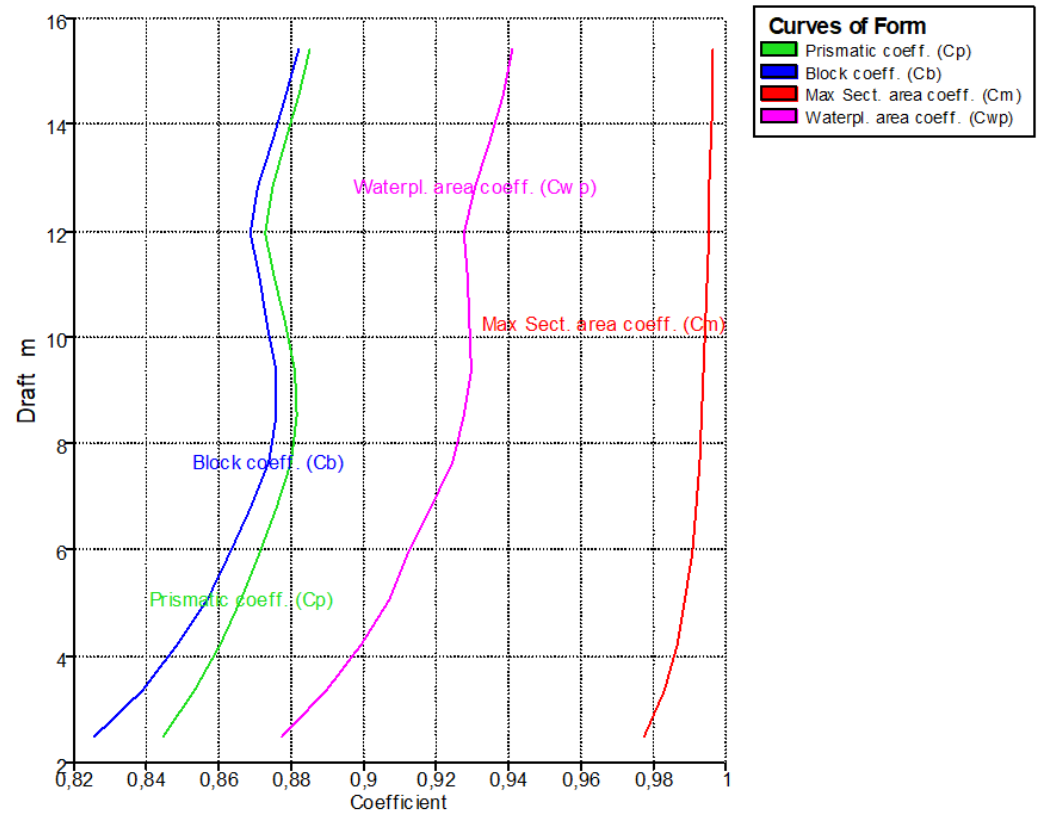
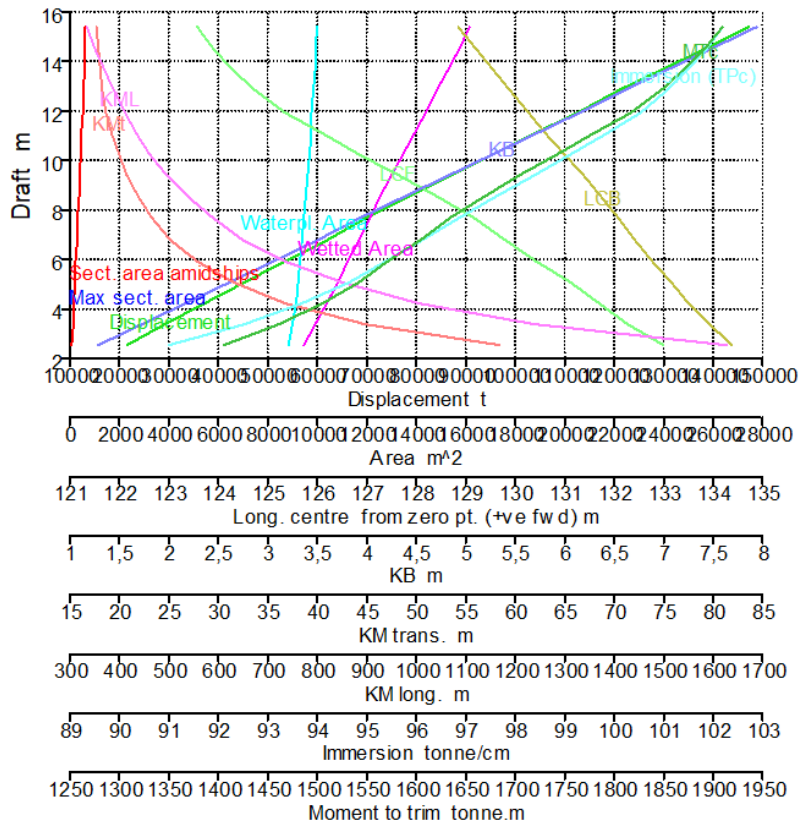
Diego Carral Amenedo - Bulkcarrier Neopanamax 120.000 TPM. Proyecto número 18-12.

Trimado -0,8% Lpp																
Draft Amidships m	2,364	3,309	4,237	5,155	6,065	6,967	7,862	8,75	9,631	10,506	11,375	12,237	13,094	13,946	14,794	15,638
Displacement t	21000	29600	38200	46800	55400	64000	72600	81200	89800	98400	107000	115600	124200	132800	141400	150000
Heel deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Draft at FP m	3,364	4,309	5,237	6,155	7,065	7,967	8,862	9,75	10,631	11,506	12,375	13,237	14,094	14,946	15,794	16,638
Draft at AP m	1,364	2,309	3,237	4,155	5,065	5,967	6,862	7,75	8,631	9,506	10,375	11,237	12,094	12,946	13,794	14,638
Draft at LCF m	2,463	3,397	4,318	5,229	6,133	7,029	7,919	8,801	9,676	10,545	11,407	12,263	13,114	13,962	14,806	15,648
Trim (+ve by stern) m	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
WL Length m	238,888	239,385	239,788	240,096	240,386	240,665	240,924	241,171	242,257	243,805	245,75	247,681	249,6	249,864	249,864	249,864
Beam max extents on WL m	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,401	42,401	42,401
Wetted Area m^2	9328,24	9863,015	10360,72	10827,19	11294,03	11754,95	12212,2	12668,05	13127,75	13571,62	14029,88	14487,03	14944,28	15394,2	15840,5	16284,53
Waterpl. Area m^2	8779,228	8965,407	9094,969	9184,146	9266,025	9339,874	9410,538	9480,286	9550,823	9624,326	9695,124	9761,37	9824,664	9875,083	9918,409	9956,689
Prismatic coeff. (Cp)	0,683	0,729	0,759	0,78	0,796	0,809	0,82	0,829	0,834	0,836	0,837	0,837	0,836	0,841	0,846	0,851
Block coeff. (Cb)	0,609	0,667	0,705	0,734	0,755	0,772	0,786	0,798	0,805	0,81	0,812	0,814	0,815	0,821	0,827	0,832
Max Sect. area coeff. (Cm)	0,963	0,971	0,976	0,98	0,983	0,985	0,986	0,988	0,989	0,99	0,99	0,991	0,992	0,992	0,993	0,993
Waterpl. area coeff. (Cwp)	0,867	0,883	0,895	0,902	0,909	0,915	0,921	0,927	0,93	0,931	0,93	0,929	0,928	0,932	0,936	0,94
LCB from zero pt. (+ve fwd) m	147,755	143,819	141,424	139,738	138,455	137,424	136,556	135,796	135,112	134,481	133,886	133,323	132,788	132,28	131,804	131,362
LCF from zero pt. (+ve fwd) m	134,872	133,617	132,701	131,831	131,13	130,444	129,75	129,036	128,294	127,492	126,707	125,959	125,234	124,672	124,256	123,949
KB m	1,318	1,787	2,253	2,717	3,178	3,636	4,091	4,543	4,993	5,441	5,886	6,329	6,769	7,208	7,644	8,079
KG m	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9
BMt m	57,382	42,199	33,487	27,802	23,808	20,858	18,594	16,802	15,347	14,137	13,104	12,208	11,425	10,737	10,129	9,588
BML m	1614,274	1204,748	967,591	809,469	700,004	618,922	556,818	508,026	468,943	437,485	411,104	388,458	368,905	350,47	333,51	318,005
GMt m	43,597	28,915	20,689	15,481	11,959	9,474	7,673	6,339	5,34	4,582	4	3,551	3,213	2,967	2,8	2,697
GML m	1600,49	1191,463	954,792	797,149	688,154	607,538	545,896	497,563	458,936	427,93	402	379,801	360,693	342,7	326,18	311,114
KMt m	58,698	43,985	35,739	30,518	26,985	24,493	22,684	21,344	20,34	19,577	18,99	18,537	18,194	17,944	17,773	17,667
KML m	1615,539	1206,495	969,812	812,16	703,158	622,537	560,89	512,552	473,921	442,911	416,977	394,774	375,662	357,666	341,143	326,074
Immersion (TPc) tonne/cm	89,987	91,895	93,223	94,138	94,977	95,734	96,458	97,173	97,896	98,649	99,375	100,054	100,703	101,22	101,664	102,056
MTC tonne.m	1369,038	1436,535	1485,658	1519,607	1552,889	1583,796	1614,331	1645,698	1678,703	1715,194	1752,084	1788,378	1824,752	1853,778	1878,679	1900,887
RM at 1deg = GMt.Disp.sin(1) ton	15978,28	14937,22	13792,8	12644,82	11562,34	10582,2	9721,535	8983,069	8369,21	7869,141	7469,056	7164,585	6964,572	6876,779	6909,978	7060,805
Max deck inclination deg	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668
Trim angle (+ve by stern) deg	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668



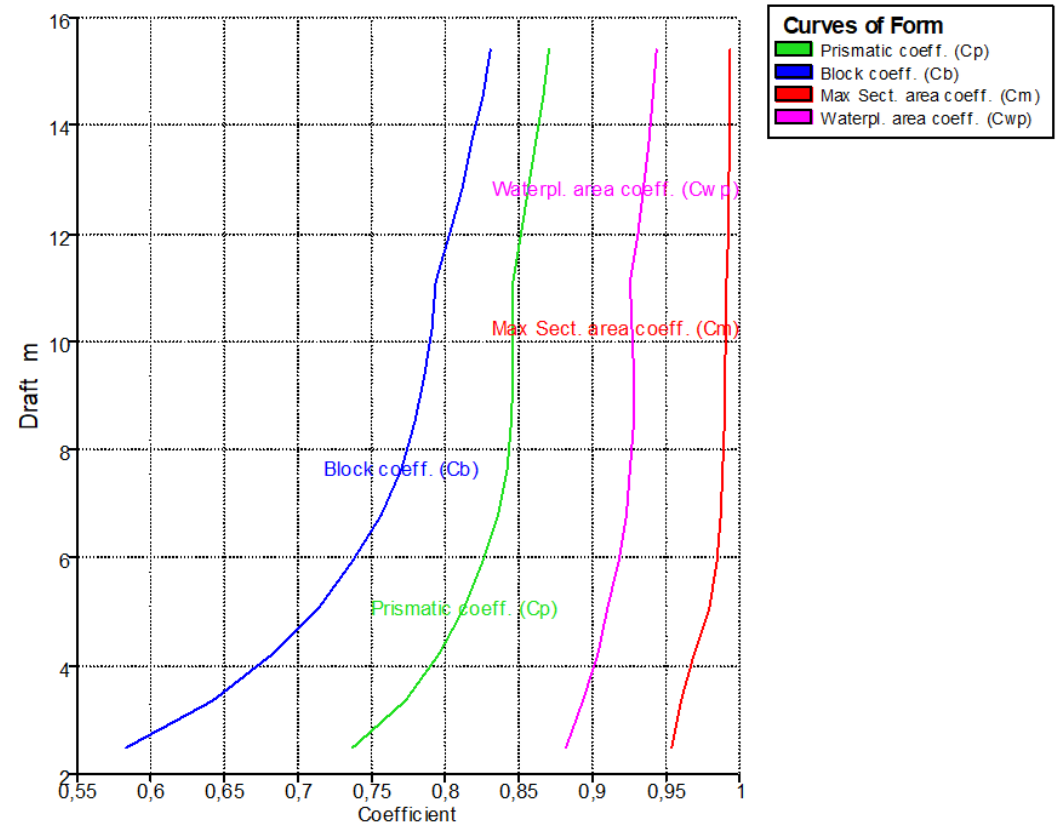
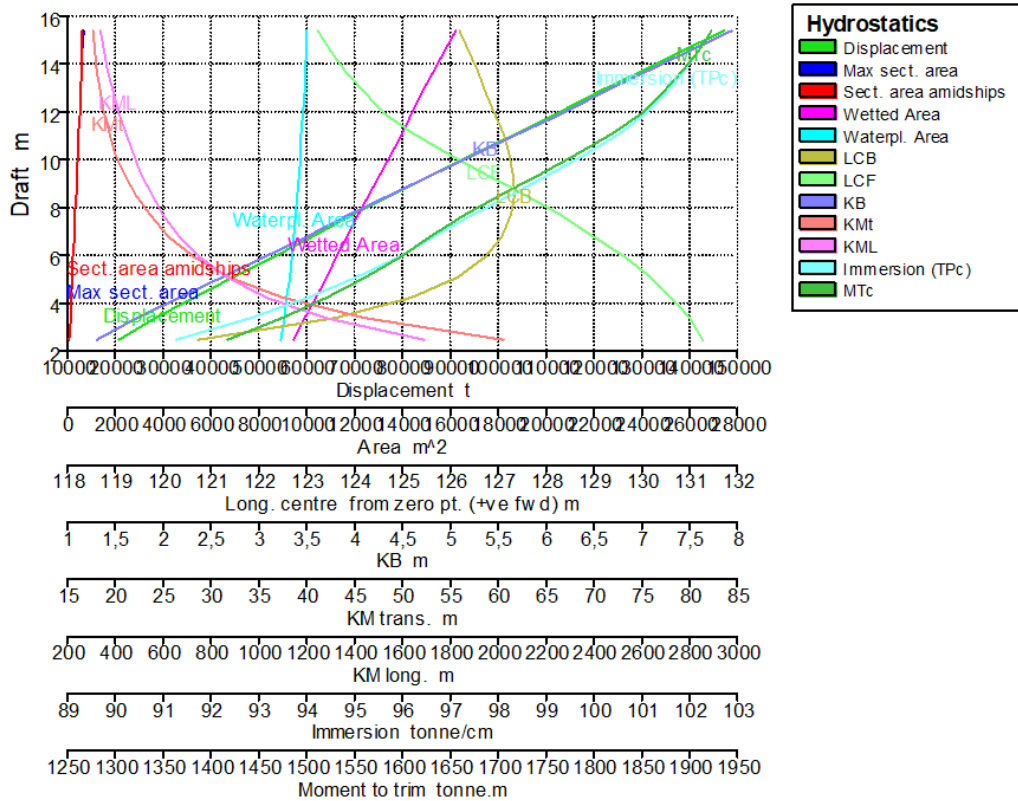
3.4 Trimado 0 (Por Calados)

Trimado 0																
Draft Amidships m	2,5	3,36	4,22	5,08	5,94	6,8	7,66	8,52	9,38	10,24	11,1	11,96	12,82	13,68	14,54	15,4
Displacement t	21409	29304	37315	45417	53590	61825	70125	78488	86915	95409	103966	112582	121252	129964	138711	147487
Heel deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Draft at FP m	2,5	3,36	4,22	5,08	5,94	6,8	7,66	8,52	9,38	10,24	11,1	11,96	12,82	13,68	14,54	15,4
Draft at AP m	2,5	3,36	4,22	5,08	5,94	6,8	7,66	8,52	9,38	10,24	11,1	11,96	12,82	13,68	14,54	15,4
Draft at LCF m	2,5	3,36	4,22	5,08	5,94	6,8	7,66	8,52	9,38	10,24	11,1	11,96	12,82	13,68	14,54	15,4
Trim (+ve by stern) m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WL Length m	238,653	239,214	239,67	240,097	240,491	240,817	241,098	242,024	243,473	245,438	247,4	249,362	249,856	249,856	249,856	249,856
Beam max extents on WL m	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,401	42,401
Max wetted Area m^2	9434,978	9907,008	10361,901	10809,082	11241,984	11684,566	12127,648	12574,868	13011,364	13465,72	13921,02	14380,929	14836,557	15289,17	15739,899	16162,372
Waterpl. Area m^2	8876,664	9027,066	9140,574	9232,96	9304,564	9378,437	9450,433	9522,517	9596,708	9670,775	9740,185	9806,88	9861,018	9904,275	9939,742	9971,203
Prismatic coeff. (Cp)	0,845	0,853	0,86	0,866	0,871	0,876	0,88	0,882	0,881	0,878	0,876	0,873	0,875	0,878	0,882	0,885
Block coeff. (Cb)	0,826	0,839	0,849	0,857	0,863	0,869	0,874	0,876	0,876	0,873	0,871	0,869	0,871	0,875	0,879	0,882
Max Sect. area coeff. (Cm)	0,977	0,983	0,987	0,989	0,991	0,992	0,993	0,993	0,994	0,995	0,995	0,995	0,996	0,996	0,996	0,996
Waterpl. area coeff. (Cwp)	0,877	0,89	0,899	0,907	0,912	0,918	0,924	0,928	0,93	0,929	0,929	0,928	0,931	0,935	0,938	0,941
LCB from zero pt. (+ve fwd) m	134,403	133,924	133,51	133,141	132,785	132,431	132,082	131,73	131,374	131,006	130,633	130,256	129,882	129,52	129,176	128,851
LCF from zero pt. (+ve fwd) m	132,985	132,288	131,686	131,119	130,436	129,818	129,153	128,438	127,664	126,863	126,098	125,342	124,735	124,26	123,881	123,577
KB m	1,288	1,73	2,173	2,615	3,057	3,499	3,941	4,383	4,826	5,27	5,715	6,16	6,606	7,051	7,497	7,942
KG m	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9
BMt m	57,214	43,073	34,539	28,829	24,752	21,705	19,348	17,468	15,929	14,639	13,533	12,572	11,733	10,998	10,346	9,769
BML m	1626,083	1237,62	1003,31	846,346	731,917	648,15	583,501	532,433	491,533	457,915	429,285	404,864	382,303	361,371	342,188	324,8
GMt m	43,602	29,903	21,812	16,544	12,909	10,304	8,388	6,951	5,856	5,009	4,348	3,833	3,439	3,149	2,943	2,811
GML m	1612,471	1224,451	990,582	834,06	720,074	636,749	572,541	521,917	481,46	448,285	420,1	396,124	374,009	353,523	334,785	317,842
KMt m	58,502	44,803	36,712	31,444	27,809	25,204	23,288	21,851	20,756	19,909	19,248	18,733	18,339	18,049	17,843	17,711
KML m	1627,371	1239,351	1005,482	848,96	734,974	651,649	587,441	536,817	496,36	463,185	435	411,024	388,909	368,423	349,685	332,742
Immersion (TPc) tonne/cm	90,986	92,527	93,691	94,638	95,372	96,129	96,867	97,606	98,366	99,125	99,837	100,521	101,075	101,519	101,882	102,205
MTc tonne.m	1406,176	1461,556	1505,619	1542,976	1571,827	1603,535	1635,398	1668,593	1704,513	1742,166	1779,058	1816,547	1847,209	1871,485	1891,568	1909,453
RM at 1deg = GMt.Disp.sin(1) t	16291,619	15293,48	14204,664	13113,211	12073,088	11117,71	10266,03	9521,288	8882,126	8340,369	7888,823	7530,326	7277,421	7142,683	7124,521	7234,736
Max deck inclination deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trim angle (+ve by stern) deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



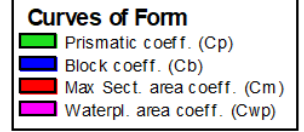
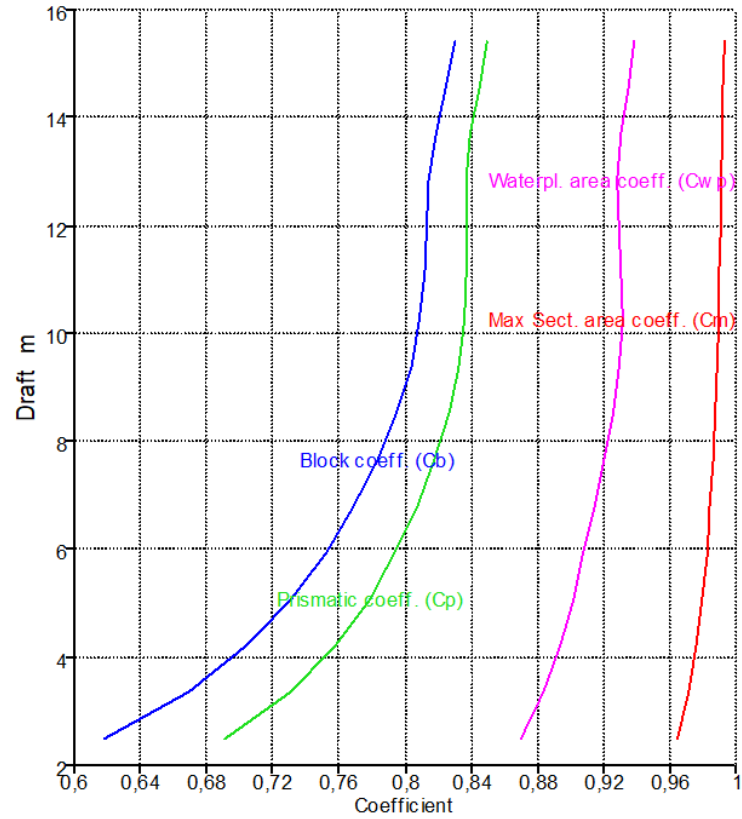
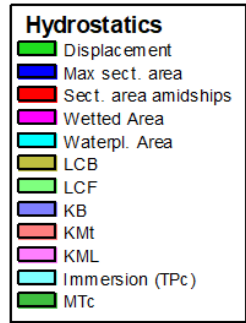
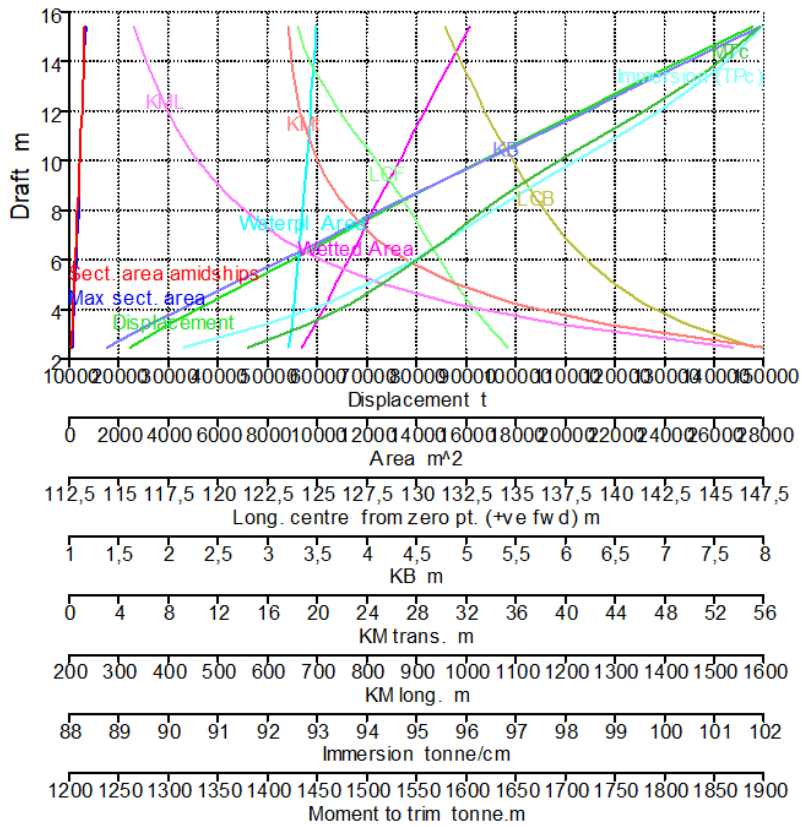
3.5 Trimado positivo (Por Calados)

Trimado +0,8% Lpp																	
Draft Amidships m	2,5	3,36	4,22	5,08	5,94	6,8	7,66	8,52	9,38	10,24	11,1	11,96	12,82	13,68	14,54	15,4	
Displacement t	20711	28632	36670	44803	53017	61303	69652	78069	86558	95112	103729	112400	121112	129859	138634	147433	
Heel deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Draft at FP m	1,5	2,36	3,22	4,08	4,94	5,8	6,66	7,52	8,38	9,24	10,1	10,96	11,82	12,68	13,54	14,4	
Draft at AP m	3,5	4,36	5,22	6,08	6,94	7,8	8,66	9,52	10,38	11,24	12,1	12,96	13,82	14,68	15,54	16,4	
Draft at LCF m	2,43	3,293	4,156	5,019	5,884	6,749	7,615	8,481	9,347	10,214	11,08	11,945	12,808	13,671	14,534	15,396	
Trim (+ve by stern) m	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
WL Length m	238,175	238,895	239,534	240,091	240,567	240,975	242,128	243,732	245,756	247,766	249,768	249,864	249,864	249,864	249,864	249,864	
Beam max extents on WL m	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	
Wetted Area m ²	9438,604	9912,345	10367,828	10816,559	11264,153	11700,778	12152,042	12591,688	13047,401	13504,287	13962,95	14419,232	14871,662	15322,385	15744,586	16193,862	
Waterpl. Area m ²	8903,589	9058,056	9174,539	9271,132	9357,747	9431,086	9509,388	9589,24	9667,17	9740,427	9806,784	9861,779	9904,607	9939,638	9969,249	9995,79	
Prismatic coeff. (Cp)	0,737	0,773	0,797	0,813	0,826	0,836	0,842	0,845	0,846	0,846	0,846	0,851	0,857	0,862	0,866	0,87	
Block coeff. (Cb)	0,583	0,642	0,684	0,714	0,738	0,757	0,77	0,78	0,786	0,791	0,794	0,803	0,811	0,818	0,825	0,831	
Max Sect. area coeff. (Cm)	0,954	0,96	0,969	0,98	0,985	0,987	0,988	0,989	0,99	0,991	0,992	0,992	0,993	0,993	0,994	0,994	
Waterpl. area coeff. (Cwp)	0,882	0,894	0,903	0,911	0,917	0,923	0,926	0,928	0,928	0,927	0,926	0,931	0,935	0,938	0,941	0,943	
LCB from zero pt. (+ve fwd) m	120,722	123,609	125,189	126,138	126,731	127,089	127,275	127,346	127,325	127,236	127,099	126,931	126,749	126,562	126,378	126,198	
LCF from zero pt. (+ve fwd) m	131,285	130,996	130,62	130,179	129,67	128,982	128,31	127,542	126,745	125,965	125,237	124,634	124,175	123,804	123,496	123,225	
KB m	1,304	1,735	2,172	2,61	3,051	3,493	3,935	4,379	4,824	5,27	5,717	6,164	6,611	7,058	7,504	7,95	
KG m	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	
BMt m	59,28	44,264	35,32	29,39	25,183	22,049	19,625	17,692	16,106	14,773	13,632	12,648	11,794	11,045	10,386	9,801	
BML m	1693,372	1277,594	1030,861	867,536	751,778	664,012	598,021	546,409	504,557	469,605	439,596	412,642	387,904	365,553	345,378	327,261	
GMt m	45,668	31,107	22,612	17,128	13,366	10,677	8,698	7,209	6,068	5,18	4,485	3,946	3,539	3,235	3,02	2,879	
GML m	1679,76	1264,437	1018,152	855,274	739,962	652,64	587,093	535,926	494,519	460,012	430,449	403,94	379,649	357,742	338,012	320,339	
KMt m	60,582	45,998	37,49	31,999	28,233	25,541	23,56	22,071	20,93	20,042	19,348	18,812	18,405	18,103	17,889	17,75	
KML m	1694,62	1279,287	1032,998	870,117	754,804	667,482	601,936	550,77	509,364	474,86	445,299	418,792	394,503	372,599	352,871	335,2	
Immersion (TPc) tonne/cm	91,262	92,845	94,039	95,029	95,917	96,669	97,471	98,29	99,088	99,839	100,52	101,083	101,522	101,881	102,185	102,457	
MTc tonne.m	1417,081	1474,661	1520,799	1560,82	1597,977	1629,673	1665,655	1704,241	1743,55	1782,182	1818,735	1849,39	1872,902	1892,288	1908,737	1923,757	
RM at 1deg = GMt.Disp.sin(1) t	16507,114	15543,987	14471,158	13392,666	12367,395	11423,232	10572,704	9822,291	9166,056	8597,949	8118,568	7741,632	7479,485	7330,968	7305,801	7406,662	
Max deck inclination deg	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	
Trim angle (+ve by stern) deg	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	



3.6 Trimado negativo (Por Calados)

Trimado -0,8% Lpp																	
Draft Amidships m	2,5	3,36	4,22	5,08	5,94	6,8	7,66	8,52	9,38	10,24	11,1	11,96	12,82	13,68	14,54	15,4	
Displacement t	22226	30070	38038	46091	54216	62407	70658	78970	87342	95774	104271	112828	121443	130111	138823	147574	
Heel deg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Draft at FP m	3,5	4,36	5,22	6,08	6,94	7,8	8,66	9,52	10,38	11,24	12,1	12,96	13,82	14,68	15,54	16,4	
Draft at AP m	1,5	2,36	3,22	4,08	4,94	5,8	6,66	7,52	8,38	9,24	10,1	10,96	11,82	12,68	13,54	14,4	
Draft at LCF m	2,597	3,448	4,301	5,154	6,009	6,864	7,718	8,573	9,427	10,281	11,134	11,988	12,842	13,697	14,553	15,41	
Trim (+ve by stern) m	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	
WL Length m	238,964	239,41	239,781	240,073	240,342	240,616	240,867	241,108	241,872	243,208	245,134	247,06	248,986	249,864	249,864	249,864	
Beam max extents on WL m	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,402	42,401	42,401	42,401	
Wetted Area m^2	9408,506	9891,006	10351,568	10788,344	11230,176	11669,853	12109,161	12549,69	12995,777	13431,658	13884,34	14340,588	14797,556	15253,899	15707,014	16159,941	
Waterpl. Area m^2	8811,058	8973,655	9092,908	9176,793	9255,387	9326,625	9394,594	9461,937	9530,822	9601,508	9672,832	9741,403	9804,545	9860,324	9905,929	9946,962	
Prismatic coeff. (Cp)	0,691	0,731	0,758	0,778	0,794	0,807	0,818	0,827	0,833	0,836	0,837	0,837	0,837	0,839	0,845	0,85	
Block coeff. (Cb)	0,619	0,669	0,705	0,732	0,752	0,769	0,783	0,795	0,804	0,809	0,812	0,813	0,815	0,818	0,825	0,831	
Max Sect. area coeff. (Cm)	0,964	0,971	0,976	0,98	0,982	0,984	0,986	0,987	0,988	0,989	0,99	0,991	0,991	0,992	0,992	0,993	
Waterpl. area coeff. (Cwp)	0,87	0,884	0,894	0,901	0,908	0,914	0,92	0,926	0,929	0,931	0,931	0,93	0,929	0,931	0,935	0,939	
LCB from zero pt. (+ve fwd) m	147,038	143,66	141,461	139,859	138,614	137,601	136,741	135,985	135,302	134,67	134,071	133,502	132,957	132,435	131,943	131,483	
LCF from zero pt. (+ve fwd) m	134,659	133,561	132,716	131,89	131,225	130,571	129,91	129,226	128,506	127,743	126,957	126,185	125,466	124,833	124,367	124,036	
KB m	1,385	1,813	2,244	2,679	3,115	3,551	3,988	4,426	4,865	5,304	5,745	6,186	6,628	7,071	7,514	7,957	
KG m	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	14,9	
BMt m	54,557	41,604	33,618	28,194	24,286	21,345	19,057	17,229	15,735	14,485	13,416	12,484	11,666	10,942	10,304	9,734	
BML m	1538,374	1188,612	971,159	820,202	713,109	632,295	569,503	519,598	479,33	446,388	418,975	395,528	374,856	356,092	338,421	322,305	
GMt m	40,844	28,347	20,81	15,835	12,372	9,876	8,032	6,648	5,597	4,792	4,169	3,683	3,311	3,035	2,843	2,72	
GML m	1524,662	1175,354	958,352	807,843	701,194	620,826	558,478	509,016	469,193	436,696	409,728	386,726	366,502	348,185	330,96	315,291	
KMt m	55,94	43,415	35,861	30,873	27,4	24,896	23,045	21,654	20,599	19,789	19,16	18,67	18,293	18,013	17,817	17,691	
KML m	1539,708	1190,385	973,371	822,854	716,2	635,826	573,472	524,006	484,179	451,678	424,706	401,701	381,472	363,151	345,923	330,251	
Immersion (TPc) tonne/cm	90,313	91,98	93,202	94,062	94,868	95,598	96,295	96,985	97,691	98,415	99,147	99,849	100,497	101,068	101,536	101,956	
MTc tonne.m	1380,328	1439,614	1484,856	1516,669	1548,503	1578,138	1607,358	1637,33	1669,238	1703,622	1740,221	1777,323	1812,983	1845,311	1871,473	1895,248	
RM at 1deg = GMt.Disp.sin(1) t	15843,537	14876,02	13814,946	12737,492	11706,028	10756,207	9904,426	9161,679	8532,317	8010,271	7585,963	7252,749	7017,366	6890,877	6887,975	7006,065	
Max deck inclination deg	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	0,4668	
Trim angle (+ve by stern) deg	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	-0,4668	



4 CÁLCULO DE CURVAS DE BRAZOS DE ADRIZAMIENTO (KN)

En este apartado calcularemos las curvas de KN del buque proyecto mediante el software Maxsurf siguiendo el mismo método de variación del desplazamiento y variación del calado que hemos empleado para el cálculo de las hidrostáticas.

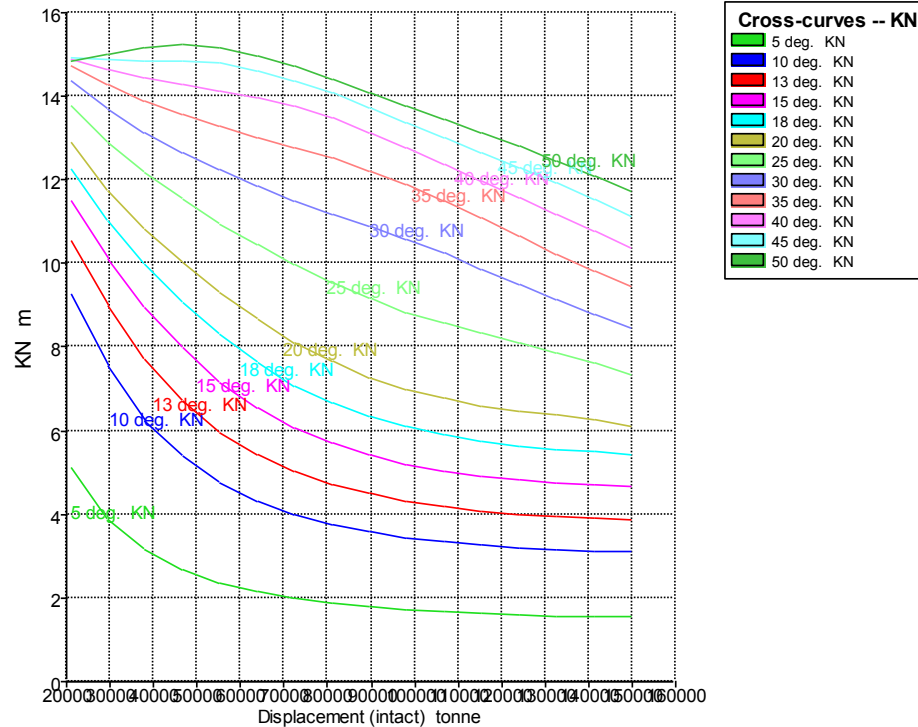
En este caso también obtendremos las curvas de KN para 3 trimados diferentes:

- Trimado 0
- Trimado positivo correspondiente a un +0,8% de la eslora entre perpendiculares, o lo que es lo mismo, un trimado de 2m.
- Trimado negativo correspondiente a un -0,8% de la eslora entre perpendiculares, o lo que es lo mismo, un trimado de -2m.

A continuación adjunto las tablas de KN para los distintos ángulos así como sus curvas características:

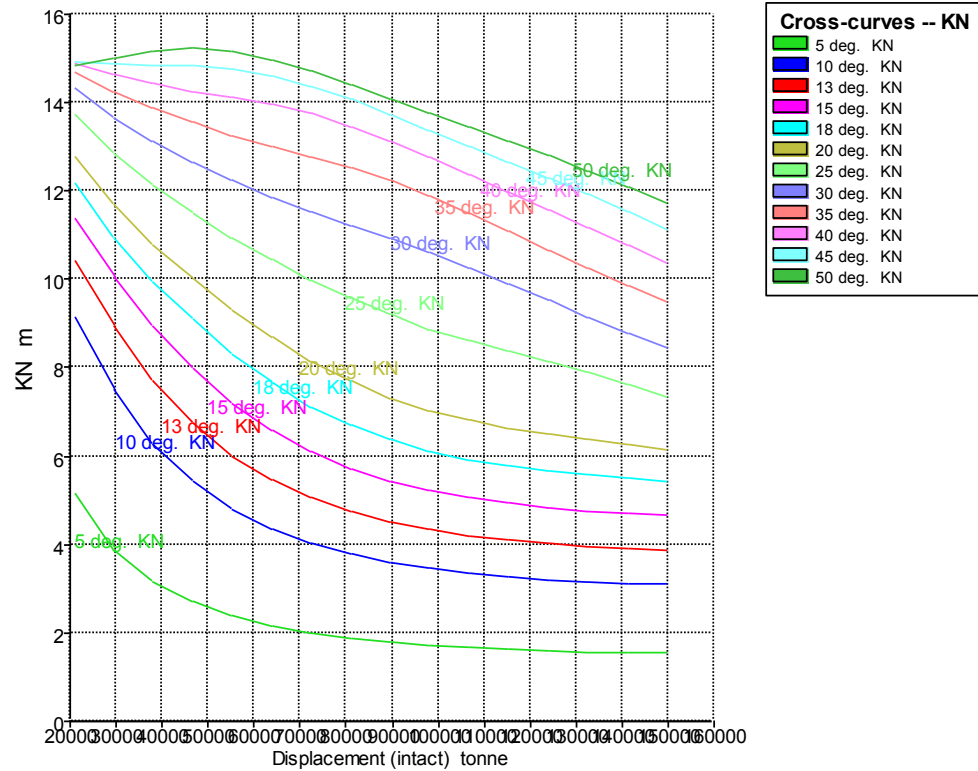
4.1 Trimado 0 (Por Desplazamientos)

Trimado 0																	
Displacement (Tn)	Draft Amidships (m)	Trim (+ by stern) (m)	LCG (m)	TCG (m)	Assumed VCG (m)	KN 5°	KN 10°	KN 12,5°	KN 15°	KN 17,5°	KN 20°	KN 25°	KN 30°	KN 35°	KN 40°	KN 45°	KN 50°
21000	2,455	0	134,43	0	0	5,116	9,248	10,525	11,494	12,257	12,869	13,77	14,356	14,711	14,884	14,912	14,825
29600	3,392	0	133,907	0	0	3,862	7,522	8,973	10,101	11,007	11,75	12,892	13,703	14,273	14,653	14,884	15,002
38200	4,314	0	133,468	0	0	3,141	6,238	7,697	8,945	9,965	10,815	12,153	13,147	13,895	14,454	14,861	15,155
46800	5,226	0	133,082	0	0	2,683	5,369	6,691	7,955	9,065	10,006	11,511	12,663	13,564	14,276	14,841	15,245
55400	6,13	0	132,706	0	0	2,373	4,761	5,959	7,141	8,274	9,288	10,941	12,233	13,271	14,118	14,789	15,169
64000	7,026	0	132,339	0	0	2,153	4,325	5,421	6,519	7,603	8,646	10,427	11,847	13,009	13,968	14,621	14,982
72600	7,915	0	131,978	0	0	1,994	4,005	5,02	6,044	7,072	8,088	9,96	11,497	12,773	13,748	14,373	14,722
81200	8,797	0	131,616	0	0	1,875	3,765	4,719	5,683	6,656	7,634	9,532	11,174	12,52	13,46	14,069	14,418
89800	9,673	0	131,25	0	0	1,785	3,582	4,49	5,406	6,333	7,271	9,148	10,876	12,21	13,123	13,725	14,083
98400	10,541	0	130,876	0	0	1,716	3,443	4,314	5,194	6,084	6,986	8,82	10,567	11,857	12,751	13,353	13,751
107000	11,403	0	130,5	0	0	1,663	3,336	4,18	5,031	5,892	6,765	8,552	10,222	11,47	12,351	12,98	13,442
115600	12,26	0	130,124	0	0	1,623	3,255	4,077	4,907	5,745	6,594	8,326	9,856	11,056	11,941	12,625	13,127
124200	13,111	0	129,757	0	0	1,592	3,193	4	4,813	5,634	6,465	8,097	9,486	10,625	11,544	12,274	12,797
132800	13,959	0	129,406	0	0	1,57	3,148	3,943	4,744	5,552	6,369	7,858	9,119	10,207	11,161	11,908	12,452
141400	14,804	0	129,074	0	0	1,554	3,116	3,903	4,695	5,494	6,264	7,608	8,762	9,822	10,773	11,529	12,094
150000	15,647	0	128,762	0	0	1,544	3,096	3,877	4,663	5,429	6,123	7,346	8,438	9,469	10,383	11,139	11,727



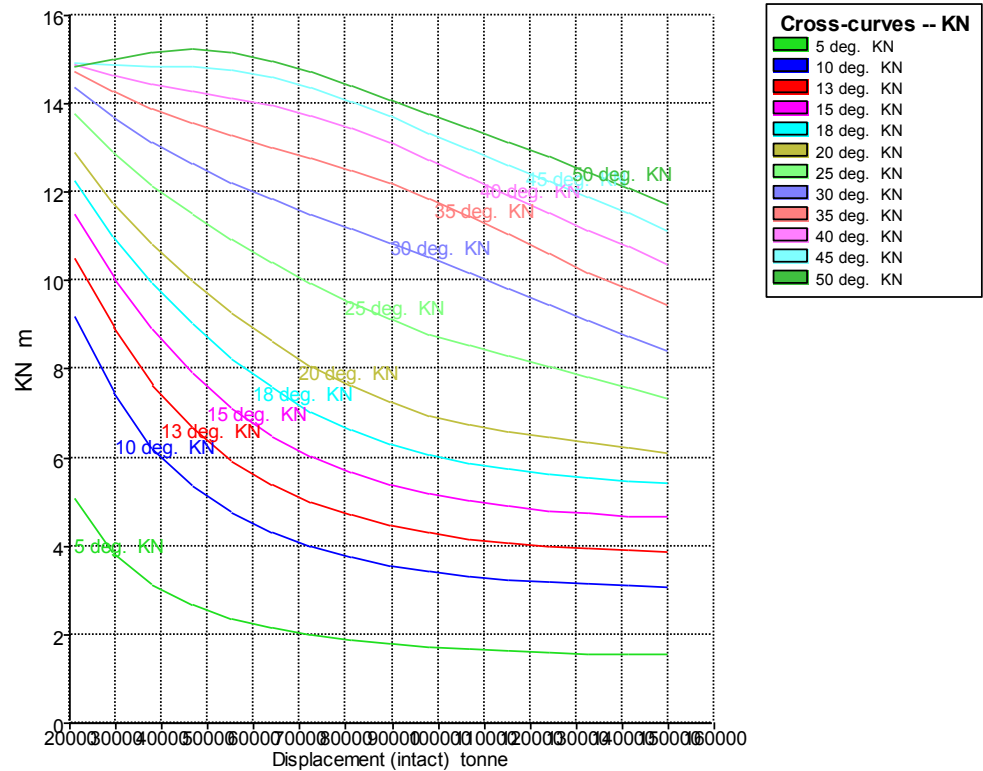
4.2 Trimado positivo (Por Desplazamientos)

Trimado +0,8% Lpp																	
Displacement (Tn)	Draft Amidships (m)	Trim (+ by stern) (m)	LCG (m)	TCG (m)	Assumed VCG (m)	KN 5°	KN 10°	KN 12,5°	KN 15°	KN 17,5°	KN 20°	KN 25°	KN 30°	KN 35°	KN 40°	KN 45°	KN 50°
21000	2,532	2,000 (fixed)	120,857	0	0	5,137	9,135	10,404	11,38	12,154	12,778	13,707	14,318	14,688	14,872	14,909	14,829
29600	3,464	2,000 (fixed)	123,835	0	0	3,887	7,517	8,932	10,047	10,949	11,693	12,842	13,664	14,246	14,638	14,881	15,006
38200	4,382	2,000 (fixed)	125,386	0	0	3,164	6,277	7,717	8,939	9,946	10,79	12,123	13,118	13,87	14,436	14,854	15,157
46800	5,29	2,000 (fixed)	126,287	0	0	2,703	5,409	6,736	7,988	9,078	10,007	11,501	12,647	13,547	14,26	14,831	15,234
55400	6,188	2,000 (fixed)	126,831	0	0	2,391	4,798	6,004	7,19	8,313	9,311	10,948	12,231	13,264	14,11	14,773	15,154
64000	7,079	2,000 (fixed)	127,135	0	0	2,17	4,358	5,462	6,566	7,654	8,689	10,449	11,858	13,013	13,962	14,61	14,967
72600	7,962	2,000 (fixed)	127,279	0	0	2,009	4,034	5,057	6,088	7,122	8,141	9,994	11,517	12,783	13,748	14,366	14,714
81200	8,838	2,000 (fixed)	127,31	0	0	1,888	3,79	4,751	5,722	6,702	7,686	9,579	11,205	12,535	13,465	14,068	14,416
89800	9,707	2,000 (fixed)	127,257	0	0	1,796	3,604	4,518	5,441	6,374	7,319	9,202	10,913	12,232	13,135	13,732	14,089
98400	10,569	2,000 (fixed)	127,145	0	0	1,725	3,462	4,339	5,224	6,12	7,029	8,875	10,608	11,882	12,768	13,367	13,763
107000	11,425	2,000 (fixed)	126,99	0	0	1,671	3,352	4,201	5,057	5,924	6,803	8,603	10,266	11,498	12,372	12,996	13,453
115600	12,276	2,000 (fixed)	126,813	0	0	1,629	3,268	4,095	4,929	5,773	6,628	8,365	9,897	11,086	11,963	12,642	13,132
124200	13,124	2,000 (fixed)	126,628	0	0	1,597	3,204	4,015	4,832	5,658	6,495	8,129	9,519	10,656	11,568	12,285	12,799
132800	13,969	2,000 (fixed)	126,441	0	0	1,574	3,157	3,955	4,76	5,572	6,389	7,881	9,142	10,235	11,181	11,915	12,455
141400	14,812	2,000 (fixed)	126,258	0	0	1,558	3,124	3,913	4,709	5,508	6,275	7,621	8,78	9,845	10,787	11,536	12,099
150000	15,652	2,000 (fixed)	126,08	0	0	1,547	3,103	3,886	4,673	5,433	6,128	7,351	8,449	9,48	10,391	11,147	11,733



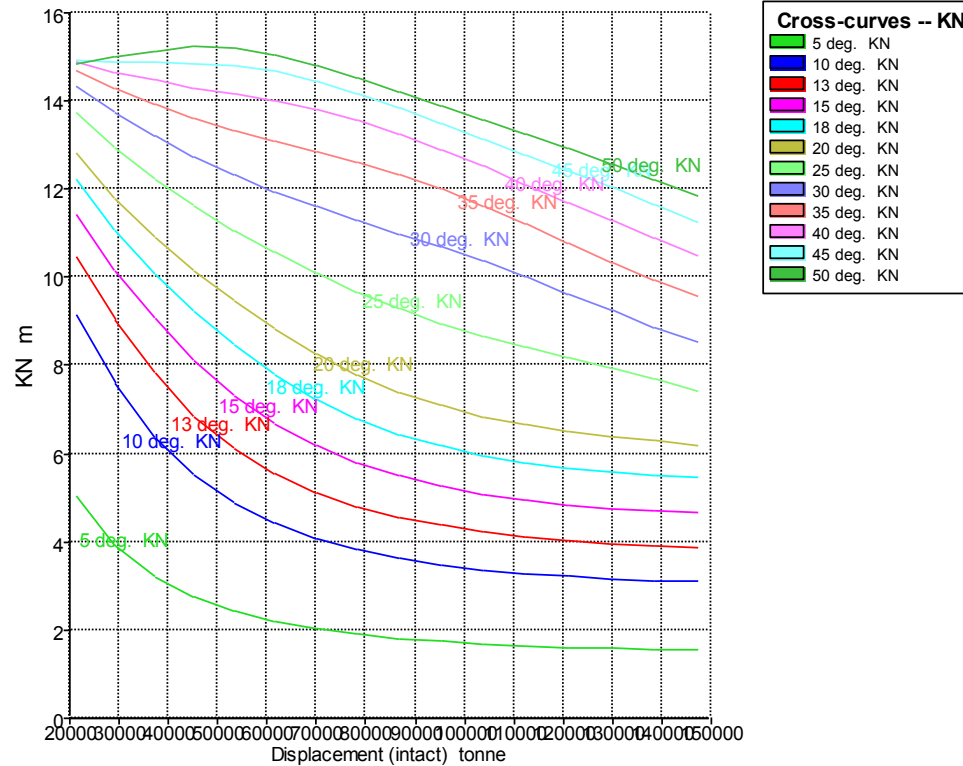
4.3 Trimado negativo (Por Desplazamientos)

Trimado -0,8% Lpp																	
Displacement (Tn)	Draft Amidships (m)	Trim (+ by stern) (m)	LCG (m)	TCG (m)	Assumed VCG (m)	KN 5°	KN 10°	KN 12,5°	KN 15°	KN 17,5°	KN 20°	KN 25°	KN 30°	KN 35°	KN 40°	KN 45°	KN 50°
21000	2,364	-2,000 (fixed)	147,766	0	0	5,055	9,182	10,493	11,483	12,256	12,873	13,772	14,355	14,708	14,88	14,909	14,823
29600	3,309	-2,000 (fixed)	143,834	0	0	3,825	7,453	8,921	10,069	10,988	11,741	12,891	13,705	14,272	14,652	14,884	15,002
38200	4,237	-2,000 (fixed)	141,442	0	0	3,116	6,19	7,64	8,899	9,933	10,794	12,145	13,147	13,897	14,454	14,862	15,156
46800	5,155	-2,000 (fixed)	139,76	0	0	2,664	5,331	6,646	7,905	9,024	9,976	11,496	12,657	13,564	14,279	14,843	15,233
55400	6,065	-2,000 (fixed)	138,481	0	0	2,357	4,73	5,921	7,099	8,231	9,252	10,921	12,223	13,267	14,12	14,78	15,161
64000	6,967	-2,000 (fixed)	137,454	0	0	2,14	4,299	5,389	6,483	7,565	8,608	10,404	11,834	13,003	13,957	14,612	14,975
72600	7,861	-2,000 (fixed)	136,589	0	0	1,982	3,983	4,994	6,014	7,038	8,053	9,933	11,481	12,761	13,735	14,365	14,717
81200	8,75	-2,000 (fixed)	135,833	0	0	1,865	3,746	4,697	5,657	6,627	7,602	9,503	11,156	12,501	13,448	14,06	14,412
89800	9,631	-2,000 (fixed)	135,153	0	0	1,777	3,566	4,471	5,384	6,308	7,244	9,119	10,852	12,191	13,112	13,717	14,078
98400	10,506	-2,000 (fixed)	134,525	0	0	1,71	3,43	4,298	5,175	6,062	6,962	8,794	10,536	11,838	12,739	13,346	13,747
107000	11,375	-2,000 (fixed)	133,934	0	0	1,658	3,325	4,166	5,015	5,873	6,744	8,526	10,19	11,449	12,34	12,973	13,438
115600	12,237	-2,000 (fixed)	133,375	0	0	1,619	3,246	4,066	4,893	5,729	6,576	8,293	9,826	11,036	11,93	12,619	13,124
124200	13,094	-2,000 (fixed)	132,843	0	0	1,589	3,186	3,99	4,801	5,62	6,449	8,067	9,459	10,606	11,533	12,267	12,794
132800	13,946	-2,000 (fixed)	132,339	0	0	1,567	3,142	3,935	4,734	5,54	6,348	7,832	9,095	10,189	11,149	11,902	12,448
141400	14,794	-2,000 (fixed)	131,866	0	0	1,552	3,112	3,897	4,687	5,48	6,24	7,587	8,745	9,807	10,762	11,521	12,089
150000	15,638	-2,000 (fixed)	131,428	0	0	1,543	3,092	3,872	4,654	5,408	6,103	7,331	8,426	9,457	10,371	11,13	11,721



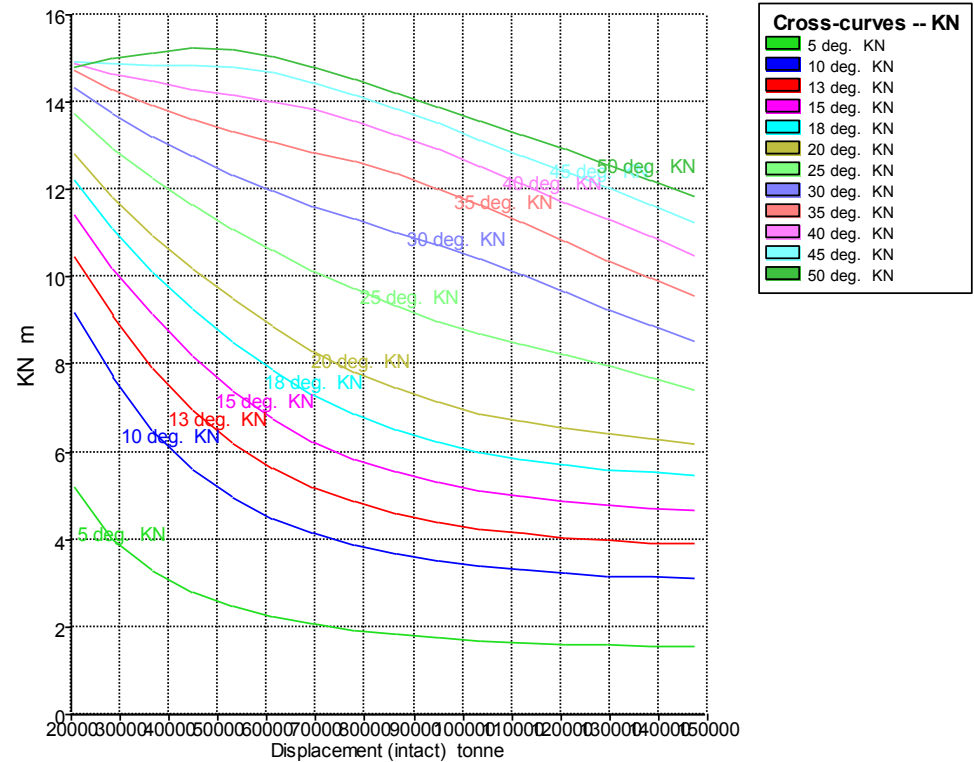
4.4 Trimado 0 (Por Calados)

Trimado 0																	
Displacement (Tn)	Draft Amidships (m)	Trim (+ by stern)	LCG (m)	TCG (m)	Assumed VCG	KN 5°	KN 10°	KN 12,5°	KN 15°	KN 17,5°	KN 20°	KN 25°	KN 30°	KN 35°	KN 40°	KN 45°	KN 50°
21409	2,5	0,000 (fixed)	134,403	0	0	5,037	9,155	10,441	11,42	12,192	12,813	13,728	14,325	14,69	14,873	14,911	14,833
29304	3,36	0,000 (fixed)	133,924	0	0	3,895	7,577	9,022	10,144	11,044	11,783	12,919	13,724	14,287	14,66	14,885	14,996
37315	4,22	0,000 (fixed)	133,51	0	0	3,201	6,351	7,822	9,058	10,066	10,905	12,223	13,199	13,93	14,472	14,863	15,14
45417	5,08	0,000 (fixed)	133,141	0	0	2,745	5,491	6,836	8,109	9,207	10,132	11,61	12,736	13,613	14,301	14,843	15,244
53590	5,94	0,000 (fixed)	132,785	0	0	2,429	4,875	6,099	7,301	8,44	9,439	11,06	12,321	13,33	14,148	14,81	15,197
61825	6,8	0,000 (fixed)	132,431	0	0	2,202	4,425	5,546	6,666	7,767	8,81	10,559	11,945	13,074	14,012	14,674	15,037
70125	7,66	0,000 (fixed)	132,082	0	0	2,035	4,089	5,127	6,173	7,219	8,247	10,099	11,601	12,843	13,824	14,454	14,804
78488	8,52	0,000 (fixed)	131,73	0	0	1,909	3,834	4,808	5,791	6,783	7,775	9,675	11,283	12,616	13,564	14,174	14,521
86915	9,38	0,000 (fixed)	131,374	0	0	1,813	3,639	4,562	5,494	6,438	7,391	9,284	10,986	12,333	13,25	13,851	14,205
95409	10,24	0,000 (fixed)	131,006	0	0	1,739	3,488	4,372	5,264	6,168	7,084	8,939	10,696	11,998	12,896	13,496	13,872
103966	11,1	0,000 (fixed)	130,633	0	0	1,681	3,371	4,224	5,086	5,957	6,841	8,651	10,364	11,625	12,51	13,121	13,561
112582	11,96	0,000 (fixed)	130,256	0	0	1,636	3,281	4,111	4,948	5,795	6,653	8,414	10,001	11,22	12,097	12,76	13,247
121252	12,82	0,000 (fixed)	129,882	0	0	1,602	3,212	4,024	4,843	5,67	6,509	8,185	9,626	10,789	11,691	12,406	12,918
129964	13,68	0,000 (fixed)	129,52	0	0	1,576	3,161	3,96	4,765	5,578	6,4	7,944	9,249	10,354	11,299	12,038	12,573
138711	14,54	0,000 (fixed)	129,176	0	0	1,558	3,125	3,914	4,709	5,511	6,303	7,692	8,877	9,947	10,904	11,656	12,213
147487	15,401	0,000 (fixed)	128,851	0	0	1,546	3,101	3,883	4,671	5,454	6,169	7,427	8,533	9,576	10,502	11,259	11,84



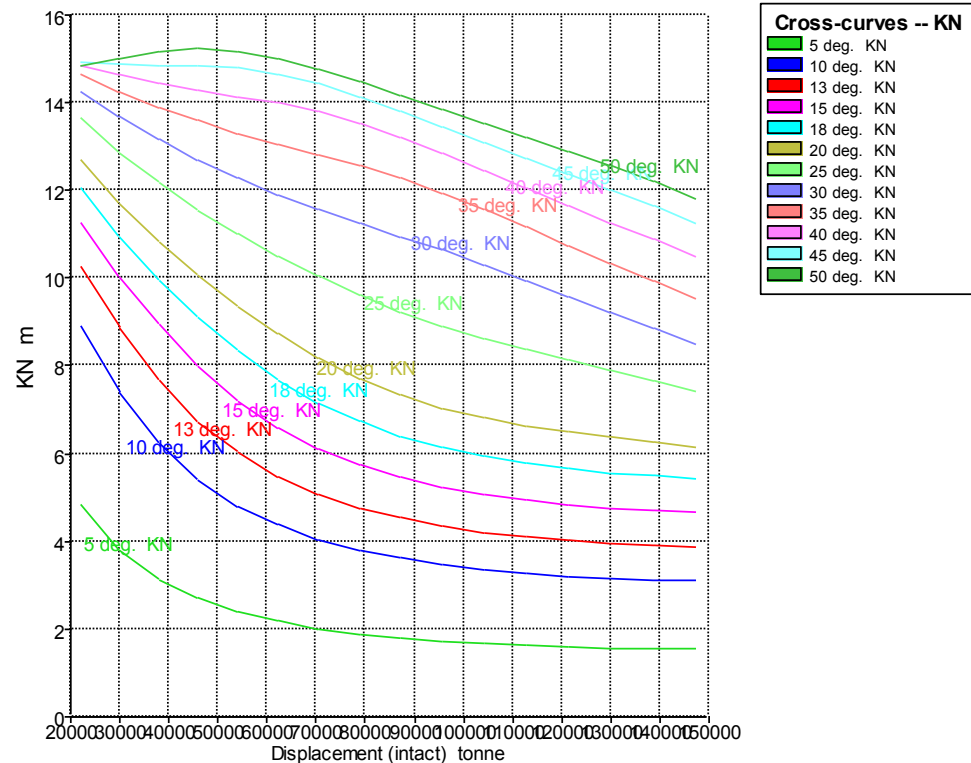
4.5 Trimado positivo (Por Calados)

Trimado +0,8% Lpp																	
Displacement (Tn)	Draft Amidships (m)	Trim (+ by stern)	LCG (m)	TCG (m)	Assumed VCG	KN 5°	KN 10°	KN 12,5°	KN 15°	KN 17,5°	KN 20°	KN 25°	KN 30°	KN 35°	KN 40°	KN 45°	KN 50°
20711	2,5	2,000 (fixed)	120,712	0	0	5,194	9,196	10,46	11,43	12,199	12,819	13,74	14,342	14,704	14,881	14,91	14,823
28632	3,36	2,000 (fixed)	123,595	0	0	3,994	7,681	9,083	10,184	11,073	11,805	12,931	13,731	14,292	14,662	14,884	14,988
36670	4,22	2,000 (fixed)	125,171	0	0	3,268	6,468	7,917	9,123	10,114	10,941	12,243	13,208	13,932	14,47	14,859	15,132
44803	5,08	2,000 (fixed)	126,117	0	0	2,794	5,583	6,941	8,196	9,269	10,18	11,638	12,751	13,618	14,298	14,837	15,23
53017	5,94	2,000 (fixed)	126,707	0	0	2,466	4,948	6,185	7,393	8,516	9,496	11,095	12,342	13,339	14,149	14,798	15,19
61303	6,8	2,000 (fixed)	127,061	0	0	2,232	4,482	5,615	6,744	7,848	8,876	10,6	11,971	13,089	14,013	14,672	15,034
69652	7,66	2,000 (fixed)	127,243	0	0	2,059	4,135	5,183	6,238	7,291	8,319	10,146	11,63	12,861	13,83	14,457	14,807
78069	8,52	2,000 (fixed)	127,31	0	0	1,928	3,871	4,853	5,844	6,843	7,84	9,726	11,316	12,631	13,574	14,182	14,529
86558	9,38	2,000 (fixed)	127,285	0	0	1,828	3,669	4,599	5,538	6,488	7,448	9,339	11,022	12,352	13,264	13,863	14,215
95112	10,24	2,000 (fixed)	127,194	0	0	1,75	3,512	4,402	5,3	6,21	7,132	8,993	10,728	12,02	12,912	13,509	13,885
103729	11,1	2,000 (fixed)	127,053	0	0	1,69	3,39	4,249	5,115	5,993	6,882	8,7	10,4	11,648	12,526	13,135	13,571
112400	11,96	2,000 (fixed)	126,881	0	0	1,643	3,297	4,131	4,973	5,824	6,688	8,452	10,036	11,242	12,115	12,773	13,254
121112	12,82	2,000 (fixed)	126,695	0	0	1,607	3,225	4,041	4,864	5,695	6,538	8,215	9,655	10,811	11,708	12,415	12,92
129859	13,68	2,000 (fixed)	126,505	0	0	1,581	3,172	3,974	4,782	5,599	6,424	7,967	9,27	10,376	11,313	12,043	12,574
138634	14,541	2,000 (fixed)	126,316	0	0	1,562	3,133	3,925	4,723	5,528	6,315	7,706	8,893	9,967	10,915	11,659	12,215
147433	15,401	2,000 (fixed)	126,133	0	0	1,55	3,108	3,893	4,683	5,459	6,176	7,432	8,544	9,587	10,509	11,264	11,843



4.6 Trimado negativo (Por Calados)

Trimado -0,8% Lpp																	
Displacement (Tn)	Draft Amidships (m)	Trim (+ by stern)	LCG (m)	TCG (m)	Assumed VCG	KN 5°	KN 10°	KN 12,5°	KN 15°	KN 17,5°	KN 20°	KN 25°	KN 30°	KN 35°	KN 40°	KN 45°	KN 50°
22226	2,5	-2,000 (fixed)	147,049	0	0	4,828	8,907	10,247	11,262	12,058	12,697	13,636	14,255	14,641	14,845	14,905	14,851
30070	3,36	-2,000 (fixed)	143,675	0	0	3,776	7,371	8,844	10	10,926	11,685	12,848	13,672	14,25	14,64	14,882	15,011
38038	4,22	-2,000 (fixed)	141,479	0	0	3,126	6,21	7,662	8,919	9,951	10,81	12,158	13,157	13,904	14,458	14,863	15,153
46091	5,08	-2,000 (fixed)	139,881	0	0	2,695	5,39	6,716	7,98	9,095	10,039	11,546	12,695	13,59	14,293	14,845	15,233
54216	5,94	-2,000 (fixed)	138,639	0	0	2,393	4,801	6,008	7,197	8,333	9,347	10,997	12,28	13,306	14,141	14,794	15,179
62407	6,8	-2,000 (fixed)	137,63	0	0	2,175	4,369	5,476	6,585	7,677	8,721	10,496	11,903	13,05	13,99	14,651	15,016
70658	7,66	-2,000 (fixed)	136,773	0	0	2,014	4,046	5,074	6,109	7,146	8,169	10,036	11,558	12,815	13,791	14,427	14,779
78970	8,52	-2,000 (fixed)	136,021	0	0	1,892	3,801	4,766	5,74	6,724	7,71	9,611	11,238	12,573	13,528	14,144	14,495
87342	9,38	-2,000 (fixed)	135,341	0	0	1,799	3,613	4,529	5,455	6,391	7,338	9,223	10,939	12,285	13,212	13,819	14,176
95774	10,24	-2,000 (fixed)	134,713	0	0	1,728	3,468	4,346	5,233	6,131	7,04	8,887	10,635	11,95	12,856	13,461	13,846
104271	11,1	-2,000 (fixed)	134,118	0	0	1,673	3,355	4,204	5,061	5,928	6,807	8,605	10,303	11,576	12,468	13,09	13,535
112828	11,96	-2,000 (fixed)	133,552	0	0	1,63	3,269	4,095	4,928	5,771	6,625	8,366	9,944	11,171	12,061	12,731	13,227
121443	12,82	-2,000 (fixed)	133,011	0	0	1,597	3,203	4,012	4,828	5,651	6,486	8,14	9,577	10,744	11,658	12,381	12,901
130111	13,68	-2,000 (fixed)	132,493	0	0	1,573	3,154	3,951	4,753	5,562	6,379	7,906	9,209	10,317	11,268	12,018	12,558
138823	14,54	-2,000 (fixed)	132,004	0	0	1,556	3,12	3,907	4,699	5,497	6,275	7,662	8,847	9,918	10,879	11,637	12,198
147574	15,4	-2,000 (fixed)	131,548	0	0	1,545	3,097	3,878	4,663	5,431	6,145	7,404	8,513	9,553	10,481	11,241	11,826

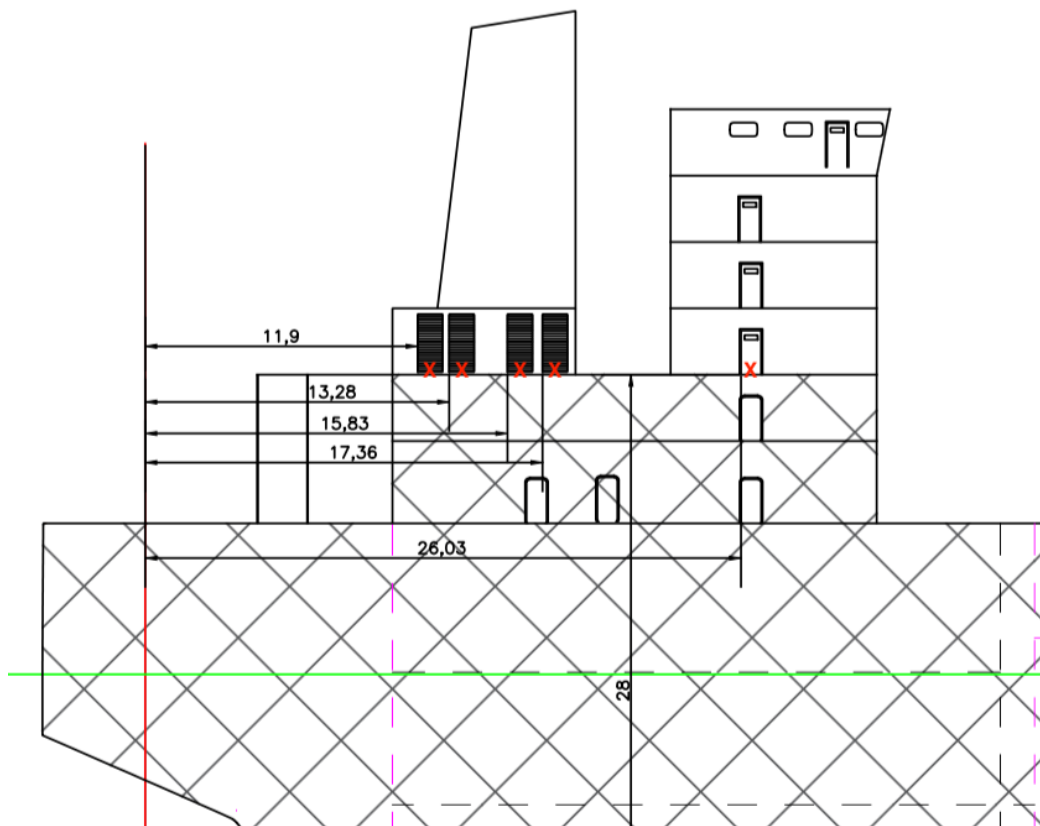


5 ZONA ESTANCA Y PUNTOS DE INUNDACIÓN PROGRESIVA

En nuestro Buque Proyecto la zona estanca estaría por debajo de la cubierta principal, puesto que las tapas de escotillas son estancas, y también entre la cubierta principal y las dos primeras cubiertas de la zona de habilitación, puesto que esos 2 primeros niveles cuentan con puertas y cierres estancos. Por encima de esos niveles ya no serían estancos y se encontrarían los puntos de inundación progresiva que aparecen fijados en el **Anexo 1_Plano Zona Estanca**, como muestra una captura.

Estos puntos de inundación progresiva corresponden con las ventilaciones de la cámara de máquinas y la puerta de acceso a la zona de habilitación correspondiente a esa cubierta, la tercera. Sus coordenadas son las siguientes:

PUNTOS INUNDACIÓN PROGRESIVA			
Nombre	X (m)	Y (m)	Z (m)
Ventilacion 1 ER	11,9	8	28
Ventilacion 1 BR	11,9	-8	28
Ventilacion 2 ER	13,28	8	28
Ventilacion 2 BR	13,28	-8	28
Ventilacion 3 ER	15,83	8	28
Ventilacion 3 BR	15,83	-8	28
Ventilacion 4 ER	17,36	8	28
Ventilacion 4 BR	17,36	-8	28
Acceso Habilitacion ER	26,03	11,9	28
Acceso Habilitacion BR	26,03	-11,9	28



6 COMPARTIMENTADO

Dividiremos el buque distinguiendo tres tipos de compartimentado:

- Compartimentado longitudinal: incluiremos pique de proa, pique de popa y espacios de carga.
- Compartimentado transversal: relativo al doble casco
- Compartimentado vertical: incluye el doble fondo y la cubierta.

Para llevar a cabo el compartimentado del buque seguiremos las reglas de la IACS para bulkcarriers aplicables a aquellos bulkcarriers con las siguientes características:

$$L < 350m$$

$$L/B > 5$$

$$B/D < 2,5$$

$$C_B \geq 0,6$$

Los cuales cumple nuestro buque.

6.1 Compartimentado longitudinal

6.1.1 Espaciado de Cuadernas

Para definir nuestra separación entre cuadernas debemos comprobar la separación máxima definida por el American Bureau of Shipping, esta viene indicada en la *Parte 3, Capítulo 2, Sección 5, Apartado 1.7 del ABS RULES FOR BUILDING AND CLASSING STEEL VESSELS 2007*:

$$S = 2,08 * L + 438$$

dónde L = eslora de escantillonado definida en el **apartado 3/1.1.1** del mismo Reglamento como:

$$L_{SC} = \text{Max}(0,96 * L_{WL}; \text{MIN}[0,97 * L_{WL}; L_{pp}])$$

$$L_{WL} = 250$$

sustituyendo: $L_{SC} = \text{Max}(240; \text{MIN}[242,5; 245,5]) = 242,5 \text{ m}$

y S: $S = 2,08 * 242,5 + 438 = 942 \text{ mm}$

De forma que nuestra separación entre Cuadernas deberá ser inferior a 942mm.

Siguiendo las separaciones de los buques similares tomados como referencia, el espaciado de cuadernas en el Buque Proyecto será el siguiente:

- Pique de popa:	600 mm
- Cámara de máquinas:	800 mm
- Espacios de carga:	800 mm
- Pique de proa:	600 mm

6.1.2 Longitud de Averías

La longitud de avería L_{AV} viene definida en “Enmiendas al Protocolo de 1988 relativo al Convenio sobre Líneas de Carga de 1966” *Regla 27 apartado 12f*:

“Cuando se prevea inundación de dos compartimentos adyacentes cualesquiera dispuestos en sentido longitudinal, la separación mínima entre mamparos estancos transversales principales será de $1/3 L^{2/3}$ o de 14,5 m, si este valor es menor, para que puedan ser considerados eficaces. Si la distancia que media entre los mamparos transversales es menor, se supondrá que no existen uno o más de éstos a fin de alcanzar la separación mínima entre mamparos.”

$$L_{AV} = \text{Max} \left(\frac{L^{2/3}}{3}; 14,5m \right)$$

Donde: $L = \text{Max}(0,96 * L_{85\%D}; L_{PP85\%D})$

$L_{85\%D}$ = Eslora total de una flotación situada al 85% del puntal, medida desde el canto alto de la quilla.

$$85\%D = 18,32 \text{ m}$$

$$L_{85\%D} = 250 \text{ m}$$

$$L_{pp85\%D} = 245,5 \text{ m}$$

Por lo que la eslora será:

$$L = \text{Max}(0,96 * 250; 245,5) = \text{Max}(240; 245,5) = 245,5 \text{ m}$$

Y la longitud de averías en función de esa eslora será:

$$L_{AV} = \text{Max} \left(\frac{245,5^{2/3}}{3}; 14,5m \right) = \text{Max}(13,07m; 14,5m) = 14,5 \text{ m}$$

Conociendo el valor de la longitud de averías de 14,5 m podemos establecer el espaciado entre mamparos transversales, siempre con distancias superiores a esta para que en caso de avería estudiada sólo dañásemos un compartimento.

6.1.3 Pique de Popa

El mamparo que limita con la cámara de máquinas se encontrará a 10,8 m de la perpendicular de popa, y la longitud total del pique será de 16,2m. El espaciado entre cuadernas en esta zona será de 600 mm por lo que el Pique de Popa abarcará de la Cuaderna 0 a la 18. Cumplirá principalmente la función de tanque de agua de lastre, aunque también albergará otros tanques estructurales destinados al almacenamiento de fuel o agua dulce.

6.1.4 Cámara de Máquinas

La longitud total de la misma es de 28 m, y la separación de cuadernas en este espacio será de 800 mm por lo que comprenderá de la Cuaderna 18 a la 53.

Mediante la siguiente aproximación podemos conocer la limitación en longitud para el motor propulsor:

$$L_{CM} = L_M + 6m \text{ por popa} + 4m \text{ por proa}$$

Según esta estimación nos permite emplear un motor de hasta 18m de longitud, lo cual no nos influiría en el primer motor considerado, seleccionado en el Cuaderno 1, ya que este tiene una longitud de 9,4m. Esto nos permite instalar motores auxiliares para la generación eléctrica en la cámara de máquinas.

6.1.5 Bodegas de Carga

El buque de Proyecto contará con 7 bodegas de carga. Empezando a numerarlas por proa, las longitudes de las bodegas de carga son las siguientes:

LONGITUD BODEGAS DE CARGA		
Bodega N°1	22,4	m
Bodega N°2	28	m
Bodega N°3	28	m
Bodega N°4	28	m
Bodega N°5	28	m
Bodega N°6	28	m
Bodega N°7	28	m

La bodega N°1 será más pequeña que las demás para poder disponer de una tapa de escotilla menor que las demás y así poder extender el castillo de proa más a popa para prevenir problemas con el francobordo y ganar cierto margen.

La separación entre Cuadernas en los espacios de carga será de 800 mm por lo que abarcarán de la Cuaderna 53 a la Cuaderna 291.

El número de mamparos transversales mínimo exigidos según el reglamento de la sociedad de clasificación es de 5. Nuestro buque presenta los siguientes mamparos transversales con referencia a la perpendicular de popa:

MAMPAROS TRANSVERSALES		
Pique de popa	10,8	m
Mamparo proa cámara de máquinas	38,8	m
Mamparo proa bodega 7	66,8	m
Mamparo proa bodega 6	94,8	m
Mamparo proa bodega 5	122,8	m
Mamparo proa bodega 4	150,8	m
Mamparo proa bodega 3	178,8	m
Mamparo proa bodega 2	206,8	m
Mamparo proa bodega 1 = pique de proa	229,2	m

6.1.6 Pique de proa

El pique de proa vendrá determinado por la situación del **mamparo de colisión**, cuyo emplazamiento viene definido por la Sociedad de Clasificación. Tomando como referencia el SOLAS Capítulo II-I, Parte B, Reg.11:

Se instalará un mamparo de colisión que será estanco hasta la cubierta de francobordo. Este mamparo estará situado a una distancia de la perpendicular de proa no inferior al 5% de la eslora del buque o a 10m si esta segunda magnitud es menor, dicha distancia no será superior al 8% de la eslora del buque.

Cuando cualquier parte del buque que quede debajo de la flotación se prolongue por delante de la perpendicular de proa, como por ejemplo ocurre con una proa de bulbo, las distancias estipuladas en el párrafo anterior se medirán desde un punto situado a mitad de dicha prolongación; o a una distancia igual al 1.5% de la eslora del buque, por delante de la perpendicular de proa; o a una distancia de 3m por delante de la perpendicular de proa; tomándose de esas medidas la menor.

Lo que coincide con lo especificado por el ABS en la Parte 3, Capítulo 3.1 para el mamparo de colisión, que deberá estar situado entre los siguientes valores.

$$\text{Min}\{0,05 * L_{FL}; 10\} < L_{PPR} < 0,08 * L_{FL}$$

donde: L_{FL} = eslora en la flotación de máxima carga = 250 m

sustituyendo: $\text{Min}\{12,5; 10\} = 10 < L_{PPR} < 20$

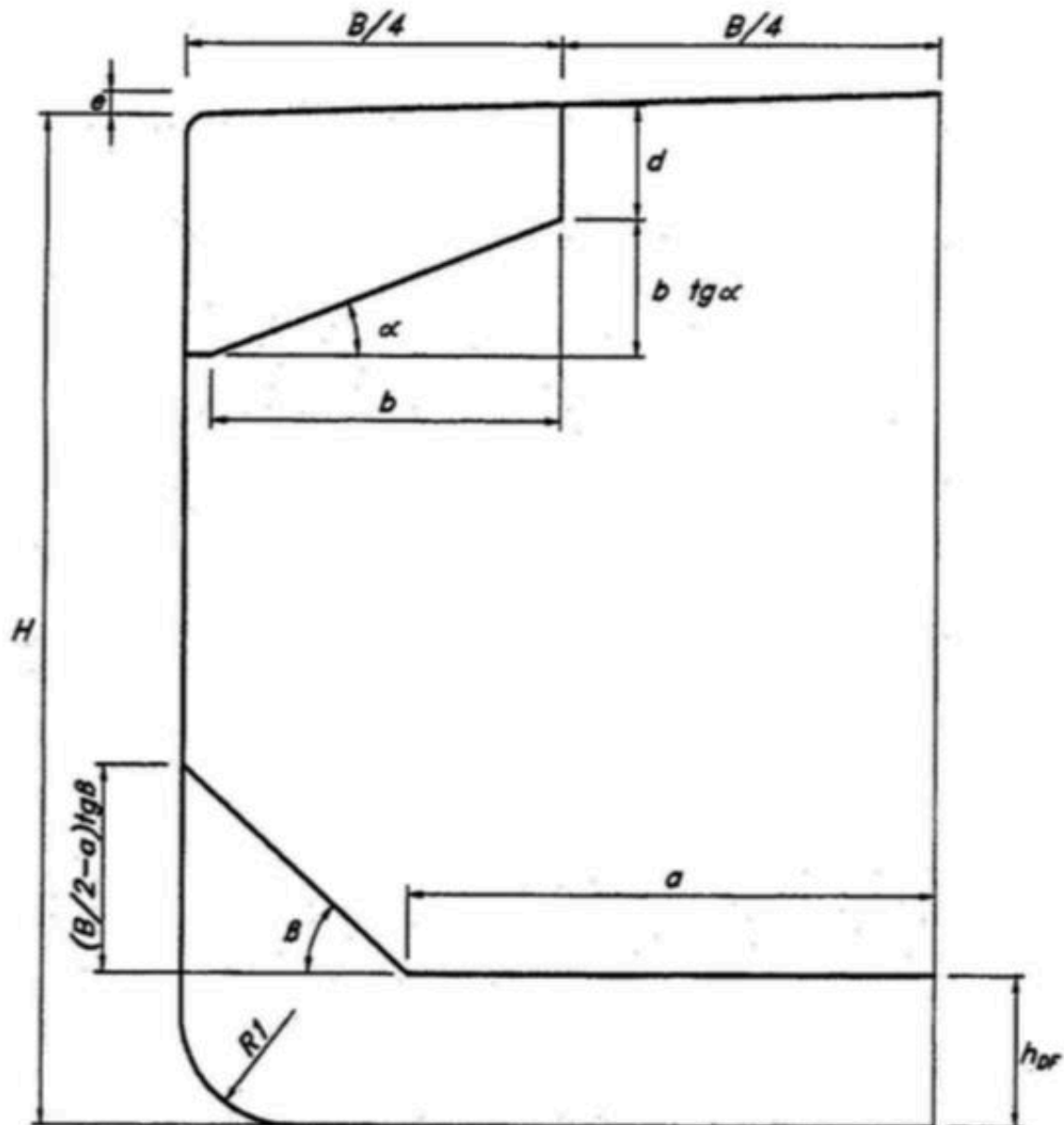
En nuestro caso: $L_{PPR} = 16,3 \text{ m}$

La separación entre Cuadernas en el pique de proa será de 600 mm a excepción de la última Cuaderna de proa que será de 100 mm, abarcará de la Cuaderna 291 a la 319.

6.2 Compartimentado transversal

De manera preliminar, para definir los espacios interiores de las bodegas necesitamos estimar las dimensiones principales de la cuaderna maestra. Para ello debemos definir nuestro doble casco y las dimensiones de las tolvas.

En nuestro caso, para compensar el volumen de bodega perdido debido al doble fondo y al doble casco, decido reducir los ángulos obtenidos para las tolvas. Para esto usaremos como referencia la cuaderna maestra que cita Manuel Arnaldos Martínez en su artículo "Dimensionamiento de Bulkcarriers", que es la siguiente:



Datos conocidos de la maestra:

$$B = 42,4 \text{ m}$$

$$H = 21,55 \text{ m}$$

Se cumplen las siguientes relaciones, teniendo en cuenta que pierdo 4m de manga por el doble casco:

$$\begin{aligned} 0,7 * B \leq 2 * a \leq 0,9 * B & \rightarrow 14,84 \leq a \leq 19,08 \text{ m} \\ 0,16 * B \leq b \leq 0,22 * B & \rightarrow 6,784 \leq b \leq 9,064 \text{ m} \\ d + b * \tan \alpha = 0,25 * H & \rightarrow d + b * \tan \alpha = 5,3875 \end{aligned}$$

Parámetro a:

$$a = \frac{13,44 + 17,28}{2} = 15,36 \approx 15,4 \text{ m}$$

Parámetro e (brusca):

$$e = 0 \text{ m}$$

Parámetro b:

$$b = \frac{6,144 + 8,448}{2} = 7,296 \approx 7,3 \text{ m}$$

Parámetro d:

Le asigno un valor de 1 m y compruebo el valor obtenido para α .

Parámetro α :

$$\alpha = \arctan\left(\frac{5,3875 - d}{b}\right) = \arctan\left(\frac{5,3875 - 1}{8}\right) = 29,91^\circ \approx 30^\circ$$

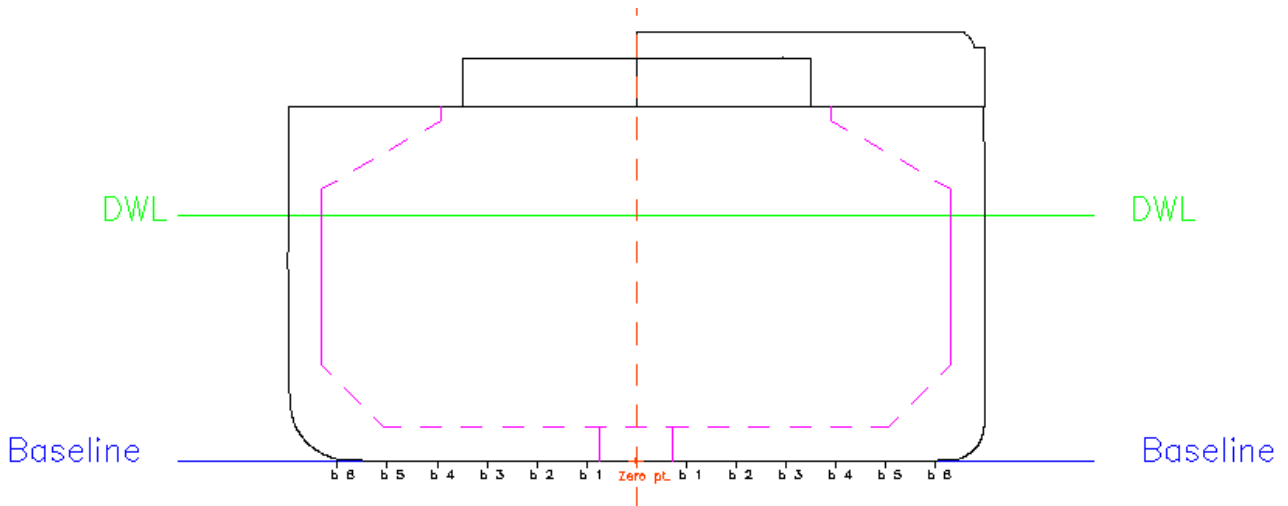
Ahora recalculo d:

Parámetro d:

$$d = 5,3875 - 8 * \tan(30) = 0,77 \approx 0,8 \text{ m}$$

Parámetro β : $\beta = 45^\circ$

Con estos parámetros procedo a dibujar las tolvas sobre la cuaderna maestra que se incluirá en el plano general anexado posteriormente. Como muestra presentamos la siguiente imagen:



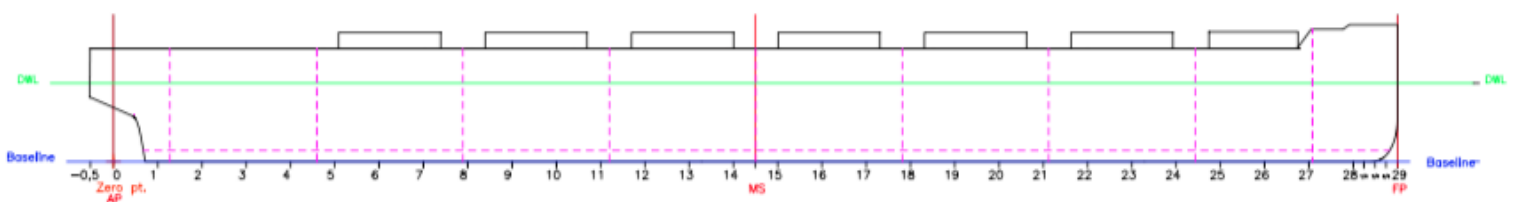
6.2.1 Resumen posición Mamparos y Cuadernas

Como resumen recojo en la siguiente tabla la posición de los distintos mamparos transversales así como la longitud de los diferentes espacios que estos delimitan:

MAMPAROS	P. LONG (m)	ESPACIO	Longitud (m)	CUADERNA
		Pique de popa	15,3	0 - 18
Mpro, Popa CC. MM.	10,8	CC. MM.	28	18 - 53
Mpro, Popa Bodega N°7	38,8	Bodega N°7	28	53 - 88
Mpro, Popa Bodega N°6	66,8	Bodega N°6	28	88 - 123
Mpro, Popa Bodega N°5	94,8	Bodega N°5	28	123 - 158
Mpro, Popa Bodega N°4	122,8	Bodega N°4	28	158 - 193
Mpro, Popa Bodega N°3	150,8	Bodega N°3	28	193 - 228
Mpro, Popa Bodega N°2	178,8	Bodega N°2	28	228 - 263
Mpro, Popa Bodega N°1	206,8	Bodega N°1	22,4	263 - 291
Mpro, Popa Pique Proa	229,2	Pique Proa	16,3	291 - 319
Lpp	245,5			

La posición longitudinal de cada mamparo se encuentra referencia a la perpendicular de popa situada en el eje de la mecha del timón.

Se puede observar la colocación de cada uno en el PLANO GENERAL que figura como **Anexo 2_Plano Tanques**. Como muestra, una captura de imagen del mismo:



6.3 Compartimentado Vertical

6.3.1 Doble Fondo

De acuerdo con lo especificado en el reglamento de la Sociedad de Clasificación (Parte 3, Capítulo 2, Sección 4, Apartado 3.1.1 ABS 2007), la altura mínima exigida se obtiene a partir de la siguiente expresión:

$$H_{minDF} = 32 * B + 190 * T^{\frac{1}{2}} = 2090 \text{ mm}$$

Donde: B = manga (m)

T = calado (m)

La altura del doble fondo en nuestro caso es de 2,1 m.

6.3.2 Túnel de Tuberías

El buque dispondrá de un **túnel central de tuberías cuya semimanga es de 2,2 m** y que se extiende por todo el doble fondo. Este túnel divide simétricamente el doble fondo en espacios destinados a agua de lastre.

6.3.3 Cubierta

Este tipo de buques poseen una sola cubierta y que estará situada a la altura del puntal, es decir, a 21,55 m desde la línea de base.

6.3.4 Castillo

El castillo tendrá una eslora mínima del 7% de L_{pp} y una altura que no debe ser menor a:

1. la altura que cumpla con los requerimientos del Convenio Internacional de Líneas de Carga de 1966 y su protocolo de 1988 (2,7m).
2. $H_c + 0,5$ m donde H_c es la altura de la brazola de escotilla situada más a proa, que en este caso será la brazola de la escotilla N°1, en nuestro caso $H_c = 3$ m.

La altura mínima será la mayor de estas dos.

La altura de nuestro castillo no será menor de 3,5 m ni más corta que 17,15 m desde la perpendicular de proa.

En nuestro Buque Proyecto la altura del castillo será de 3,6 m, como ya hemos considerado para la primera estimación del francobordo en el Cuaderno 1, y **tendrá una longitud de 17,3 m**.

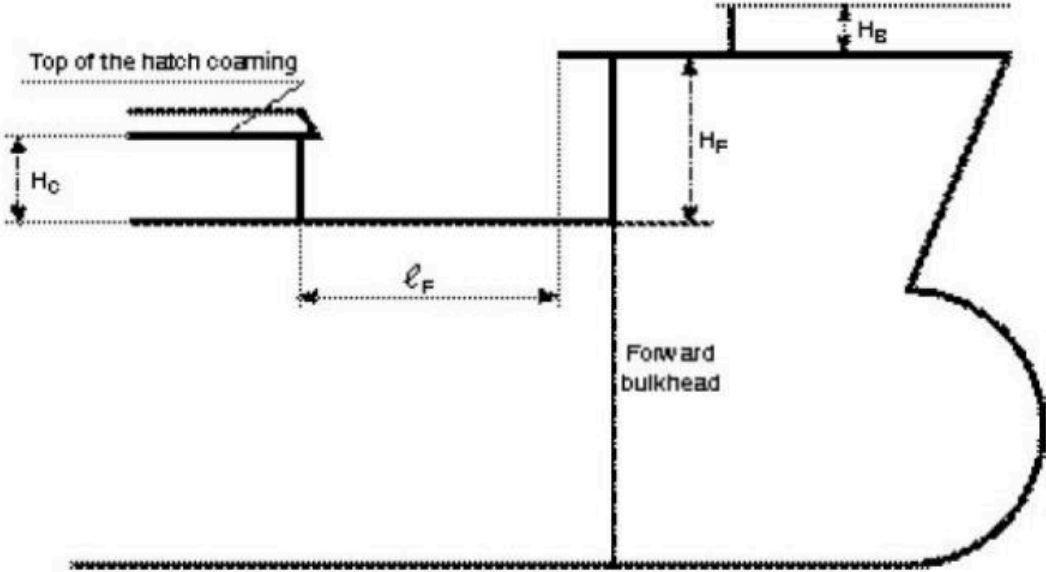
Por otra parte, la localización del extremo del castillo según las sociedades de clasificación ha de estar a una distancia l_F de la escotilla de la bodega N°1:

$$l_F \leq 5 * \sqrt{H_F - H_C}$$

Las definiciones de H_F y H_C se pueden ver en el siguiente gráfico y en nuestro caso tienen los valores de 3,6 m y 3 m respectivamente, sustituyendo:

$$l_F \leq 3,9 \text{ m}$$

En nuestro caso el valor de l_F será de 2,35 m.



7 CAPACIDADES DE TANQUES

A continuación estimaremos la capacidad mínima necesaria en los diferentes tanques para cumplir con el RPA de la autonomía. Como veremos en el siguiente capítulo, en las tablas de capacidades, todas estas capacidades mínimas serán superadas con cierto margen.

7.1 Capacidad Heavy Fuel Oil (HFO)

La autonomía de nuestro buque será de 12.000 millas y la velocidad de servicio de 14 nudos. Por lo tanto el tiempo de navegación será:

$$T_{NAV} = \frac{Autonomía}{Vservicio} = \frac{12000}{14} = 857,14 \text{ horas} = 35,71 \approx 35 \text{ días}$$

El consumo específico de diésel pesado de nuestro motor principal, extraído del catálogo de WinGD será de 163,2 g/kW*h al 85% de su capacidad y a las revoluciones necesarias para impulsar el barco a una velocidad de 14 nudos.

Por lo tanto la cantidad total de HFO a transportar será:

$$Consumo \text{ HFO} = \frac{Autonomía}{Vservicio} * Consumo \left(\frac{g}{kW} * h \right) * Potencia * Régimen$$

$$Consumo \text{ HFO} = \frac{12000}{14} * 163,2 * 21660 * \frac{1}{10^6} * 0,85 = 2575,43 \text{ t}$$

Aplicando una densidad de $\rho = 0,98 \text{ Tn/m}^3$ obtenemos el volumen de fuel necesario, y después le añadimos un 10% de margen ya que las bombas no aspiran bien cuando queda menos del 10% y otros factores:

$$V_{HFO} = \left(\frac{2575,43}{0,98} \right) + 10\% = 2627 * 1,1 = 2890 \text{ m}^3$$

Esta es la capacidad correspondiente a los tanques almacén.

7.1.1 Capacidad de almacenamiento del tanque de uso diario de HFO:

Ahora estimaremos la capacidad de los tanques de uso diario, esta capacidad viene definida por SOLAS como mínimo para cubrir 8 horas de funcionamiento del motor principal, y deberán estar duplicados. Nosotros estimaremos su capacidad para 24 horas de funcionamiento, para ello dividimos la cantidad de combustible total entre los días de funcionamiento del motor para cubrir la autonomía ya fijada:

$$V_{SERV_HFO} = \frac{V_{HFO}}{T_{NAV}} = \frac{2890}{35} = 82,5 \approx 83 \text{ m}^3$$

7.1.2 Capacidad de almacenamiento del tanque de sedimentación de HFO:

Su volumen viene dado por Solas mediante la fórmula:

$$V_{SED_HFO} = \frac{5,7 * MCR}{1000} = \frac{5,7 * 21660}{1000} = 123 \text{ m}^3$$

7.1.3 Capacidad del tanque de reboses de HFO:

Su volumen mínimo de almacenamiento es una estimación correspondiente al volumen de 10 o 15 minutos en tiempo de carga de los tanques de almacenamiento.

Suponiendo una velocidad de carga aproximada de 100 m³/hora el volumen aproximado del tanque de reboses será:

$$V_{REBOSES_HFO} = V_{llenado} \left(\frac{\text{m}^3}{\text{min}} \right) * \text{Tiempo (min)} = 1,67 * 10 \approx 17 \text{ m}^3$$

7.2 Capacidad de Diesel Oil (DO)

El diésel será empleado en los motores para la generación de la planta eléctrica. En esta fase del proyecto el balance eléctrico es preliminar y puede sufrir modificaciones, por lo que tomaremos la estimación realizada en el cuaderno 2, ya con la información de consumo específico de los generadores auxiliares duales.

Tomaremos una densidad del diésel $\rho = 0,87 \text{ Tn/m}^3$

$$\text{Consumo DO} = \frac{\text{Autonomía}}{V_{servicio}} * \text{Consumo} \left(\frac{\text{g}}{\text{kW}} * \text{h} \right) * \text{Potencia} * \text{Régimen}$$

$$\text{Consumo DO} = \frac{12000}{14} * 182 * 1900 * \frac{1}{10^6} * 0,85 = 251,92 \text{ t}$$

$$V_{DO} = \left(\frac{251,92}{0,87} \right) + 10\% = 288,5 * 1,1 = 317,3 \approx 317 \text{ m}^3$$

7.2.1 Capacidad de almacenamiento del tanque de uso diario de DO:

Igual que en el caso del HFO, la capacidad de los tanques de uso diario de Diesel Oil viene definida por SOLAS y deberán estar duplicados también.

$$V_{SERV_DO} = \frac{V_{DO}}{T_{NAV}} = \frac{317}{35} = 9,05 \approx 9 \text{ m}^3$$

7.2.2 Capacidad de almacenamiento del tanque de sedimentación de DO:

Se dimensiona el tanque de sedimentación para un mínimo de dos días de funcionamiento del motor:

$$V_{SED_DO} = 9,05 * 2 = 18,1 \approx 18 \text{ m}^3$$

7.2.3 Capacidad de almacenamiento del tanque de reboses de DO:

Se estima de la misma forma que el tanque de reboses de HFO, pero suponiendo una velocidad de llenado del tanque de almacenamiento de DO acorde a la capacidad del mismo

(mucho mas pequeña). En este caso podemos suponer una velocidad de llenado de 20 m³/h.

$$V_{REBOSES_DO} = V_{llenado} \left(\frac{m^3}{min} \right) * Tiempo (min) = 0,33 * 10 \approx 3 m^3$$

7.3 Capacidad de Gas Natural Licuado (GNL)

El consumo de GNL en principio se limitará a las estancias en puerto, pese a poder emplearse también en navegación al entrar en alguna zona con limitación de emisiones contaminantes, pero como esto resulta difícil de predecir, y además la calificación de estas zonas variará con el tiempo, supondremos que se usará solo en puerto.

Para decidir el emplazamiento del tanque almacén de GNL nos hemos basado en el "IGF CODE", que en su parte A-1, apartado 5.2 Functional requirements establece:

“.1 the fuel tank(s) shall be located in such a way that the probability for the tank(s) to be damaged following a collision or grounding is reduced to a minimum taking into account the safe operation of the ship and other hazards that may be relevant to the ship;

.2 fuel containment systems, fuel piping and other fuel sources of release shall be so located and arranged that released gas is lead to a safe location in the open air”

Teniendo en cuenta esto hemos decidido situar el tanque almacén de GNL a centrado a popa de la habitación del buque, y estamos limitados en manga por la regla:

“The fuel tanks shall be located at a minimum distance of B/5 or 11.5 m, whichever is less, measured inboard from the ship side at right angles to the centreline at the level of the summer load line draught;

where:

B is the greatest moulded breadth of the ship at or below the deepest draught (summer load line draught) (refer to SOLAS regulation II-1/2.8).”

De modo que nuestro tanque no podrá tener un ancho superior a:

$$42,4 - 2 * (B/5)$$

Puesto que MAN no facilita el consumo exacto de los Generadores Duales, más allá de una estimación de consumo de GNL de 182 g/kW*h, tomaremos ese dato.

Teniendo en cuenta que para descargar el barco empleará normalmente 4 días, y 3 para cargar con 1 día de margen por posibles malas situaciones de la mar o similares, la estancia media en puerto será de 8 días. Y supondremos que el buque podrá repostar GNL en 1 de cada 3 puertos entre los que opere.

La potencia de la planta de generación auxiliar empleada en puerto será de 1900 kW porque emplearemos 2 de los 3 generadores duales auxiliares y cada uno tendrá una potencia de 950 kW.

Tomaremos una densidad para el GNL de $\rho = 0,45 \text{ Tn/m}^3$

$$\text{Consumo GNL} = \text{horas funcionamiento} * \text{Consumo} \left(\frac{g}{kW} * h \right) * \text{Potencia} * \text{Régimen}$$

$$\text{Consumo GNL} = 3 * 8 * 24 * 182 * 1900 * \frac{1}{10^6} * 0,85 = 169,30 \text{ Tn}$$

$$V_{GNL} = \left(\frac{169,3}{0,45} \right) + 5\% = 375 * 1,05 = 394,3 \approx 394 \text{ m}^3$$

7.4 Capacidad de aceite

Mantenemos la estimación del cuaderno 2 que establecía que el consumo de aceite se estimaba en el 3% del consumo total de combustibles (HFO, DO, GNL...)

Su densidad se toma como $\rho = 0,90 \text{ Tn/m}^3$

$$\text{Consumo ACEITE} = 0,03 * (2627 + 288) = 87,45 \text{ Tn}$$

$$V_{ACEITE} = \frac{87,45}{0,9} = 97,16 \approx 97 \text{ m}^3$$

7.5 Capacidad del Tanque de Lodos

Estimaremos su capacidad basándonos en el MARPOL, el cual en su regla 17.1, apartado 4 (el aplicable a nuestro caso) establece:

“Respecto de los buques que no lleven agua de lastre en los tanques de fueloil, la capacidad mínima del tanque de fangos (V1) se calculará mediante la fórmula siguiente:

$$V1 = K1 * C * D \text{ (m}^3\text{)}$$

Siendo:

K1 = 0,015 para los buques en los que se purifique el fueloil pesado destinado a la máquina principal, o bien 0,005 para los buques en que se utilice aceite diesel o fueloil pesado que no haya de ser purificado antes de su uso,

C = consumo diario del fueloil (m3)

D = duración máxima ,en días, del viaje entre puertos en los que los fangos pueden descargarse en tierra. A falta de datos precisos, se utilizará la cifra de 30 días.”

$$V_{Lodos} = K1 * C * D = 0,005 * 83 * 35 = 14,52 \approx 16 \text{ m}^3$$

7.6 Capacidad de agua dulce

El agua dulce que consumirá la tripulación se estimará mediante la relación:

$$\text{Consumo agua dulce} = 100 \text{ litros} * \text{tripulación} * \frac{\text{autonomía}}{\text{velocidad} * \text{horas}}$$

$$\text{Consumo agua dulce} = 100 * 30 * \frac{12000}{14 * 24} = 107142 \text{ litros} \approx 110 \text{ m}^3$$

7.6.1 Capacidad de agua dulce técnica

Para los distintos equipos instalados a bordo es necesario emplear agua dulce. Para este cometido estimaremos un tanque de 80 m^3 como suficiente para cubrir las necesidades del buque durante la navegación.

7.7 Capacidad de tanque de aguas grises y negras

Para el cálculo de aguas grises y negras se aplica la norma UNE-EN-ISO15749-1 de 2005.

Cuando se diseña una planta hay que considerar las cantidades mínimas de agua de desecho de acuerdo con la tabla 2 de la citada normativa.

Tabla 2
Cantidad mínima de agua de desecho

Tipo de buque	Cantidad mínima de agua de desecho por persona y día en litros			
	Planta sin vacío		Planta con vacío	
	Aguas negras	Aguas negras y grises	Aguas negras	Aguas negras y grises
Buques de pasaje	70	230	25	185
Buques de alta mar exceptuando los de pasaje	70	180	25	135
Los buques costeros pueden conservar los valores recomendados por las autoridades responsables.				
NOTA – Estos valores son los recomendados. Hay que considerar las posibles variaciones debidas a los reglamentos nacionales o a las recomendaciones de las sociedades de clasificación.				

Considerando que el sistema es una planta con vacío la producción total será:

$$V_{GENERADO} = 25 + 135 = 160 \text{ litros/Persona día}$$

$$V_{AGUAS\ GRIS\ Y\ NEGRAS} = V_{GENERADO} * TRIPULACION * T_{NAV}$$

$$V_{AGUAS\ GRIS\ Y\ NEGRAS} = 160 \left(\frac{l}{pers\ día} \right) * 30 * 35 = 168000 \text{ litros} \approx 168 \text{ m}^3$$

De todas formas es importante tener en cuenta que fuera de puerto y zonas restringidas es posible vaciar las aguas grises al mar, o en caso de contar con una planta de tratamiento de aguas grises este volumen podría reducirse hasta poder albergar el volumen generado en 4-5 días de navegación.

7.8 Capacidad de agua de lastre

El lastre necesario lo marcará el calado mínimo necesario para una navegación satisfactoria, esto se considera cuando el diámetro del propulsor se encuentra sumergido al menos al 96% en condiciones estáticas.

Nuestro calado mínimo será en torno a 9,5 m, para determinar el desplazamiento que correspondiente a este calado nos apoyamos en las tablas hidrostáticas para calado 0, concretamente en el siguiente calado mayor a 9,5 m. Ese calado será 9,67 m y le corresponderá un desplazamiento de 89.800.

Teniendo en cuenta que el rosca de nuestro barco es de 22644 necesitaré un 67256 Tn de lastre, es decir, 70.000 Tn de agua de mar aproximadamente.

Trimado 0	
Draft Amidships m	9,673
Displacement t	89800
Heel deg	0
Draft at FP m	9,673
Draft at AP m	9,673
Draft at LCF m	9,673
Trim (+ve by stern) m	0
WL Length m	244,142
Beam max extents on WL m	42,402
Wetted Area m ²	13165,525
Waterpl. Area m ²	9622,791
Prismatic coeff. (Cp)	0,88
Block coeff. (Cb)	0,875
Max Sect. area coeff. (Cm)	0,994
Waterpl. area coeff. (Cwp)	0,93
LCB from zero pt. (+ve fwd) m	131,25
LCF from zero pt. (+ve fwd) m	127,383
KB m	4,977
KG m	14,9
BMt m	15,466
BML m	479,511
GMt m	5,543
GML m	469,588
KMt m	20,443
KML m	484,488
Immersion (TPc) tonne/cm	98,634
MTc tonne.m	1717,668
RM at 1deg = GMt.Disp.sin(1) tonne	8687,107
Max deck inclination deg	0
Trim angle (+ve by stern) deg	0

$$M_{LASTRE}(Tn) = \Delta - P_{ROSCA}$$

$$M_{LASTRE}(Tn) = 89900 - 22644$$

$$M_{LASTRE}(Tn) = 67\ 256\ Tn$$

Aplicandole una densidad de 1,025 T/m³

$$V_{AGUA\ LASTRE} = \frac{67\ 256}{1,025} = 65615\ m^3$$

$$V_{AGUA\ LASTRE}(m^3) = 65615\ m^3$$

Este volumen de lastre lo obtenemos de sobra

empleando la bodega 4 (inundable) para lastrar,

y la Bodega 2 y 6 (parcialmente inundables) para lastrarlas aproximadamente al 15-20% de su capacidad. Esto requerirá una futura corrección por superficies libres que se realizará en el Cuaderno 5.

7.9 Capacidades finales tanques

En la siguiente tabla se recoge el volumen final de cada tanque, así como de cada una de las bodegas de carga, pudiendo comprobar la situación de los mismos en el **Anexo 2_Plano Tanques**.

TANQUES Y CAPACIDADES	
NOMBRE	CAPACIDAD (m ³)
B7 CARGA	20332
DOBLE FONDO 7 LASTRE ER-BR	2116
DOBLE CASCO 7 LASTRE ER-BR	1276
TOLVA SUPERIOR 7 LASTRE ER-BR	1780
B6,B5,B4,B3,B2 CARGA	103700
DOBLE FONDO 6,5,4,3,2 LASTRE ER-BR	14530
DOBLE CASCO 6,5,4,3,2 LASTRE ER-BR	5930
TOLVA SUPERIOR 6,5,4,3,2 LASTRE ER-BR	8750
B1 CARGA	16131
DOBLE FONDO 2 LASTRE ER-BR	2232
DOBLE CASCO 2 LASTRE ER-BR	946
TOLVA SUPERIOR 2 LASTRE ER-BR	1924
Tk PIQUE PROA	4485
Tk PIQUE POPA	1370
Tk N1 HFO ALMACEN ER	950
Tk N1 HFO ALMACEN BR	950
Tk N2 HFO ALMACEN ER	690
Tk N3 HFO ALMACEN BR	350
Tk HFO SED ER	130
Tk HFO SERV N1 ER	97
Tk HFO SERV N2 ER	97
Tk HFO REBOSES	23
Tk DO ALMACEN BR	335
Tk DO SED BR	30
Tk DO SERV 1 BR	16
Tk DO SERV 2 BR	16
Tk DO REBOSES	5
Tk LODOS	27
Tk GNL ALMACEN	409
Tk LUBE OIL ALMACEN ER	100
Tk AGUA DULCE ALMACEN ER	35
Tk AGUA DULCE ALMACEN BR	120
Tk AGUA TECNICA ER	85
Tk AGUAS GRISES	195

Estos volúmenes de cada tanque se han obtenido una vez definidos y conformados todos los tanques y tras realizar la “calibración” de los mismos, también con el software maxsurf, obteniendo así sus capacidades y diversos datos relativos a las superficies libres con distintos llenados del mismo.

Todo esto se adjunta en **Anexo 3_Tank Calibration** debido a su gran extensión.

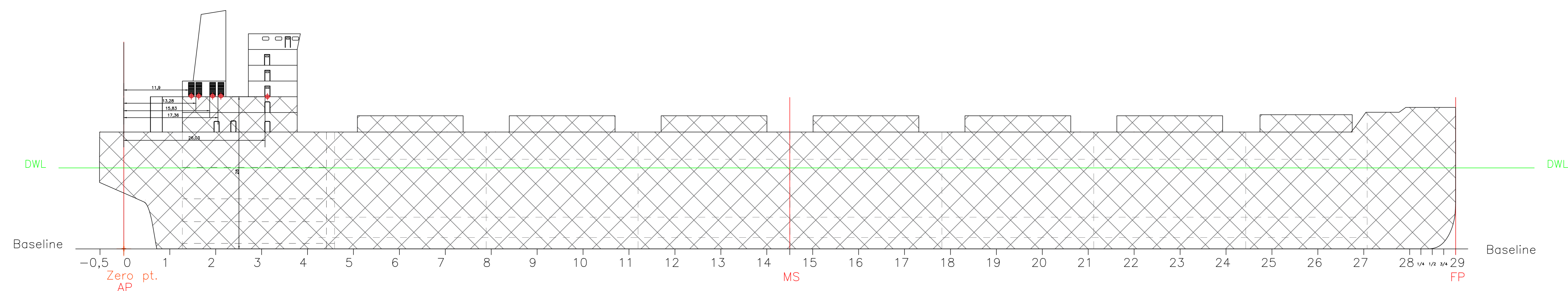
A modo de resumen se adjunta una tabla donde se recogen los volúmenes finales de cada servicio en comparación con los volúmenes mínimos necesarios calculados con anterioridad:

RESUMEN			
Servicio	V Mínimo (m ³)	V Real (m ³)	Margen
HFO almacen	2890	2940	50
HFO sed	123	130	7
HFO serv	81	97	16
HFO Reboses	17	23	6
DO almacen	317	335	18
DO sed	18	30	12
DO serv	9	16	7
DO Reboses	3	5	2
GNL almacen	394	409	15
Lube Oil	80	100	20
LODOS	16	27	11
Agua Dulce	110	155	45
Agua Técnica	80	85	5
Aguas Grises	168	195	27
Lastre	65700	86819	21119

Como podemos observar los márgenes son aceptables en todos los casos, se ajustan bastante al mínimo requerido a excepción del agua dulce que tiene cierto margen debido al beneficio estructural de hacer sus tanques de esas dimensiones.

Cabe destacar que el margen del lastre se debe a que habrá 2 bodegas parcialmente inundables (B2 y B6 inundables un 25%) y una tercera inundable por completo (B4) a mayores de todos los tanques de lastre. Esto significa que habrá capacidad de sobra para albergar el lastre necesario, estimado anteriormente en torno a los 65.000 m³.

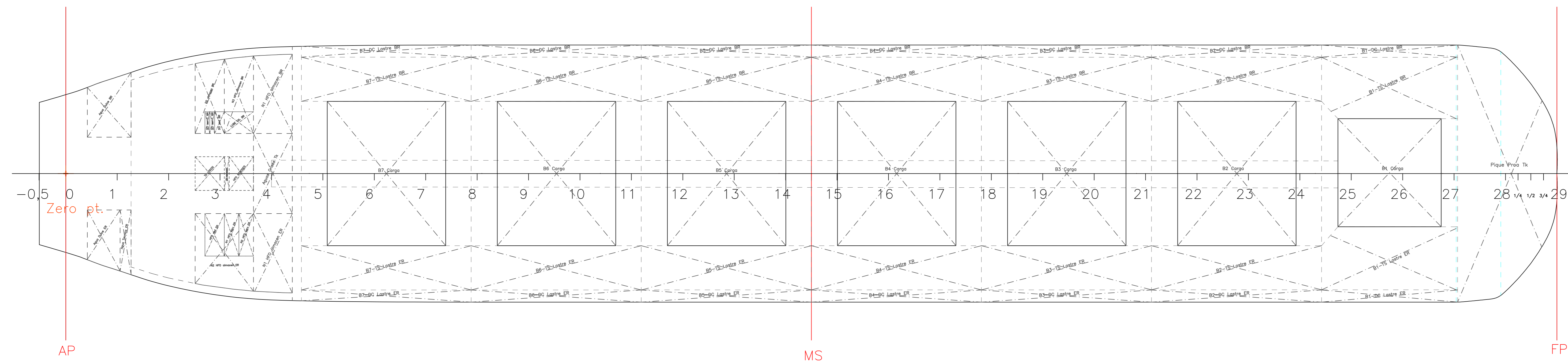
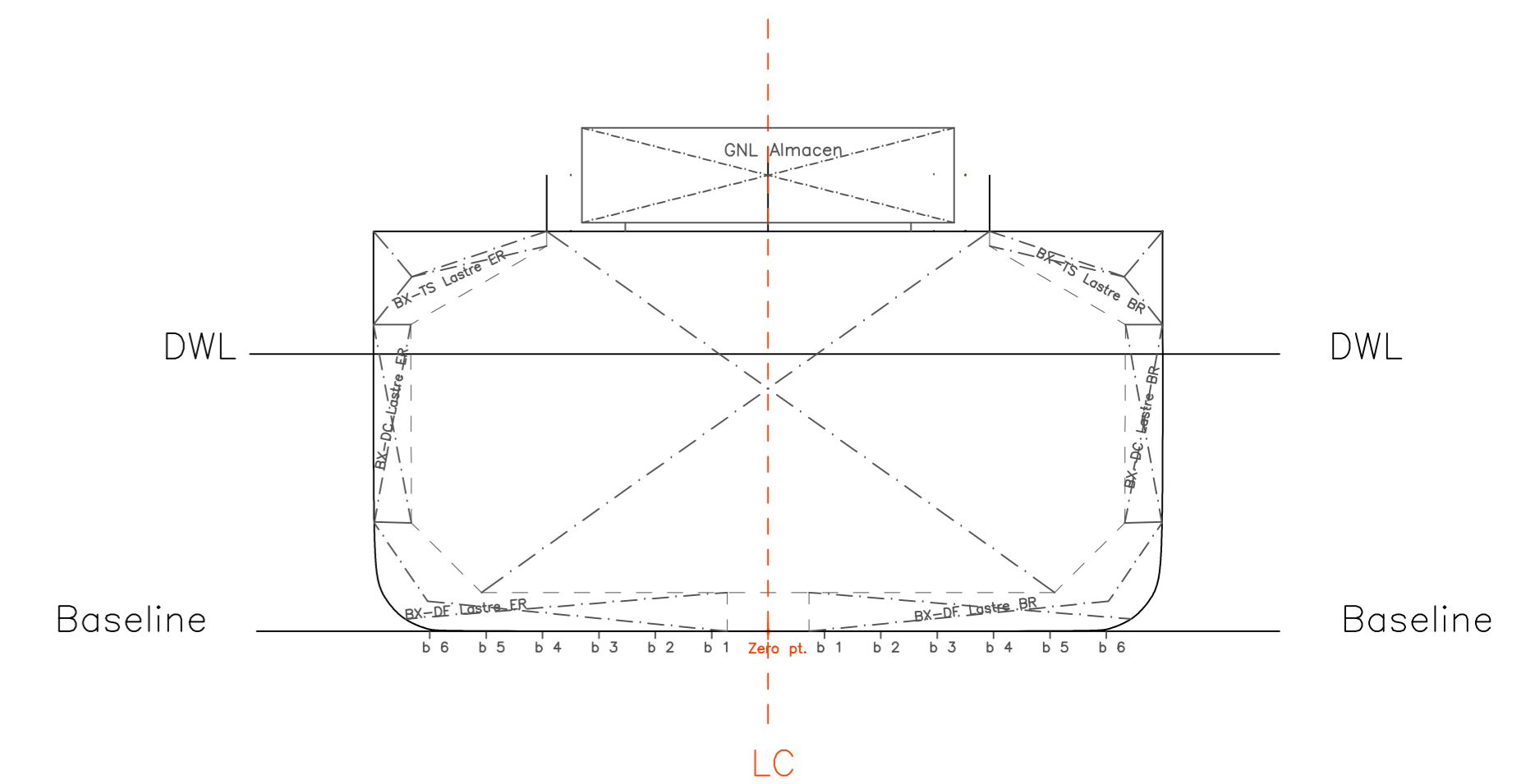
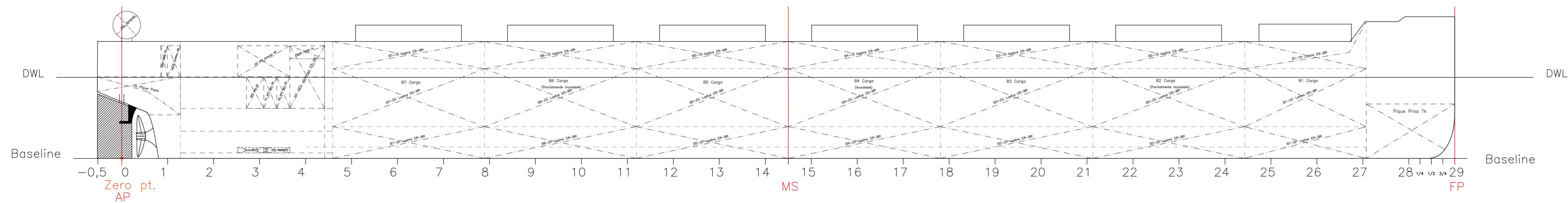
8 ANEXO 1_PLANO ZONA ESTANCA



DIMENSIONES PRINCIPALES	
Eslora total (LOA)	250 m
Eslora entre Perpendiculares (Lpp)	245,5 m
Manga (B)	42,4 m
Puntal (D)	21,55 m
Calado (T)	14,9 m
Peso Muerto	120.000 T.P.M

Alumno		Diego Carral Amenedo			
		BULKCARRIER NEOPANAMAX 120.000 TPM			
		TITULO DEL PLANO ZONA ESTANCA Y PIP			
PROYECTO N° 18-12		FECHA	JULIO 2018	FORMATO	A3
		ESCALA	1/1000	HOJA	1/1

9 ANEXO 2_PLANO TANQUES



DIMENSIONES PRINCIPALES	
Eslora total (LOA)	250 m
Eslora entre Perpendiculares (Lpp)	245,5 m
Manga (B)	42,4 m
Puntal (D)	21,55 m
Calado (T)	14,9 m
Peso Muerto	120.000 T.P.M

Alumno	Diego Carral Amedo			
	BULKCARRIER NEOPANAMAX 120.000 TPM			
	TITULO DEL PLANO DISPOSICIÓN TANQUES			
PROYECTO N° 18-12	FECHA	JULIO 2018	FORMATO	A2
	ESCALA	1/500	HOJA	1/1

10 ANEXO 3_TANK CALIBRATION

Tank Calibrations - Proyecto Bulkcarrier Diego Carral_V2

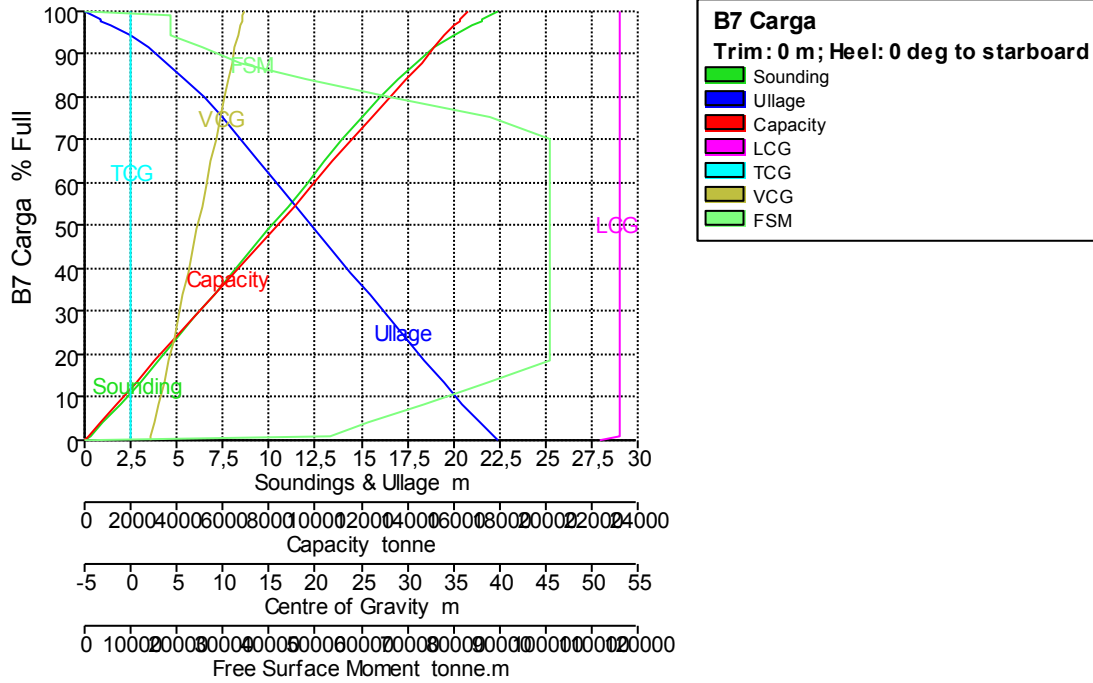
Stability 21.02.00.05, build: 05

Tank Calibrations - B7 Carga

Fluid Type = HOMOGEN Specific gravity = 0,817

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

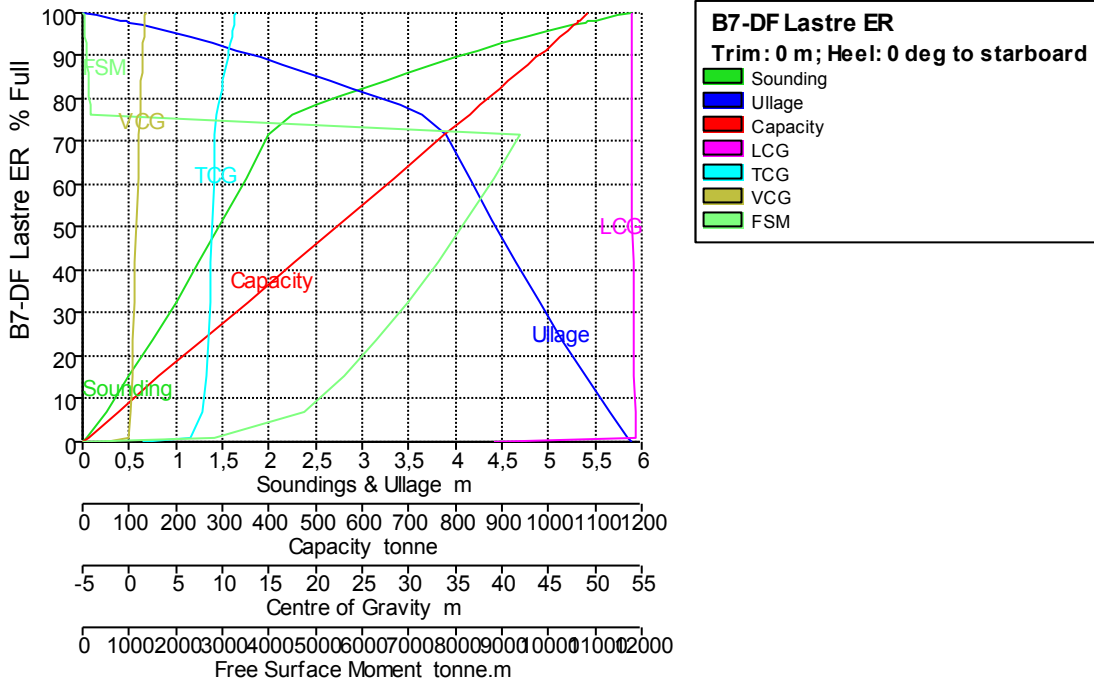


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B7 Carga	22,456	0,000	100,000	20315,255	16597,563	53,001	0,000	12,326	0,000
	22,000	0,456	98,927	20097,243	16419,447	53,004	0,000	12,197	18441,556
	21,606	0,850	98,000	19908,950	16265,613	53,006	0,000	12,087	18441,556
	21,564	0,892	97,900	19888,635	16249,015	53,006	0,000	12,075	18441,556
	21,000	1,456	96,573	19619,050	16028,764	53,010	0,000	11,921	18441,556
	20,000	2,456	94,219	19140,857	15638,080	53,017	0,000	11,656	18441,556
	19,000	3,456	91,397	18567,455	15169,611	53,024	0,000	11,352	25699,341
	18,000	4,456	88,005	17878,410	14606,661	53,032	0,000	10,998	33871,340
	17,000	5,456	84,185	17102,363	13972,630	53,038	0,000	10,611	48194,406
	16,000	6,456	79,917	16235,381	13264,307	53,043	0,000	10,188	66099,993
	15,000	7,456	75,202	15277,465	12481,689	53,046	0,000	9,727	87990,007
	14,000	8,456	70,093	14239,588	11633,744	53,046	0,000	9,230	100783,890
	13,000	9,456	64,926	13189,945	10776,185	53,047	0,000	8,728	100783,890
	12,000	10,456	59,760	12140,302	9918,626	53,047	0,000	8,225	100783,890
	11,000	11,456	54,593	11090,658	9061,068	53,048	0,000	7,721	100783,890
	10,000	12,456	49,426	10041,015	8203,509	53,049	0,000	7,217	100783,890
	9,000	13,456	44,259	8991,372	7345,951	53,050	0,000	6,712	100783,890
	8,000	14,456	39,092	7941,728	6488,392	53,052	0,000	6,206	100783,890
	7,000	15,456	33,926	6892,085	5630,833	53,053	0,000	5,697	100783,890
	6,000	16,456	28,759	5842,441	4773,275	53,056	0,000	5,186	100783,890
	5,000	17,456	23,592	4792,798	3915,716	53,059	0,000	4,669	100783,890
	4,000	18,456	18,425	3743,155	3058,157	53,065	0,000	4,144	100783,890
	3,000	19,456	13,360	2714,126	2217,441	53,072	0,000	3,611	87572,293
	2,000	20,456	8,569	1740,790	1422,226	53,077	0,000	3,086	73665,365
	1,000	21,456	4,055	823,733	672,990	53,073	0,000	2,571	61317,510

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,286	22,170	1,000	203,152	165,975	52,988	0,000	2,209	53400,734
	0,000	22,456	0,000	0,000	0,000	50,857	0,000	2,044	0,000

Tank Calibrations - B7-DF Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

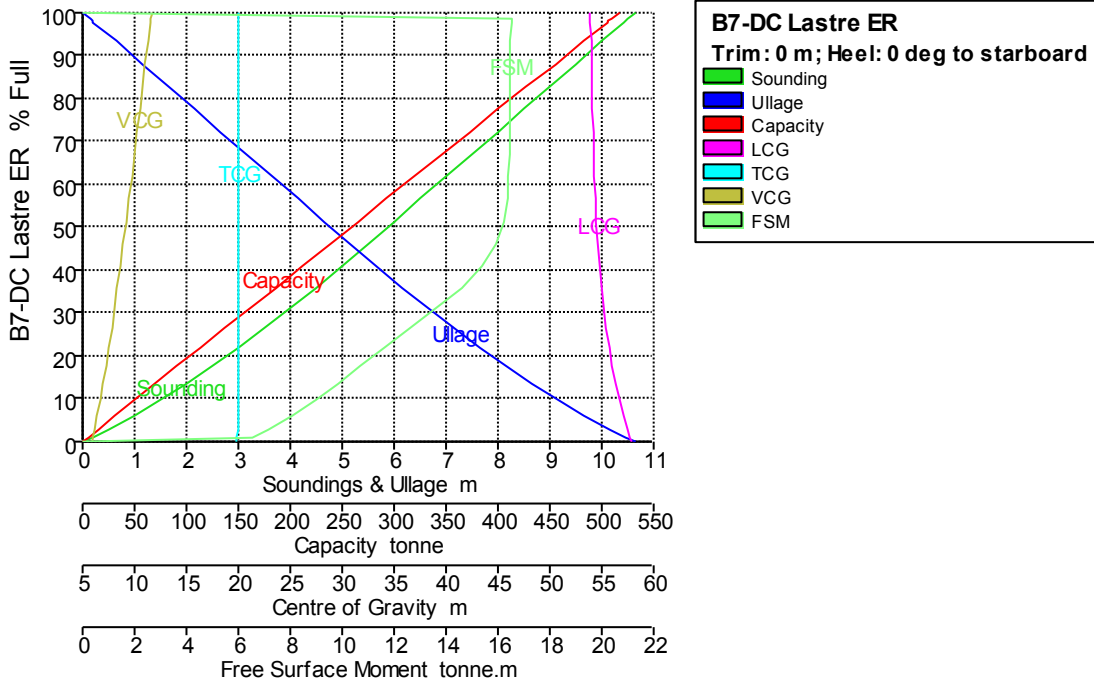


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B7-DF Lastre ER	5,900	0,000	100,000	1059,377	1085,861	53,998	11,421	1,774	0,000
	5,750	0,150	99,419	1053,219	1079,549	54,001	11,374	1,750	29,872
	5,500	0,400	98,354	1041,939	1067,988	54,005	11,288	1,708	36,677
	5,422	0,477	98,000	1038,189	1064,144	54,006	11,259	1,694	39,007
	5,401	0,499	97,900	1037,130	1063,058	54,007	11,251	1,691	39,672
	5,250	0,650	97,173	1029,432	1055,167	54,009	11,192	1,663	44,582
	5,000	0,900	95,877	1015,699	1041,092	54,012	11,087	1,617	53,550
	4,750	1,150	94,476	1000,852	1025,873	54,014	10,972	1,568	62,765
	4,500	1,400	92,976	984,970	1009,595	54,015	10,847	1,519	73,041
	4,250	1,650	91,380	968,057	992,259	54,015	10,713	1,469	84,489
	4,000	1,900	89,694	950,197	973,951	54,013	10,570	1,419	95,747
	3,750	2,150	87,934	931,557	954,846	54,009	10,418	1,370	107,102
	3,500	2,400	86,104	912,165	934,970	54,003	10,257	1,322	119,036
	3,250	2,650	84,221	892,218	914,524	53,994	10,089	1,276	129,181
	3,000	2,900	82,297	871,836	893,632	53,981	9,914	1,233	139,117
	2,750	3,150	80,351	851,223	872,503	53,964	9,733	1,193	146,483
	2,500	3,400	78,399	830,536	851,299	53,941	9,548	1,158	152,310
	2,250	3,650	76,457	809,963	830,212	53,913	9,360	1,127	155,975
	2,000	3,900	71,541	757,884	776,831	53,895	9,188	1,061	9381,655
	1,750	4,150	61,423	650,702	666,970	53,941	9,065	0,927	8827,533
	1,500	4,400	51,552	546,133	559,786	53,991	8,933	0,794	8239,081
	1,250	4,650	41,955	444,460	455,572	54,045	8,788	0,660	7626,434

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	1,000	4,900	32,660	345,990	354,639	54,103	8,628	0,528	6990,256
	0,750	5,150	23,701	251,079	257,356	54,166	8,443	0,396	6321,321
	0,500	5,400	15,121	160,191	164,195	54,236	8,214	0,265	5593,962
	0,250	5,650	6,992	74,072	75,924	54,323	7,848	0,135	4764,558
	0,050	5,850	1,000	10,594	10,859	54,377	6,525	0,029	2844,999
	0,000	5,900	0,000	0,000	0,000	39,052	1,493	-2,520	0,000

Tank Calibrations - B7-DC Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B7-DC Lastre ER	10,635	0,000	100,000	504,099	516,702	53,897	20,092	11,640	0,000
	10,500	0,135	98,574	496,913	509,336	53,907	20,092	11,570	16,540
	10,445	0,190	98,000	494,017	506,368	53,911	20,091	11,542	16,536
	10,436	0,199	97,900	493,513	505,851	53,912	20,091	11,537	16,535
	10,000	0,635	93,314	470,395	482,154	53,947	20,088	11,312	16,499
	9,500	1,135	88,059	443,906	455,004	53,991	20,085	11,053	16,467
	9,000	1,635	82,809	417,437	427,873	54,039	20,081	10,793	16,456
	8,500	2,135	77,561	390,984	400,758	54,094	20,076	10,532	16,445
	8,000	2,635	72,316	364,545	373,658	54,155	20,071	10,270	16,435
	7,500	3,135	67,074	338,121	346,574	54,225	20,065	10,005	16,423
	7,000	3,635	61,837	311,720	319,513	54,306	20,058	9,739	16,402
	6,500	4,135	56,606	285,352	292,486	54,400	20,050	9,470	16,352
	6,000	4,635	51,390	259,057	265,533	54,510	20,040	9,198	16,206
	5,500	5,135	46,203	232,907	238,730	54,641	20,029	8,923	15,920
	5,000	5,635	41,069	207,031	212,207	54,795	20,017	8,644	15,383
	4,500	6,135	36,026	181,607	186,147	54,977	20,003	8,363	14,606
	4,000	6,635	31,115	156,848	160,770	55,188	19,988	8,081	13,642
	3,500	7,135	26,372	132,942	136,266	55,428	19,973	7,798	12,614

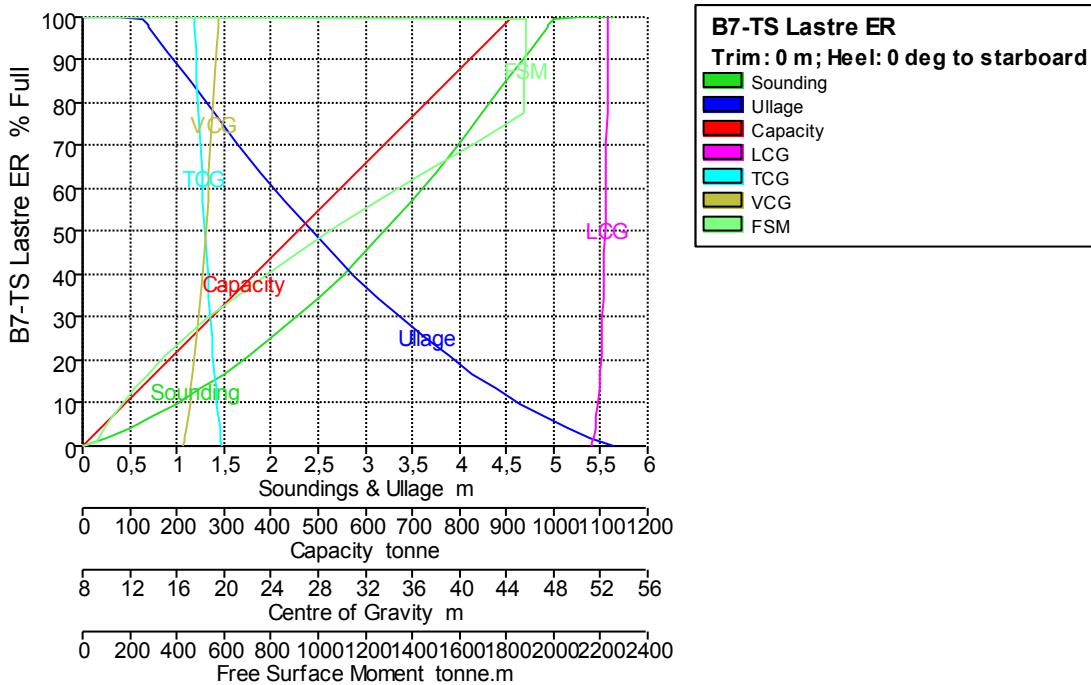
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	3,000	7,635	21,831	110,052	112,803	55,699	19,959	7,517	11,627
	2,500	8,135	17,515	88,291	90,498	56,000	19,946	7,237	10,715
	2,000	8,635	13,444	67,772	69,466	56,337	19,934	6,959	9,832
	1,500	9,135	9,641	48,600	49,815	56,705	19,924	6,685	9,030
	1,000	9,635	6,124	30,870	31,642	57,102	19,914	6,416	8,061
	0,500	10,135	2,916	14,700	15,068	57,491	19,907	6,154	7,141
	0,177	10,458	1,000	5,041	5,167	57,730	19,896	5,985	6,575
	0,000	10,635	0,000	0,000	0,000	57,883	19,880	5,900	0,000

Tank Calibrations - B7-TS Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

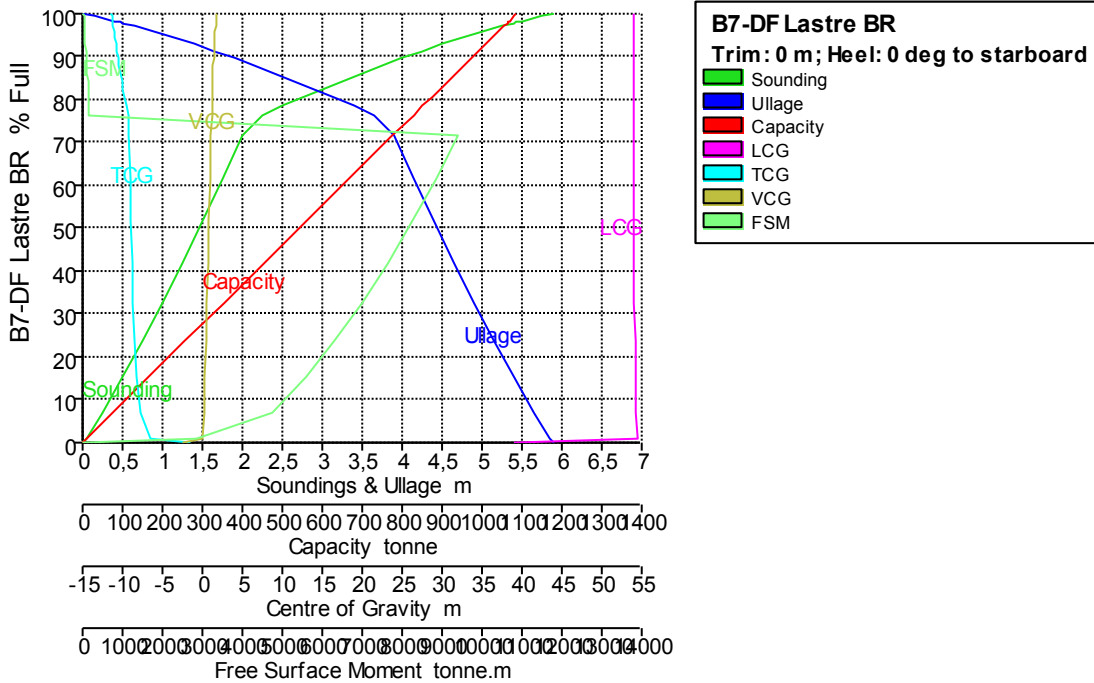


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B7-TS Lastre ER	5,642	0,000	100,000	889,367	911,601	52,600	17,552	19,545	0,000
	5,500	0,142	100,000	889,367	911,601	52,600	17,552	19,545	0,000
	5,250	0,392	100,000	889,367	911,601	52,600	17,552	19,545	0,000
	5,000	0,642	99,576	885,595	907,735	52,599	17,556	19,537	1879,876
	4,946	0,696	98,000	871,580	893,369	52,595	17,573	19,505	1879,636
	4,942	0,700	97,900	870,690	892,458	52,595	17,574	19,503	1879,621
	4,750	0,892	92,314	821,007	841,532	52,579	17,638	19,390	1878,772
	4,500	1,142	85,053	756,432	775,343	52,556	17,734	19,238	1877,670
	4,250	1,392	77,794	691,870	709,167	52,528	17,848	19,082	1876,570
	4,000	1,642	70,653	628,368	644,078	52,495	17,976	18,923	1670,946
	3,750	1,892	63,831	567,693	581,885	52,460	18,103	18,764	1451,536
	3,500	2,142	57,330	509,872	522,618	52,423	18,230	18,605	1252,624
	3,250	2,392	51,149	454,905	466,278	52,382	18,356	18,447	1073,189
	3,000	2,642	45,290	402,794	412,863	52,338	18,481	18,290	912,208
	2,750	2,892	39,751	353,537	362,375	52,290	18,605	18,134	768,661
	2,500	3,142	34,534	307,134	314,813	52,237	18,728	17,979	641,526

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	2,250	3,392	29,638	263,587	270,177	52,180	18,849	17,825	529,780
	2,000	3,642	25,062	222,894	228,467	52,116	18,970	17,672	432,401
	1,750	3,892	20,808	185,056	189,682	52,045	19,088	17,520	348,368
	1,500	4,142	16,874	150,071	153,823	51,967	19,205	17,371	276,750
	1,250	4,392	13,261	117,936	120,884	51,879	19,319	17,223	216,423
	1,000	4,642	9,968	88,650	90,866	51,779	19,431	17,078	166,335
	0,750	4,892	6,995	62,213	63,768	51,666	19,539	16,936	125,464
	0,500	5,142	4,343	38,626	39,592	51,536	19,643	16,798	92,787
	0,250	5,392	2,011	17,888	18,335	51,385	19,741	16,664	67,276
	0,129	5,513	1,000	8,894	9,116	51,303	19,787	16,601	57,215
	0,000	5,642	0,000	0,000	0,000	51,208	19,834	16,535	0,000

Tank Calibrations - B7-DF Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

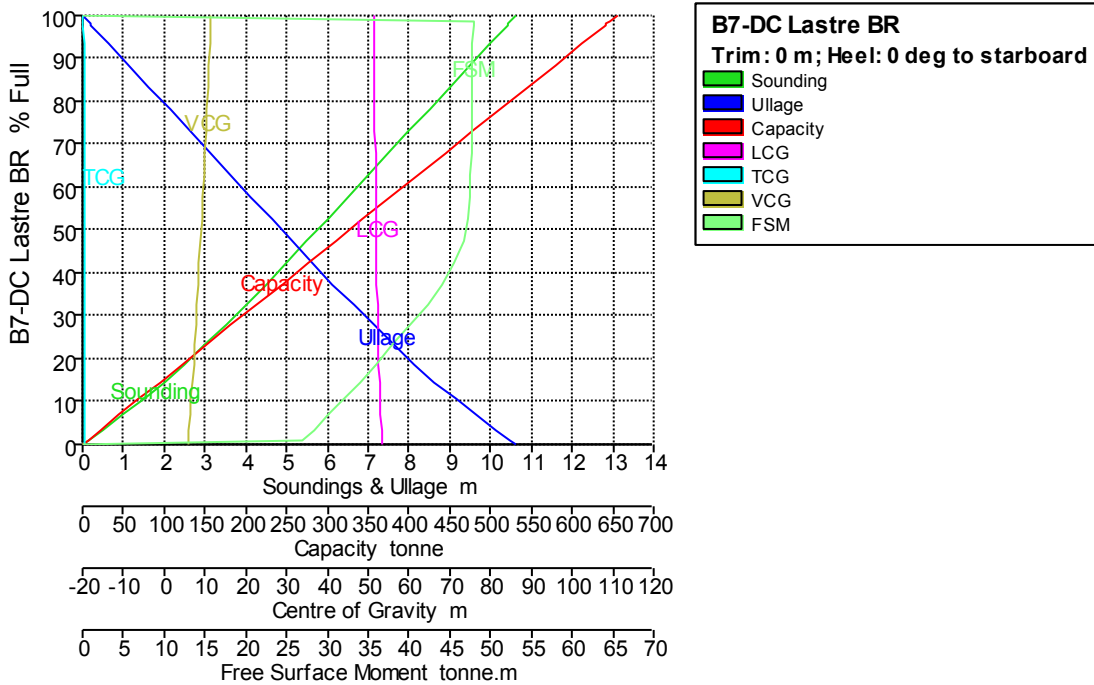


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B7-DF Lastre BR	5,900	0,000	100,000	1059,377	1085,861	53,998	-11,421	1,774	0,000
	5,750	0,150	99,419	1053,219	1079,549	54,001	-11,374	1,750	29,872
	5,500	0,400	98,354	1041,939	1067,988	54,005	-11,288	1,708	36,677
	5,422	0,477	98,000	1038,189	1064,144	54,006	-11,259	1,694	39,007
	5,401	0,499	97,900	1037,130	1063,058	54,007	-11,251	1,691	39,672
	5,250	0,650	97,173	1029,432	1055,167	54,009	-11,192	1,663	44,582
	5,000	0,900	95,877	1015,699	1041,092	54,012	-11,087	1,617	53,550
	4,750	1,150	94,476	1000,852	1025,873	54,014	-10,972	1,568	62,765
	4,500	1,400	92,976	984,970	1009,595	54,015	-10,847	1,519	73,041
	4,250	1,650	91,380	968,057	992,259	54,015	-10,713	1,469	84,489
	4,000	1,900	89,694	950,197	973,951	54,013	-10,570	1,419	95,747
	3,750	2,150	87,934	931,557	954,846	54,009	-10,418	1,370	107,102
	3,500	2,400	86,104	912,165	934,970	54,003	-10,257	1,322	119,036

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	3,250	2,650	84,221	892,218	914,524	53,994	-10,089	1,276	129,181
	3,000	2,900	82,297	871,836	893,632	53,981	-9,914	1,233	139,117
	2,750	3,150	80,351	851,223	872,503	53,964	-9,733	1,193	146,483
	2,500	3,400	78,399	830,536	851,299	53,941	-9,548	1,158	152,310
	2,250	3,650	76,457	809,963	830,212	53,913	-9,360	1,127	155,975
	2,000	3,900	71,541	757,884	776,831	53,895	-9,188	1,061	9381,655
	1,750	4,150	61,423	650,702	666,970	53,941	-9,065	0,927	8827,533
	1,500	4,400	51,552	546,133	559,786	53,991	-8,933	0,794	8239,081
	1,250	4,650	41,955	444,460	455,572	54,045	-8,788	0,660	7626,434
	1,000	4,900	32,660	345,990	354,639	54,103	-8,628	0,528	6990,256
	0,750	5,150	23,701	251,079	257,356	54,166	-8,443	0,396	6321,321
	0,500	5,400	15,121	160,191	164,195	54,236	-8,214	0,265	5593,962
	0,250	5,650	6,992	74,072	75,924	54,323	-7,848	0,135	4764,558
	0,050	5,850	1,000	10,594	10,859	54,377	-6,525	0,029	2844,999
	0,000	5,900	0,000	0,000	0,000	39,052	-1,493	-2,520	0,000

Tank Calibrations - B7-DC Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

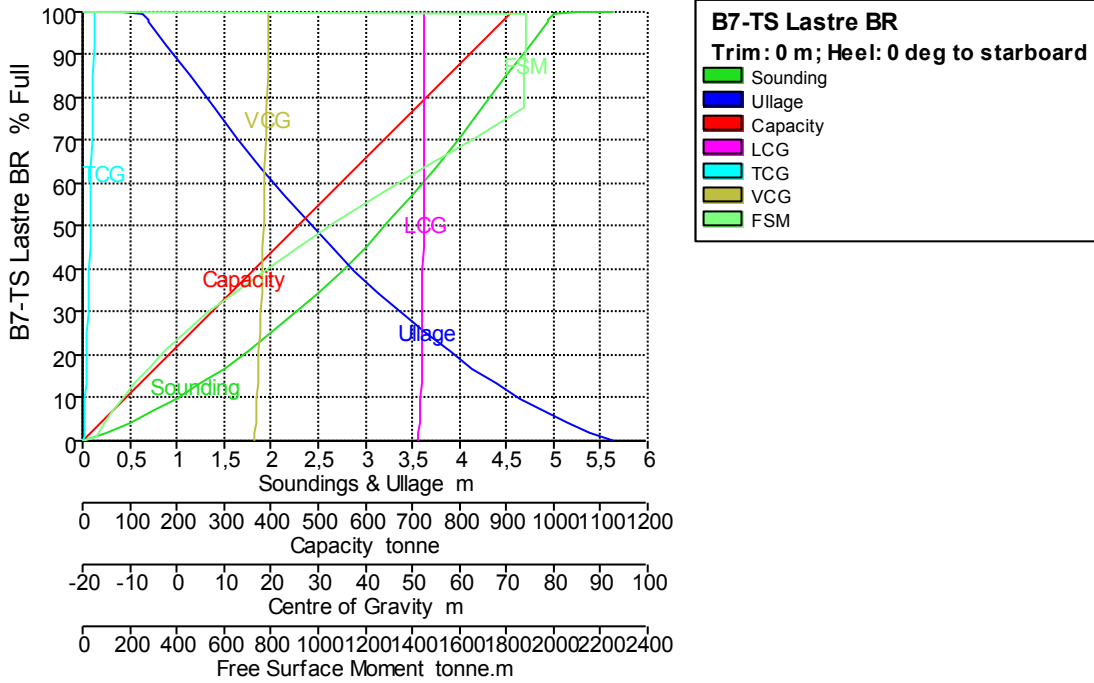


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B7-DC Lastre BR	10,635	0,000	100,000	639,533	655,522	51,582	-19,758	11,553	0,000
	10,500	0,135	98,610	630,644	646,410	51,587	-19,757	11,483	47,870
	10,441	0,194	98,000	626,743	642,411	51,590	-19,757	11,453	47,861
	10,431	0,204	97,900	626,103	641,756	51,590	-19,757	11,448	47,859
	10,000	0,635	93,465	597,741	612,685	51,608	-19,753	11,226	47,790
	9,500	1,135	88,325	564,869	578,991	51,630	-19,749	10,969	47,726
	9,000	1,635	83,188	532,016	545,316	51,655	-19,744	10,711	47,699
	8,500	2,135	78,053	499,177	511,657	51,682	-19,738	10,452	47,673
	8,000	2,635	72,921	466,354	478,013	51,713	-19,731	10,191	47,648

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	7,500	3,135	67,791	433,546	444,384	51,748	-19,724	9,930	47,619
	7,000	3,635	62,665	400,761	410,780	51,788	-19,715	9,666	47,570
	6,500	4,135	57,543	368,008	377,208	51,833	-19,705	9,401	47,470
	6,000	4,635	52,433	335,328	343,712	51,886	-19,693	9,133	47,189
	5,500	5,135	47,346	302,794	310,364	51,948	-19,680	8,862	46,654
	5,000	5,635	42,302	270,534	277,297	52,021	-19,664	8,589	45,643
	4,500	6,135	37,328	238,725	244,694	52,106	-19,646	8,315	44,160
	4,000	6,635	32,458	207,582	212,772	52,204	-19,628	8,039	42,263
	3,500	7,135	27,722	177,292	181,724	52,315	-19,608	7,764	40,148
	3,000	7,635	23,145	148,017	151,717	52,439	-19,588	7,489	38,022
	2,500	8,135	18,744	119,871	122,868	52,573	-19,568	7,216	35,973
	2,000	8,635	14,537	92,968	95,293	52,723	-19,548	6,946	33,958
	1,500	9,135	10,541	67,412	69,097	52,886	-19,528	6,678	32,163
	1,000	9,635	6,770	43,298	44,380	53,068	-19,509	6,413	30,190
	0,500	10,135	3,253	20,801	21,321	53,272	-19,492	6,154	28,349
	0,158	10,477	1,000	6,395	6,555	53,416	-19,480	5,980	27,040
	0,000	10,635	0,000	0,000	0,000	53,490	-19,474	5,900	0,000

Tank Calibrations - B7-TS Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

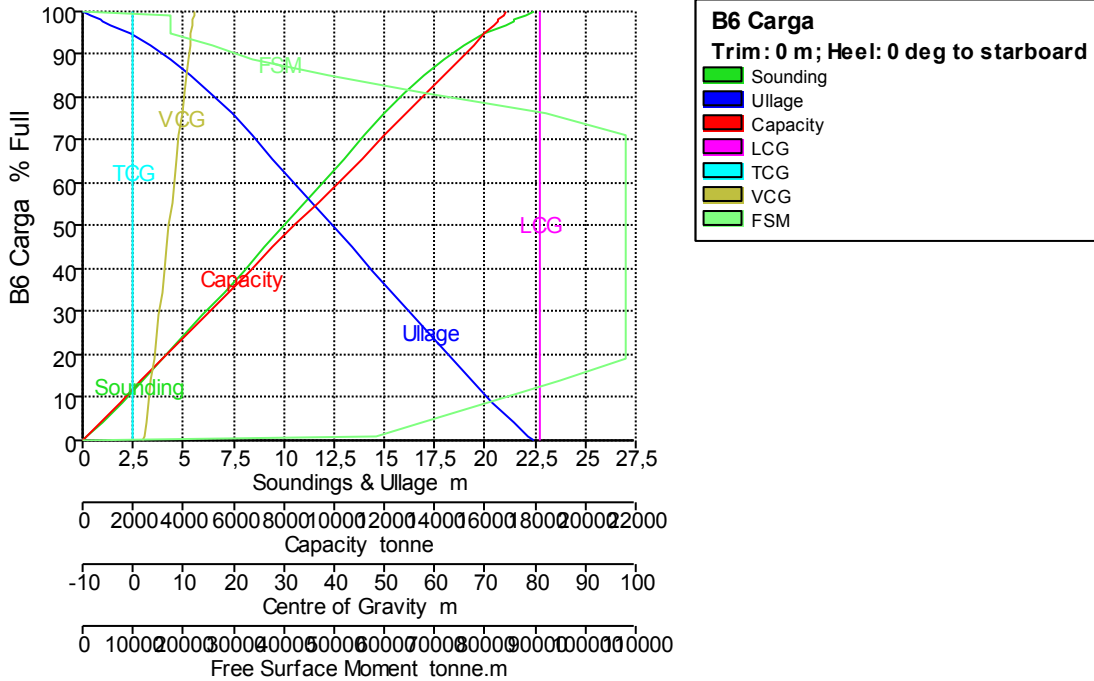


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B7-TS Lastre BR	5,642	0,000	100,000	889,390	911,625	52,600	-17,552	19,545	0,000
	5,500	0,142	100,000	889,390	911,625	52,600	-17,552	19,545	0,000
	5,250	0,392	100,000	889,390	911,625	52,600	-17,552	19,545	0,000
	5,000	0,642	99,564	885,514	907,652	52,599	-17,556	19,537	1879,825
	4,946	0,696	98,000	871,602	893,392	52,595	-17,573	19,505	1879,588
	4,943	0,700	97,900	870,713	892,481	52,595	-17,574	19,503	1879,573
	4,750	0,892	92,302	820,927	841,450	52,579	-17,638	19,389	1878,725

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	4,500	1,142	85,042	756,353	775,262	52,556	-17,734	19,238	1877,627
	4,250	1,392	77,783	691,791	709,086	52,528	-17,848	19,082	1876,530
	4,000	1,642	70,643	628,294	644,001	52,495	-17,976	18,922	1670,546
	3,750	1,892	63,822	567,623	581,813	52,460	-18,103	18,763	1451,176
	3,500	2,142	57,321	509,807	522,552	52,423	-18,230	18,605	1252,301
	3,250	2,392	51,141	454,845	466,216	52,382	-18,356	18,447	1072,900
	3,000	2,642	45,283	402,738	412,807	52,338	-18,481	18,290	911,953
	2,750	2,892	39,745	353,486	362,323	52,290	-18,605	18,134	768,436
	2,500	3,142	34,528	307,089	314,766	52,237	-18,728	17,978	641,329
	2,250	3,392	29,632	263,546	270,134	52,179	-18,850	17,824	529,609
	2,000	3,642	25,057	222,858	228,429	52,116	-18,970	17,671	432,255
	1,750	3,892	20,803	185,024	189,650	52,045	-19,088	17,520	348,244
	1,500	4,142	16,870	150,044	153,795	51,966	-19,205	17,370	276,645
	1,250	4,392	13,258	117,913	120,861	51,878	-19,319	17,223	216,335
	1,000	4,642	9,965	88,631	90,847	51,779	-19,431	17,078	166,262
	0,750	4,892	6,993	62,199	63,754	51,665	-19,539	16,936	125,405
	0,500	5,142	4,342	38,617	39,582	51,535	-19,643	16,797	92,741
	0,250	5,392	2,011	17,884	18,331	51,385	-19,742	16,663	67,240
	0,129	5,513	1,000	8,894	9,116	51,303	-19,787	16,601	57,186
	0,000	5,642	0,000	0,000	0,000	51,208	-19,834	16,535	0,000

Tank Calibrations - B6 Carga

Fluid Type = HOMOGEN Specific gravity = 0,817
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

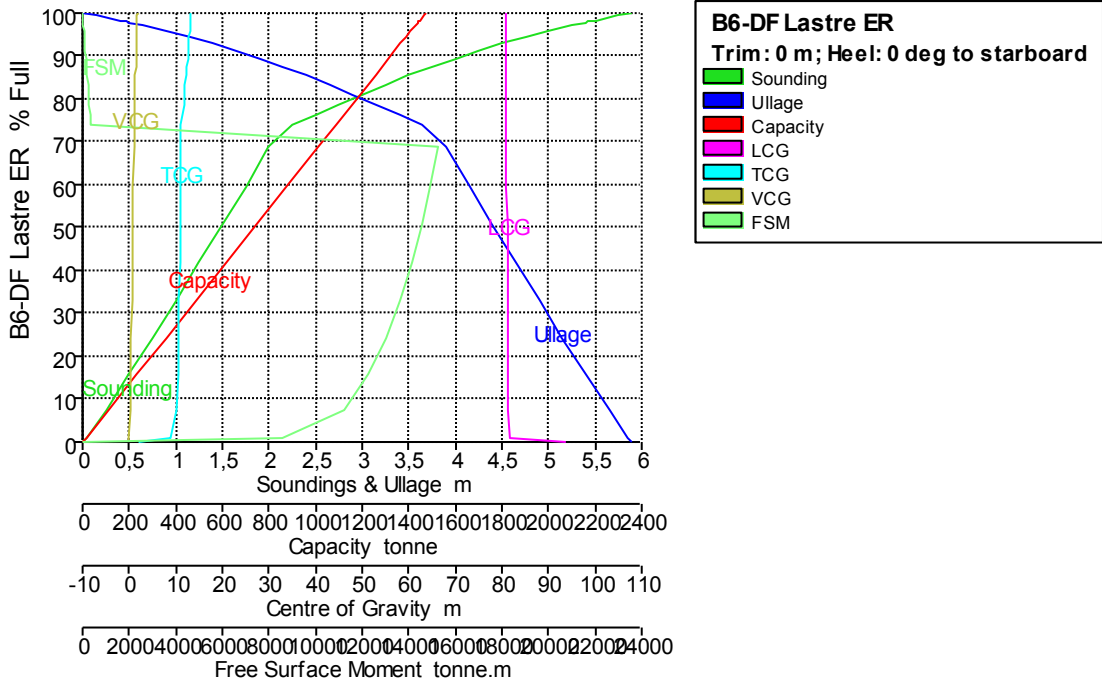


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B6 Carga	22,400	0,000	100,000	20644,091	16866,222	80,813	0,000	12,244	0,000
	22,000	0,400	99,131	20464,768	16719,716	80,811	0,000	12,139	17288,959
	21,479	0,921	98,000	20231,211	16528,899	80,809	0,000	12,004	17288,959
	21,433	0,967	97,900	20210,566	16512,032	80,809	0,000	11,993	17288,959

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	21,000	1,400	96,960	20016,463	16353,450	80,807	0,000	11,883	17288,959
	20,000	2,400	94,788	19568,157	15987,184	80,803	0,000	11,638	17288,959
	19,000	3,400	92,141	19021,709	15540,736	80,800	0,000	11,353	25699,796
	18,000	4,400	88,814	18334,819	14979,547	80,800	0,000	11,007	33705,823
	17,000	5,400	85,046	17556,875	14343,967	80,800	0,000	10,627	49018,505
	16,000	6,400	80,807	16681,937	13629,143	80,800	0,000	10,209	68382,368
	15,000	7,400	76,099	15710,005	12835,074	80,800	0,000	9,753	92272,860
	14,000	8,400	70,966	14650,269	11969,269	80,800	0,000	9,258	107942,523
	13,000	9,400	65,758	13575,069	11090,831	80,800	0,000	8,755	107942,523
	12,000	10,400	60,549	12499,869	10212,393	80,800	0,000	8,252	107942,523
	11,000	11,400	55,341	11424,668	9333,954	80,801	0,000	7,749	107942,523
	10,000	12,400	50,133	10349,468	8455,516	80,801	0,000	7,245	107942,523
	9,000	13,400	44,925	9274,268	7577,077	80,801	0,000	6,740	107942,523
	8,000	14,400	39,716	8199,068	6698,639	80,801	0,000	6,234	107942,523
	7,000	15,400	34,508	7123,868	5820,200	80,801	0,000	5,726	107942,523
	6,000	16,400	29,300	6048,668	4941,762	80,801	0,000	5,215	107942,523
	5,000	17,400	24,091	4973,468	4063,324	80,801	0,000	4,700	107942,523
	4,000	18,400	18,883	3898,268	3184,885	80,802	0,000	4,176	107942,523
	3,000	19,400	13,761	2840,909	2321,023	80,802	0,000	3,644	95058,913
	2,000	20,400	8,904	1838,187	1501,799	80,802	0,000	3,120	80451,209
	1,000	21,400	4,317	891,217	728,125	80,803	0,000	2,605	67422,353
	0,237	22,163	1,000	206,441	168,662	80,803	0,000	2,219	58490,656
	0,000	22,400	0,000	0,000	0,000	80,804	0,000	2,100	0,000

Tank Calibrations - B6-DF Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

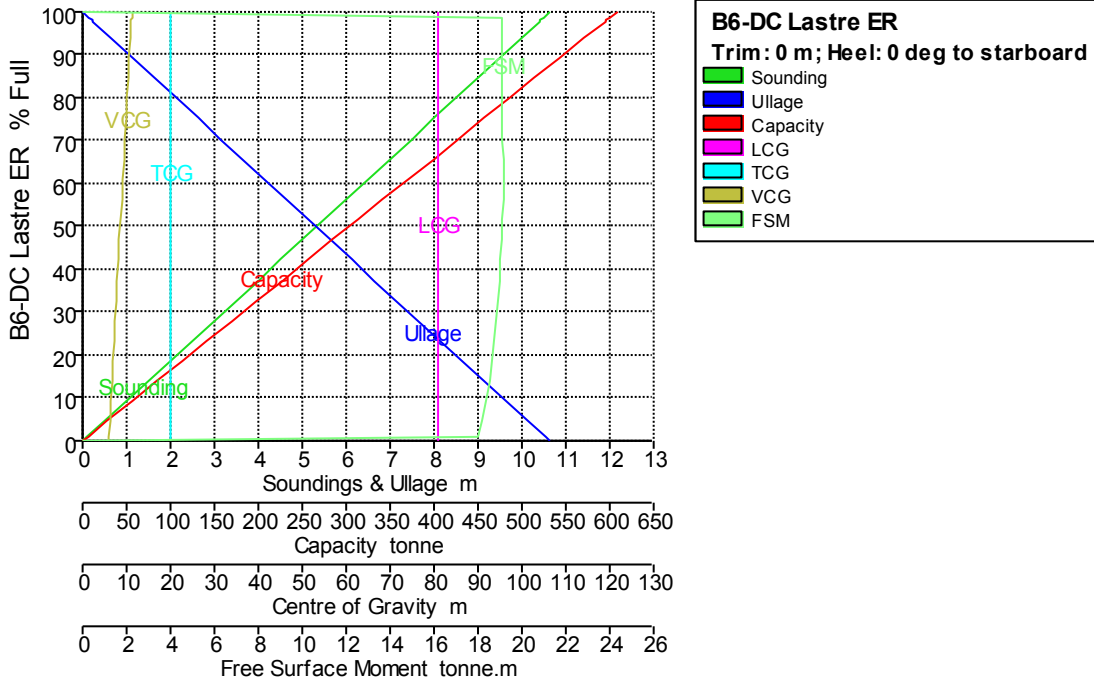


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B6-DF Lastre ER	5,900	0,000	100,000	1434,981	1470,855	81,045	13,269	1,808	0,000

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	5,750	0,150	99,407	1426,478	1462,140	81,045	13,228	1,784	22,278
	5,500	0,400	98,323	1410,916	1446,189	81,046	13,153	1,742	30,921
	5,430	0,469	98,000	1406,281	1441,438	81,047	13,131	1,730	33,673
	5,409	0,490	97,900	1404,846	1439,967	81,047	13,124	1,726	34,540
	5,250	0,650	97,120	1393,656	1428,497	81,047	13,070	1,697	41,553
	5,000	0,900	95,799	1374,696	1409,064	81,048	12,977	1,650	54,378
	4,750	1,150	94,360	1354,041	1387,892	81,050	12,875	1,601	69,492
	4,500	1,400	92,804	1331,714	1365,007	81,051	12,764	1,550	86,949
	4,250	1,650	91,132	1307,726	1340,419	81,052	12,642	1,498	107,031
	4,000	1,900	89,345	1282,080	1314,132	81,053	12,509	1,445	129,978
	3,750	2,150	87,443	1254,792	1286,162	81,054	12,365	1,393	155,523
	3,500	2,400	85,429	1225,894	1256,541	81,055	12,209	1,340	183,774
	3,250	2,650	83,305	1195,406	1225,291	81,055	12,039	1,288	214,847
	3,000	2,900	81,072	1163,372	1192,456	81,054	11,855	1,238	248,135
	2,750	3,150	78,736	1129,844	1158,090	81,053	11,655	1,189	283,384
	2,500	3,400	76,301	1094,906	1122,278	81,050	11,439	1,143	319,534
	2,250	3,650	73,776	1058,666	1085,133	81,045	11,204	1,101	355,296
	2,000	3,900	68,609	984,530	1009,143	81,046	11,032	1,027	15252,428
	1,750	4,150	59,600	855,250	876,631	81,060	10,970	0,899	14937,549
	1,500	4,400	50,662	726,984	745,158	81,075	10,901	0,770	14571,657
	1,250	4,650	41,805	599,896	614,893	81,092	10,819	0,642	14154,396
	1,000	4,900	33,046	474,200	486,055	81,111	10,722	0,514	13662,188
	0,750	5,150	24,406	350,224	358,979	81,133	10,601	0,386	13056,216
	0,500	5,400	15,924	228,501	234,213	81,163	10,439	0,258	12255,644
	0,250	5,650	7,658	109,891	112,638	81,219	10,173	0,130	11189,146
	0,040	5,859	1,000	14,350	14,709	81,528	8,906	0,023	8599,985
	0,000	5,900	0,000	0,000	0,000	93,511	2,186	-0,057	0,000

Tank Calibrations - B6-DC Lastre ER

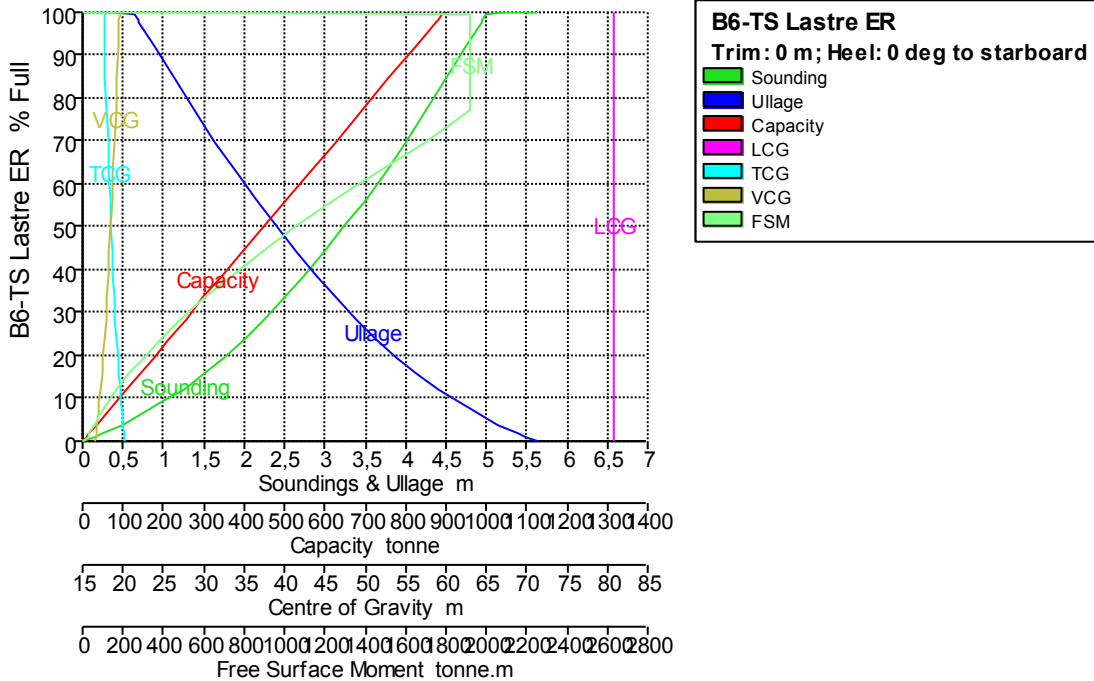
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B6-DC Lastre ER	10,635	0,000	100,000	593,162	607,991	80,835	20,196	11,232	0,000
	10,500	0,135	98,727	585,609	600,249	80,835	20,196	11,164	19,081
	10,423	0,212	98,000	581,299	595,831	80,835	20,196	11,126	19,082
	10,412	0,223	97,900	580,706	595,223	80,835	20,196	11,120	19,082
	10,000	0,635	94,010	557,633	571,574	80,836	20,196	10,914	19,087
	9,500	1,135	89,293	529,654	542,895	80,838	20,196	10,664	19,095
	9,000	1,635	84,576	501,670	514,212	80,840	20,195	10,414	19,104
	8,500	2,135	79,857	473,683	485,525	80,842	20,195	10,163	19,112
	8,000	2,635	75,138	445,691	456,833	80,845	20,195	9,913	19,121
	7,500	3,135	70,418	417,694	428,137	80,848	20,195	9,662	19,131
	7,000	3,635	65,698	389,693	399,436	80,851	20,194	9,412	19,139
	6,500	4,135	60,976	361,689	370,731	80,855	20,194	9,161	19,144
	6,000	4,635	56,255	333,685	342,027	80,859	20,193	8,910	19,136
	5,500	5,135	51,535	305,688	313,330	80,864	20,193	8,659	19,115
	5,000	5,635	46,818	277,705	284,648	80,870	20,192	8,408	19,081
	4,500	6,135	42,104	249,742	255,986	80,876	20,191	8,157	19,035
	4,000	6,635	37,393	221,803	227,348	80,882	20,190	7,906	18,982
	3,500	7,135	32,688	193,893	198,740	80,890	20,189	7,655	18,921
	3,000	7,635	27,988	166,014	170,165	80,898	20,188	7,404	18,855
	2,500	8,135	23,295	138,178	141,633	80,907	20,187	7,153	18,755
	2,000	8,635	18,611	110,394	113,154	80,917	20,186	6,902	18,653
	1,500	9,135	13,936	82,664	84,730	80,929	20,184	6,651	18,537
	1,000	9,635	9,275	55,014	56,389	80,941	20,183	6,401	18,359
	0,500	10,135	4,629	27,458	28,144	80,955	20,181	6,150	18,185
	0,108	10,527	1,000	5,932	6,080	80,969	20,179	5,954	18,035
	0,000	10,635	0,000	0,000	0,000	80,973	20,179	5,900	0,000

Tank Calibrations - B6-TS Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



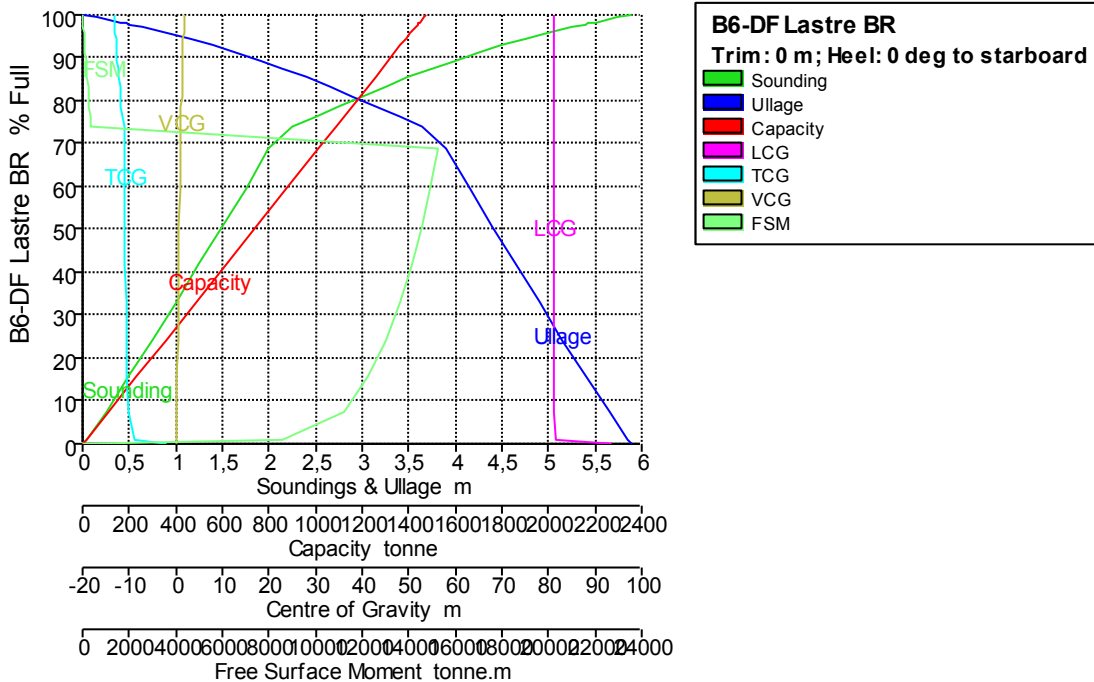
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B6-TS Lastre ER	5,642	0,000	100,000	874,701	896,569	80,802	17,640	19,585	0,000
	5,500	0,142	100,000	874,701	896,569	80,802	17,640	19,585	0,000
	5,250	0,392	100,000	874,701	896,569	80,802	17,640	19,585	0,000
	5,000	0,642	99,554	870,797	892,567	80,802	17,644	19,577	1921,501
	4,948	0,695	98,000	857,207	878,637	80,802	17,662	19,546	1921,511
	4,944	0,698	97,900	856,332	877,741	80,802	17,663	19,544	1921,511
	4,750	0,892	92,114	805,722	825,865	80,802	17,733	19,429	1921,548
	4,500	1,142	84,674	740,647	759,163	80,802	17,837	19,276	1921,594
	4,250	1,392	77,234	675,571	692,460	80,802	17,961	19,119	1921,641
	4,000	1,642	69,923	611,615	626,906	80,802	18,101	18,958	1699,887
	3,750	1,892	62,954	550,661	564,427	80,802	18,240	18,797	1464,300
	3,500	2,142	56,332	492,736	505,055	80,802	18,379	18,637	1251,551
	3,250	2,392	50,056	437,843	448,789	80,802	18,517	18,477	1060,476
	3,000	2,642	44,127	385,980	395,629	80,802	18,655	18,318	889,912
	2,750	2,892	38,544	337,147	345,576	80,802	18,792	18,159	738,693
	2,500	3,142	33,308	291,345	298,629	80,802	18,929	18,002	605,655
	2,250	3,392	28,418	248,574	254,788	80,802	19,064	17,845	489,634
	2,000	3,642	23,875	208,833	214,054	80,803	19,199	17,690	389,465
	1,750	3,892	19,678	172,123	176,426	80,803	19,332	17,536	303,987
	1,500	4,142	15,827	138,443	141,904	80,803	19,464	17,383	232,033
	1,250	4,392	12,323	107,793	110,488	80,803	19,595	17,233	172,436
	1,000	4,642	9,166	80,174	82,178	80,803	19,723	17,085	124,032
	0,750	4,892	6,355	55,585	56,975	80,803	19,848	16,941	85,658
	0,500	5,142	3,890	34,026	34,877	80,804	19,970	16,800	56,147
	0,250	5,392	1,772	15,498	15,885	80,804	20,088	16,664	34,337
	0,147	5,495	1,000	8,747	8,966	80,804	20,134	16,610	27,320
	0,000	5,642	0,000	0,000	0,000	80,804	20,199	16,535	0,000

Tank Calibrations - B6-DF Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



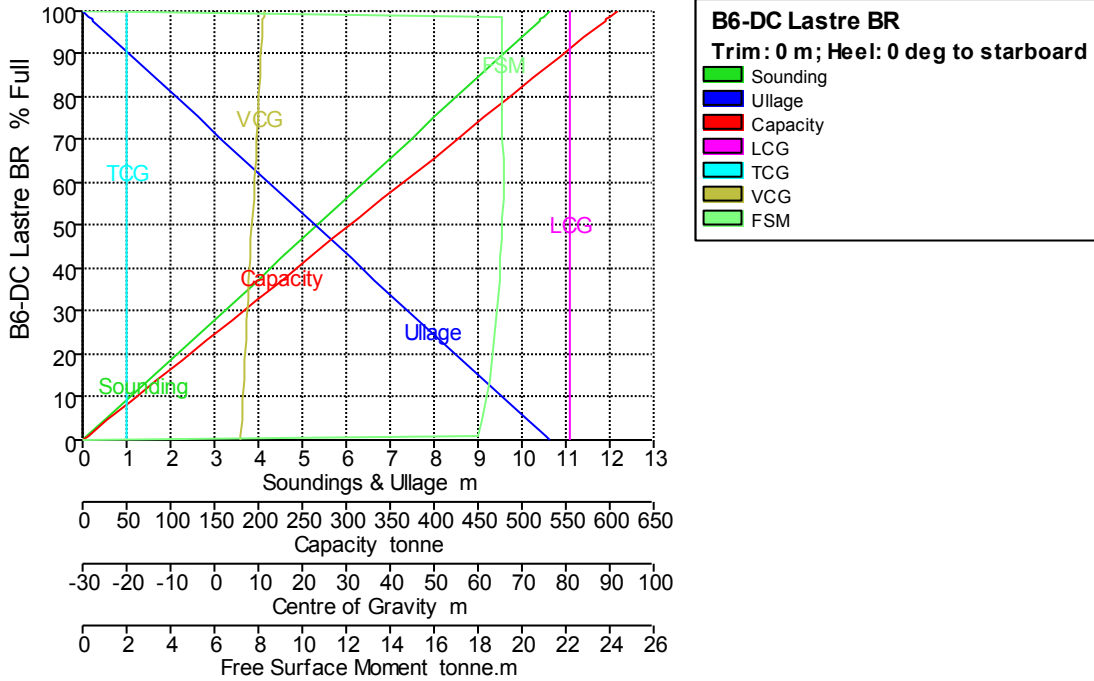
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B6-DF Lastre BR	5,900	0,000	100,000	1434,981	1470,855	81,045	-13,269	1,808	0,000
	5,750	0,150	99,407	1426,478	1462,140	81,045	-13,228	1,784	22,278
	5,500	0,400	98,323	1410,916	1446,189	81,046	-13,153	1,742	30,921
	5,430	0,469	98,000	1406,281	1441,438	81,047	-13,131	1,730	33,673
	5,409	0,490	97,900	1404,846	1439,967	81,047	-13,124	1,726	34,540
	5,250	0,650	97,120	1393,656	1428,497	81,047	-13,070	1,697	41,553
	5,000	0,900	95,799	1374,696	1409,064	81,048	-12,977	1,650	54,378
	4,750	1,150	94,360	1354,041	1387,892	81,050	-12,875	1,601	69,492
	4,500	1,400	92,804	1331,714	1365,007	81,051	-12,764	1,550	86,949
	4,250	1,650	91,132	1307,726	1340,419	81,052	-12,642	1,498	107,031
	4,000	1,900	89,345	1282,080	1314,132	81,053	-12,509	1,445	129,978
	3,750	2,150	87,443	1254,792	1286,162	81,054	-12,365	1,393	155,523
	3,500	2,400	85,429	1225,894	1256,541	81,055	-12,209	1,340	183,774
	3,250	2,650	83,305	1195,406	1225,291	81,055	-12,039	1,288	214,847
	3,000	2,900	81,072	1163,372	1192,456	81,054	-11,855	1,238	248,135
	2,750	3,150	78,736	1129,844	1158,090	81,053	-11,655	1,189	283,384
	2,500	3,400	76,301	1094,906	1122,278	81,050	-11,439	1,143	319,534
	2,250	3,650	73,776	1058,666	1085,133	81,045	-11,204	1,101	355,296
	2,000	3,900	68,609	984,530	1009,143	81,046	-11,032	1,027	15252,428
	1,750	4,150	59,600	855,250	876,631	81,060	-10,970	0,899	14937,549
	1,500	4,400	50,662	726,984	745,158	81,075	-10,901	0,770	14571,657
	1,250	4,650	41,805	599,896	614,893	81,092	-10,819	0,642	14154,396
	1,000	4,900	33,046	474,200	486,055	81,111	-10,722	0,514	13662,188
	0,750	5,150	24,406	350,224	358,979	81,133	-10,601	0,386	13056,216
	0,500	5,400	15,924	228,501	234,213	81,163	-10,439	0,258	12255,644
	0,250	5,650	7,658	109,891	112,638	81,219	-10,173	0,130	11189,146
	0,040	5,859	1,000	14,350	14,709	81,528	-8,906	0,023	8599,985
	0,000	5,900	0,000	0,000	0,000	93,511	-2,186	-0,057	0,000

Tank Calibrations - B6-DC Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B6-DC Lastre BR	10,635	0,000	100,000	593,162	607,991	80,835	-20,196	11,232	0,000
	10,500	0,135	98,727	585,609	600,249	80,835	-20,196	11,164	19,081
	10,423	0,212	98,000	581,299	595,831	80,835	-20,196	11,126	19,082
	10,412	0,223	97,900	580,706	595,223	80,835	-20,196	11,120	19,082
	10,000	0,635	94,010	557,633	571,574	80,836	-20,196	10,914	19,087
	9,500	1,135	89,293	529,654	542,895	80,838	-20,196	10,664	19,095
	9,000	1,635	84,576	501,670	514,212	80,840	-20,195	10,414	19,104
	8,500	2,135	79,857	473,683	485,525	80,842	-20,195	10,163	19,112
	8,000	2,635	75,138	445,691	456,833	80,845	-20,195	9,913	19,121
	7,500	3,135	70,418	417,694	428,137	80,848	-20,195	9,662	19,131
	7,000	3,635	65,698	389,693	399,436	80,851	-20,194	9,412	19,139
	6,500	4,135	60,976	361,689	370,731	80,855	-20,194	9,161	19,144
	6,000	4,635	56,255	333,685	342,027	80,859	-20,193	8,910	19,136
	5,500	5,135	51,535	305,688	313,330	80,864	-20,193	8,659	19,115
	5,000	5,635	46,818	277,705	284,648	80,870	-20,192	8,408	19,081
	4,500	6,135	42,104	249,742	255,986	80,876	-20,191	8,157	19,035
	4,000	6,635	37,393	221,803	227,348	80,882	-20,190	7,906	18,982
	3,500	7,135	32,688	193,893	198,740	80,890	-20,189	7,655	18,921
	3,000	7,635	27,988	166,014	170,165	80,898	-20,188	7,404	18,855
	2,500	8,135	23,295	138,178	141,633	80,907	-20,187	7,153	18,755
	2,000	8,635	18,611	110,394	113,154	80,917	-20,186	6,902	18,653
	1,500	9,135	13,936	82,664	84,730	80,929	-20,184	6,651	18,537
	1,000	9,635	9,275	55,014	56,389	80,941	-20,183	6,401	18,359
	0,500	10,135	4,629	27,458	28,144	80,955	-20,181	6,150	18,185
	0,108	10,527	1,000	5,932	6,080	80,969	-20,179	5,954	18,035
	0,000	10,635	0,000	0,000	0,000	80,973	-20,179	5,900	0,000

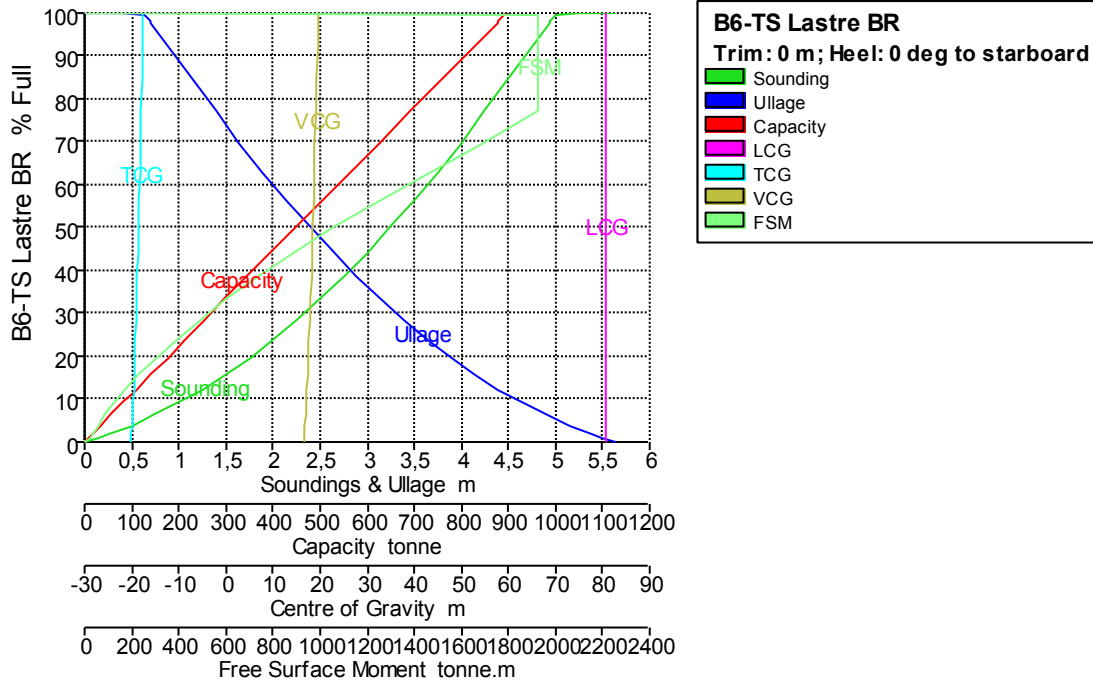
Tank Calibrations - B6-TS Lastre BR

Fluid Type = Water Ballast

Specific gravity = 1,025

Permeability = 100 %

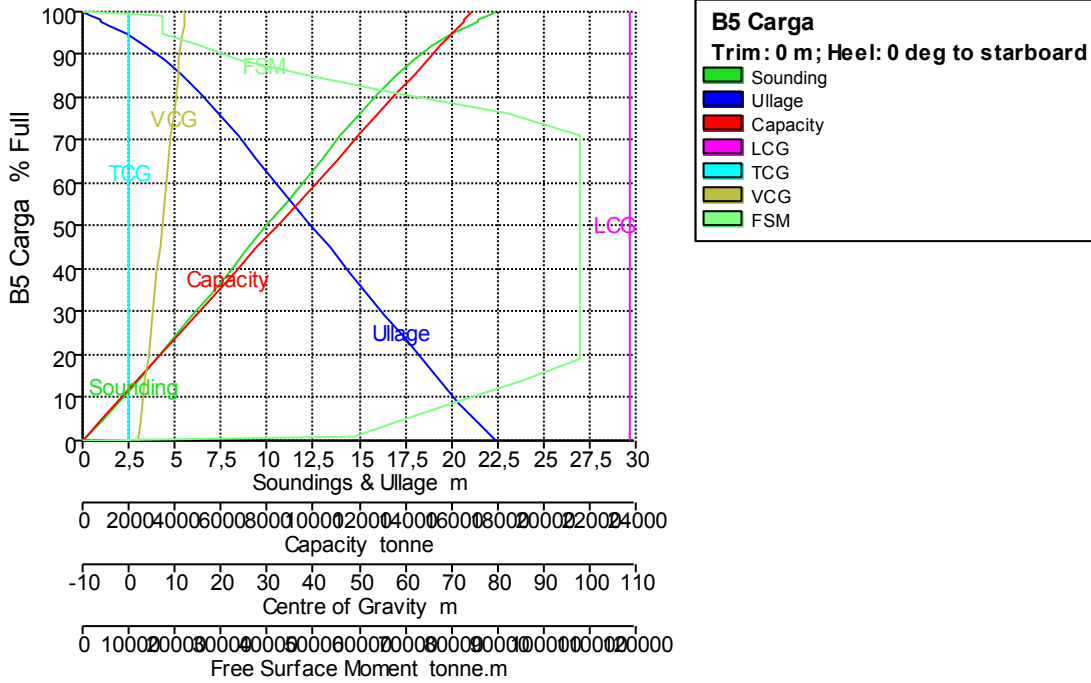
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B6-TS Lastre BR	5,642	0,000	100,000	874,701	896,568	80,802	-17,640	19,585	0,000
	5,500	0,142	100,000	874,701	896,568	80,802	-17,640	19,585	0,000
	5,250	0,392	100,000	874,701	896,568	80,802	-17,640	19,585	0,000
	5,000	0,642	99,554	870,796	892,566	80,802	-17,644	19,577	1921,492
	4,948	0,695	98,000	857,206	878,637	80,802	-17,662	19,546	1921,502
	4,944	0,698	97,900	856,332	877,740	80,802	-17,663	19,544	1921,502
	4,750	0,892	92,114	805,721	825,865	80,802	-17,733	19,429	1921,539
	4,500	1,142	84,674	740,646	759,162	80,802	-17,837	19,276	1921,586
	4,250	1,392	77,234	675,570	692,460	80,802	-17,961	19,119	1921,634
	4,000	1,642	69,923	611,615	626,905	80,802	-18,101	18,958	1699,882
	3,750	1,892	62,954	550,660	564,427	80,802	-18,240	18,797	1464,295
	3,500	2,142	56,332	492,736	505,055	80,802	-18,379	18,637	1251,547
	3,250	2,392	50,056	437,843	448,789	80,802	-18,517	18,477	1060,474
	3,000	2,642	44,127	385,980	395,629	80,802	-18,655	18,318	889,910
	2,750	2,892	38,544	337,147	345,576	80,802	-18,792	18,159	738,692
	2,500	3,142	33,308	291,345	298,629	80,802	-18,929	18,002	605,654
	2,250	3,392	28,418	248,574	254,788	80,802	-19,064	17,845	489,633
	2,000	3,642	23,875	208,833	214,054	80,803	-19,199	17,690	389,465
	1,750	3,892	19,678	172,123	176,426	80,803	-19,332	17,536	303,987
	1,500	4,142	15,827	138,443	141,904	80,803	-19,464	17,383	232,033
	1,250	4,392	12,323	107,793	110,488	80,803	-19,595	17,233	172,436
	1,000	4,642	9,166	80,174	82,178	80,803	-19,723	17,085	124,032
	0,750	4,892	6,355	55,585	56,975	80,803	-19,848	16,941	85,658
	0,500	5,142	3,890	34,026	34,877	80,804	-19,970	16,800	56,147
	0,250	5,392	1,772	15,498	15,885	80,804	-20,088	16,664	34,337
	0,147	5,495	1,000	8,747	8,966	80,804	-20,134	16,610	27,320
	0,000	5,642	0,000	0,000	0,000	80,804	-20,199	16,535	0,000

Tank Calibrations - B5 Carga

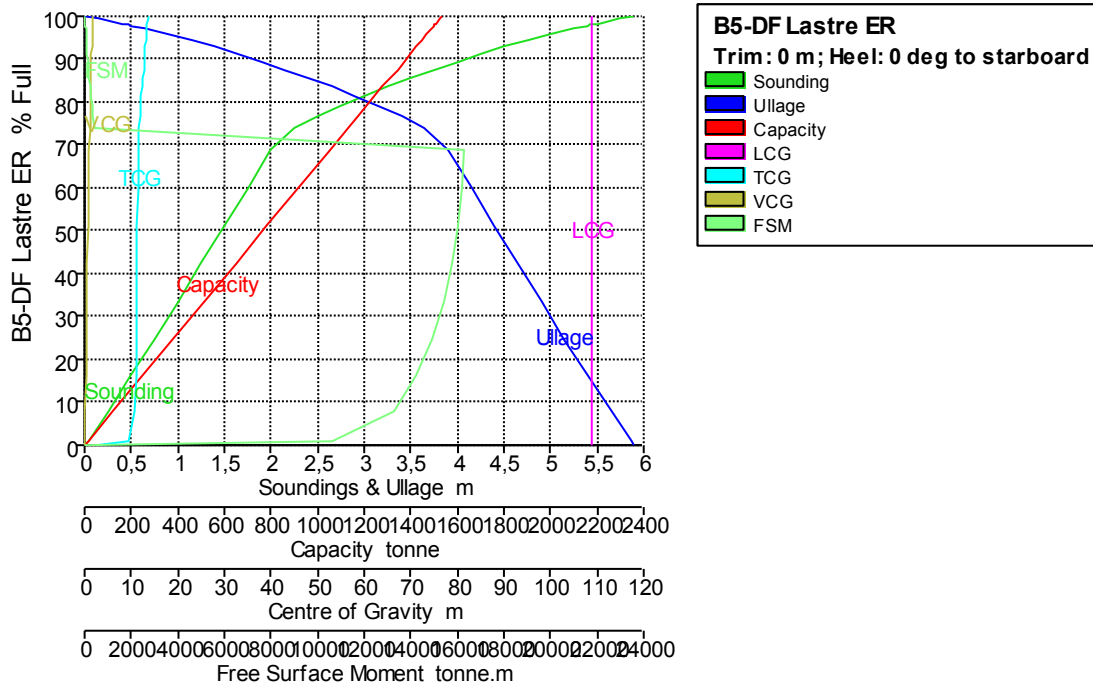
Fluid Type = HOMOGEN Specific gravity = 0,817
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B5 Carga	22,400	0,000	100,000	20646,615	16868,285	108,789	0,000	12,243	0,000
	22,000	0,400	99,131	20467,293	16721,778	108,790	0,000	12,138	17288,958
	21,479	0,921	98,000	20233,682	16530,918	108,792	0,000	12,003	17288,958
	21,433	0,967	97,900	20213,036	16514,051	108,792	0,000	11,992	17288,958
	21,000	1,400	96,960	20018,987	16355,513	108,794	0,000	11,882	17288,958
	20,000	2,400	94,789	19570,682	15989,247	108,798	0,000	11,637	17288,958
	19,000	3,400	92,142	19024,234	15542,799	108,800	0,000	11,352	25699,796
	18,000	4,400	88,815	18337,344	14981,610	108,800	0,000	11,006	33705,717
	17,000	5,400	85,047	17559,402	14346,031	108,800	0,000	10,626	49018,161
	16,000	6,400	80,810	16684,466	13631,209	108,800	0,000	10,208	68381,683
	15,000	7,400	76,102	15712,537	12837,143	108,800	0,000	9,751	92271,722
	14,000	8,400	70,970	14652,804	11971,340	108,800	0,000	9,257	107942,523
	13,000	9,400	65,762	13577,603	11092,902	108,800	0,000	8,754	107942,523
	12,000	10,400	60,554	12502,403	10214,464	108,800	0,000	8,251	107942,523
	11,000	11,400	55,347	11427,203	9336,025	108,801	0,000	7,748	107942,523
	10,000	12,400	50,139	10352,003	8457,587	108,801	0,000	7,244	107942,523
	9,000	13,400	44,931	9276,803	7579,148	108,801	0,000	6,739	107942,523
	8,000	14,400	39,724	8201,603	6700,710	108,801	0,000	6,233	107942,523
	7,000	15,400	34,516	7126,403	5822,271	108,801	0,000	5,725	107942,523
	6,000	16,400	29,308	6051,203	4943,833	108,801	0,000	5,215	107942,523
	5,000	17,400	24,101	4976,003	4065,395	108,801	0,000	4,699	107942,523
	4,000	18,400	18,893	3900,803	3186,956	108,802	0,000	4,175	107942,523
	3,000	19,400	13,771	2843,331	2323,002	108,802	0,000	3,644	95136,654
	2,000	20,400	8,913	1840,153	1503,405	108,802	0,000	3,120	80607,776
	1,000	21,400	4,322	892,376	729,071	108,803	0,000	2,605	67638,932
	0,237	22,163	1,000	206,466	168,683	108,803	0,000	2,219	58737,848
	0,000	22,400	0,000	0,000	0,000	108,804	0,000	2,100	0,000

Tank Calibrations - B5-DF Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



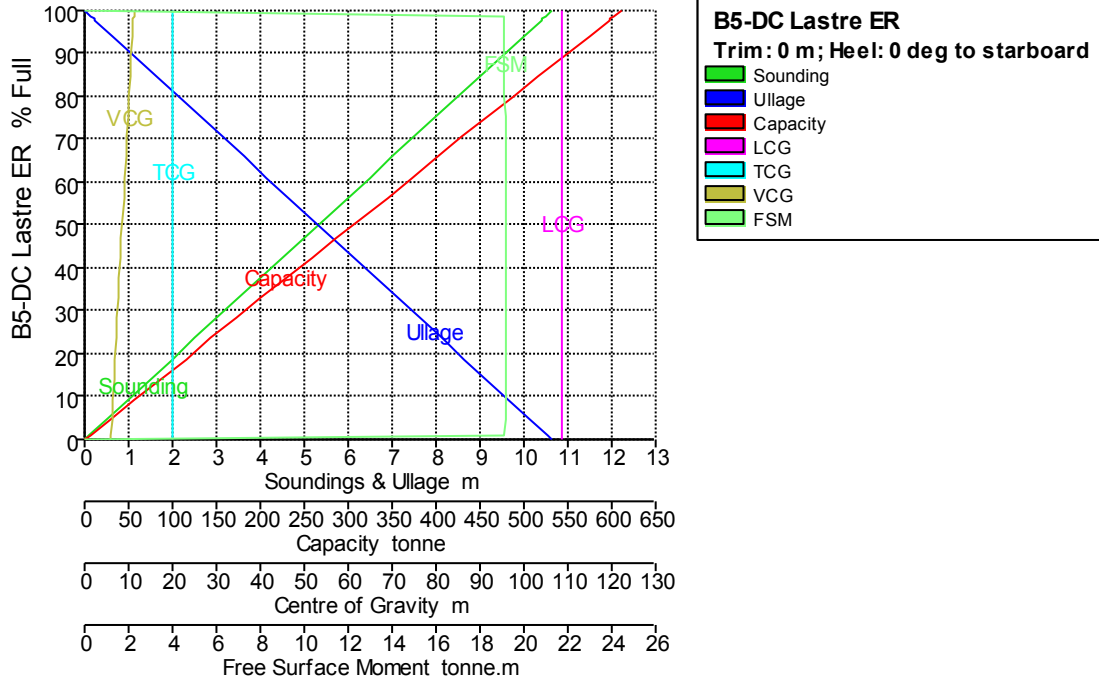
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B5-DF Lastre ER	5,900	0,000	100,000	1493,633	1530,974	108,816	13,539	1,794	0,000
	5,750	0,150	99,418	1484,942	1522,066	108,816	13,500	1,770	23,699
	5,500	0,400	98,354	1469,042	1505,768	108,816	13,429	1,729	32,856
	5,422	0,477	98,000	1463,760	1500,355	108,816	13,406	1,715	36,111
	5,401	0,499	97,900	1462,267	1498,823	108,816	13,399	1,711	37,050
	5,250	0,650	97,173	1451,412	1487,698	108,816	13,350	1,684	44,112
	5,000	0,900	95,877	1432,053	1467,854	108,816	13,263	1,638	57,683
	4,750	1,150	94,465	1410,963	1446,237	108,817	13,167	1,590	73,786
	4,500	1,400	92,937	1388,144	1422,847	108,817	13,061	1,540	92,638
	4,250	1,650	91,294	1363,595	1397,685	108,817	12,947	1,489	114,435
	4,000	1,900	89,535	1337,318	1370,751	108,818	12,821	1,437	139,402
	3,750	2,150	87,660	1309,314	1342,047	108,818	12,685	1,385	167,758
	3,500	2,400	85,669	1279,581	1311,571	108,818	12,537	1,333	199,721
	3,250	2,650	83,563	1248,122	1279,325	108,819	12,375	1,281	235,450
	3,000	2,900	81,341	1214,938	1245,312	108,819	12,199	1,231	275,164
	2,750	3,150	79,004	1180,031	1209,532	108,820	12,006	1,182	319,071
	2,500	3,400	76,552	1143,406	1171,991	108,820	11,796	1,136	367,192
	2,250	3,650	73,986	1105,073	1132,700	108,821	11,565	1,093	419,372
	2,000	3,900	68,843	1028,258	1053,964	108,822	11,401	1,019	16328,118
	1,750	4,150	59,963	895,627	918,018	108,823	11,361	0,892	16194,967
	1,500	4,400	51,114	763,451	782,537	108,824	11,313	0,765	16000,869
	1,250	4,650	42,306	631,898	647,696	108,826	11,253	0,638	15743,826
	1,000	4,900	33,554	501,180	513,709	108,828	11,179	0,511	15399,779
	0,750	5,150	24,879	371,608	380,898	108,830	11,083	0,383	14926,624
	0,500	5,400	16,316	243,694	249,786	108,832	10,950	0,256	14236,321
	0,250	5,650	7,915	118,227	121,182	108,835	10,724	0,130	13269,479
	0,038	5,862	1,000	14,936	15,310	108,840	9,479	0,021	10627,299
	0,000	5,900	0,000	0,000	0,000	108,969	2,420	0,000	0,000

Tank Calibrations - B5-DC Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

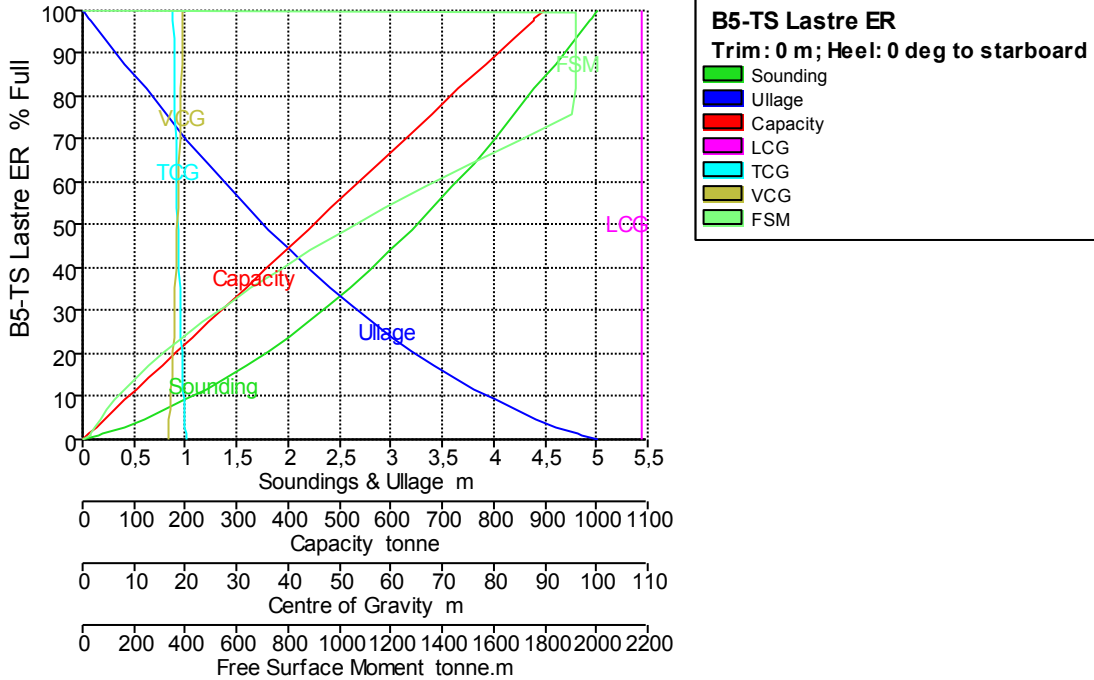
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B5-DC Lastre ER	10,635	0,000	100,000	595,641	610,532	108,800	20,200	11,217	0,000
	10,500	0,135	98,732	588,087	602,790	108,800	20,200	11,149	19,084
	10,422	0,213	98,000	583,728	598,321	108,800	20,200	11,110	19,085
	10,411	0,224	97,900	583,132	597,711	108,800	20,200	11,105	19,085
	10,000	0,635	94,035	560,110	574,112	108,800	20,200	10,900	19,093
	9,500	1,135	89,337	532,127	545,430	108,801	20,200	10,650	19,103
	9,000	1,635	84,638	504,139	516,743	108,801	20,200	10,400	19,113
	8,500	2,135	79,939	476,147	488,050	108,801	20,200	10,150	19,125
	8,000	2,635	75,238	448,147	459,351	108,801	20,200	9,900	19,138
	7,500	3,135	70,536	420,142	430,646	108,801	20,200	9,650	19,149
	7,000	3,635	65,834	392,133	401,936	108,801	20,200	9,400	19,156
	6,500	4,135	61,131	364,121	373,224	108,801	20,200	9,150	19,158
	6,000	4,635	56,428	336,109	344,512	108,801	20,200	8,900	19,159
	5,500	5,135	51,725	308,096	315,799	108,801	20,200	8,650	19,159
	5,000	5,635	47,022	280,084	287,086	108,801	20,200	8,400	19,159
	4,500	6,135	42,319	252,072	258,374	108,801	20,200	8,150	19,158
	4,000	6,635	37,617	224,060	229,661	108,801	20,200	7,900	19,158
	3,500	7,135	32,914	196,048	200,949	108,802	20,200	7,650	19,157
	3,000	7,635	28,211	168,037	172,237	108,802	20,200	7,400	19,155
	2,500	8,135	23,509	140,026	143,527	108,802	20,200	7,150	19,153
	2,000	8,635	18,806	112,017	114,817	108,802	20,200	6,900	19,152
	1,500	9,135	14,104	84,009	86,109	108,803	20,200	6,650	19,147
	1,000	9,635	9,402	56,004	57,404	108,803	20,200	6,400	19,142
	0,500	10,135	4,701	28,000	28,700	108,803	20,200	6,150	19,137
	0,106	10,529	1,000	5,956	6,105	108,804	20,200	5,953	19,133
	0,000	10,635	0,000	0,000	0,000	108,804	20,200	5,900	0,000

Tank Calibrations - B5-TS Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B5-TS Lastre ER	5,015	0,000	100,000	874,692	896,560	108,799	17,639	19,585	0,000
	5,000	0,015	99,554	870,788	892,558	108,799	17,644	19,577	1921,344
	4,948	0,067	98,000	857,199	878,629	108,799	17,662	19,546	1921,355
	4,944	0,071	97,900	856,324	877,732	108,799	17,663	19,544	1921,356
	4,800	0,215	93,602	818,730	839,198	108,799	17,714	19,458	1921,388
	4,600	0,415	87,650	766,671	785,838	108,799	17,793	19,338	1921,432
	4,400	0,615	81,699	714,612	732,477	108,799	17,884	19,214	1921,476
	4,200	0,815	75,747	662,558	679,121	108,799	17,989	19,087	1905,455
	4,000	1,015	69,923	611,613	626,903	108,799	18,101	18,958	1699,776
	3,800	1,215	64,321	562,608	576,673	108,799	18,212	18,829	1509,458
	3,600	1,415	58,940	515,542	528,431	108,799	18,323	18,701	1333,904
	3,400	1,615	53,781	470,416	482,176	108,799	18,434	18,573	1172,518
	3,200	1,815	48,843	427,229	437,910	108,799	18,545	18,445	1024,705
	3,000	2,015	44,128	385,982	395,631	108,799	18,655	18,318	889,867
	2,800	2,215	39,634	346,674	355,341	108,799	18,765	18,191	767,410
	2,600	2,415	35,362	309,306	317,038	108,799	18,874	18,065	656,736
	2,400	2,615	31,311	273,877	280,724	108,799	18,983	17,939	557,250
	2,200	2,815	27,483	240,388	246,397	108,799	19,091	17,814	468,355
	2,000	3,015	23,876	208,838	214,058	108,799	19,199	17,690	389,458
	1,800	3,215	20,490	179,227	183,708	108,799	19,306	17,566	319,963
	1,600	3,415	17,327	151,556	155,345	108,799	19,412	17,444	259,270
	1,400	3,615	14,385	125,824	128,969	108,799	19,517	17,323	206,782
	1,200	3,815	11,665	102,031	104,582	108,799	19,620	17,203	161,904
	1,000	4,015	9,166	80,177	82,182	108,799	19,723	17,085	124,040
	0,800	4,215	6,890	60,263	61,770	108,799	19,823	16,969	92,594
	0,600	4,415	4,835	42,289	43,346	108,799	19,922	16,856	66,970
	0,400	4,615	3,001	26,253	26,909	108,799	20,018	16,745	46,571

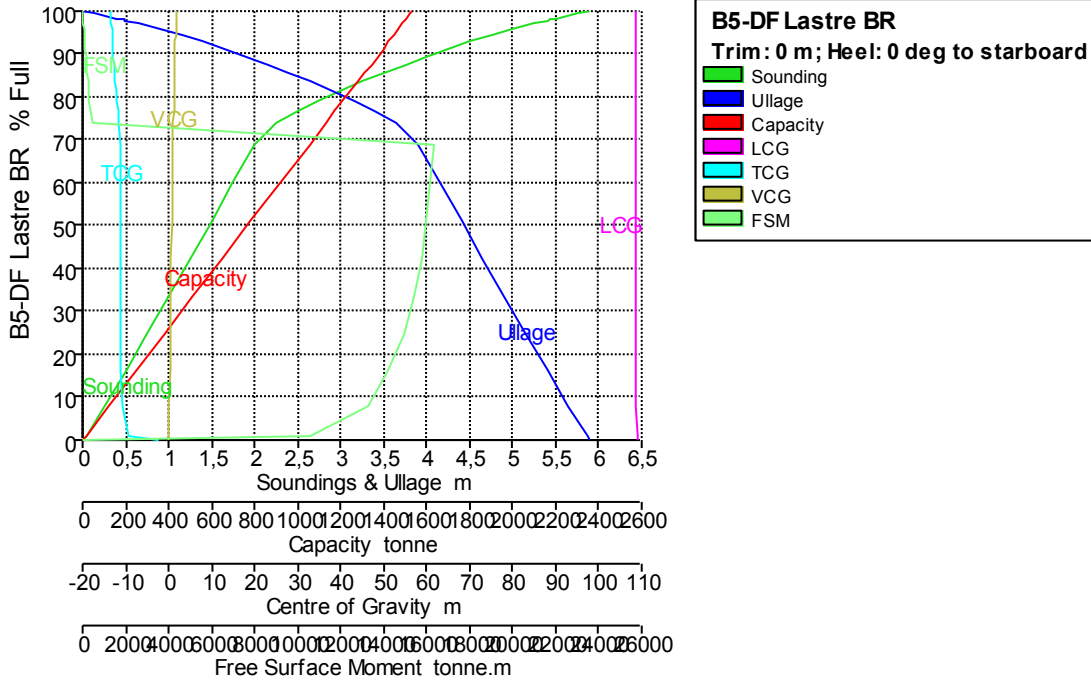
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,200	4,815	1,390	12,157	12,461	108,799	20,110	16,638	30,803
	0,147	4,868	1,000	8,747	8,966	108,799	20,134	16,610	27,325
	0,000	5,015	0,000	0,000	0,000	108,799	20,199	16,535	0,000

Tank Calibrations - B5-DF Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B5-DF Lastre BR	5,900	0,000	100,000	1493,633	1530,974	108,816	-13,539	1,794	0,000
	5,750	0,150	99,418	1484,942	1522,066	108,816	-13,500	1,770	23,699
	5,500	0,400	98,354	1469,042	1505,768	108,816	-13,429	1,729	32,856
	5,422	0,477	98,000	1463,760	1500,355	108,816	-13,406	1,715	36,111
	5,401	0,499	97,900	1462,267	1498,823	108,816	-13,399	1,711	37,050
	5,250	0,650	97,173	1451,412	1487,698	108,816	-13,350	1,684	44,112
	5,000	0,900	95,877	1432,053	1467,854	108,816	-13,263	1,638	57,683
	4,750	1,150	94,465	1410,963	1446,237	108,817	-13,167	1,590	73,786
	4,500	1,400	92,937	1388,144	1422,847	108,817	-13,061	1,540	92,638
	4,250	1,650	91,294	1363,595	1397,685	108,817	-12,947	1,489	114,435
	4,000	1,900	89,535	1337,318	1370,751	108,818	-12,821	1,437	139,402
	3,750	2,150	87,660	1309,314	1342,047	108,818	-12,685	1,385	167,758
	3,500	2,400	85,669	1279,581	1311,571	108,818	-12,537	1,333	199,721
	3,250	2,650	83,563	1248,122	1279,325	108,819	-12,375	1,281	235,450
	3,000	2,900	81,341	1214,938	1245,312	108,819	-12,199	1,231	275,164
	2,750	3,150	79,004	1180,031	1209,532	108,820	-12,006	1,182	319,071
	2,500	3,400	76,552	1143,406	1171,991	108,820	-11,796	1,136	367,192
	2,250	3,650	73,986	1105,073	1132,700	108,821	-11,565	1,093	419,372
	2,000	3,900	68,843	1028,258	1053,964	108,822	-11,401	1,019	16328,118
	1,750	4,150	59,963	895,627	918,018	108,823	-11,361	0,892	16194,967
	1,500	4,400	51,114	763,451	782,537	108,824	-11,313	0,765	16000,869

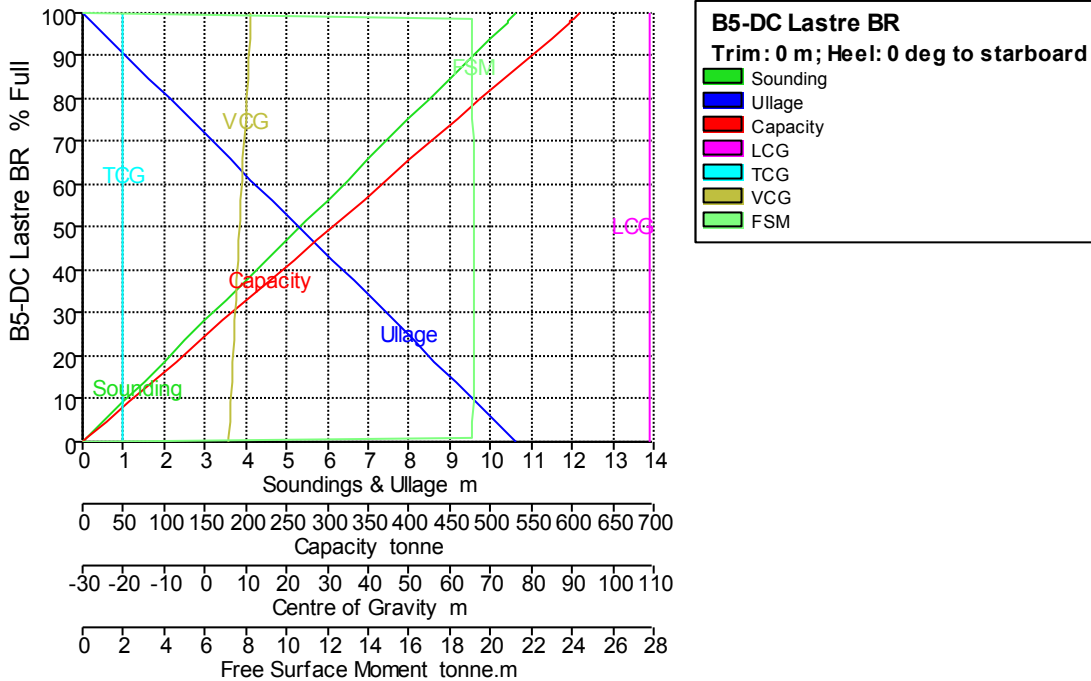
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	1,250	4,650	42,306	631,898	647,696	108,826	-11,253	0,638	15743,826
	1,000	4,900	33,554	501,180	513,709	108,828	-11,179	0,511	15399,779
	0,750	5,150	24,879	371,608	380,898	108,830	-11,083	0,383	14926,624
	0,500	5,400	16,316	243,694	249,786	108,832	-10,950	0,256	14236,321
	0,250	5,650	7,915	118,227	121,182	108,835	-10,724	0,130	13269,479
	0,038	5,862	1,000	14,936	15,310	108,840	-9,479	0,021	10627,299
	0,000	5,900	0,000	0,000	0,000	108,969	-2,420	0,000	0,000

Tank Calibrations - B5-DC Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

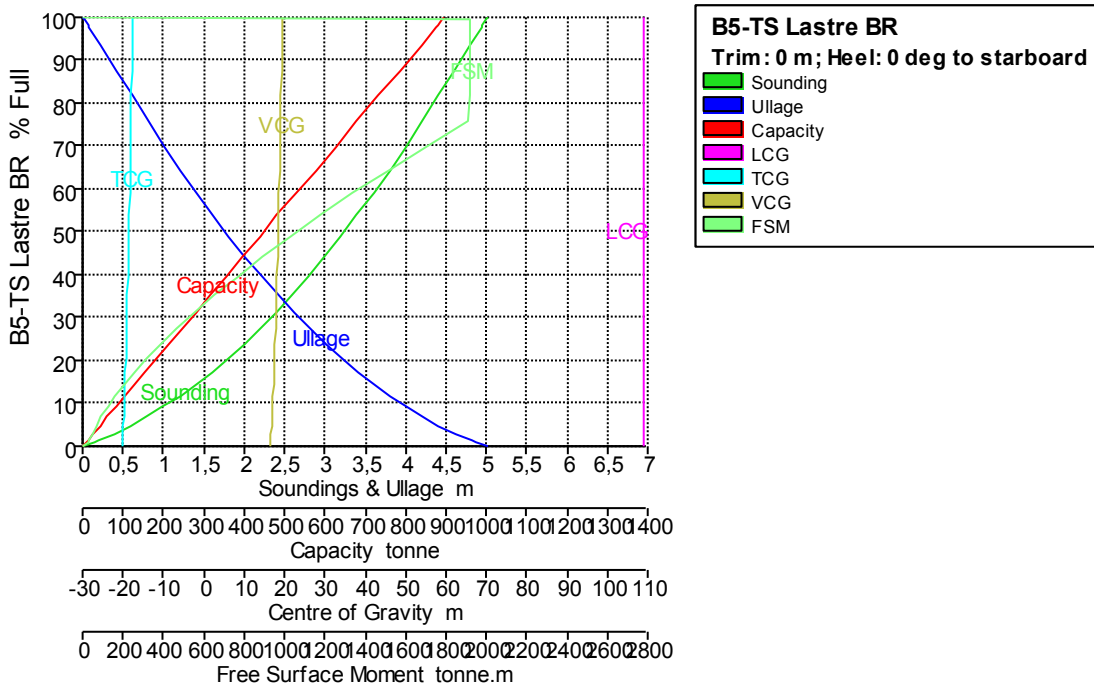


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B5-DC Lastre BR	10,635	0,000	100,000	595,641	610,532	108,800	-20,200	11,217	0,000
	10,500	0,135	98,732	588,087	602,790	108,800	-20,200	11,149	19,084
	10,422	0,213	98,000	583,728	598,321	108,800	-20,200	11,110	19,085
	10,411	0,224	97,900	583,132	597,711	108,800	-20,200	11,105	19,085
	10,000	0,635	94,035	560,110	574,112	108,800	-20,200	10,900	19,093
	9,500	1,135	89,337	532,127	545,430	108,801	-20,200	10,650	19,103
	9,000	1,635	84,638	504,139	516,743	108,801	-20,200	10,400	19,113
	8,500	2,135	79,939	476,147	488,050	108,801	-20,200	10,150	19,125
	8,000	2,635	75,238	448,147	459,351	108,801	-20,200	9,900	19,138
	7,500	3,135	70,536	420,142	430,646	108,801	-20,200	9,650	19,149
	7,000	3,635	65,834	392,133	401,936	108,801	-20,200	9,400	19,156
	6,500	4,135	61,131	364,121	373,224	108,801	-20,200	9,150	19,158
	6,000	4,635	56,428	336,109	344,512	108,801	-20,200	8,900	19,159
	5,500	5,135	51,725	308,096	315,799	108,801	-20,200	8,650	19,159
	5,000	5,635	47,022	280,084	287,086	108,801	-20,200	8,400	19,159
	4,500	6,135	42,319	252,072	258,374	108,801	-20,200	8,150	19,158
	4,000	6,635	37,617	224,060	229,661	108,801	-20,200	7,900	19,158

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	3,500	7,135	32,914	196,048	200,949	108,802	-20,200	7,650	19,157
	3,000	7,635	28,211	168,037	172,237	108,802	-20,200	7,400	19,155
	2,500	8,135	23,509	140,026	143,527	108,802	-20,200	7,150	19,153
	2,000	8,635	18,806	112,017	114,817	108,802	-20,200	6,900	19,152
	1,500	9,135	14,104	84,009	86,109	108,803	-20,200	6,650	19,147
	1,000	9,635	9,402	56,004	57,404	108,803	-20,200	6,400	19,142
	0,500	10,135	4,701	28,000	28,700	108,803	-20,200	6,150	19,137
	0,106	10,529	1,000	5,956	6,105	108,804	-20,200	5,953	19,133
	0,000	10,635	0,000	0,000	0,000	108,804	-20,200	5,900	0,000

Tank Calibrations - B5-TS Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

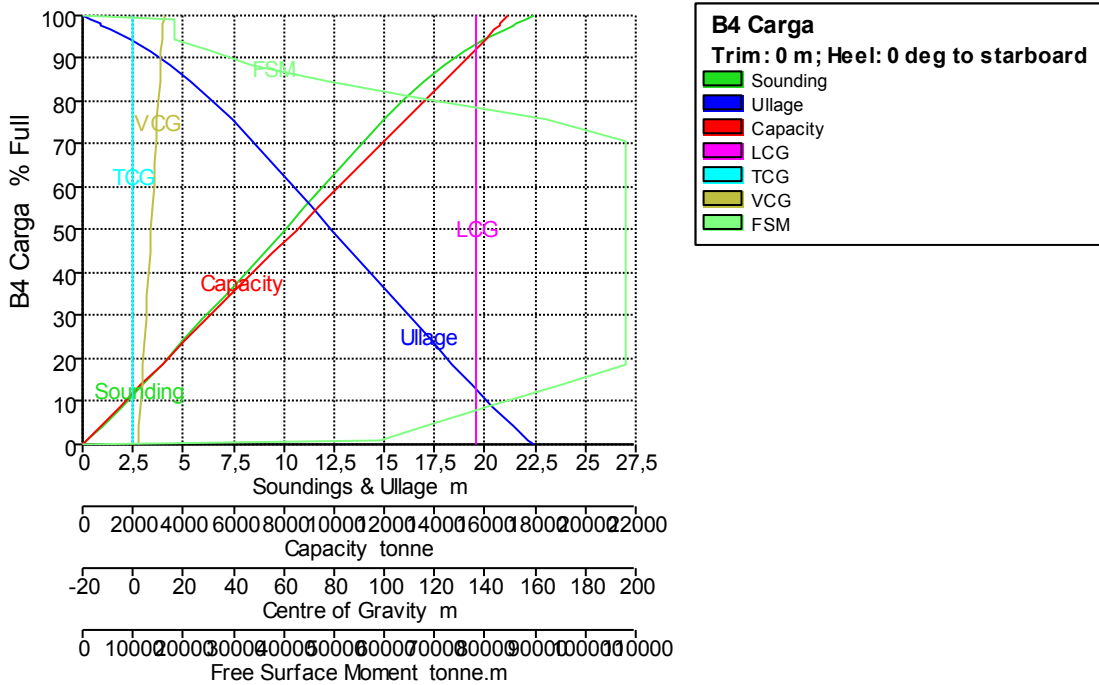


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B5-TS Lastre BR	5,015	0,000	100,000	874,692	896,559	108,799	-17,639	19,585	0,000
	5,000	0,015	99,554	870,788	892,557	108,799	-17,644	19,577	1921,334
	4,948	0,067	98,000	857,198	878,628	108,799	-17,662	19,546	1921,345
	4,944	0,071	97,900	856,323	877,731	108,799	-17,663	19,544	1921,346
	4,800	0,215	93,602	818,729	839,197	108,799	-17,714	19,458	1921,378
	4,600	0,415	87,650	766,670	785,837	108,799	-17,793	19,338	1921,423
	4,400	0,615	81,699	714,611	732,477	108,799	-17,884	19,214	1921,468
	4,200	0,815	75,748	662,557	679,121	108,799	-17,989	19,087	1905,447
	4,000	1,015	69,923	611,613	626,903	108,799	-18,101	18,958	1699,770
	3,800	1,215	64,321	562,608	576,673	108,799	-18,212	18,829	1509,453
	3,600	1,415	58,940	515,542	528,431	108,799	-18,323	18,701	1333,900
	3,400	1,615	53,781	470,416	482,176	108,799	-18,434	18,573	1172,515
	3,200	1,815	48,843	427,229	437,910	108,799	-18,545	18,445	1024,702
	3,000	2,015	44,128	385,982	395,631	108,799	-18,655	18,318	889,865
	2,800	2,215	39,634	346,674	355,341	108,799	-18,765	18,191	767,408

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	2,600	2,415	35,362	309,306	317,038	108,799	-18,874	18,065	656,735
	2,400	2,615	31,311	273,877	280,724	108,799	-18,983	17,939	557,249
	2,200	2,815	27,483	240,388	246,397	108,799	-19,091	17,814	468,355
	2,000	3,015	23,876	208,838	214,058	108,799	-19,199	17,690	389,458
	1,800	3,215	20,490	179,227	183,708	108,799	-19,306	17,566	319,963
	1,600	3,415	17,327	151,556	155,345	108,799	-19,412	17,444	259,270
	1,400	3,615	14,385	125,824	128,969	108,799	-19,517	17,323	206,782
	1,200	3,815	11,665	102,031	104,582	108,799	-19,620	17,203	161,904
	1,000	4,015	9,166	80,177	82,182	108,799	-19,723	17,085	124,040
	0,800	4,215	6,890	60,263	61,770	108,799	-19,823	16,969	92,594
	0,600	4,415	4,835	42,289	43,346	108,799	-19,922	16,856	66,970
	0,400	4,615	3,001	26,253	26,909	108,799	-20,018	16,745	46,571
	0,200	4,815	1,390	12,157	12,461	108,799	-20,110	16,638	30,803
	0,147	4,868	1,000	8,747	8,966	108,799	-20,134	16,610	27,325
	0,000	5,015	0,000	0,000	0,000	108,799	-20,199	16,535	0,000

Tank Calibrations - B4 Carga

Fluid Type = HOMOGEN Specific gravity = 0,817
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B4 Carga	22,400	0,000	100,000	20737,307	16942,380	136,806	0,000	12,288	0,000
	22,000	0,400	99,078	20546,029	16786,106	136,805	0,000	12,177	18441,554
	21,533	0,867	98,000	20322,562	16603,533	136,804	0,000	12,048	18441,554
	21,489	0,911	97,900	20301,824	16586,590	136,804	0,000	12,037	18441,554
	21,000	1,400	96,772	20067,837	16395,423	136,803	0,000	11,905	18441,554
	20,000	2,400	94,466	19589,644	16004,739	136,801	0,000	11,644	18441,554
	19,000	3,400	91,751	19026,758	15544,862	136,800	0,000	11,351	25699,796
	18,000	4,400	88,439	18339,869	14983,673	136,800	0,000	11,005	33705,613
	17,000	5,400	84,688	17561,928	14348,095	136,800	0,000	10,625	49017,823

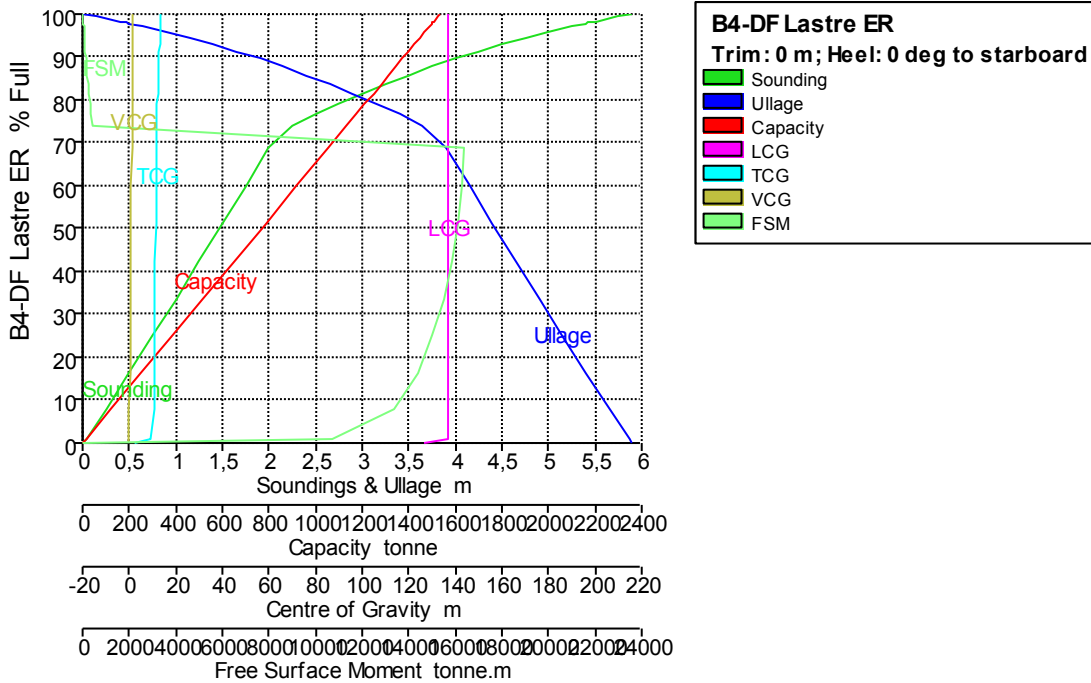
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	16,000	6,400	80,468	16686,995	13633,275	136,800	0,000	10,207	68380,997
	15,000	7,400	75,782	15715,070	12839,212	136,800	0,000	9,750	92270,549
	14,000	8,400	70,671	14655,338	11973,412	136,800	0,000	9,255	107942,523
	13,000	9,400	65,487	13580,138	11094,973	136,800	0,000	8,753	107942,523
	12,000	10,400	60,302	12504,938	10216,535	136,800	0,000	8,250	107942,523
	11,000	11,400	55,117	11429,738	9338,096	136,801	0,000	7,747	107942,523
	10,000	12,400	49,932	10354,538	8459,658	136,801	0,000	7,243	107942,523
	9,000	13,400	44,747	9279,338	7581,219	136,801	0,000	6,738	107942,523
	8,000	14,400	39,562	8204,138	6702,781	136,801	0,000	6,232	107942,523
	7,000	15,400	34,377	7128,938	5824,342	136,801	0,000	5,725	107942,523
	6,000	16,400	29,192	6053,738	4945,904	136,801	0,000	5,214	107942,523
	5,000	17,400	24,008	4978,538	4067,466	136,801	0,000	4,698	107942,523
	4,000	18,400	18,823	3903,338	3189,027	136,802	0,000	4,175	107942,523
	3,000	19,400	13,723	2845,754	2324,981	136,802	0,000	3,644	95214,440
	2,000	20,400	8,883	1842,119	1505,011	136,802	0,000	3,120	80764,547
	1,000	21,400	4,309	893,535	730,018	136,803	0,000	2,605	67855,975
	0,238	22,162	1,000	207,373	169,424	136,803	0,000	2,219	58996,907
	0,000	22,400	0,000	0,000	0,000	136,804	0,000	2,100	0,000

Tank Calibrations - B4-DF Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

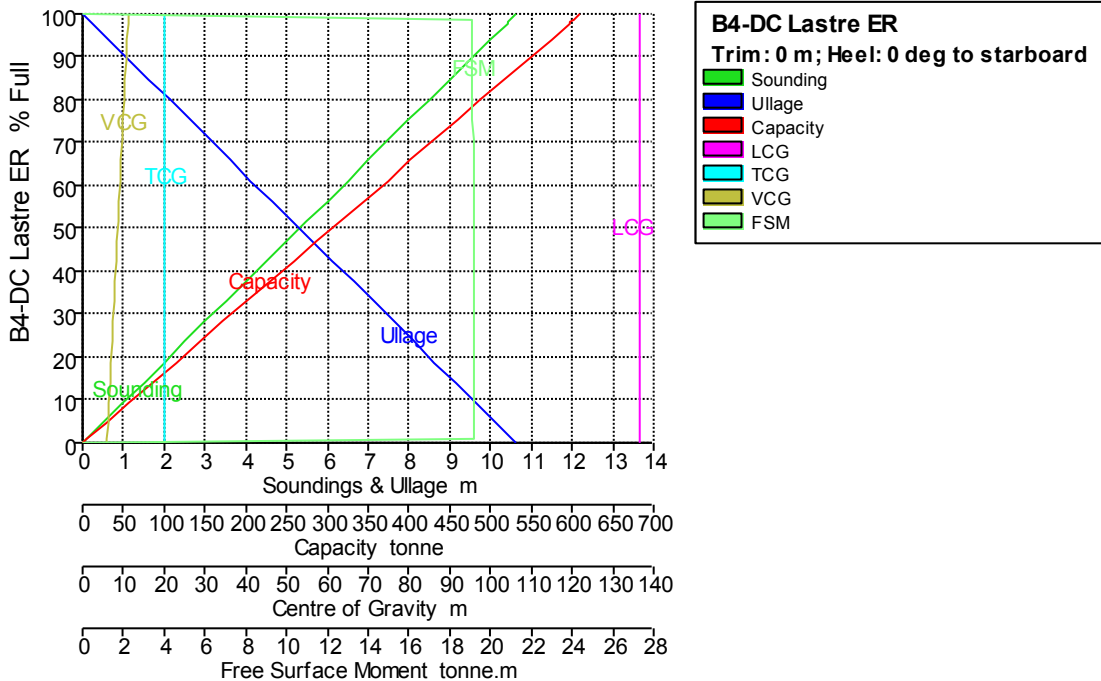


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B4-DF Lastre ER	5,900	0,000	100,000	1495,267	1532,648	136,799	13,550	1,792	0,000
	5,750	0,150	99,419	1486,574	1523,738	136,799	13,511	1,768	23,700
	5,500	0,400	98,356	1470,678	1507,445	136,799	13,440	1,726	32,801
	5,422	0,478	98,000	1465,361	1501,995	136,799	13,417	1,713	36,058
	5,400	0,499	97,900	1463,866	1500,463	136,799	13,410	1,709	36,993
	5,250	0,650	97,177	1453,062	1489,389	136,799	13,362	1,682	43,976

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	5,000	0,900	95,884	1433,726	1469,570	136,799	13,275	1,636	57,439
	4,750	1,150	94,476	1412,670	1447,987	136,799	13,179	1,587	73,401
	4,500	1,400	92,953	1389,894	1424,641	136,799	13,074	1,538	92,077
	4,250	1,650	91,315	1365,398	1399,532	136,799	12,960	1,487	113,678
	4,000	1,900	89,561	1339,181	1372,661	136,799	12,835	1,435	138,417
	3,750	2,150	87,693	1311,244	1344,026	136,799	12,699	1,383	166,506
	3,500	2,400	85,710	1281,588	1313,628	136,799	12,552	1,331	198,161
	3,250	2,650	83,611	1250,211	1281,467	136,799	12,391	1,280	233,591
	3,000	2,900	81,398	1217,115	1247,543	136,800	12,216	1,230	273,003
	2,750	3,150	79,069	1182,299	1211,856	136,800	12,024	1,181	316,616
	2,500	3,400	76,626	1145,763	1174,407	136,800	11,815	1,135	364,624
	2,250	3,650	74,068	1107,509	1135,197	136,800	11,585	1,093	417,213
	2,000	3,900	68,929	1030,671	1056,438	136,801	11,422	1,018	16382,796
	1,750	4,150	60,047	897,867	920,314	136,801	11,383	0,892	16265,839
	1,500	4,400	51,194	765,479	784,616	136,801	11,336	0,765	16084,371
	1,250	4,650	42,379	633,680	649,522	136,801	11,278	0,638	15838,630
	1,000	4,900	33,618	502,683	515,250	136,801	11,206	0,511	15504,960
	0,750	5,150	24,932	372,799	382,119	136,801	11,111	0,383	15041,401
	0,500	5,400	16,354	244,538	250,651	136,801	10,980	0,256	14357,822
	0,250	5,650	7,937	118,678	121,645	136,801	10,757	0,129	13405,018
	0,038	5,862	1,000	14,953	15,326	136,800	9,504	0,021	10730,489
	0,000	5,900	0,000	0,000	0,000	126,624	2,170	-0,106	0,000

Tank Calibrations - B4-DC Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

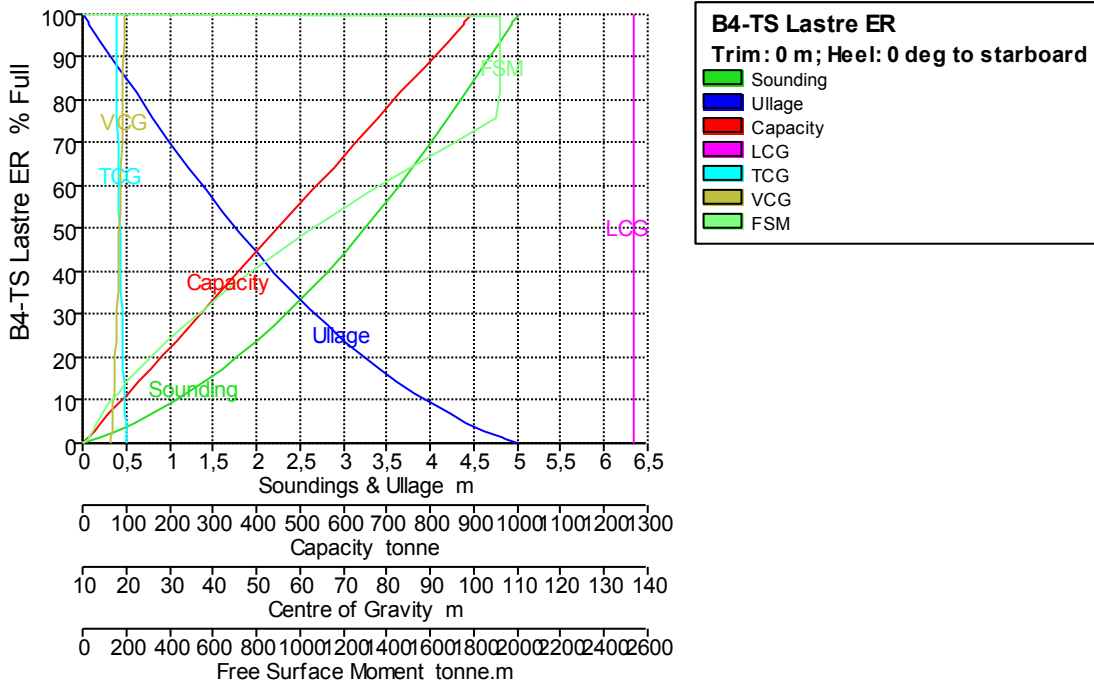


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B4-DC Lastre ER	10,635	0,000	100,000	595,651	610,542	136,800	20,200	11,216	0,000
	10,500	0,135	98,732	588,100	602,802	136,800	20,200	11,149	19,065

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	10,422	0,213	98,000	583,738	598,331	136,800	20,200	11,110	19,066
	10,411	0,224	97,900	583,142	597,721	136,800	20,200	11,105	19,067
	10,000	0,635	94,037	560,130	574,134	136,800	20,200	10,899	19,077
	9,500	1,135	89,340	532,155	545,459	136,800	20,200	10,649	19,090
	9,000	1,635	84,642	504,173	516,777	136,800	20,200	10,400	19,103
	8,500	2,135	79,943	476,183	488,088	136,800	20,200	10,150	19,120
	8,000	2,635	75,243	448,185	459,390	136,800	20,200	9,900	19,137
	7,500	3,135	70,541	420,180	430,684	136,800	20,200	9,650	19,151
	7,000	3,635	65,839	392,169	401,973	136,800	20,200	9,400	19,157
	6,500	4,135	61,136	364,157	373,261	136,800	20,200	9,150	19,158
	6,000	4,635	56,433	336,145	344,549	136,800	20,200	8,900	19,159
	5,500	5,135	51,730	308,133	315,836	136,800	20,200	8,650	19,159
	5,000	5,635	47,028	280,120	287,123	136,800	20,200	8,400	19,159
	4,500	6,135	42,325	252,108	258,410	136,800	20,200	8,150	19,159
	4,000	6,635	37,622	224,095	229,698	136,800	20,200	7,900	19,159
	3,500	7,135	32,919	196,083	200,985	136,800	20,200	7,650	19,159
	3,000	7,635	28,216	168,071	172,273	136,800	20,200	7,400	19,158
	2,500	8,135	23,514	140,059	143,560	136,800	20,200	7,150	19,158
	2,000	8,635	18,811	112,047	114,848	136,800	20,200	6,900	19,158
	1,500	9,135	14,108	84,035	86,135	136,800	20,200	6,650	19,158
	1,000	9,635	9,405	56,023	57,423	136,800	20,200	6,400	19,157
	0,500	10,135	4,703	28,011	28,712	136,800	20,200	6,150	19,157
	0,106	10,529	1,000	5,957	6,105	136,800	20,200	5,953	19,156
	0,000	10,635	0,000	0,000	0,000	136,800	20,200	5,900	0,000

Tank Calibrations - B4-TS Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
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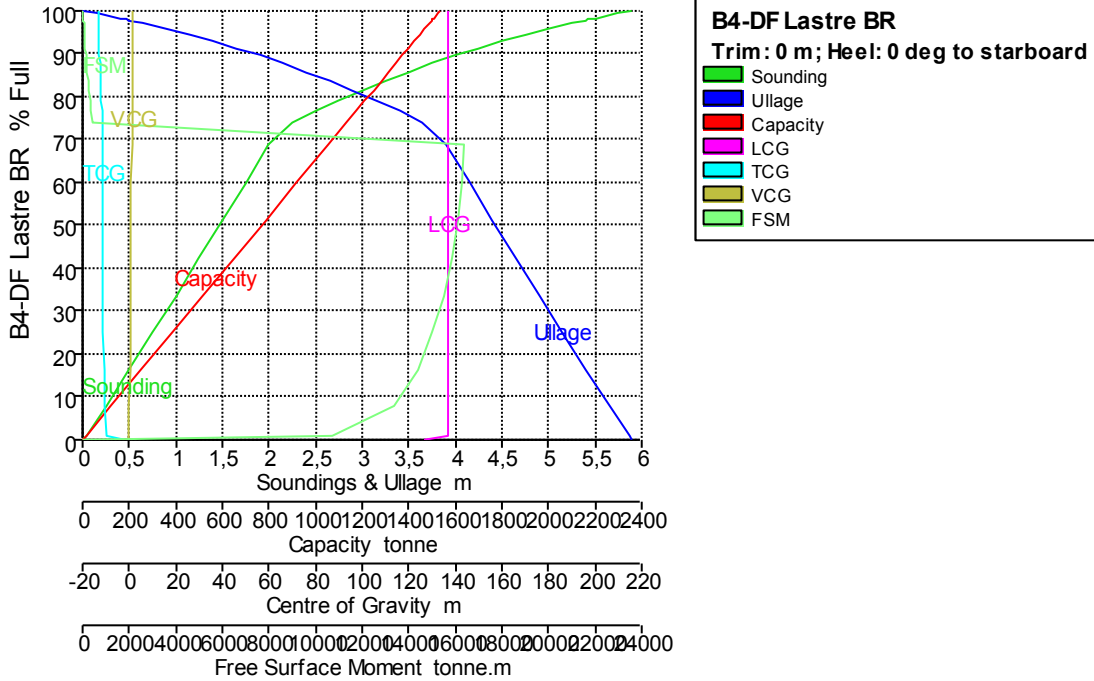
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B4-TS Lastre ER	5,015	0,000	100,000	874,555	896,419	136,800	17,639	19,585	0,000
	5,000	0,015	99,554	870,651	892,417	136,800	17,644	19,577	1920,540
	4,948	0,067	98,000	857,064	878,490	136,800	17,661	19,546	1920,555
	4,944	0,071	97,900	856,189	877,594	136,800	17,662	19,544	1920,556
	4,800	0,215	93,602	818,600	839,065	136,800	17,713	19,458	1920,597
	4,600	0,415	87,650	766,548	785,712	136,800	17,793	19,338	1920,654
	4,400	0,615	81,698	714,496	732,358	136,800	17,883	19,214	1920,711
	4,200	0,815	75,747	662,449	679,010	136,800	17,988	19,087	1904,707
	4,000	1,015	69,923	611,511	626,798	136,800	18,100	18,958	1699,097
	3,800	1,215	64,320	562,512	576,575	136,800	18,212	18,829	1508,844
	3,600	1,415	58,939	515,453	528,339	136,800	18,323	18,701	1333,350
	3,400	1,615	53,780	470,333	482,091	136,800	18,434	18,573	1172,021
	3,200	1,815	48,842	427,152	437,831	136,800	18,544	18,445	1024,261
	3,000	2,015	44,127	385,911	395,559	136,800	18,655	18,318	889,472
	2,800	2,215	39,633	346,609	355,275	136,800	18,764	18,191	767,060
	2,600	2,415	35,360	309,247	316,978	136,800	18,874	18,065	656,428
	2,400	2,615	31,310	273,823	280,669	136,800	18,983	17,939	556,980
	2,200	2,815	27,481	240,340	246,348	136,800	19,091	17,814	468,121
	2,000	3,015	23,874	208,795	214,015	136,800	19,199	17,690	389,259
	1,800	3,215	20,489	179,189	183,669	136,800	19,305	17,566	319,795
	1,600	3,415	17,326	151,523	155,311	136,800	19,411	17,444	259,129
	1,400	3,615	14,384	125,796	128,941	136,800	19,516	17,323	206,666
	1,200	3,815	11,664	102,008	104,558	136,800	19,620	17,203	161,809
	1,000	4,015	9,166	80,159	82,163	136,800	19,722	17,085	123,964
	0,800	4,215	6,889	60,249	61,755	136,800	19,823	16,969	92,534
	0,600	4,415	4,834	42,278	43,335	136,800	19,921	16,856	66,924
	0,400	4,615	3,001	26,246	26,902	136,799	20,017	16,745	46,537
	0,200	4,815	1,390	12,153	12,457	136,799	20,110	16,638	30,778
	0,147	4,868	1,000	8,745	8,964	136,799	20,134	16,610	27,304
	0,000	5,015	0,000	0,000	0,000	136,799	20,199	16,535	0,000

Tank Calibrations - B4-DF Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

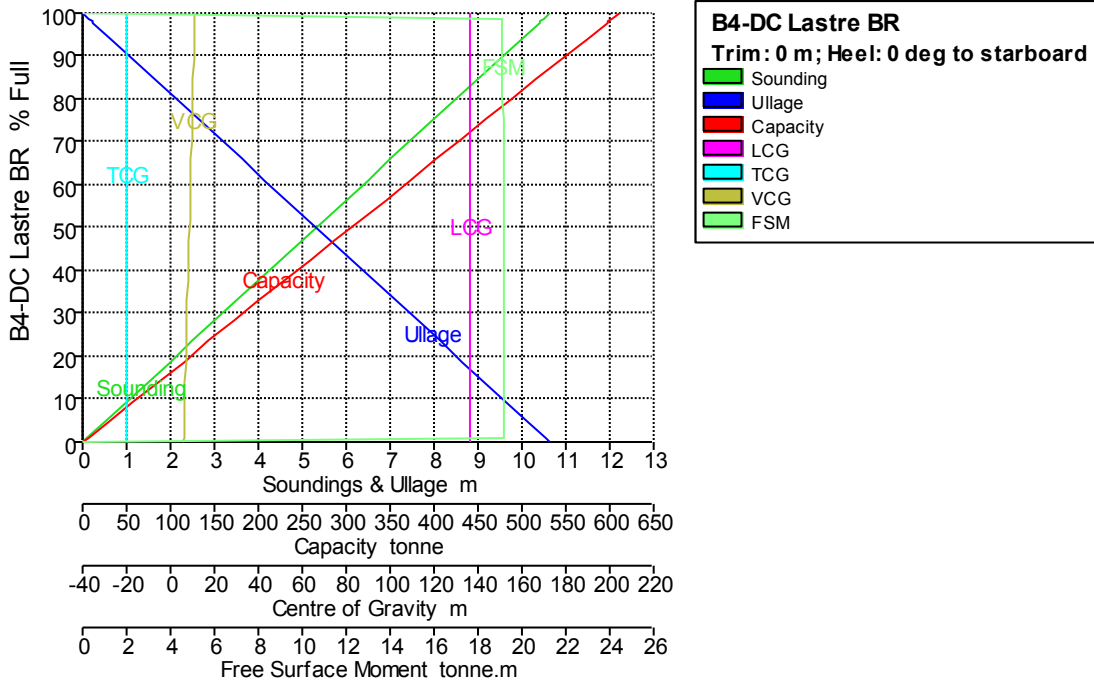


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B4-DF Lastre BR	5,900	0,000	100,000	1495,267	1532,648	136,799	-13,550	1,792	0,000
	5,750	0,150	99,419	1486,574	1523,738	136,799	-13,511	1,768	23,700
	5,500	0,400	98,356	1470,678	1507,445	136,799	-13,440	1,726	32,801
	5,422	0,478	98,000	1465,361	1501,995	136,799	-13,417	1,713	36,058
	5,400	0,499	97,900	1463,866	1500,463	136,799	-13,410	1,709	36,993
	5,250	0,650	97,177	1453,062	1489,389	136,799	-13,362	1,682	43,976
	5,000	0,900	95,884	1433,726	1469,570	136,799	-13,275	1,636	57,439
	4,750	1,150	94,476	1412,670	1447,987	136,799	-13,179	1,587	73,401
	4,500	1,400	92,953	1389,894	1424,641	136,799	-13,074	1,538	92,077
	4,250	1,650	91,315	1365,398	1399,532	136,799	-12,960	1,487	113,678
	4,000	1,900	89,561	1339,181	1372,661	136,799	-12,835	1,435	138,417
	3,750	2,150	87,693	1311,244	1344,026	136,799	-12,699	1,383	166,506
	3,500	2,400	85,710	1281,588	1313,628	136,799	-12,552	1,331	198,161
	3,250	2,650	83,611	1250,211	1281,467	136,799	-12,391	1,280	233,591
	3,000	2,900	81,398	1217,115	1247,543	136,800	-12,216	1,230	273,003
	2,750	3,150	79,069	1182,299	1211,856	136,800	-12,024	1,181	316,616
	2,500	3,400	76,626	1145,763	1174,407	136,800	-11,815	1,135	364,624
	2,250	3,650	74,068	1107,509	1135,197	136,800	-11,585	1,093	417,213
	2,000	3,900	68,929	1030,671	1056,438	136,801	-11,422	1,018	16382,796
	1,750	4,150	60,047	897,867	920,314	136,801	-11,383	0,892	16265,839
	1,500	4,400	51,194	765,479	784,616	136,801	-11,336	0,765	16084,371
	1,250	4,650	42,379	633,680	649,522	136,801	-11,278	0,638	15838,630
	1,000	4,900	33,618	502,683	515,250	136,801	-11,206	0,511	15504,960
	0,750	5,150	24,932	372,799	382,119	136,801	-11,111	0,383	15041,401
	0,500	5,400	16,354	244,538	250,651	136,801	-10,980	0,256	14357,822
	0,250	5,650	7,937	118,678	121,645	136,801	-10,757	0,129	13405,018
	0,038	5,862	1,000	14,953	15,326	136,800	-9,504	0,021	10730,489
	0,000	5,900	0,000	0,000	0,000	126,624	-2,170	-0,106	0,000

Tank Calibrations - B4-DC Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



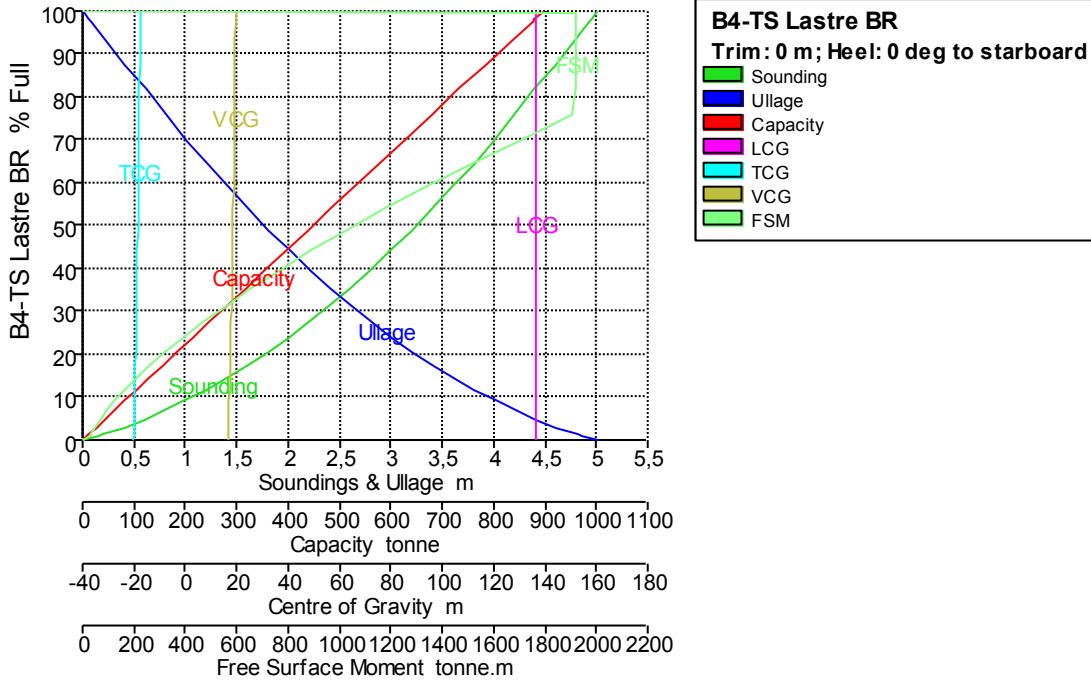
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B4-DC Lastre BR	10,635	0,000	100,000	595,651	610,542	136,800	-20,200	11,216	0,000
	10,500	0,135	98,732	588,100	602,802	136,800	-20,200	11,149	19,065
	10,422	0,213	98,000	583,738	598,331	136,800	-20,200	11,110	19,066
	10,411	0,224	97,900	583,142	597,721	136,800	-20,200	11,105	19,067
	10,000	0,635	94,037	560,130	574,134	136,800	-20,200	10,899	19,077
	9,500	1,135	89,340	532,155	545,459	136,800	-20,200	10,649	19,090
	9,000	1,635	84,642	504,173	516,777	136,800	-20,200	10,400	19,103
	8,500	2,135	79,943	476,183	488,088	136,800	-20,200	10,150	19,120
	8,000	2,635	75,243	448,185	459,390	136,800	-20,200	9,900	19,137
	7,500	3,135	70,541	420,180	430,684	136,800	-20,200	9,650	19,151
	7,000	3,635	65,839	392,169	401,973	136,800	-20,200	9,400	19,157
	6,500	4,135	61,136	364,157	373,261	136,800	-20,200	9,150	19,158
	6,000	4,635	56,433	336,145	344,549	136,800	-20,200	8,900	19,159
	5,500	5,135	51,730	308,133	315,836	136,800	-20,200	8,650	19,159
	5,000	5,635	47,028	280,120	287,123	136,800	-20,200	8,400	19,159
	4,500	6,135	42,325	252,108	258,410	136,800	-20,200	8,150	19,159
	4,000	6,635	37,622	224,095	229,698	136,800	-20,200	7,900	19,159
	3,500	7,135	32,919	196,083	200,985	136,800	-20,200	7,650	19,159
	3,000	7,635	28,216	168,071	172,273	136,800	-20,200	7,400	19,158
	2,500	8,135	23,514	140,059	143,560	136,800	-20,200	7,150	19,158
	2,000	8,635	18,811	112,047	114,848	136,800	-20,200	6,900	19,158
	1,500	9,135	14,108	84,035	86,135	136,800	-20,200	6,650	19,158
	1,000	9,635	9,405	56,023	57,423	136,800	-20,200	6,400	19,157
	0,500	10,135	4,703	28,011	28,712	136,800	-20,200	6,150	19,157
	0,106	10,529	1,000	5,957	6,105	136,800	-20,200	5,953	19,156
	0,000	10,635	0,000	0,000	0,000	136,800	-20,200	5,900	0,000

Tank Calibrations - B4-TS Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



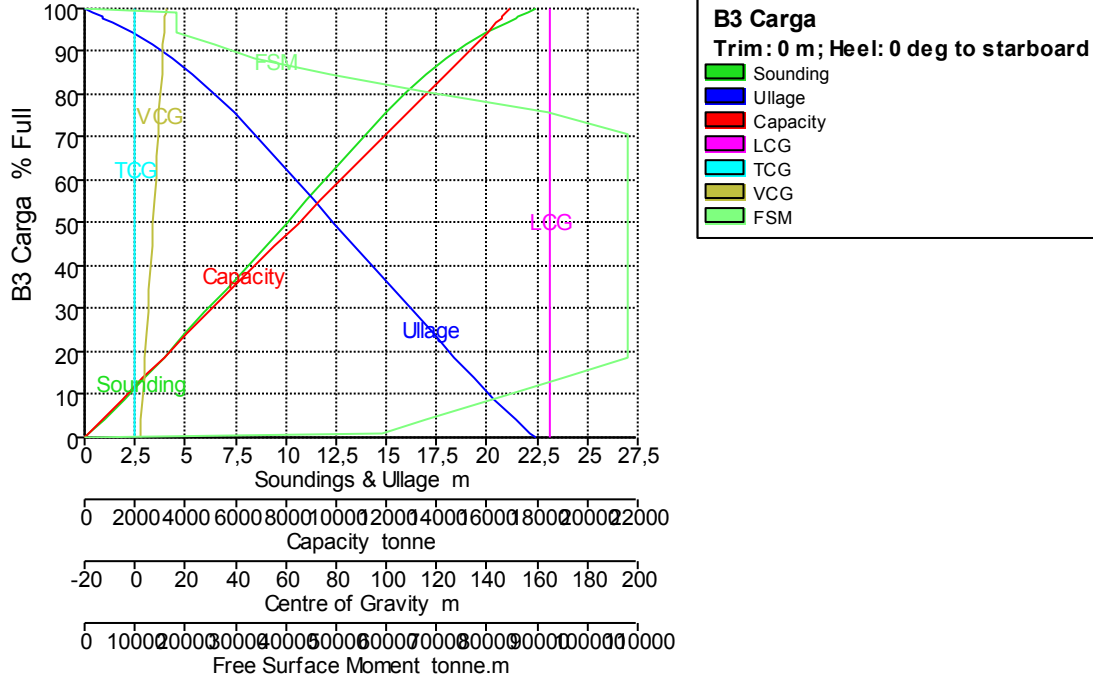
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B4-TS Lastre BR	5,015	0,000	100,000	874,554	896,418	136,800	-17,639	19,585	0,000
	5,000	0,015	99,554	870,651	892,417	136,800	-17,644	19,577	1920,531
	4,948	0,067	98,000	857,063	878,490	136,800	-17,661	19,546	1920,546
	4,944	0,071	97,900	856,189	877,593	136,800	-17,662	19,544	1920,547
	4,800	0,215	93,602	818,599	839,064	136,800	-17,713	19,458	1920,588
	4,600	0,415	87,650	766,548	785,711	136,800	-17,793	19,338	1920,646
	4,400	0,615	81,698	714,496	732,358	136,800	-17,883	19,214	1920,703
	4,200	0,815	75,747	662,448	679,010	136,800	-17,988	19,087	1904,700
	4,000	1,015	69,923	611,510	626,798	136,800	-18,100	18,958	1699,091
	3,800	1,215	64,320	562,512	576,575	136,800	-18,212	18,829	1508,839
	3,600	1,415	58,939	515,453	528,339	136,800	-18,323	18,701	1333,347
	3,400	1,615	53,780	470,333	482,091	136,800	-18,434	18,573	1172,019
	3,200	1,815	48,842	427,152	437,831	136,800	-18,544	18,445	1024,259
	3,000	2,015	44,127	385,911	395,559	136,800	-18,655	18,318	889,471
	2,800	2,215	39,633	346,609	355,275	136,800	-18,764	18,191	767,059
	2,600	2,415	35,360	309,247	316,978	136,800	-18,874	18,065	656,427
	2,400	2,615	31,310	273,823	280,669	136,800	-18,983	17,939	556,980
	2,200	2,815	27,481	240,340	246,348	136,800	-19,091	17,814	468,121
	2,000	3,015	23,874	208,795	214,015	136,800	-19,199	17,690	389,259
	1,800	3,215	20,489	179,189	183,669	136,800	-19,305	17,566	319,795
	1,600	3,415	17,326	151,523	155,311	136,800	-19,411	17,444	259,129
	1,400	3,615	14,384	125,796	128,941	136,800	-19,516	17,323	206,666
	1,200	3,815	11,664	102,008	104,558	136,800	-19,620	17,203	161,809
	1,000	4,015	9,166	80,159	82,163	136,800	-19,722	17,085	123,964
	0,800	4,215	6,889	60,249	61,755	136,800	-19,823	16,969	92,534
	0,600	4,415	4,834	42,278	43,335	136,800	-19,921	16,856	66,924
	0,400	4,615	3,001	26,246	26,902	136,799	-20,017	16,745	46,537
	0,200	4,815	1,390	12,153	12,457	136,799	-20,110	16,638	30,778
	0,147	4,868	1,000	8,745	8,964	136,799	-20,134	16,610	27,304
	0,000	5,015	0,000	0,000	0,000	136,799	-20,199	16,535	0,000

Tank Calibrations - B3 Carga

Fluid Type = HOMOGEN Specific gravity = 0,817

Permeability = 100 %

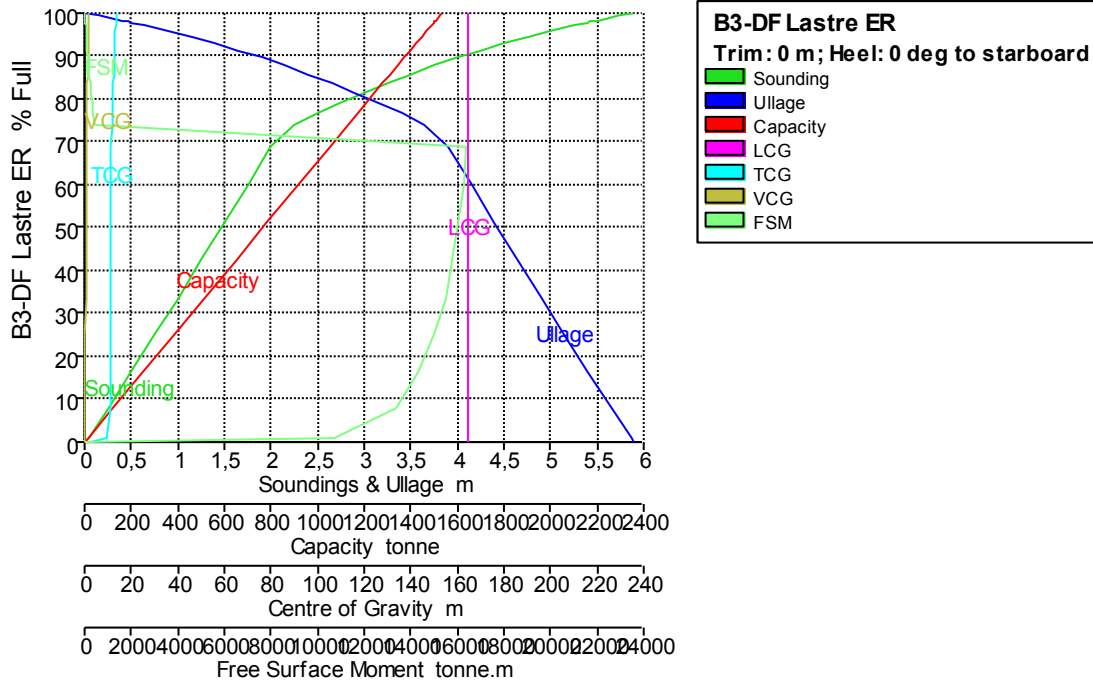
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B3 Carga	22,400	0,000	100,000	20739,831	16944,442	164,780	0,000	12,287	0,000
	22,000	0,400	99,078	20548,554	16788,169	164,783	0,000	12,175	18441,554
	21,533	0,867	98,000	20325,034	16605,553	164,786	0,000	12,047	18441,554
	21,489	0,911	97,900	20304,295	16588,609	164,786	0,000	12,036	18441,554
	21,000	1,400	96,772	20070,361	16397,485	164,789	0,000	11,904	18441,554
	20,000	2,400	94,466	19592,169	16006,802	164,796	0,000	11,643	18441,554
	19,000	3,400	91,752	19029,283	15546,924	164,800	0,000	11,350	25699,796
	18,000	4,400	88,440	18342,394	14985,736	164,800	0,000	11,004	33705,507
	17,000	5,400	84,689	17564,454	14350,159	164,800	0,000	10,624	49017,476
	16,000	6,400	80,471	16689,524	13635,341	164,800	0,000	10,206	68380,313
	15,000	7,400	75,785	15717,602	12841,281	164,800	0,000	9,749	92269,416
	14,000	8,400	70,675	14657,873	11975,483	164,800	0,000	9,254	107942,523
	13,000	9,400	65,491	13582,673	11097,044	164,800	0,000	8,752	107942,523
	12,000	10,400	60,307	12507,473	10218,606	164,800	0,000	8,249	107942,523
	11,000	11,400	55,122	11432,273	9340,167	164,801	0,000	7,746	107942,523
	10,000	12,400	49,938	10357,073	8461,729	164,801	0,000	7,242	107942,523
	9,000	13,400	44,754	9281,873	7583,290	164,801	0,000	6,738	107942,523
	8,000	14,400	39,570	8206,673	6704,852	164,801	0,000	6,232	107942,523
	7,000	15,400	34,385	7131,473	5826,414	164,801	0,000	5,724	107942,523
	6,000	16,400	29,201	6056,273	4947,975	164,801	0,000	5,213	107942,523
	5,000	17,400	24,017	4981,073	4069,537	164,801	0,000	4,698	107942,523
	4,000	18,400	18,833	3905,873	3191,098	164,802	0,000	4,174	107942,523
	3,000	19,400	13,733	2848,177	2326,960	164,802	0,000	3,643	95292,268
	2,000	20,400	8,892	1844,085	1506,618	164,802	0,000	3,120	80921,521
	1,000	21,400	4,314	894,693	730,964	164,803	0,000	2,605	68073,481
	0,237	22,163	1,000	207,399	169,445	164,803	0,000	2,219	59245,540
	0,000	22,400	0,000	0,000	0,000	164,804	0,000	2,100	0,000

Tank Calibrations - B3-DF Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

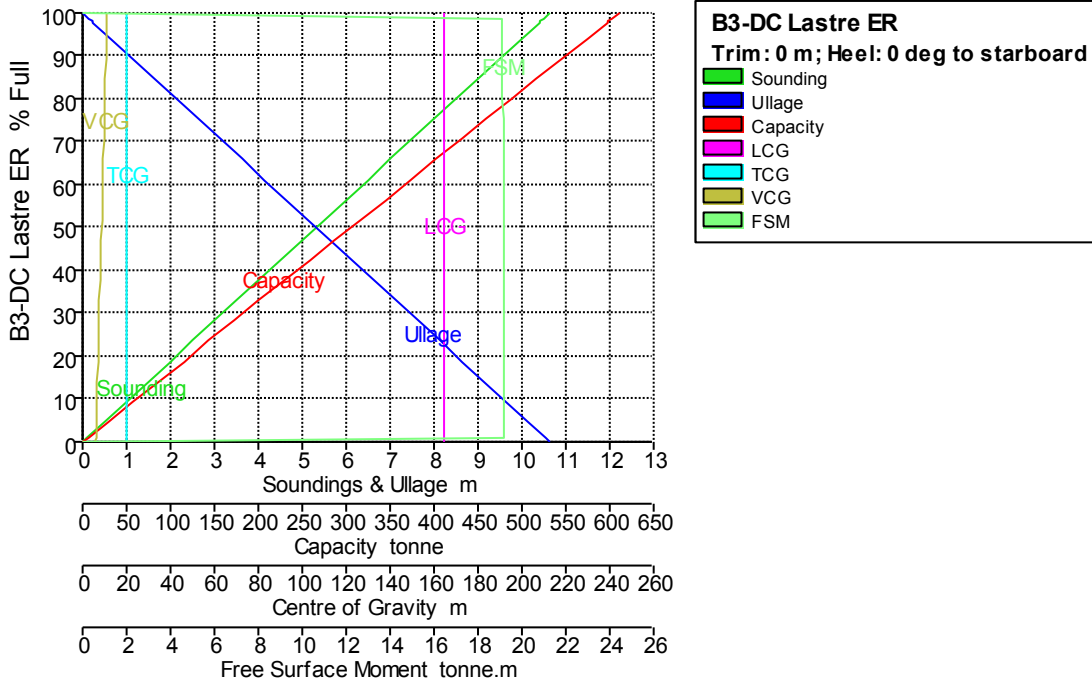


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B3-DF Lastre ER	5,900	0,000	100,000	1493,350	1530,684	164,795	13,544	1,791	0,000
	5,750	0,150	99,418	1484,658	1521,775	164,795	13,506	1,767	23,672
	5,500	0,400	98,354	1468,774	1505,494	164,794	13,435	1,725	32,703
	5,422	0,477	98,000	1463,483	1500,070	164,794	13,411	1,712	35,920
	5,401	0,499	97,900	1461,989	1498,539	164,794	13,404	1,708	36,847
	5,250	0,650	97,176	1451,181	1487,460	164,794	13,356	1,681	43,779
	5,000	0,900	95,884	1431,878	1467,675	164,794	13,269	1,635	57,111
	4,750	1,150	94,477	1410,866	1446,137	164,794	13,173	1,586	72,907
	4,500	1,400	92,955	1388,144	1422,848	164,794	13,068	1,537	91,376
	4,250	1,650	91,319	1363,713	1397,806	164,794	12,954	1,486	112,727
	4,000	1,900	89,569	1337,573	1371,012	164,794	12,829	1,434	137,168
	3,750	2,150	87,704	1309,723	1342,466	164,794	12,693	1,382	164,909
	3,500	2,400	85,724	1280,164	1312,169	164,795	12,545	1,331	196,159
	3,250	2,650	83,631	1248,896	1280,119	164,795	12,385	1,280	231,125
	3,000	2,900	81,422	1215,919	1246,317	164,795	12,209	1,230	270,010
	2,750	3,150	79,100	1181,233	1210,764	164,795	12,018	1,181	313,029
	2,500	3,400	76,662	1144,838	1173,459	164,795	11,809	1,135	360,356
	2,250	3,650	74,111	1106,737	1134,405	164,795	11,579	1,093	412,112
	2,000	3,900	68,973	1030,005	1055,755	164,795	11,417	1,019	16376,509
	1,750	4,150	60,082	897,231	919,662	164,795	11,377	0,892	16250,943
	1,500	4,400	51,220	764,892	784,015	164,794	11,329	0,765	16063,484
	1,250	4,650	42,399	633,158	648,987	164,794	11,271	0,638	15812,732
	1,000	4,900	33,632	502,240	514,796	164,794	11,198	0,511	15474,899
	0,750	5,150	24,940	372,447	381,758	164,793	11,103	0,383	15008,241
	0,500	5,400	16,358	244,286	250,393	164,792	10,971	0,256	14322,358
	0,250	5,650	7,938	118,536	121,499	164,791	10,747	0,130	13367,531

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,038	5,862	1,000	14,933	15,307	164,789	9,492	0,021	10680,673
	0,000	5,900	0,000	0,000	0,000	164,787	2,420	0,000	0,000

Tank Calibrations - B3-DC Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

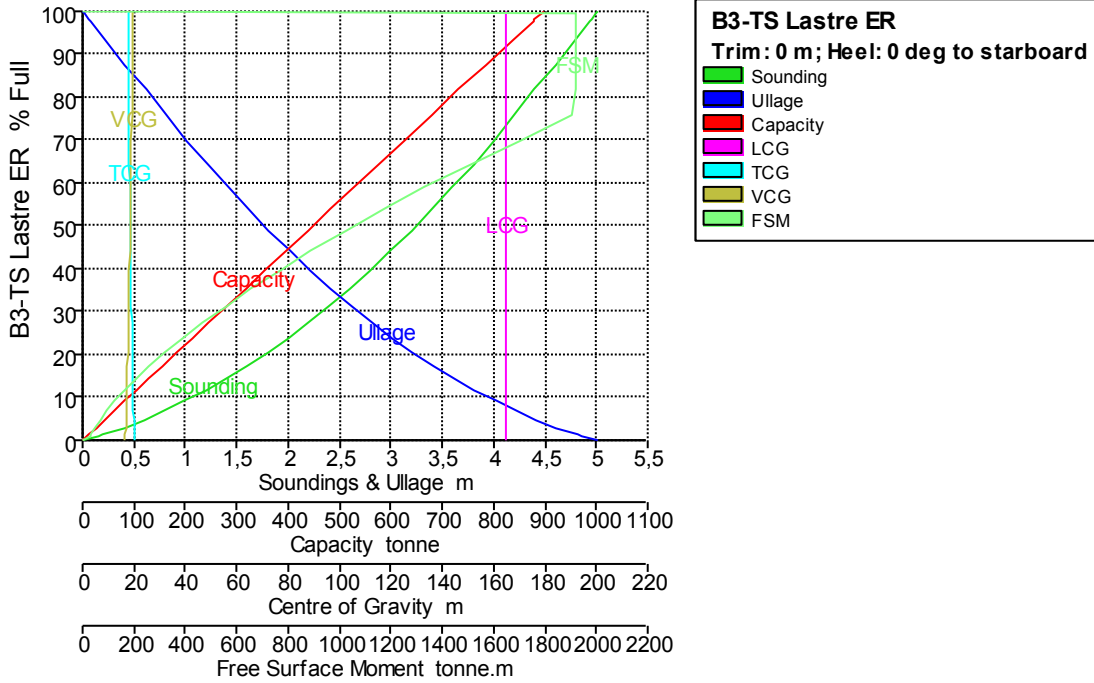


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B3-DC Lastre ER	10,635	0,000	100,000	595,643	610,534	164,800	20,200	11,216	0,000
	10,500	0,135	98,733	588,093	602,795	164,800	20,200	11,149	19,055
	10,422	0,213	98,000	583,730	598,323	164,800	20,200	11,110	19,057
	10,411	0,224	97,900	583,134	597,712	164,800	20,200	11,105	19,058
	10,000	0,635	94,038	560,128	574,131	164,800	20,200	10,899	19,070
	9,500	1,135	89,341	532,155	545,459	164,800	20,200	10,649	19,084
	9,000	1,635	84,644	504,176	516,780	164,800	20,200	10,400	19,099
	8,500	2,135	79,945	476,188	488,092	164,800	20,200	10,150	19,119
	8,000	2,635	75,245	448,190	459,395	164,800	20,200	9,900	19,138
	7,500	3,135	70,543	420,184	430,689	164,800	20,200	9,650	19,152
	7,000	3,635	65,840	392,173	401,978	164,800	20,200	9,400	19,157
	6,500	4,135	61,138	364,161	373,265	164,800	20,200	9,150	19,158
	6,000	4,635	56,435	336,149	344,553	164,800	20,200	8,900	19,159
	5,500	5,135	51,732	308,137	315,840	164,800	20,200	8,650	19,159
	5,000	5,635	47,029	280,124	287,127	164,800	20,200	8,400	19,159
	4,500	6,135	42,326	252,112	258,414	164,800	20,200	8,150	19,159
	4,000	6,635	37,623	224,099	229,702	164,800	20,200	7,900	19,159
	3,500	7,135	32,920	196,087	200,989	164,800	20,200	7,650	19,159
	3,000	7,635	28,217	168,074	172,276	164,800	20,200	7,400	19,159
	2,500	8,135	23,514	140,062	143,564	164,800	20,200	7,150	19,159
	2,000	8,635	18,812	112,050	114,851	164,800	20,200	6,900	19,159
	1,500	9,135	14,109	84,037	86,138	164,800	20,200	6,650	19,159

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	1,000	9,635	9,406	56,025	57,425	164,800	20,200	6,400	19,159
	0,500	10,135	4,703	28,012	28,713	164,800	20,200	6,150	19,159
	0,106	10,529	1,000	5,956	6,105	164,800	20,200	5,953	19,159
	0,000	10,635	0,000	0,000	0,000	164,800	20,200	5,900	0,000

Tank Calibrations - B3-TS Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

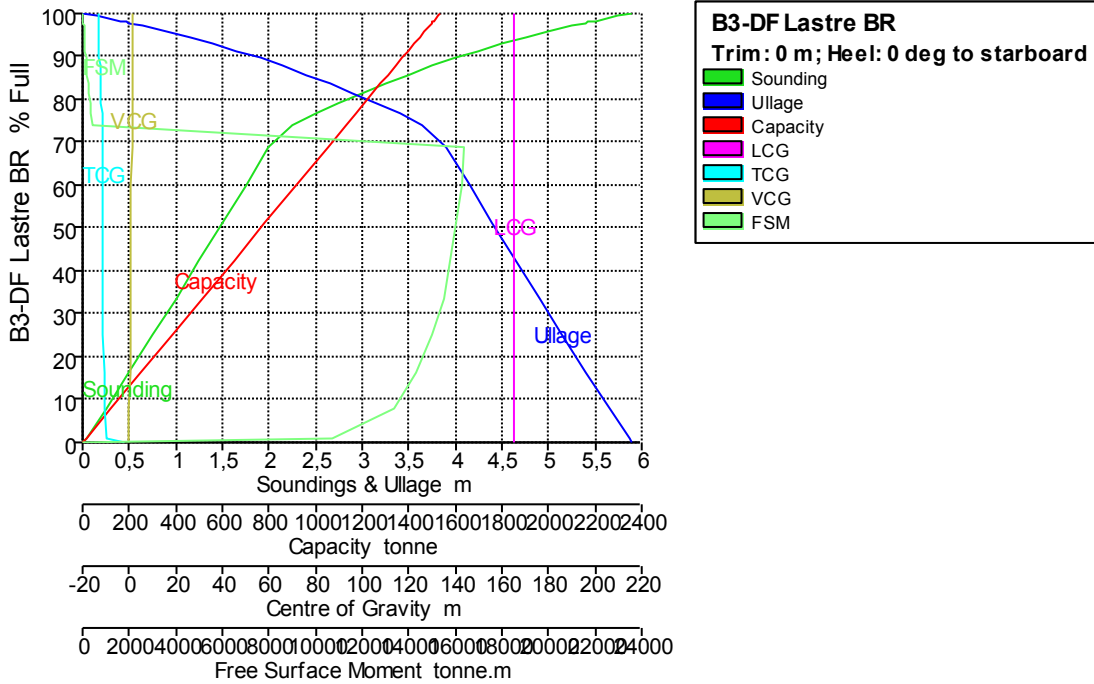


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B3-TS Lastre ER	5,015	0,000	100,000	874,487	896,350	164,800	17,639	19,585	0,000
	5,000	0,015	99,554	870,584	892,349	164,800	17,643	19,577	1920,114
	4,948	0,067	98,000	856,998	878,423	164,800	17,661	19,546	1920,131
	4,944	0,071	97,900	856,123	877,526	164,800	17,662	19,544	1920,132
	4,800	0,215	93,602	818,537	839,000	164,800	17,713	19,458	1920,179
	4,600	0,415	87,650	766,489	785,651	164,800	17,792	19,338	1920,244
	4,400	0,615	81,698	714,440	732,301	164,800	17,883	19,214	1920,309
	4,200	0,815	75,747	662,396	678,956	164,800	17,988	19,087	1904,315
	4,000	1,015	69,922	611,462	626,748	164,800	18,100	18,958	1698,745
	3,800	1,215	64,320	562,467	576,528	164,800	18,211	18,829	1508,527
	3,600	1,415	58,939	515,411	528,296	164,800	18,323	18,701	1333,068
	3,400	1,615	53,779	470,294	482,051	164,800	18,433	18,573	1171,770
	3,200	1,815	48,842	427,117	437,795	164,800	18,544	18,445	1024,038
	3,000	2,015	44,126	385,878	395,525	164,800	18,654	18,318	889,276
	2,800	2,215	39,632	346,579	355,244	164,800	18,764	18,191	766,888
	2,600	2,415	35,360	309,220	316,950	164,800	18,874	18,065	656,278
	2,400	2,615	31,310	273,799	280,644	164,800	18,982	17,939	556,851
	2,200	2,815	27,481	240,318	246,326	164,800	19,091	17,814	468,010
	2,000	3,015	23,874	208,776	213,995	164,800	19,198	17,690	389,165
	1,800	3,215	20,489	179,173	183,652	164,800	19,305	17,566	319,716

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	1,600	3,415	17,325	151,508	155,296	164,800	19,411	17,444	259,064
	1,400	3,615	14,384	125,783	128,928	164,800	19,516	17,323	206,612
	1,200	3,815	11,664	101,997	104,547	164,800	19,620	17,203	161,766
	1,000	4,015	9,165	80,150	82,154	164,800	19,722	17,085	123,930
	0,800	4,215	6,889	60,242	61,748	164,800	19,822	16,969	92,508
	0,600	4,415	4,834	42,273	43,330	164,800	19,921	16,856	66,904
	0,400	4,615	3,001	26,243	26,899	164,800	20,017	16,745	46,522
	0,200	4,815	1,390	12,152	12,456	164,800	20,110	16,638	30,767
	0,147	4,868	1,000	8,745	8,964	164,800	20,134	16,610	27,295
	0,000	5,015	0,000	0,000	0,000	164,800	20,199	16,535	0,000

Tank Calibrations - B3-DF Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B3-DF Lastre BR	5,900	0,000	100,000	1493,350	1530,684	164,795	-13,544	1,791	0,000
	5,750	0,150	99,418	1484,658	1521,775	164,795	-13,506	1,767	23,672
	5,500	0,400	98,354	1468,774	1505,494	164,794	-13,435	1,725	32,703
	5,422	0,477	98,000	1463,483	1500,070	164,794	-13,411	1,712	35,920
	5,401	0,499	97,900	1461,989	1498,539	164,794	-13,404	1,708	36,847
	5,250	0,650	97,176	1451,181	1487,460	164,794	-13,356	1,681	43,779
	5,000	0,900	95,884	1431,878	1467,675	164,794	-13,269	1,635	57,111
	4,750	1,150	94,477	1410,866	1446,137	164,794	-13,173	1,586	72,907
	4,500	1,400	92,955	1388,144	1422,848	164,794	-13,068	1,537	91,376
	4,250	1,650	91,319	1363,713	1397,806	164,794	-12,954	1,486	112,727
	4,000	1,900	89,569	1337,573	1371,012	164,794	-12,829	1,434	137,168
	3,750	2,150	87,704	1309,723	1342,466	164,794	-12,693	1,382	164,909
	3,500	2,400	85,724	1280,164	1312,169	164,795	-12,545	1,331	196,159
	3,250	2,650	83,631	1248,896	1280,119	164,795	-12,385	1,280	231,125

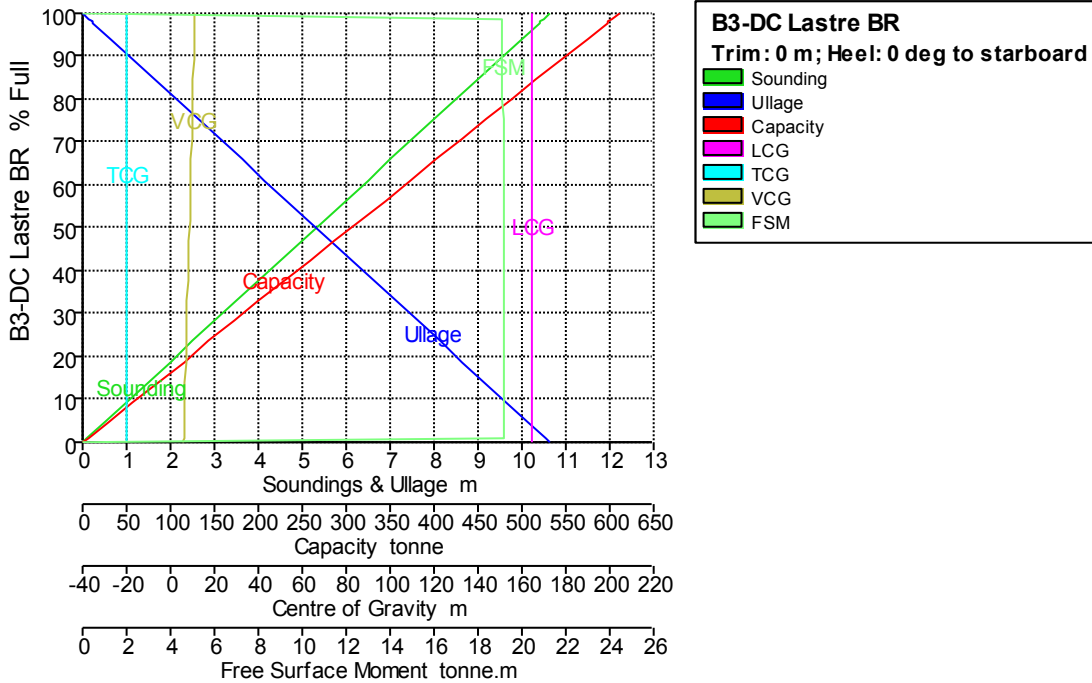
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	3,000	2,900	81,422	1215,919	1246,317	164,795	-12,209	1,230	270,010
	2,750	3,150	79,100	1181,233	1210,764	164,795	-12,018	1,181	313,029
	2,500	3,400	76,662	1144,838	1173,459	164,795	-11,809	1,135	360,356
	2,250	3,650	74,111	1106,737	1134,405	164,795	-11,579	1,093	412,112
	2,000	3,900	68,973	1030,005	1055,755	164,795	-11,417	1,019	16376,509
	1,750	4,150	60,082	897,231	919,662	164,795	-11,377	0,892	16250,943
	1,500	4,400	51,220	764,892	784,015	164,794	-11,329	0,765	16063,484
	1,250	4,650	42,399	633,158	648,987	164,794	-11,271	0,638	15812,732
	1,000	4,900	33,632	502,240	514,796	164,794	-11,198	0,511	15474,899
	0,750	5,150	24,940	372,447	381,758	164,793	-11,103	0,383	15008,241
	0,500	5,400	16,358	244,286	250,393	164,792	-10,971	0,256	14322,358
	0,250	5,650	7,938	118,536	121,499	164,791	-10,747	0,130	13367,531
	0,038	5,862	1,000	14,933	15,307	164,789	-9,492	0,021	10680,673
	0,000	5,900	0,000	0,000	0,000	164,787	-2,420	0,000	0,000

Tank Calibrations - B3-DC Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

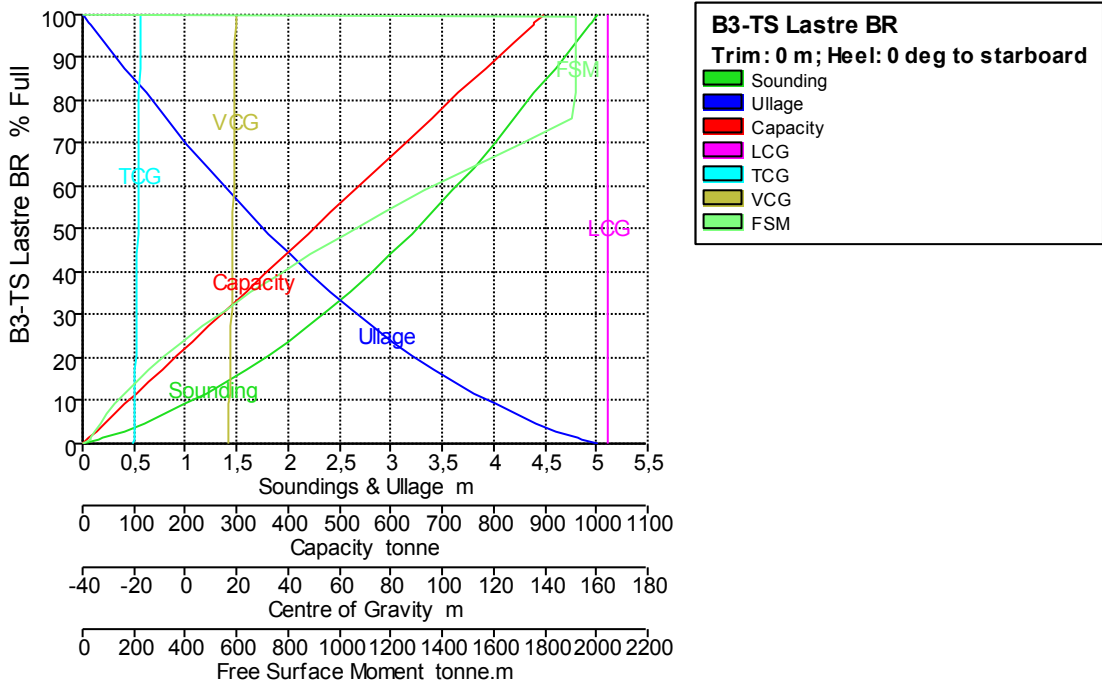


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B3-DC Lastre BR	10,635	0,000	100,000	595,643	610,534	164,800	-20,200	11,216	0,000
	10,500	0,135	98,733	588,093	602,795	164,800	-20,200	11,149	19,055
	10,422	0,213	98,000	583,730	598,323	164,800	-20,200	11,110	19,057
	10,411	0,224	97,900	583,134	597,712	164,800	-20,200	11,105	19,058
	10,000	0,635	94,038	560,128	574,131	164,800	-20,200	10,899	19,070
	9,500	1,135	89,341	532,155	545,459	164,800	-20,200	10,649	19,084
	9,000	1,635	84,644	504,176	516,780	164,800	-20,200	10,400	19,099
	8,500	2,135	79,945	476,188	488,092	164,800	-20,200	10,150	19,119
	8,000	2,635	75,245	448,190	459,395	164,800	-20,200	9,900	19,138
	7,500	3,135	70,543	420,184	430,689	164,800	-20,200	9,650	19,152

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	7,000	3,635	65,840	392,173	401,978	164,800	-20,200	9,400	19,157
	6,500	4,135	61,138	364,161	373,265	164,800	-20,200	9,150	19,158
	6,000	4,635	56,435	336,149	344,553	164,800	-20,200	8,900	19,159
	5,500	5,135	51,732	308,137	315,840	164,800	-20,200	8,650	19,159
	5,000	5,635	47,029	280,124	287,127	164,800	-20,200	8,400	19,159
	4,500	6,135	42,326	252,112	258,414	164,800	-20,200	8,150	19,159
	4,000	6,635	37,623	224,099	229,702	164,800	-20,200	7,900	19,159
	3,500	7,135	32,920	196,087	200,989	164,800	-20,200	7,650	19,159
	3,000	7,635	28,217	168,074	172,276	164,800	-20,200	7,400	19,159
	2,500	8,135	23,514	140,062	143,564	164,800	-20,200	7,150	19,159
	2,000	8,635	18,812	112,050	114,851	164,800	-20,200	6,900	19,159
	1,500	9,135	14,109	84,037	86,138	164,800	-20,200	6,650	19,159
	1,000	9,635	9,406	56,025	57,425	164,800	-20,200	6,400	19,159
	0,500	10,135	4,703	28,012	28,713	164,800	-20,200	6,150	19,159
	0,106	10,529	1,000	5,956	6,105	164,800	-20,200	5,953	19,159
	0,000	10,635	0,000	0,000	0,000	164,800	-20,200	5,900	0,000

Tank Calibrations - B3-TS Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

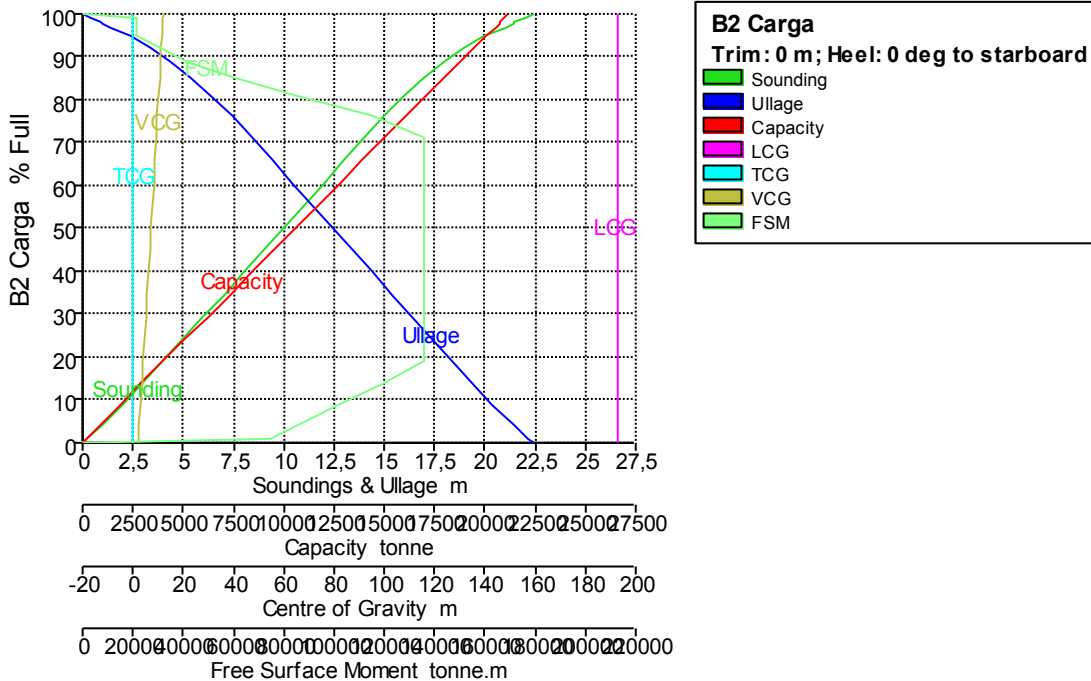


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B3-TS Lastre BR	5,015	0,000	100,000	874,487	896,350	164,800	-17,639	19,585	0,000
	5,000	0,015	99,554	870,584	892,349	164,800	-17,643	19,577	1920,114
	4,948	0,067	98,000	856,998	878,423	164,800	-17,661	19,546	1920,131
	4,944	0,071	97,900	856,123	877,526	164,800	-17,662	19,544	1920,132
	4,800	0,215	93,602	818,537	839,000	164,800	-17,713	19,458	1920,179
	4,600	0,415	87,650	766,489	785,651	164,800	-17,792	19,338	1920,244
	4,400	0,615	81,698	714,440	732,301	164,800	-17,883	19,214	1920,309
	4,200	0,815	75,747	662,396	678,956	164,800	-17,988	19,087	1904,315

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	4,000	1,015	69,922	611,462	626,748	164,800	-18,100	18,958	1698,744
	3,800	1,215	64,320	562,467	576,528	164,800	-18,211	18,829	1508,527
	3,600	1,415	58,939	515,411	528,296	164,800	-18,323	18,701	1333,067
	3,400	1,615	53,779	470,294	482,051	164,800	-18,433	18,573	1171,770
	3,200	1,815	48,842	427,117	437,795	164,800	-18,544	18,445	1024,038
	3,000	2,015	44,126	385,878	395,525	164,800	-18,654	18,318	889,276
	2,800	2,215	39,632	346,579	355,244	164,800	-18,764	18,191	766,888
	2,600	2,415	35,360	309,220	316,950	164,800	-18,874	18,065	656,278
	2,400	2,615	31,310	273,799	280,644	164,800	-18,982	17,939	556,851
	2,200	2,815	27,481	240,318	246,326	164,800	-19,091	17,814	468,010
	2,000	3,015	23,874	208,776	213,995	164,800	-19,198	17,690	389,165
	1,800	3,215	20,489	179,173	183,652	164,800	-19,305	17,566	319,716
	1,600	3,415	17,325	151,508	155,296	164,800	-19,411	17,444	259,064
	1,400	3,615	14,384	125,783	128,928	164,800	-19,516	17,323	206,612
	1,200	3,815	11,664	101,997	104,547	164,800	-19,620	17,203	161,766
	1,000	4,015	9,165	80,150	82,154	164,800	-19,722	17,085	123,930
	0,800	4,215	6,889	60,242	61,748	164,800	-19,822	16,969	92,508
	0,600	4,415	4,834	42,273	43,330	164,800	-19,921	16,856	66,904
	0,400	4,615	3,001	26,243	26,899	164,800	-20,017	16,745	46,522
	0,200	4,815	1,390	12,152	12,456	164,800	-20,110	16,638	30,767
	0,147	4,868	1,000	8,745	8,964	164,800	-20,134	16,610	27,295
	0,000	5,015	0,000	0,000	0,000	164,800	-20,199	16,535	0,000

Tank Calibrations - B2 Carga

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

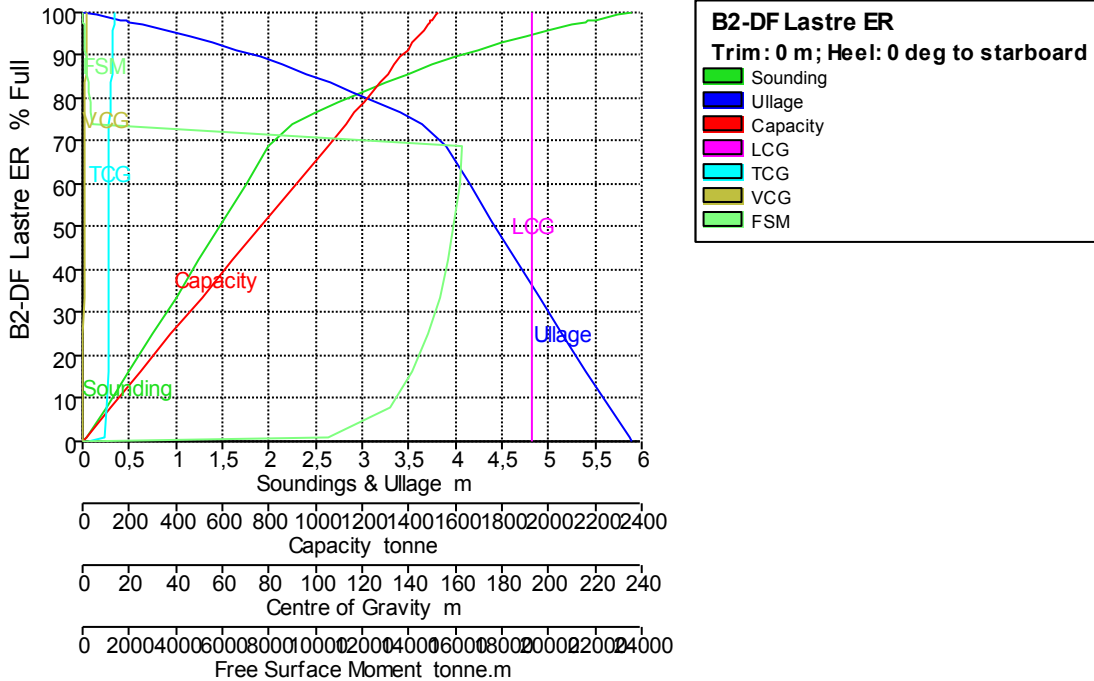


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B2 Carga	22,400	0,000	100,000	20631,172	21146,951	192,784	0,000	12,232	0,000
	22,000	0,400	99,131	20451,850	20963,146	192,784	0,000	12,126	21690,558

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	21,480	0,920	98,000	20218,549	20724,013	192,784	0,000	11,991	21690,558
	21,434	0,966	97,900	20197,919	20702,867	192,784	0,000	11,980	21690,558
	21,000	1,400	96,958	20003,544	20503,633	192,784	0,000	11,870	21690,558
	20,000	2,400	94,785	19555,238	20044,119	192,785	0,000	11,624	21690,558
	19,000	3,400	92,153	19012,336	19487,645	192,787	0,000	11,341	31214,273
	18,000	4,400	88,860	18332,933	18791,256	192,792	0,000	10,998	41218,537
	17,000	5,400	85,117	17560,725	17999,743	192,796	0,000	10,620	60480,022
	16,000	6,400	80,895	16689,657	17106,898	192,799	0,000	10,204	84995,675
	15,000	7,400	76,194	15719,730	16112,723	192,800	0,000	9,748	115402,677
	14,000	8,400	71,059	14660,303	15026,810	192,800	0,000	9,253	135423,607
	13,000	9,400	65,847	13585,102	13924,730	192,800	0,000	8,751	135423,607
	12,000	10,400	60,636	12509,902	12822,650	192,800	0,000	8,249	135423,607
	11,000	11,400	55,424	11434,702	11720,570	192,800	0,000	7,745	135423,607
	10,000	12,400	50,213	10359,502	10618,490	192,800	0,000	7,241	135423,607
	9,000	13,400	45,001	9284,302	9516,410	192,800	0,000	6,737	135423,607
	8,000	14,400	39,790	8209,102	8414,330	192,801	0,000	6,231	135423,607
	7,000	15,400	34,578	7133,902	7312,250	192,801	0,000	5,723	135423,607
	6,000	16,400	29,367	6058,702	6210,170	192,801	0,000	5,212	135423,607
	5,000	17,400	24,155	4983,502	5108,090	192,801	0,000	4,697	135423,607
	4,000	18,400	18,944	3908,302	4006,010	192,801	0,000	4,174	135423,607
	3,000	19,400	13,816	2850,498	2921,761	192,802	0,000	3,643	119646,337
	2,000	20,400	8,947	1845,969	1892,119	192,802	0,000	3,120	101712,280
	1,000	21,400	4,342	895,803	918,198	192,802	0,000	2,605	85666,333
	0,236	22,164	1,000	206,310	211,468	192,803	0,000	2,218	74611,223
	0,000	22,400	0,000	0,000	0,000	192,803	0,000	2,100	0,000

Tank Calibrations - B2-DF Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



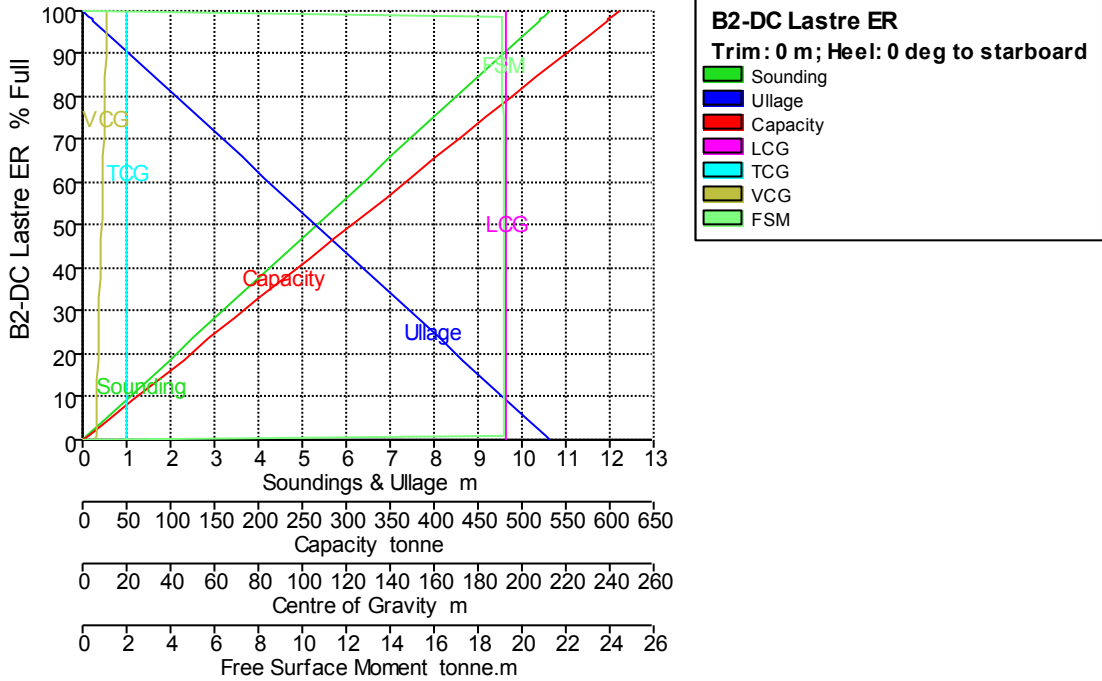
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B2-DF Lastre ER	5,900	0,000	100,000	1488,736	1525,955	192,786	13,526	1,791	0,000
	5,750	0,150	99,416	1480,047	1517,048	192,786	13,487	1,768	23,643
	5,500	0,400	98,350	1464,174	1500,778	192,786	13,416	1,726	32,605
	5,423	0,476	98,000	1458,961	1495,435	192,786	13,392	1,713	35,751
	5,402	0,498	97,900	1457,473	1493,910	192,786	13,386	1,709	36,667
	5,250	0,650	97,170	1446,602	1482,768	192,785	13,337	1,682	43,585
	5,000	0,900	95,875	1427,332	1463,015	192,785	13,249	1,635	56,790
	4,750	1,150	94,467	1406,363	1441,522	192,785	13,153	1,587	72,425
	4,500	1,400	92,944	1383,695	1418,287	192,785	13,047	1,537	90,693
	4,250	1,650	91,308	1359,328	1393,311	192,785	12,932	1,486	111,799
	4,000	1,900	89,557	1333,263	1366,594	192,785	12,807	1,435	135,950
	3,750	2,150	87,692	1305,499	1338,136	192,784	12,671	1,383	163,349
	3,500	2,400	85,713	1276,036	1307,937	192,784	12,523	1,331	194,199
	3,250	2,650	83,620	1244,875	1275,997	192,784	12,361	1,280	228,691
	3,000	2,900	81,412	1212,017	1242,318	192,784	12,185	1,230	267,021
	2,750	3,150	79,091	1177,463	1206,900	192,784	11,993	1,182	309,365
	2,500	3,400	76,657	1141,217	1169,748	192,783	11,783	1,136	355,720
	2,250	3,650	74,110	1103,295	1130,878	192,783	11,552	1,093	405,639
	2,000	3,900	68,968	1026,754	1052,423	192,783	11,388	1,019	16321,855
	1,750	4,150	60,063	894,175	916,529	192,781	11,347	0,892	16166,154
	1,500	4,400	51,191	762,102	781,155	192,780	11,297	0,765	15955,743
	1,250	4,650	42,365	630,696	646,464	192,779	11,237	0,638	15685,099
	1,000	4,900	33,596	500,160	512,664	192,777	11,162	0,511	15330,588
	0,750	5,150	24,907	370,798	380,068	192,776	11,064	0,384	14851,286
	0,500	5,400	16,330	243,109	249,187	192,774	10,930	0,256	14159,231
	0,250	5,650	7,918	117,880	120,827	192,770	10,700	0,130	13186,815
	0,038	5,862	1,000	14,887	15,260	192,763	9,447	0,021	10506,892
	0,000	5,900	0,000	0,000	0,000	192,751	2,420	0,000	0,000

Tank Calibrations - B2-DC Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 100 %

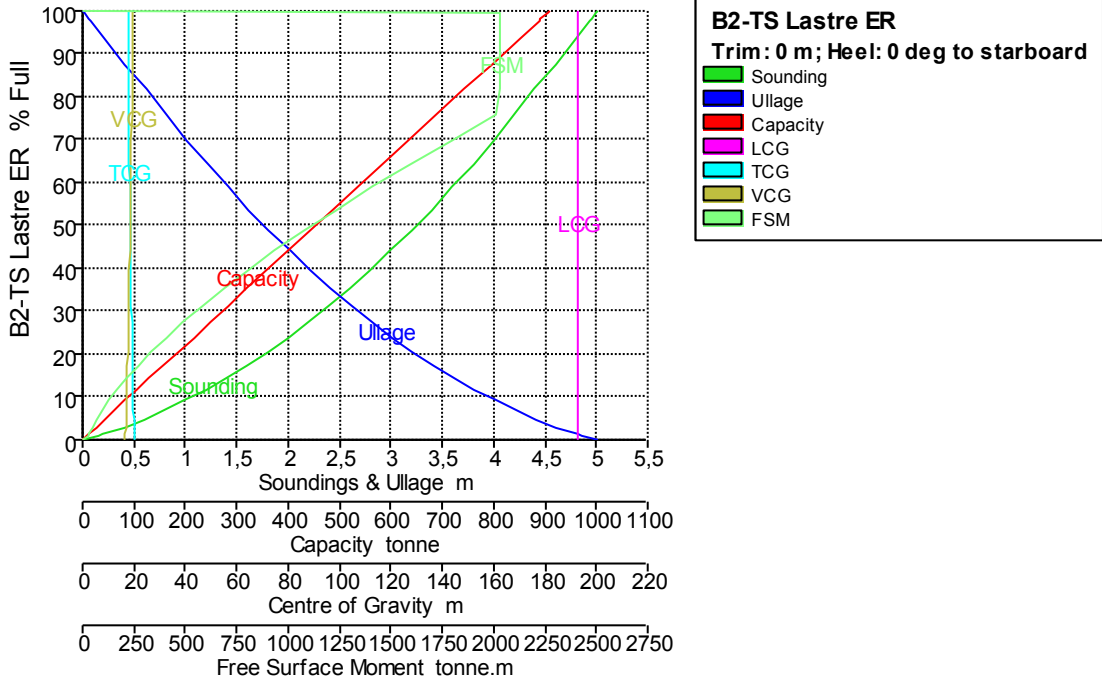
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B2-DC Lastre ER	10,635	0,000	100,000	595,647	610,538	192,800	20,200	11,216	0,000
	10,500	0,135	98,732	588,097	602,799	192,800	20,200	11,149	19,058
	10,422	0,213	98,000	583,734	598,327	192,800	20,200	11,110	19,060
	10,411	0,224	97,900	583,138	597,717	192,800	20,200	11,105	19,060
	10,000	0,635	94,037	560,130	574,134	192,800	20,200	10,899	19,072
	9,500	1,135	89,341	532,157	545,461	192,800	20,200	10,649	19,086
	9,000	1,635	84,644	504,177	516,781	192,800	20,200	10,400	19,101
	8,500	2,135	79,945	476,188	488,093	192,800	20,200	10,150	19,119
	8,000	2,635	75,244	448,190	459,395	192,800	20,200	9,900	19,138
	7,500	3,135	70,543	420,184	430,689	192,800	20,200	9,650	19,152
	7,000	3,635	65,840	392,173	401,978	192,800	20,200	9,400	19,157
	6,500	4,135	61,137	364,161	373,265	192,800	20,200	9,150	19,158
	6,000	4,635	56,434	336,149	344,553	192,800	20,200	8,900	19,159
	5,500	5,135	51,731	308,137	315,840	192,800	20,200	8,650	19,159
	5,000	5,635	47,029	280,124	287,127	192,800	20,200	8,400	19,159
	4,500	6,135	42,326	252,112	258,415	192,800	20,200	8,150	19,159
	4,000	6,635	37,623	224,099	229,702	192,800	20,200	7,900	19,159
	3,500	7,135	32,920	196,087	200,989	192,800	20,200	7,650	19,159
	3,000	7,635	28,217	168,075	172,276	192,800	20,200	7,400	19,159
	2,500	8,135	23,514	140,062	143,564	192,800	20,200	7,150	19,159
	2,000	8,635	18,811	112,050	114,851	192,800	20,200	6,900	19,159
	1,500	9,135	14,109	84,037	86,138	192,800	20,200	6,650	19,159
	1,000	9,635	9,406	56,025	57,425	192,800	20,200	6,400	19,159
	0,500	10,135	4,703	28,012	28,713	192,800	20,200	6,150	19,159
	0,106	10,529	1,000	5,956	6,105	192,800	20,200	5,953	19,159
	0,000	10,635	0,000	0,000	0,000	192,800	20,200	5,900	0,000

Tank Calibrations - B2-TS Lastre ER

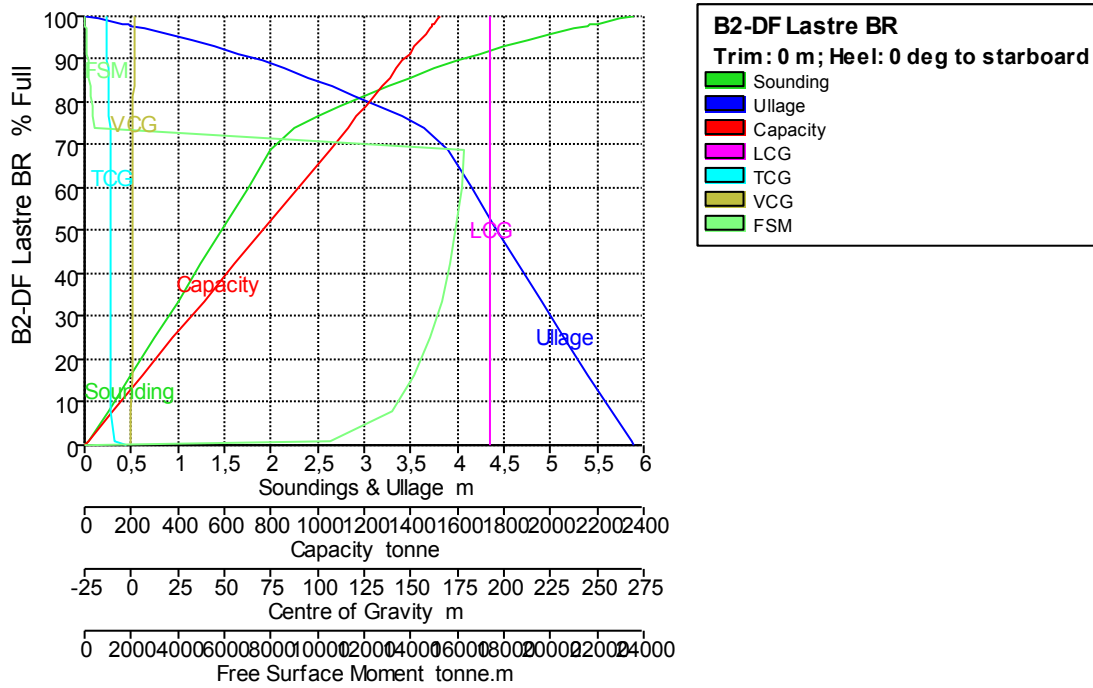
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B2-TS Lastre ER	5,015	0,000	100,000	885,964	908,113	192,962	17,581	19,589	0,000
	5,000	0,015	99,553	882,002	904,052	192,962	17,586	19,580	2031,604
	4,948	0,067	98,000	868,245	889,951	192,962	17,604	19,549	2031,621
	4,945	0,070	97,900	867,359	889,043	192,962	17,605	19,547	2031,622
	4,800	0,215	93,589	829,166	849,895	192,961	17,658	19,462	2031,670
	4,600	0,415	87,625	776,329	795,737	192,959	17,738	19,341	2031,736
	4,400	0,615	81,661	723,491	741,579	192,957	17,831	19,217	2031,801
	4,200	0,815	75,698	670,659	687,425	192,954	17,938	19,090	2014,773
	4,000	1,015	69,863	618,957	634,431	192,952	18,053	18,961	1795,989
	3,800	1,215	64,250	569,232	583,463	192,949	18,167	18,832	1593,651
	3,600	1,415	58,861	521,484	534,521	192,946	18,281	18,703	1407,117
	3,400	1,615	53,694	475,712	487,605	192,943	18,394	18,575	1235,743
	3,200	1,815	48,751	431,917	442,715	192,939	18,507	18,447	1078,887
	3,000	2,015	44,031	390,098	399,851	192,935	18,620	18,320	935,905
	2,800	2,215	39,534	350,256	359,013	192,931	18,732	18,193	806,155
	2,600	2,415	35,260	312,391	320,201	192,927	18,844	18,067	688,994
	2,400	2,615	31,209	276,502	283,415	192,922	18,955	17,941	583,780
	2,200	2,815	27,381	242,590	248,655	192,917	19,066	17,816	489,869
	2,000	3,015	23,777	210,654	215,921	192,911	19,176	17,691	406,625
	1,800	3,215	20,395	180,695	185,212	192,905	19,285	17,568	333,400
	1,600	3,415	17,237	152,712	156,530	192,898	19,394	17,445	269,547
	1,400	3,615	14,301	126,706	129,873	192,891	19,501	17,324	214,425
	1,200	3,815	11,589	102,676	105,243	192,882	19,607	17,204	167,391
	1,000	4,015	9,100	80,622	82,638	192,873	19,712	17,086	127,803
	0,800	4,215	6,834	60,545	62,059	192,862	19,814	16,970	95,017
	0,600	4,415	4,791	42,444	43,505	192,850	19,915	16,856	68,391
	0,400	4,615	2,971	26,320	26,978	192,836	20,013	16,745	47,283
	0,200	4,815	1,374	12,172	12,476	192,820	20,108	16,638	31,050
	0,149	4,866	1,000	8,860	9,081	192,815	20,132	16,611	27,592
	0,000	5,015	0,000	0,000	0,000	192,800	20,199	16,535	0,000

Tank Calibrations - B2-DF Lastre BR

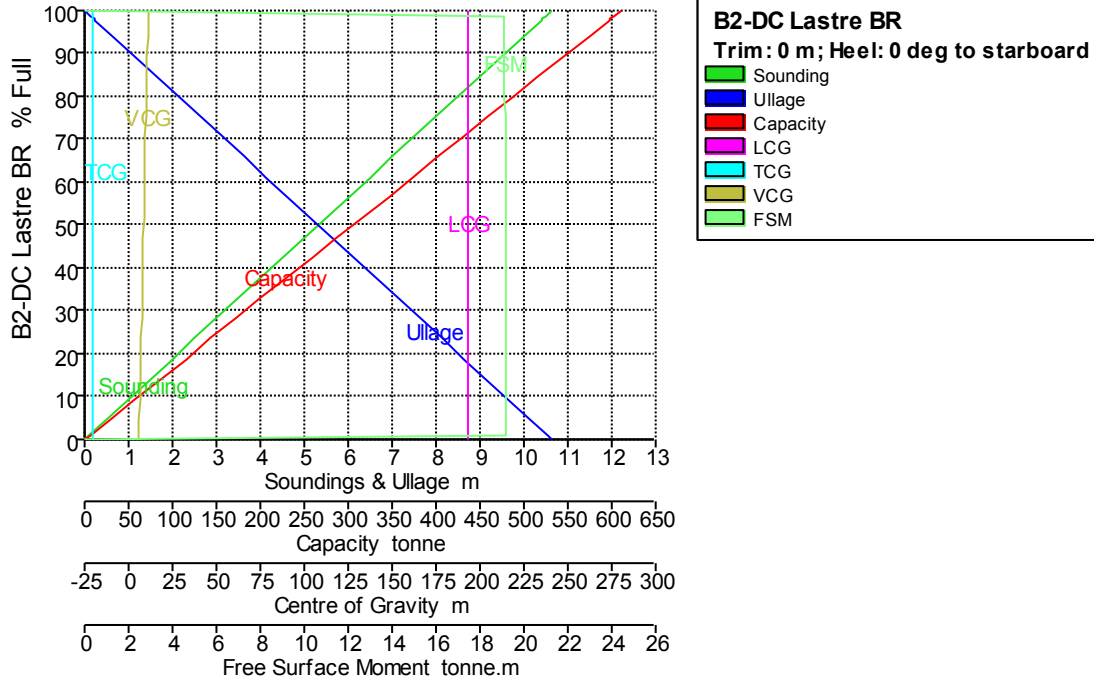
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B2-DF Lastre BR	5,900	0,000	100,000	1488,736	1525,955	192,786	-13,526	1,791	0,000
	5,750	0,150	99,416	1480,047	1517,048	192,786	-13,487	1,768	23,643
	5,500	0,400	98,350	1464,174	1500,778	192,786	-13,416	1,726	32,605
	5,423	0,476	98,000	1458,961	1495,435	192,786	-13,392	1,713	35,751
	5,402	0,498	97,900	1457,473	1493,910	192,786	-13,386	1,709	36,667
	5,250	0,650	97,170	1446,602	1482,768	192,785	-13,337	1,682	43,585
	5,000	0,900	95,875	1427,332	1463,015	192,785	-13,249	1,635	56,790
	4,750	1,150	94,467	1406,363	1441,522	192,785	-13,153	1,587	72,425
	4,500	1,400	92,944	1383,695	1418,287	192,785	-13,047	1,537	90,693
	4,250	1,650	91,308	1359,328	1393,311	192,785	-12,932	1,486	111,799
	4,000	1,900	89,557	1333,263	1366,594	192,785	-12,807	1,435	135,950
	3,750	2,150	87,692	1305,499	1338,136	192,784	-12,671	1,383	163,349
	3,500	2,400	85,713	1276,036	1307,937	192,784	-12,523	1,331	194,199
	3,250	2,650	83,620	1244,875	1275,997	192,784	-12,361	1,280	228,691
	3,000	2,900	81,412	1212,017	1242,318	192,784	-12,185	1,230	267,021
	2,750	3,150	79,091	1177,463	1206,900	192,784	-11,993	1,182	309,365
	2,500	3,400	76,657	1141,217	1169,748	192,783	-11,783	1,136	355,720
	2,250	3,650	74,110	1103,295	1130,878	192,783	-11,552	1,093	405,639
	2,000	3,900	68,968	1026,754	1052,423	192,783	-11,388	1,019	463,218,555
	1,750	4,150	60,063	894,175	916,529	192,781	-11,347	0,892	16166,154
	1,500	4,400	51,191	762,102	781,155	192,780	-11,297	0,765	15955,743
	1,250	4,650	42,365	630,696	646,464	192,779	-11,237	0,638	15685,099
	1,000	4,900	33,596	500,160	512,664	192,777	-11,162	0,511	15330,588
	0,750	5,150	24,907	370,798	380,068	192,776	-11,064	0,384	14851,286
	0,500	5,400	16,330	243,109	249,187	192,774	-10,930	0,256	14159,231
	0,250	5,650	7,918	117,880	120,827	192,770	-10,700	0,130	13186,815
	0,038	5,862	1,000	14,887	15,260	192,763	-9,447	0,021	10506,892
	0,000	5,900	0,000	0,000	0,000	192,751	-2,420	0,000	0,000

Tank Calibrations - B2-DC Lastre BR

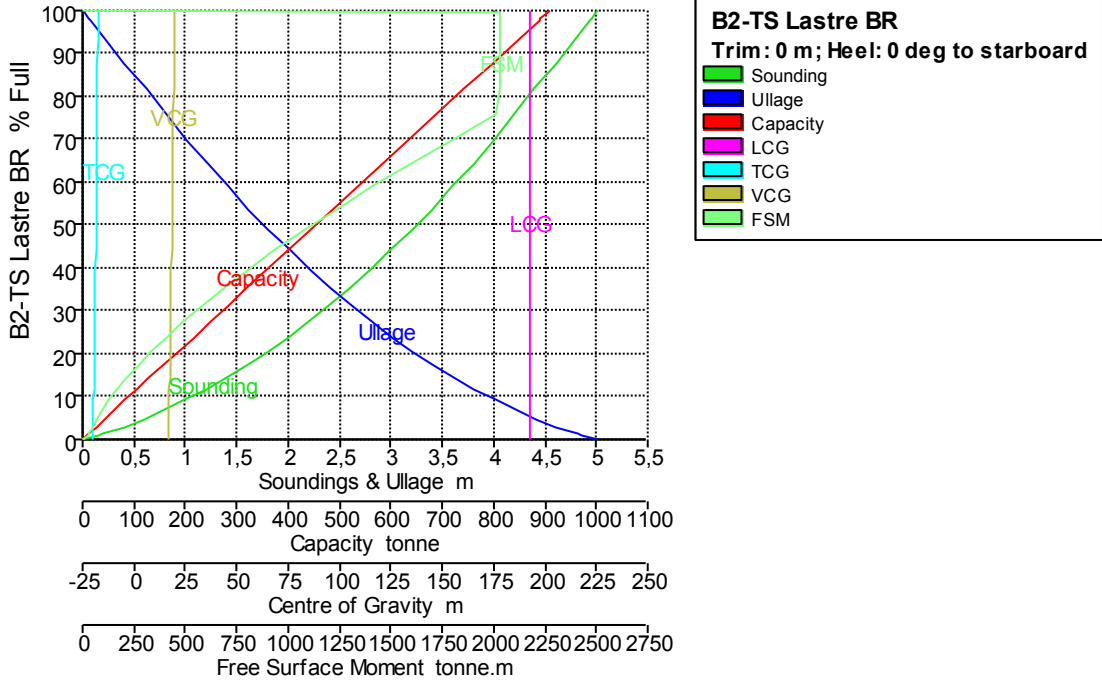
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B2-DC Lastre BR	10,635	0,000	100,000	595,647	610,538	192,800	-20,200	11,216	0,000
	10,500	0,135	98,732	588,097	602,799	192,800	-20,200	11,149	19,058
	10,422	0,213	98,000	583,734	598,327	192,800	-20,200	11,110	19,060
	10,411	0,224	97,900	583,138	597,717	192,800	-20,200	11,105	19,060
	10,000	0,635	94,037	560,130	574,134	192,800	-20,200	10,899	19,072
	9,500	1,135	89,341	532,157	545,461	192,800	-20,200	10,649	19,086
	9,000	1,635	84,644	504,177	516,781	192,800	-20,200	10,400	19,101
	8,500	2,135	79,945	476,188	488,093	192,800	-20,200	10,150	19,119
	8,000	2,635	75,244	448,190	459,395	192,800	-20,200	9,900	19,138
	7,500	3,135	70,543	420,184	430,689	192,800	-20,200	9,650	19,152
	7,000	3,635	65,840	392,173	401,978	192,800	-20,200	9,400	19,157
	6,500	4,135	61,137	364,161	373,265	192,800	-20,200	9,150	19,158
	6,000	4,635	56,434	336,149	344,553	192,800	-20,200	8,900	19,159
	5,500	5,135	51,731	308,137	315,840	192,800	-20,200	8,650	19,159
	5,000	5,635	47,029	280,124	287,127	192,800	-20,200	8,400	19,159
	4,500	6,135	42,326	252,112	258,415	192,800	-20,200	8,150	19,159
	4,000	6,635	37,623	224,099	229,702	192,800	-20,200	7,900	19,159
	3,500	7,135	32,920	196,087	200,989	192,800	-20,200	7,650	19,159
	3,000	7,635	28,217	168,075	172,276	192,800	-20,200	7,400	19,159
	2,500	8,135	23,514	140,062	143,564	192,800	-20,200	7,150	19,159
	2,000	8,635	18,811	112,050	114,851	192,800	-20,200	6,900	19,159
	1,500	9,135	14,109	84,037	86,138	192,800	-20,200	6,650	19,159
	1,000	9,635	9,406	56,025	57,425	192,800	-20,200	6,400	19,159
	0,500	10,135	4,703	28,012	28,713	192,800	-20,200	6,150	19,159
	0,106	10,529	1,000	5,956	6,105	192,800	-20,200	5,953	19,159
	0,000	10,635	0,000	0,000	0,000	192,800	-20,200	5,900	0,000

Tank Calibrations - B2-TS Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B2-TS Lastre BR	5,015	0,000	100,000	885,964	908,113	192,962	-17,581	19,589	0,000
	5,000	0,015	99,553	882,002	904,052	192,962	-17,586	19,580	2031,604
	4,948	0,067	98,000	868,245	889,951	192,962	-17,604	19,549	2031,621
	4,945	0,070	97,900	867,359	889,043	192,962	-17,605	19,547	2031,622
	4,800	0,215	93,589	829,166	849,895	192,961	-17,658	19,462	2031,670
	4,600	0,415	87,625	776,329	795,737	192,959	-17,738	19,341	2031,736
	4,400	0,615	81,661	723,491	741,579	192,957	-17,831	19,217	2031,802
	4,200	0,815	75,698	670,659	687,425	192,954	-17,938	19,090	2014,773
	4,000	1,015	69,863	618,957	634,431	192,952	-18,053	18,961	1795,989
	3,800	1,215	64,250	569,232	583,463	192,949	-18,167	18,832	1593,651
	3,600	1,415	58,861	521,484	534,521	192,946	-18,281	18,703	1407,117
	3,400	1,615	53,694	475,712	487,605	192,943	-18,394	18,575	1235,743
	3,200	1,815	48,751	431,917	442,715	192,939	-18,507	18,447	1078,887
	3,000	2,015	44,031	390,098	399,851	192,935	-18,620	18,320	935,905
	2,800	2,215	39,534	350,256	359,013	192,931	-18,732	18,193	806,155
	2,600	2,415	35,260	312,391	320,201	192,927	-18,844	18,067	688,994
	2,400	2,615	31,209	276,502	283,415	192,922	-18,955	17,941	583,780
	2,200	2,815	27,381	242,590	248,655	192,917	-19,066	17,816	489,869
	2,000	3,015	23,777	210,654	215,921	192,911	-19,176	17,691	406,625
	1,800	3,215	20,395	180,695	185,212	192,905	-19,285	17,568	333,400
	1,600	3,415	17,237	152,712	156,530	192,898	-19,394	17,445	269,547
	1,400	3,615	14,301	126,706	129,873	192,891	-19,501	17,324	214,425
	1,200	3,815	11,589	102,676	105,243	192,882	-19,607	17,204	167,391
	1,000	4,015	9,100	80,622	82,638	192,873	-19,712	17,086	127,803
	0,800	4,215	6,834	60,545	62,059	192,862	-19,814	16,970	95,017
	0,600	4,415	4,791	42,444	43,505	192,850	-19,915	16,856	68,391
	0,400	4,615	2,971	26,320	26,978	192,836	-20,013	16,745	47,283

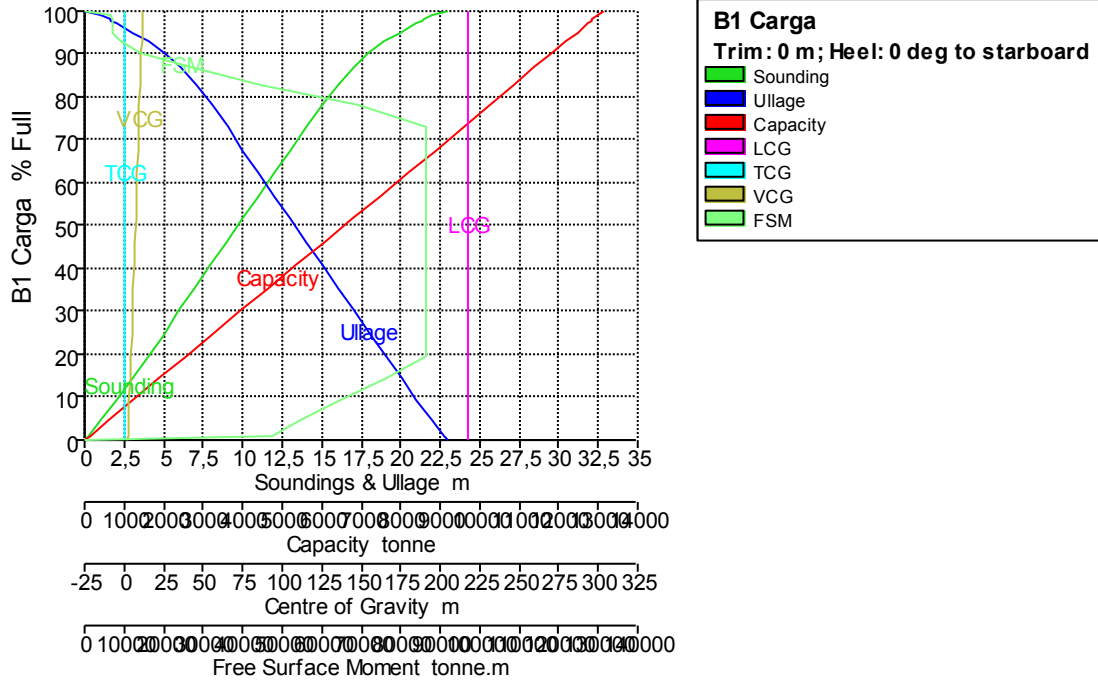
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,200	4,815	1,374	12,172	12,476	192,820	-20,108	16,638	31,050
	0,149	4,866	1,000	8,860	9,081	192,815	-20,132	16,611	27,592
	0,000	5,015	0,000	0,000	0,000	192,800	-20,199	16,535	0,000

Tank Calibrations - B1 Carga

Fluid Type = HOMOGEN Specific gravity = 0,817

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

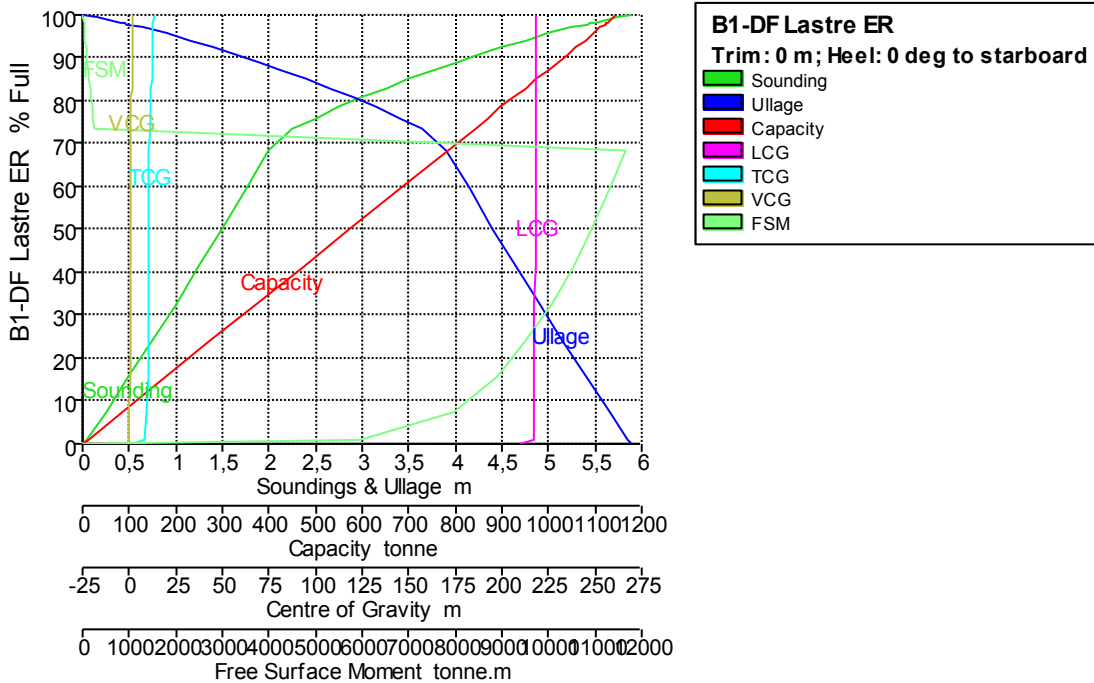


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B1 Carga	23,035	0,000	100,000	16057,348	13118,854	218,050	0,000	12,005	0,000
	23,000	0,035	99,997	16056,941	13118,521	218,050	0,000	12,005	251,539
	22,000	1,035	99,110	15914,398	13002,063	218,044	0,000	11,895	6540,998
	21,426	1,609	98,000	15736,202	12856,477	218,038	0,000	11,760	7024,803
	21,376	1,659	97,900	15720,143	12843,357	218,037	0,000	11,748	7024,803
	21,000	2,035	97,139	15597,888	12743,474	218,030	0,000	11,658	7024,803
	20,000	3,035	95,115	15272,967	12478,014	218,010	0,000	11,426	7024,803
	19,000	4,035	92,806	14902,235	12175,126	217,994	0,000	11,173	8863,158
	18,000	5,035	90,157	14476,840	11827,578	217,996	0,000	10,896	14377,890
	17,000	6,035	86,873	13949,505	11396,745	217,998	0,000	10,568	26708,096
	16,000	7,035	82,913	13313,578	10877,194	217,999	0,000	10,185	44622,398
	15,000	8,035	78,276	12569,060	10268,922	217,999	0,000	9,747	69164,919
	14,000	9,035	73,027	11726,228	9580,329	217,999	0,000	9,255	86353,995
	13,000	10,035	67,670	10866,069	8877,578	217,999	0,000	8,752	86353,995
	12,000	11,035	62,314	10005,909	8174,827	217,999	0,000	8,249	86353,995
	11,000	12,035	56,957	9145,749	7472,077	217,999	0,000	7,746	86353,995
	10,000	13,035	51,600	8285,589	6769,326	217,999	0,000	7,242	86353,995
	9,000	14,035	46,243	7425,429	6066,576	217,999	0,000	6,738	86353,995
	8,000	15,035	40,886	6565,270	5363,825	217,999	0,000	6,232	86353,995
	7,000	16,035	35,530	5705,110	4661,075	217,999	0,000	5,724	86353,995
	6,000	17,035	30,173	4844,950	3958,324	217,998	0,000	5,213	86353,995

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	5,000	18,035	24,816	3984,790	3255,574	217,998	0,000	4,698	86353,995
	4,000	19,035	19,459	3124,630	2552,823	217,998	0,000	4,174	86353,995
	3,000	20,035	14,190	2278,476	1861,515	217,997	0,000	3,643	76231,734
	2,000	21,035	9,187	1475,216	1205,251	217,996	0,000	3,120	64733,054
	1,000	22,035	4,457	715,724	584,746	217,995	0,000	2,605	54453,040
	0,230	22,805	1,000	160,573	131,188	217,995	0,000	2,215	47322,832
	0,000	23,035	0,000	0,000	0,000	217,994	0,000	2,100	0,000

Tank Calibrations - B1-DF Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

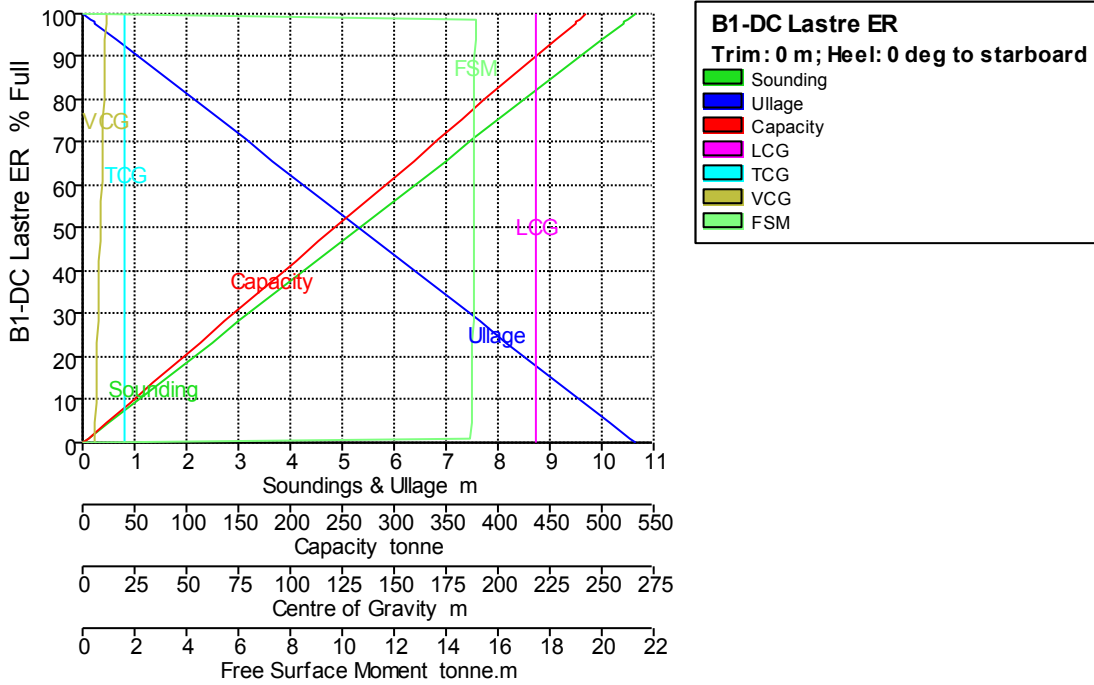


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B1-DF Lastre ER	5,900	0,000	100,000	1117,257	1145,189	217,721	13,111	1,823	0,000
	5,750	0,150	99,385	1110,391	1138,151	217,720	13,067	1,798	18,419
	5,500	0,400	98,262	1097,843	1125,289	217,719	12,987	1,755	25,405
	5,445	0,454	98,000	1094,912	1122,285	217,718	12,969	1,745	27,135
	5,425	0,475	97,900	1093,795	1121,140	217,718	12,961	1,741	27,804
	5,250	0,650	97,019	1083,953	1111,052	217,717	12,898	1,708	33,917
	5,000	0,900	95,657	1068,730	1095,449	217,715	12,800	1,660	44,071
	4,750	1,150	94,176	1052,189	1078,494	217,712	12,692	1,609	55,938
	4,500	1,400	92,579	1034,346	1060,205	217,710	12,574	1,557	69,584
	4,250	1,650	90,868	1015,224	1040,605	217,708	12,445	1,504	85,022
	4,000	1,900	89,044	994,853	1019,725	217,707	12,304	1,450	102,154
	3,750	2,150	87,112	973,268	997,600	217,706	12,153	1,397	120,933
	3,500	2,400	85,076	950,515	974,278	217,706	11,988	1,343	141,081
	3,250	2,650	82,940	926,652	949,818	217,707	11,811	1,291	162,272
	3,000	2,900	80,711	901,749	924,293	217,709	11,620	1,240	183,899
	2,750	3,150	78,397	875,899	897,797	217,713	11,415	1,192	205,191
	2,500	3,400	76,009	849,211	870,441	217,720	11,196	1,147	225,294

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	2,250	3,650	73,556	821,815	842,361	217,728	10,961	1,106	243,092
	2,000	3,900	68,408	764,294	783,401	217,729	10,786	1,032	11638,727
	1,750	4,150	59,317	662,722	679,290	217,714	10,710	0,903	11303,232
	1,500	4,400	50,323	562,233	576,288	217,699	10,626	0,774	10935,062
	1,250	4,650	41,440	462,989	474,564	217,681	10,531	0,645	10524,194
	1,000	4,900	32,684	365,161	374,290	217,661	10,419	0,516	10057,887
	0,750	5,150	24,075	268,984	275,709	217,637	10,281	0,388	9529,130
	0,500	5,400	15,647	174,815	179,186	217,604	10,094	0,259	8894,516
	0,250	5,650	7,463	83,382	85,467	217,542	9,772	0,131	7972,719
	0,041	5,858	1,000	11,173	11,452	217,399	8,547	0,023	5948,224
	0,000	5,900	0,000	0,000	0,000	209,340	2,204	-0,008	0,000

Tank Calibrations - B1-DC Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

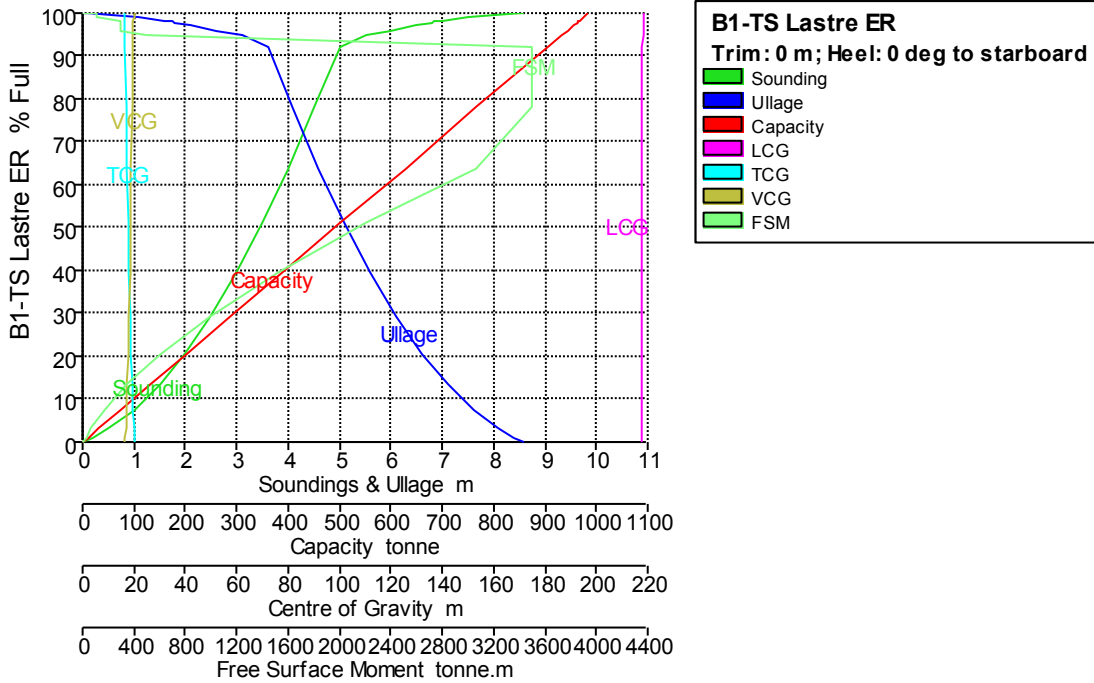


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B1-DC Lastre ER	10,635	0,000	100,000	473,230	485,060	217,926	20,194	11,223	0,000
	10,500	0,135	98,727	467,207	478,887	217,926	20,194	11,155	15,134
	10,423	0,212	98,000	463,765	475,359	217,926	20,194	11,116	15,133
	10,412	0,223	97,900	463,292	474,874	217,926	20,194	11,111	15,133
	10,000	0,635	94,014	444,904	456,027	217,924	20,194	10,905	15,125
	9,500	1,135	89,303	422,608	433,173	217,923	20,194	10,654	15,115
	9,000	1,635	84,593	400,318	410,326	217,921	20,194	10,404	15,107
	8,500	2,135	79,884	378,034	387,484	217,919	20,193	10,154	15,102
	8,000	2,635	75,176	355,754	364,647	217,918	20,193	9,903	15,099
	7,500	3,135	70,468	333,477	341,814	217,916	20,193	9,653	15,095
	7,000	3,635	65,762	311,205	318,985	217,915	20,193	9,403	15,090
	6,500	4,135	61,056	288,937	296,160	217,914	20,193	9,153	15,084
	6,000	4,635	56,352	266,673	273,340	217,912	20,193	8,902	15,078

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	5,500	5,135	51,648	244,414	250,525	217,911	20,193	8,652	15,072
	5,000	5,635	46,946	222,160	227,714	217,909	20,193	8,402	15,066
	4,500	6,135	42,244	199,911	204,909	217,907	20,193	8,152	15,059
	4,000	6,635	37,543	177,667	182,109	217,905	20,192	7,901	15,053
	3,500	7,135	32,844	155,428	159,314	217,903	20,192	7,651	15,046
	3,000	7,635	28,146	133,196	136,526	217,901	20,192	7,401	15,039
	2,500	8,135	23,449	110,969	113,744	217,899	20,192	7,151	15,031
	2,000	8,635	18,754	88,750	90,969	217,896	20,192	6,901	15,023
	1,500	9,135	14,060	66,538	68,202	217,892	20,191	6,650	15,012
	1,000	9,635	9,369	44,338	45,446	217,887	20,191	6,400	14,998
	0,500	10,135	4,681	22,153	22,707	217,880	20,190	6,150	14,970
	0,107	10,528	1,000	4,732	4,851	217,873	20,190	5,953	14,928
	0,000	10,635	0,000	0,000	0,000	217,871	20,190	5,900	0,000

Tank Calibrations - B1-TS Lastre ER

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

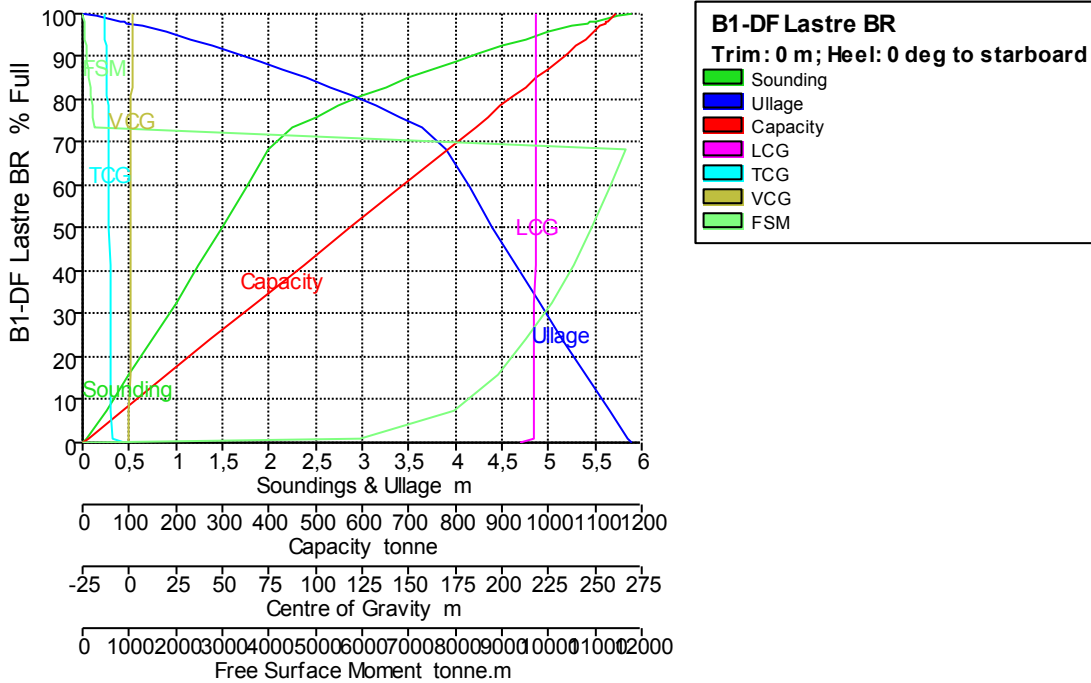


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B1-TS Lastre ER	8,600	0,000	100,000	959,150	983,129	218,784	16,445	19,866	0,000
	8,500	0,100	99,916	958,348	982,307	218,775	16,446	19,862	103,179
	8,000	0,600	99,499	954,342	978,201	218,734	16,451	19,843	102,982
	7,500	1,100	99,081	950,338	974,097	218,691	16,457	19,825	102,786
	7,000	1,600	98,360	943,418	967,004	218,620	16,467	19,797	301,732
	6,853	1,747	98,000	939,967	963,466	218,585	16,472	19,784	301,675
	6,812	1,788	97,900	939,008	962,483	218,575	16,473	19,781	301,659
	6,500	2,100	97,138	931,703	954,995	218,499	16,484	19,755	301,518
	6,000	2,600	95,917	919,990	942,990	218,376	16,502	19,718	301,283
	5,500	3,100	94,692	908,234	930,940	218,248	16,521	19,685	500,179
	5,000	3,600	92,299	885,290	907,422	218,050	16,558	19,632	3491,842

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	4,500	4,100	78,040	748,516	767,229	218,049	16,827	19,330	3491,723
	4,000	4,600	63,911	612,999	628,324	218,046	17,200	19,008	3063,274
	3,500	5,100	50,967	488,852	501,074	218,043	17,594	18,682	2205,592
	3,000	5,600	39,439	378,282	387,739	218,039	17,987	18,358	1525,114
	2,500	6,100	29,327	281,288	288,321	218,035	18,377	18,036	1001,335
	2,000	6,600	20,630	197,871	202,818	218,028	18,763	17,718	613,736
	1,500	7,100	13,349	128,033	131,233	218,020	19,143	17,404	341,775
	1,000	7,600	7,483	71,774	73,569	218,009	19,514	17,098	165,038
	0,500	8,100	3,034	29,097	29,824	217,992	19,870	16,804	62,997
	0,192	8,408	1,000	9,592	9,831	217,977	20,075	16,635	28,451
	0,000	8,600	0,000	0,000	0,000	217,965	20,196	16,535	0,000

Tank Calibrations - B1-DF Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

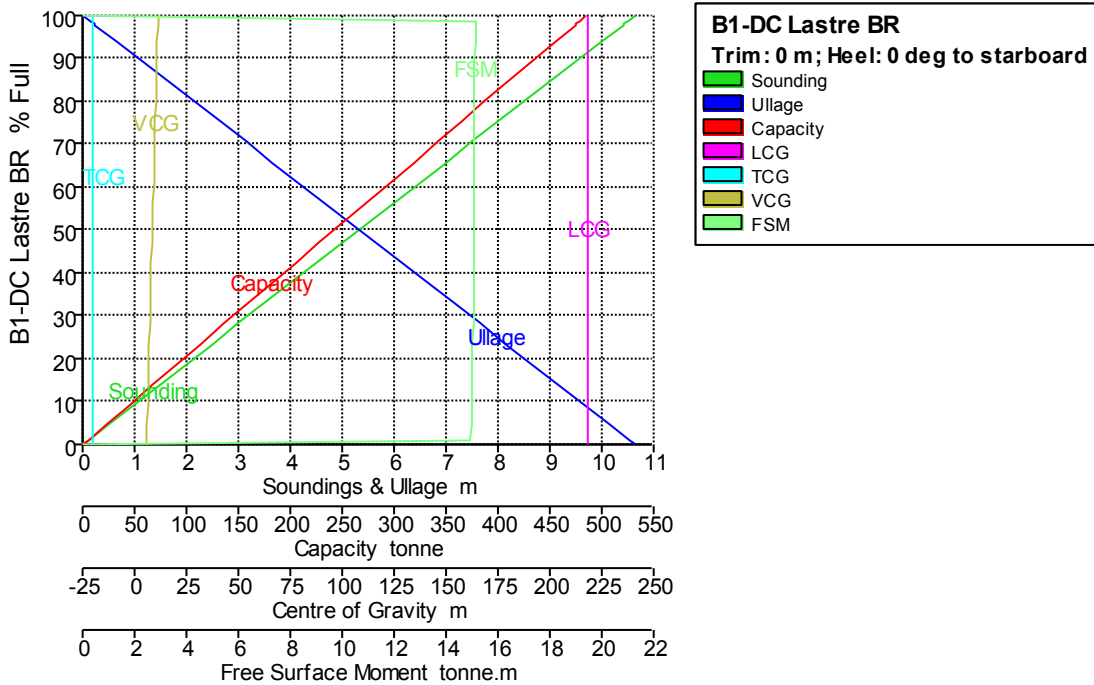


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B1-DF Lastre BR	5,900	0,000	100,000	1117,257	1145,189	217,721	-13,111	1,823	0,000
	5,750	0,150	99,385	1110,391	1138,151	217,720	-13,067	1,798	18,419
	5,500	0,400	98,262	1097,843	1125,289	217,719	-12,987	1,755	25,405
	5,445	0,454	98,000	1094,912	1122,285	217,718	-12,969	1,745	27,135
	5,425	0,475	97,900	1093,795	1121,140	217,718	-12,961	1,741	27,804
	5,250	0,650	97,019	1083,953	1111,052	217,717	-12,898	1,708	33,917
	5,000	0,900	95,657	1068,730	1095,449	217,715	-12,800	1,660	44,071
	4,750	1,150	94,176	1052,189	1078,494	217,712	-12,692	1,609	55,938
	4,500	1,400	92,579	1034,346	1060,205	217,710	-12,574	1,557	69,584
	4,250	1,650	90,868	1015,224	1040,605	217,708	-12,445	1,504	85,022
	4,000	1,900	89,044	994,853	1019,725	217,707	-12,304	1,450	102,154
	3,750	2,150	87,112	973,268	997,600	217,706	-12,153	1,397	120,933
	3,500	2,400	85,076	950,515	974,278	217,706	-11,988	1,343	141,081

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	3,250	2,650	82,940	926,652	949,818	217,707	-11,811	1,291	162,272
	3,000	2,900	80,711	901,749	924,293	217,709	-11,620	1,240	183,899
	2,750	3,150	78,397	875,899	897,797	217,713	-11,415	1,192	205,191
	2,500	3,400	76,009	849,211	870,441	217,720	-11,196	1,147	225,294
	2,250	3,650	73,556	821,815	842,361	217,728	-10,961	1,106	243,092
	2,000	3,900	68,408	764,294	783,401	217,729	-10,786	1,032	11638,727
	1,750	4,150	59,317	662,722	679,290	217,714	-10,710	0,903	11303,232
	1,500	4,400	50,323	562,233	576,288	217,699	-10,626	0,774	10935,062
	1,250	4,650	41,440	462,989	474,564	217,681	-10,531	0,645	10524,194
	1,000	4,900	32,684	365,161	374,290	217,661	-10,419	0,516	10057,887
	0,750	5,150	24,075	268,984	275,709	217,637	-10,281	0,388	9529,130
	0,500	5,400	15,647	174,815	179,186	217,604	-10,094	0,259	8894,516
	0,250	5,650	7,463	83,382	85,467	217,542	-9,772	0,131	7972,719
	0,041	5,858	1,000	11,173	11,452	217,399	-8,547	0,023	5948,224
	0,000	5,900	0,000	0,000	0,000	209,340	-2,204	-0,008	0,000

Tank Calibrations - B1-DC Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

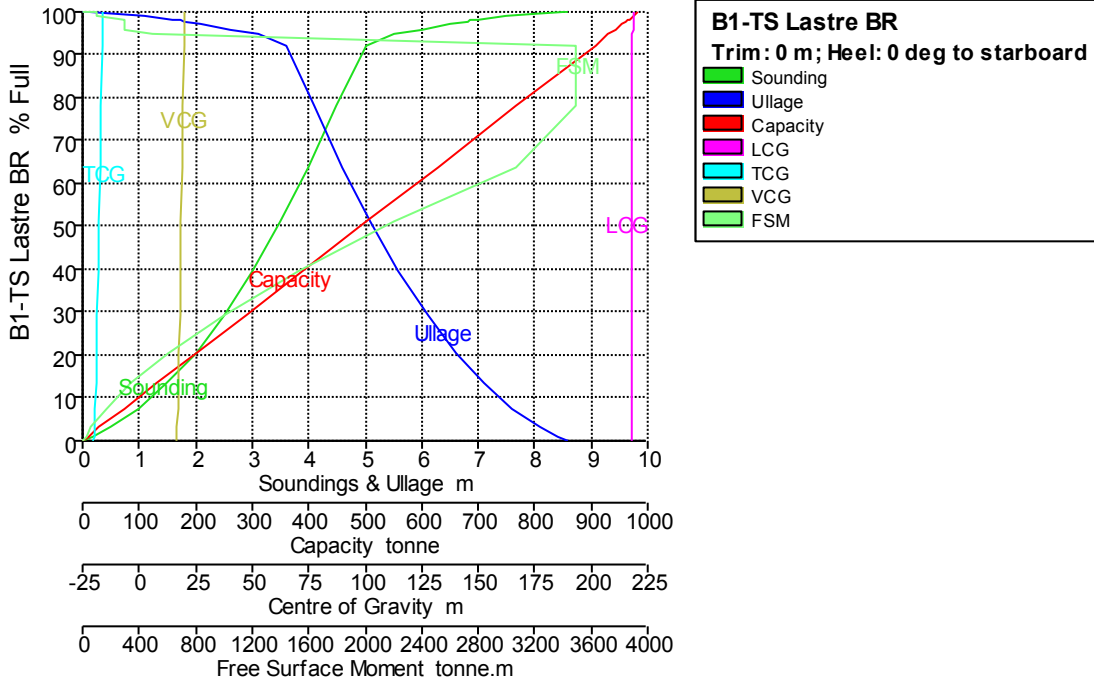


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B1-DC Lastre BR	10,635	0,000	100,000	473,230	485,060	217,926	-20,194	11,223	0,000
	10,500	0,135	98,727	467,207	478,887	217,926	-20,194	11,155	15,134
	10,423	0,212	98,000	463,765	475,359	217,926	-20,194	11,116	15,133
	10,412	0,223	97,900	463,292	474,874	217,926	-20,194	11,111	15,133
	10,000	0,635	94,014	444,904	456,027	217,924	-20,194	10,905	15,125
	9,500	1,135	89,303	422,608	433,173	217,923	-20,194	10,654	15,115
	9,000	1,635	84,593	400,318	410,326	217,921	-20,194	10,404	15,107
	8,500	2,135	79,884	378,034	387,484	217,919	-20,193	10,154	15,102
	8,000	2,635	75,176	355,754	364,647	217,918	-20,193	9,903	15,099

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	7,500	3,135	70,468	333,477	341,814	217,916	-20,193	9,653	15,095
	7,000	3,635	65,762	311,205	318,985	217,915	-20,193	9,403	15,090
	6,500	4,135	61,056	288,937	296,160	217,914	-20,193	9,153	15,084
	6,000	4,635	56,352	266,673	273,340	217,912	-20,193	8,902	15,078
	5,500	5,135	51,648	244,414	250,525	217,911	-20,193	8,652	15,072
	5,000	5,635	46,946	222,160	227,714	217,909	-20,193	8,402	15,066
	4,500	6,135	42,244	199,911	204,909	217,907	-20,193	8,152	15,059
	4,000	6,635	37,543	177,667	182,109	217,905	-20,192	7,901	15,053
	3,500	7,135	32,844	155,428	159,314	217,903	-20,192	7,651	15,046
	3,000	7,635	28,146	133,196	136,526	217,901	-20,192	7,401	15,039
	2,500	8,135	23,449	110,969	113,744	217,899	-20,192	7,151	15,031
	2,000	8,635	18,754	88,750	90,969	217,896	-20,192	6,901	15,023
	1,500	9,135	14,060	66,538	68,202	217,892	-20,191	6,650	15,012
	1,000	9,635	9,369	44,338	45,446	217,887	-20,191	6,400	14,998
	0,500	10,135	4,681	22,153	22,707	217,880	-20,190	6,150	14,970
	0,107	10,528	1,000	4,732	4,851	217,873	-20,190	5,953	14,928
	0,000	10,635	0,000	0,000	0,000	217,871	-20,190	5,900	0,000

Tank Calibrations - B1-TS Lastre BR

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

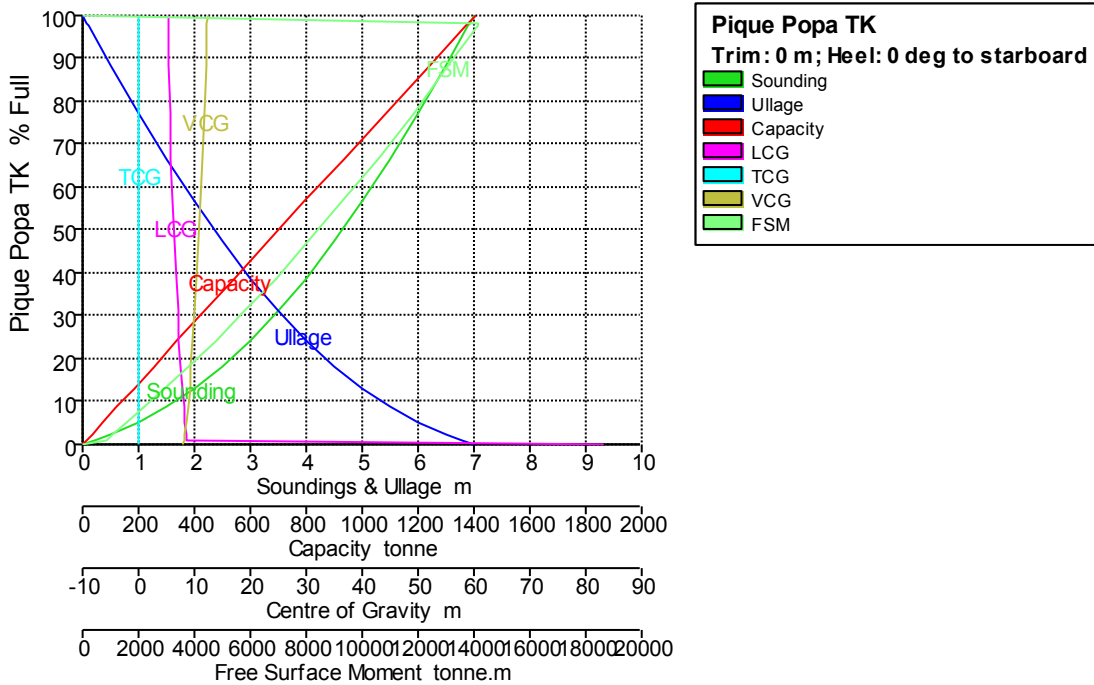


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
B1-TS Lastre BR	8,600	0,000	100,000	959,150	983,129	218,784	-16,445	19,866	0,000
	8,500	0,100	99,916	958,348	982,307	218,775	-16,446	19,862	103,179
	8,000	0,600	99,499	954,342	978,201	218,734	-16,451	19,843	102,982
	7,500	1,100	99,081	950,338	974,097	218,691	-16,457	19,825	102,786
	7,000	1,600	98,360	943,418	967,004	218,620	-16,467	19,797	301,732
	6,853	1,747	98,000	939,967	963,466	218,585	-16,472	19,784	301,675
	6,812	1,788	97,900	939,008	962,483	218,575	-16,473	19,781	301,659

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	6,500	2,100	97,138	931,703	954,995	218,499	-16,484	19,755	301,518
	6,000	2,600	95,917	919,990	942,990	218,376	-16,502	19,718	301,283
	5,500	3,100	94,692	908,234	930,940	218,248	-16,521	19,685	500,179
	5,000	3,600	92,299	885,290	907,422	218,050	-16,558	19,632	3491,842
	4,500	4,100	78,040	748,516	767,229	218,049	-16,827	19,330	3491,723
	4,000	4,600	63,911	612,999	628,324	218,046	-17,200	19,008	3063,274
	3,500	5,100	50,967	488,852	501,074	218,043	-17,594	18,682	2205,592
	3,000	5,600	39,439	378,282	387,739	218,039	-17,987	18,358	1525,114
	2,500	6,100	29,327	281,288	288,321	218,035	-18,377	18,036	1001,335
	2,000	6,600	20,630	197,871	202,818	218,028	-18,763	17,718	613,736
	1,500	7,100	13,349	128,033	131,233	218,020	-19,143	17,404	341,775
	1,000	7,600	7,483	71,774	73,569	218,009	-19,514	17,098	165,038
	0,500	8,100	3,034	29,097	29,824	217,992	-19,870	16,804	62,997
	0,192	8,408	1,000	9,592	9,831	217,977	-20,075	16,635	28,451
	0,000	8,600	0,000	0,000	0,000	217,965	-20,196	16,535	0,000

Tank Calibrations - Pique Popa TK

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

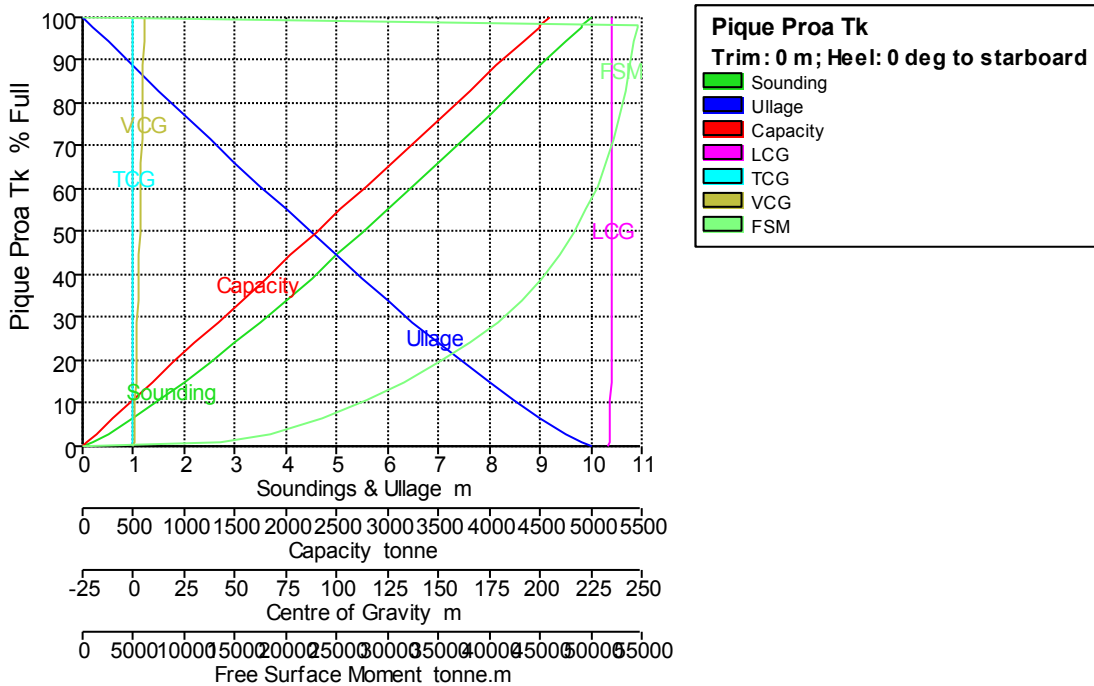


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Pique Popa TK	7,000	0,000	100,000	1369,919	1404,167	5,358	0,000	12,369	0,000
	6,915	0,085	98,000	1342,520	1376,083	5,382	0,000	12,317	14163,245
	6,911	0,089	97,900	1341,150	1374,679	5,383	0,000	12,314	14152,296
	6,500	0,500	88,434	1211,472	1241,758	5,507	0,000	12,058	13089,546
	6,000	1,000	77,329	1059,347	1085,830	5,679	0,000	11,742	11824,557
	5,500	1,500	66,732	914,175	937,029	5,879	0,000	11,423	10551,767
	5,000	2,000	56,702	776,766	796,185	6,114	0,000	11,099	9295,253
	4,500	2,500	47,309	648,099	664,302	6,385	0,000	10,770	8074,185
	4,000	3,000	38,679	529,874	543,121	6,684	0,000	10,432	6904,630

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	3,500	3,500	30,941	423,861	434,458	6,982	0,000	10,097	5803,126
	3,000	4,000	24,090	330,014	338,264	7,277	0,000	9,765	4770,072
	2,500	4,500	18,115	248,155	254,359	7,564	0,000	9,455	3819,723
	2,000	5,000	13,018	178,330	182,788	7,825	0,000	9,140	2955,886
	1,500	5,500	8,723	119,498	122,485	8,070	0,000	8,832	2201,601
	1,000	6,000	5,187	71,057	72,834	8,282	0,000	8,533	1579,285
	0,500	6,500	2,322	31,811	32,606	8,444	0,000	8,217	1090,075
	0,228	6,772	1,000	13,699	14,042	8,517	0,000	8,097	878,973
	0,000	7,000	0,000	0,000	0,000	83,099	0,000	8,000	0,000

Tank Calibrations - Pique Proa Tk

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Pique Proa Tk	10,000	0,000	100,000	4484,434	4596,544	235,617	0,000	5,394	0,000
	10,000	0,000	100,000	4484,433	4596,544	235,617	0,000	5,394	0,000
	9,824	0,176	98,000	4394,745	4504,614	235,610	0,000	5,302	54531,013
	9,816	0,184	97,900	4390,261	4500,017	235,610	0,000	5,297	54523,973
	9,500	0,500	94,312	4229,361	4335,095	235,597	0,000	5,131	54262,520
	9,000	1,000	88,642	3975,092	4074,469	235,575	0,000	4,868	53820,824
	8,500	1,500	82,993	3721,747	3814,790	235,551	0,000	4,604	53333,395
	8,000	2,000	77,367	3469,466	3556,203	235,525	0,000	4,338	52787,822
	7,500	2,500	71,769	3218,445	3298,907	235,495	0,000	4,072	52166,705
	7,000	3,000	66,205	2968,936	3043,159	235,463	0,000	3,805	51449,222
	6,500	3,500	60,682	2721,264	2789,296	235,426	0,000	3,536	50603,576
	6,000	4,000	55,210	2475,857	2537,754	235,387	0,000	3,267	49596,413
	5,500	4,500	49,801	2233,277	2289,109	235,343	0,000	2,996	48391,869
	5,000	5,000	44,463	1993,907	2043,755	235,296	0,000	2,705	46938,678
	4,500	5,500	39,205	1758,115	1802,068	235,241	0,000	2,436	45201,941

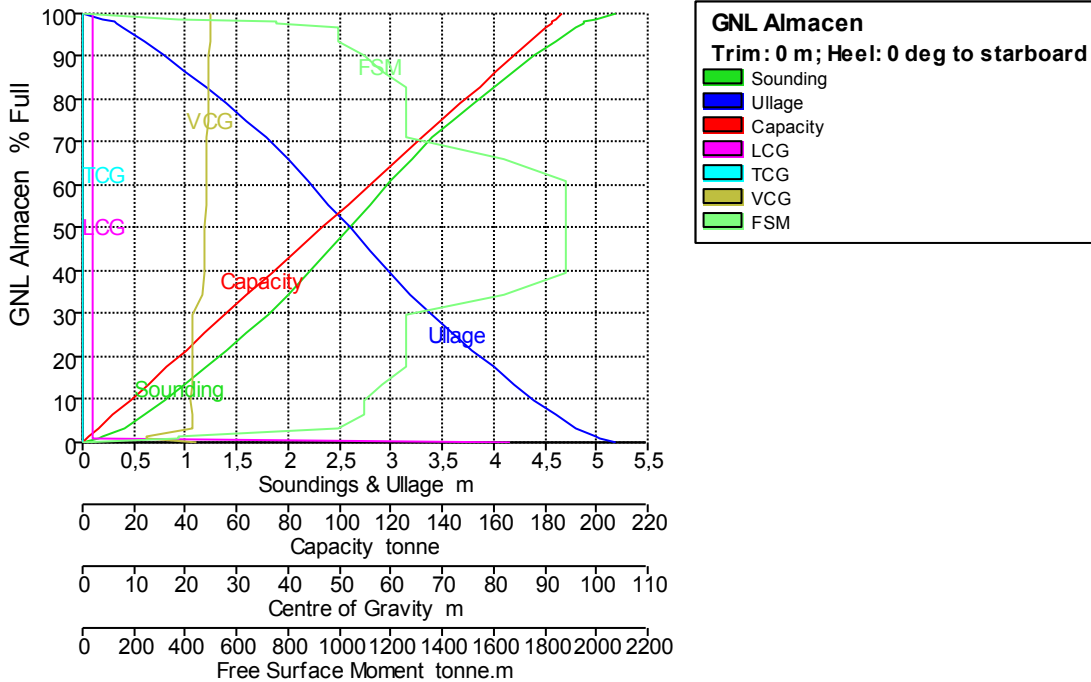
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	4,000	6,000	34,044	1526,692	1564,859	235,178	0,000	2,166	43164,812
	3,500	6,500	29,002	1300,563	1333,077	235,105	0,000	1,896	40801,157
	3,000	7,000	24,104	1080,937	1107,960	235,022	0,000	1,625	38089,241
	2,500	7,500	19,408	870,356	892,115	234,940	0,000	1,321	35031,911
	2,000	8,000	14,914	668,819	685,539	234,850	0,000	1,058	31616,167
	1,500	8,500	10,634	476,860	488,782	234,732	0,000	0,796	27808,932
	1,000	9,000	6,620	296,889	304,311	234,569	0,000	0,536	23556,817
	0,500	9,500	2,986	133,889	137,236	234,379	0,000	0,242	18446,846
	0,194	9,806	1,000	44,844	45,965	234,121	0,000	0,102	13633,174
	0,000	10,000	0,000	0,000	0,000	233,269	0,000	0,000	0,000

Tank Calibrations - GNL Almacen

Fluid Type = GNL Specific gravity = 0,45

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
GNL Almacen	5,197	0,000	100,000	413,810	186,215	1,872	0,000	24,892	0,000
	5,000	0,197	98,773	408,731	183,929	1,871	0,000	24,862	376,727
	4,882	0,315	98,000	405,534	182,490	1,870	0,000	24,844	753,455
	4,873	0,324	97,900	405,120	182,304	1,869	0,000	24,842	753,455
	4,800	0,397	96,815	400,630	180,284	1,866	0,000	24,817	998,389
	4,600	0,597	93,683	387,669	174,451	1,860	0,000	24,746	998,389
	4,400	0,797	90,252	373,471	168,062	1,859	0,000	24,669	1092,445
	4,200	0,997	86,618	358,434	161,295	1,861	0,000	24,589	1167,413
	4,000	1,197	82,875	342,947	154,326	1,867	0,000	24,508	1261,721
	3,800	1,397	78,895	326,475	146,914	1,880	0,000	24,425	1261,721
	3,600	1,597	74,914	310,003	139,501	1,894	0,000	24,342	1261,721
	3,400	1,797	70,934	293,531	132,089	1,910	0,000	24,262	1261,721
	3,200	1,997	66,142	273,701	123,165	1,899	0,000	24,166	1638,448
	3,000	2,197	60,819	251,677	113,255	1,890	0,000	24,059	1883,637

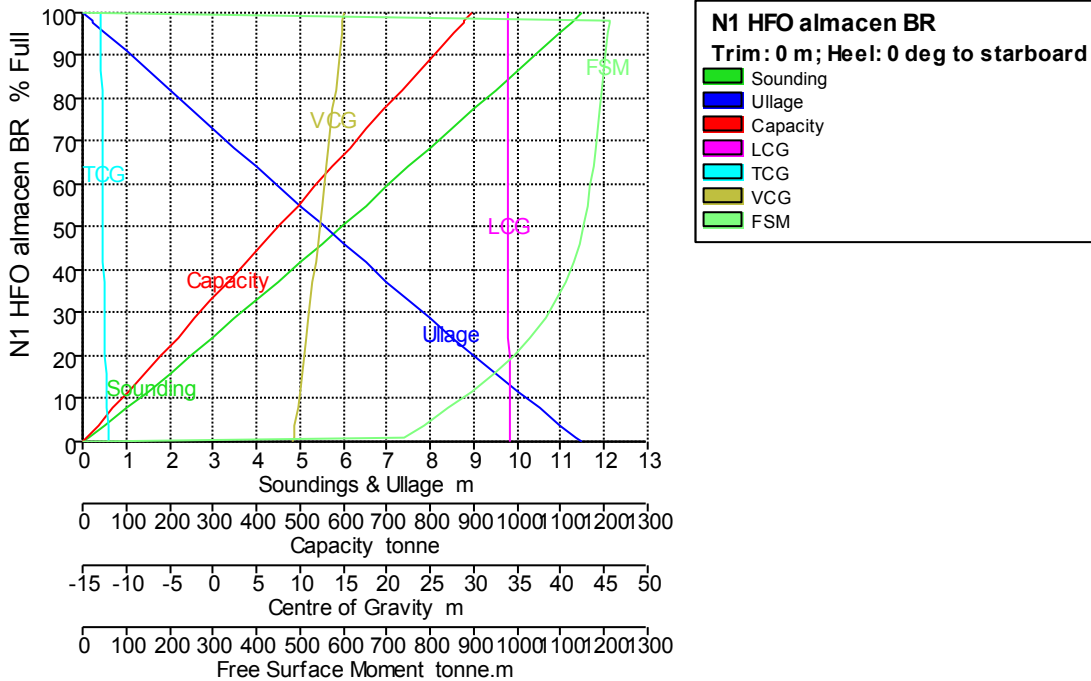
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	2,800	2,397	55,431	229,379	103,221	1,882	0,000	23,949	1883,637
	2,600	2,597	50,042	207,081	93,186	1,872	0,000	23,836	1883,637
	2,400	2,797	44,759	185,217	83,348	1,866	0,000	23,722	1883,637
	2,200	2,997	39,547	163,651	73,643	1,864	0,000	23,607	1883,637
	2,000	3,197	34,396	142,335	64,051	1,857	0,000	23,248	1638,448
	1,800	3,397	29,710	122,943	55,324	1,835	0,000	21,554	1261,721
	1,600	3,597	25,645	106,120	47,754	1,860	0,000	21,491	1261,721
	1,400	3,797	21,579	89,297	40,184	1,895	0,000	21,440	1261,721
	1,200	3,997	17,514	72,474	32,613	1,945	0,000	21,409	1261,721
	1,000	4,197	13,682	56,617	25,478	1,986	0,000	21,266	1167,413
	0,800	4,397	9,960	41,214	18,546	2,035	0,000	21,150	1092,445
	0,600	4,597	6,440	26,648	11,991	2,074	0,000	21,293	1092,445
	0,400	4,797	3,222	13,332	6,000	2,028	0,000	21,526	998,389
	0,200	4,997	1,214	5,023	2,260	1,883	0,000	12,408	376,727
	0,165	5,032	1,000	4,138	1,862	1,883	0,000	12,397	376,727
	0,000	5,197	0,000	0,000	0,000	83,099	0,000	22,293	0,000

Tank Calibrations - N1 HFO almacén BR

Fluid Type = Fuel Oil Specific gravity = 0,9443

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

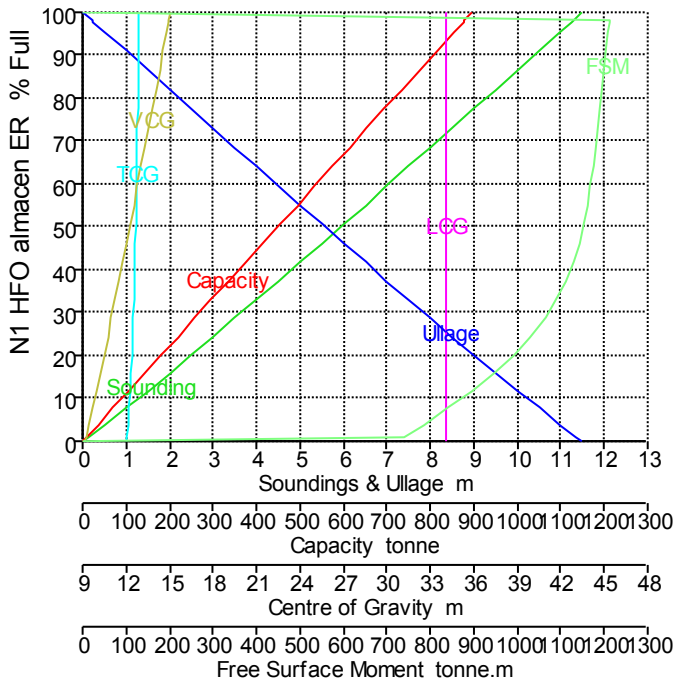


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
N1 HFO almacén BR	11,500	0,000	100,000	949,462	896,577	34,022	-12,863	15,078	0,000
	11,279	0,221	98,000	930,473	878,645	34,022	-12,858	14,966	1211,755
	11,268	0,232	97,900	929,523	877,749	34,022	-12,858	14,960	1211,660
	11,000	0,500	95,484	906,587	856,090	34,022	-12,852	14,824	1209,369
	10,500	1,000	90,974	863,764	815,652	34,023	-12,840	14,570	1205,098
	10,000	1,500	86,469	820,992	775,263	34,023	-12,828	14,316	1200,794
	9,500	2,000	81,970	778,274	734,925	34,024	-12,814	14,061	1195,980
	9,000	2,500	77,477	735,615	694,641	34,025	-12,799	13,807	1191,182

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	8,500	3,000	72,990	693,013	654,413	34,025	-12,784	13,552	1186,402
	8,000	3,500	68,510	650,472	614,240	34,026	-12,766	13,297	1180,995
	7,500	4,000	64,036	608,001	574,135	34,026	-12,748	13,042	1174,982
	7,000	4,500	59,571	565,603	534,099	34,027	-12,727	12,786	1168,992
	6,500	5,000	55,114	523,286	494,139	34,028	-12,704	12,530	1161,295
	6,000	5,500	50,668	481,070	454,274	34,029	-12,678	12,274	1152,938
	5,500	6,000	46,233	438,964	414,513	34,030	-12,649	12,018	1142,355
	5,000	6,500	41,814	397,006	374,892	34,030	-12,616	11,761	1129,947
	4,500	7,000	37,414	355,229	335,443	34,032	-12,580	11,503	1112,398
	4,000	7,500	33,039	313,693	296,220	34,033	-12,538	11,245	1090,677
	3,500	8,000	28,697	272,471	257,295	34,034	-12,492	10,987	1063,509
	3,000	8,500	24,397	231,644	218,742	34,036	-12,442	10,729	1030,173
	2,500	9,000	20,148	191,298	180,643	34,037	-12,386	10,472	990,734
	2,000	9,500	15,959	151,527	143,087	34,039	-12,326	10,215	945,579
	1,500	10,000	11,841	112,424	106,162	34,041	-12,261	9,959	895,358
	1,000	10,500	7,803	74,082	69,955	34,044	-12,192	9,704	841,195
	0,500	11,000	3,853	36,583	34,545	34,046	-12,120	9,451	784,476
	0,131	11,369	1,000	9,495	8,966	34,048	-12,065	9,266	741,586
	0,000	11,500	0,000	0,000	0,000	34,048	-12,045	9,200	0,000

Tank Calibrations - N1 HFO almacén ER

Fluid Type = Fuel Oil Specific gravity = 0,9443
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



N1 HFO almacén ER
 Trim: 0 m; Heel: 0 deg to starboard

- █ Sounding
- █ Ullage
- █ Capacity
- █ LCG
- █ TCG
- █ VCG
- █ FSM

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
N1 HFO almacén ER	11,500	0,000	100,000	949,462	896,577	34,022	12,863	15,078	0,000
	11,279	0,221	98,000	930,473	878,645	34,022	12,858	14,966	1211,755
	11,268	0,232	97,900	929,523	877,749	34,022	12,852	14,824	1209,369
	11,000	0,500	95,484	906,587	856,090	34,022	12,852	14,824	1209,369
	10,500	1,000	90,974	863,764	815,652	34,023	12,840	14,570	1205,098

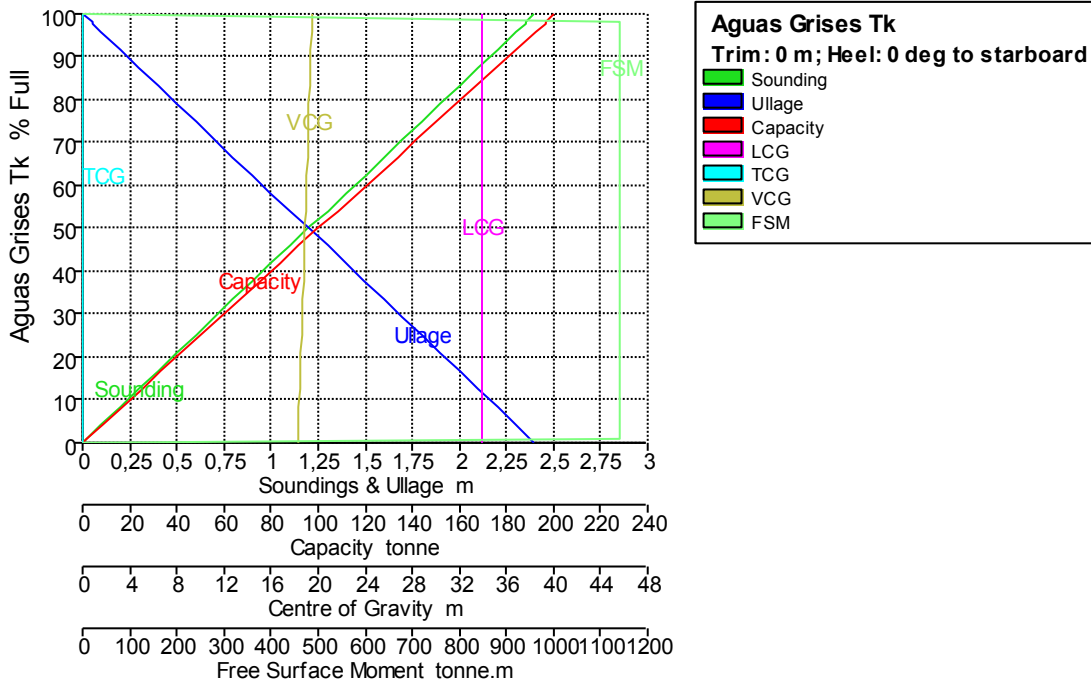
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	10,000	1,500	86,469	820,992	775,263	34,023	12,828	14,316	1200,794
	9,500	2,000	81,970	778,274	734,925	34,024	12,814	14,061	1195,980
	9,000	2,500	77,477	735,615	694,641	34,025	12,799	13,807	1191,182
	8,500	3,000	72,990	693,013	654,413	34,025	12,784	13,552	1186,402
	8,000	3,500	68,510	650,472	614,240	34,026	12,766	13,297	1180,995
	7,500	4,000	64,036	608,001	574,135	34,026	12,748	13,042	1174,982
	7,000	4,500	59,571	565,603	534,099	34,027	12,727	12,786	1168,992
	6,500	5,000	55,114	523,286	494,139	34,028	12,704	12,530	1161,295
	6,000	5,500	50,668	481,070	454,274	34,029	12,678	12,274	1152,938
	5,500	6,000	46,233	438,964	414,513	34,030	12,649	12,018	1142,355
	5,000	6,500	41,814	397,006	374,892	34,030	12,616	11,761	1129,947
	4,500	7,000	37,414	355,229	335,443	34,032	12,580	11,503	1112,398
	4,000	7,500	33,039	313,693	296,220	34,033	12,538	11,245	1090,677
	3,500	8,000	28,697	272,471	257,295	34,034	12,492	10,987	1063,509
	3,000	8,500	24,397	231,644	218,742	34,036	12,442	10,729	1030,173
	2,500	9,000	20,148	191,298	180,643	34,037	12,386	10,472	990,734
	2,000	9,500	15,959	151,527	143,087	34,039	12,326	10,215	945,579
	1,500	10,000	11,841	112,424	106,162	34,041	12,261	9,959	895,358
	1,000	10,500	7,803	74,082	69,955	34,044	12,192	9,704	841,195
	0,500	11,000	3,853	36,583	34,545	34,046	12,120	9,451	784,476
	0,131	11,369	1,000	9,495	8,966	34,048	12,065	9,266	741,586
	0,000	11,500	0,000	0,000	0,000	34,048	12,045	9,200	0,000

Tank Calibrations - Aguas Grises Tk

Fluid Type = A GRISES Specific gravity = 1,02

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

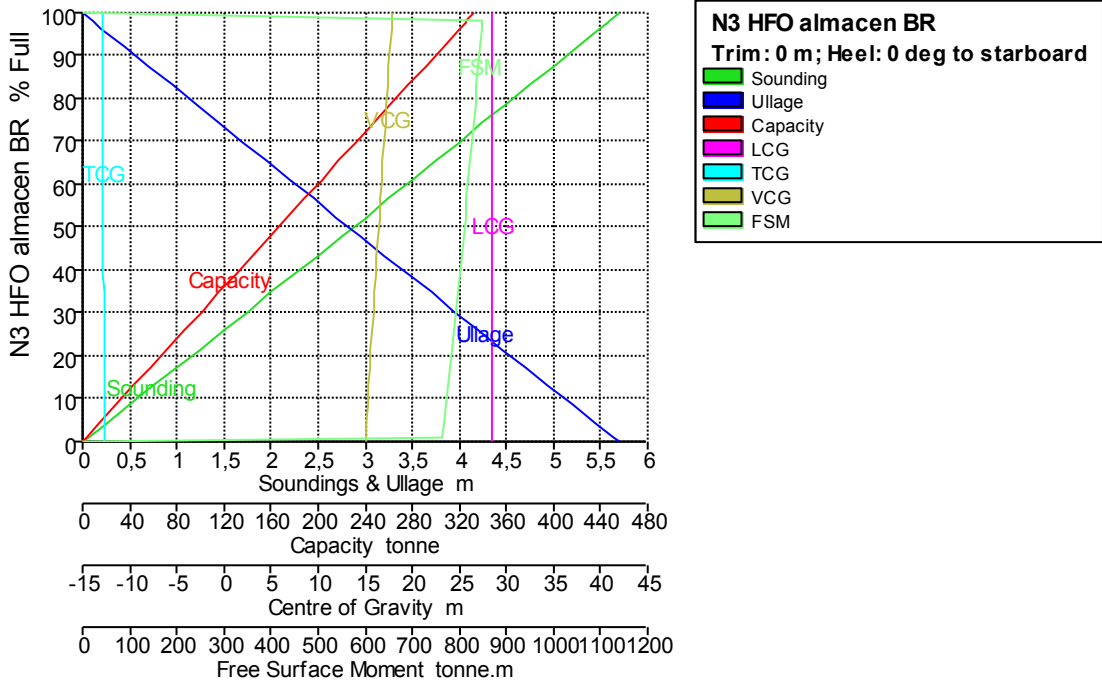


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aguas Grises Tk	2,400	0,000	100,000	196,608	200,540	34,000	0,000	19,500	0,000
	2,352	0,048	98,000	192,676	196,529	34,000	0,000	19,476	1140,851

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	2,350	0,050	97,900	192,479	196,329	34,000	0,000	19,475	1140,851
	2,300	0,100	95,833	188,416	192,184	34,000	0,000	19,450	1140,851
	2,200	0,200	91,667	180,224	183,829	34,000	0,000	19,400	1140,851
	2,100	0,300	87,500	172,032	175,473	34,000	0,000	19,350	1140,851
	2,000	0,400	83,333	163,840	167,117	34,000	0,000	19,300	1140,851
	1,900	0,500	79,167	155,648	158,761	34,000	0,000	19,250	1140,851
	1,800	0,600	75,000	147,456	150,405	34,000	0,000	19,200	1140,851
	1,700	0,700	70,833	139,264	142,049	34,000	0,000	19,150	1140,851
	1,600	0,800	66,667	131,072	133,693	34,000	0,000	19,100	1140,851
	1,500	0,900	62,500	122,880	125,338	34,000	0,000	19,050	1140,851
	1,400	1,000	58,333	114,688	116,982	34,000	0,000	19,000	1140,851
	1,300	1,100	54,167	106,496	108,626	34,000	0,000	18,950	1140,851
	1,200	1,200	50,000	98,304	100,270	34,000	0,000	18,900	1140,851
	1,100	1,300	45,833	90,112	91,914	34,000	0,000	18,850	1140,851
	1,000	1,400	41,667	81,920	83,558	34,000	0,000	18,800	1140,851
	0,900	1,500	37,500	73,728	75,203	34,000	0,000	18,750	1140,851
	0,800	1,600	33,333	65,536	66,847	34,000	0,000	18,700	1140,851
	0,700	1,700	29,167	57,344	58,491	34,000	0,000	18,650	1140,851
	0,600	1,800	25,000	49,152	50,135	34,000	0,000	18,600	1140,851
	0,500	1,900	20,833	40,960	41,779	34,000	0,000	18,550	1140,851
	0,400	2,000	16,667	32,768	33,423	34,000	0,000	18,500	1140,851
	0,300	2,100	12,500	24,576	25,068	34,000	0,000	18,450	1140,851
	0,200	2,200	8,333	16,384	16,712	34,000	0,000	18,400	1140,851
	0,100	2,300	4,167	8,192	8,356	34,000	0,000	18,350	1140,851
	0,024	2,376	1,000	1,966	2,005	34,000	0,000	18,312	1140,851
	0,000	2,400	0,000	0,000	0,000	34,000	0,000	18,300	0,000

Tank Calibrations - N3 HFO almacén BR

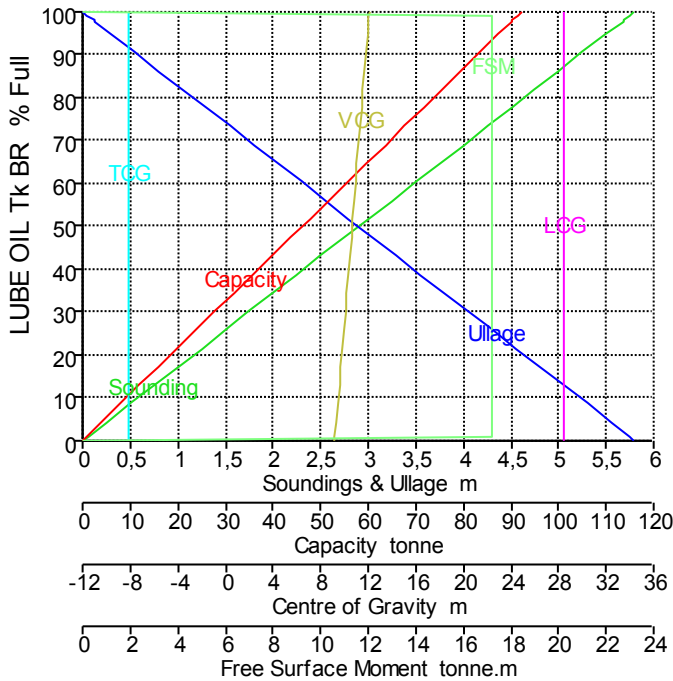
Fluid Type = Fuel Oil Specific gravity = 0,9443
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
N3 HFO almacen BR	5,700	0,000	100,000	352,600	332,960	28,414	-12,845	17,867	0,000
	5,588	0,112	98,000	345,548	326,301	28,414	-12,843	17,810	849,281
	5,582	0,118	97,900	345,195	325,968	28,414	-12,843	17,807	849,201
	5,500	0,200	96,433	340,024	321,084	28,414	-12,841	17,766	848,032
	5,250	0,450	91,981	324,324	306,259	28,414	-12,836	17,640	844,486
	5,000	0,700	87,534	308,646	291,454	28,414	-12,831	17,513	840,950
	4,750	0,950	83,094	292,989	276,670	28,414	-12,826	17,387	837,424
	4,500	1,200	78,660	277,355	261,907	28,414	-12,821	17,261	833,908
	4,250	1,450	74,232	261,743	247,164	28,415	-12,816	17,135	830,403
	4,000	1,700	69,811	246,154	232,443	28,415	-12,811	17,009	826,774
	3,750	1,950	65,396	230,587	217,743	28,415	-12,806	16,883	823,135
	3,500	2,200	60,988	215,043	203,065	28,415	-12,801	16,757	819,507
	3,250	2,450	56,586	199,523	188,409	28,415	-12,796	16,631	815,890
	3,000	2,700	52,191	184,025	173,775	28,415	-12,791	16,505	812,285
	2,750	2,950	47,802	168,550	159,162	28,415	-12,785	16,379	808,690
	2,500	3,200	43,420	153,099	144,571	28,416	-12,780	16,254	805,106
	2,250	3,450	39,044	137,671	130,002	28,416	-12,775	16,128	801,276
	2,000	3,700	34,676	122,268	115,457	28,416	-12,769	16,002	797,350
	1,750	3,950	30,315	106,890	100,936	28,416	-12,763	15,877	793,437
	1,500	4,200	25,961	91,538	86,440	28,416	-12,758	15,751	789,538
	1,250	4,450	21,614	76,211	71,967	28,416	-12,752	15,626	785,652
	1,000	4,700	17,275	60,910	57,518	28,417	-12,746	15,501	781,661
	0,750	4,950	12,943	45,637	43,095	28,417	-12,739	15,375	777,073
	0,500	5,200	8,620	30,395	28,702	28,417	-12,733	15,250	772,505
	0,250	5,450	4,306	15,182	14,337	28,417	-12,727	15,125	767,954
	0,058	5,642	1,000	3,526	3,330	28,417	-12,722	15,029	764,474
	0,000	5,700	0,000	0,000	0,000	28,417	-12,721	15,000	0,000

Tank Calibrations - LUBE OIL Tk BR

Fluid Type = Lube Oil Specific gravity = 0,92
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



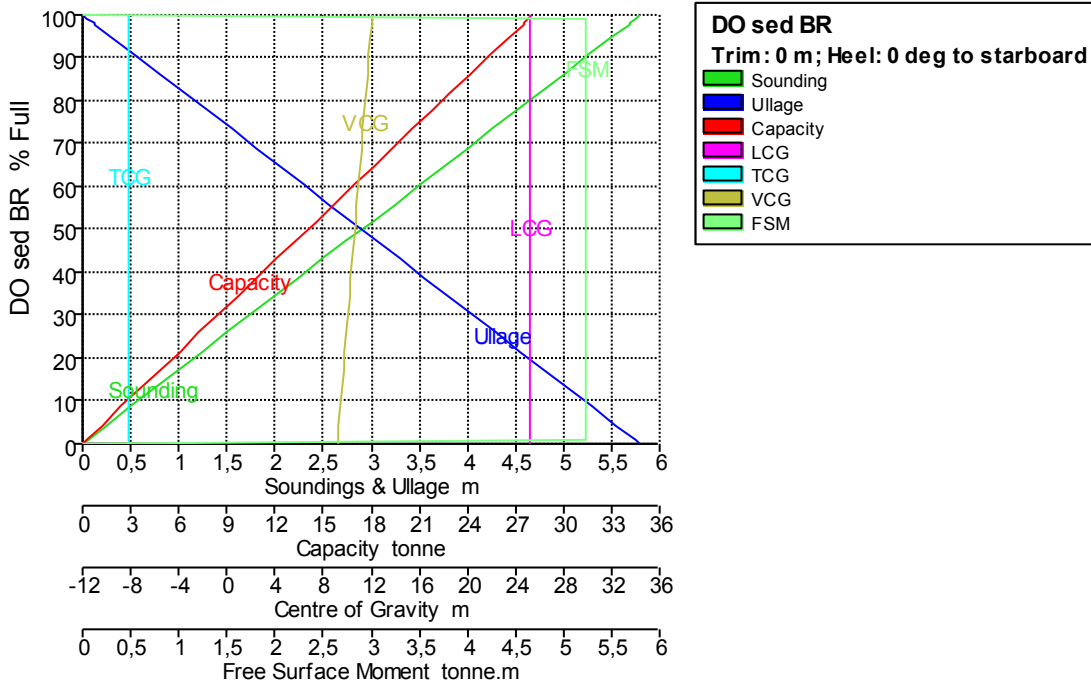
LUBE OIL Tk BR
 Trim: 0 m; Heel: 0 deg to starboard

- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
LUBE OIL Tk BR	5,800	0,000	100,000	100,224	92,206	28,400	-8,200	12,100	0,000
	5,750	0,050	99,138	99,360	91,411	28,400	-8,200	12,075	17,169
	5,684	0,116	98,000	98,220	90,362	28,400	-8,200	12,042	17,169
	5,678	0,122	97,900	98,119	90,270	28,400	-8,200	12,039	17,169
	5,500	0,300	94,828	95,040	87,437	28,400	-8,200	11,950	17,169
	5,250	0,550	90,517	90,720	83,462	28,400	-8,200	11,825	17,169
	5,000	0,800	86,207	86,400	79,488	28,400	-8,200	11,700	17,169
	4,750	1,050	81,897	82,080	75,514	28,400	-8,200	11,575	17,169
	4,500	1,300	77,586	77,760	71,539	28,400	-8,200	11,450	17,169
	4,250	1,550	73,276	73,440	67,565	28,400	-8,200	11,325	17,169
	4,000	1,800	68,966	69,120	63,590	28,400	-8,200	11,200	17,169
	3,750	2,050	64,655	64,800	59,616	28,400	-8,200	11,075	17,169
	3,500	2,300	60,345	60,480	55,642	28,400	-8,200	10,950	17,169
	3,250	2,550	56,034	56,160	51,667	28,400	-8,200	10,825	17,169
	3,000	2,800	51,724	51,840	47,693	28,400	-8,200	10,700	17,169
	2,750	3,050	47,414	47,520	43,718	28,400	-8,200	10,575	17,169
	2,500	3,300	43,103	43,200	39,744	28,400	-8,200	10,450	17,169
	2,250	3,550	38,793	38,880	35,770	28,400	-8,200	10,325	17,169
	2,000	3,800	34,483	34,560	31,795	28,400	-8,200	10,200	17,169
	1,750	4,050	30,172	30,240	27,821	28,400	-8,200	10,075	17,169
	1,500	4,300	25,862	25,920	23,846	28,400	-8,200	9,950	17,169
	1,250	4,550	21,552	21,600	19,872	28,400	-8,200	9,825	17,169
	1,000	4,800	17,241	17,280	15,898	28,400	-8,200	9,700	17,169
	0,750	5,050	12,931	12,960	11,923	28,400	-8,200	9,575	17,169
	0,500	5,300	8,621	8,640	7,949	28,400	-8,200	9,450	17,169
	0,250	5,550	4,310	4,320	3,974	28,400	-8,200	9,325	17,169
	0,058	5,742	1,000	1,002	0,922	28,400	-8,200	9,229	17,169
	0,000	5,800	0,000	0,000	0,000	28,400	-8,200	9,200	0,000

Tank Calibrations - DO sed BR

Fluid Type = Diesel Specific gravity = 0,84
Permeability = 100 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

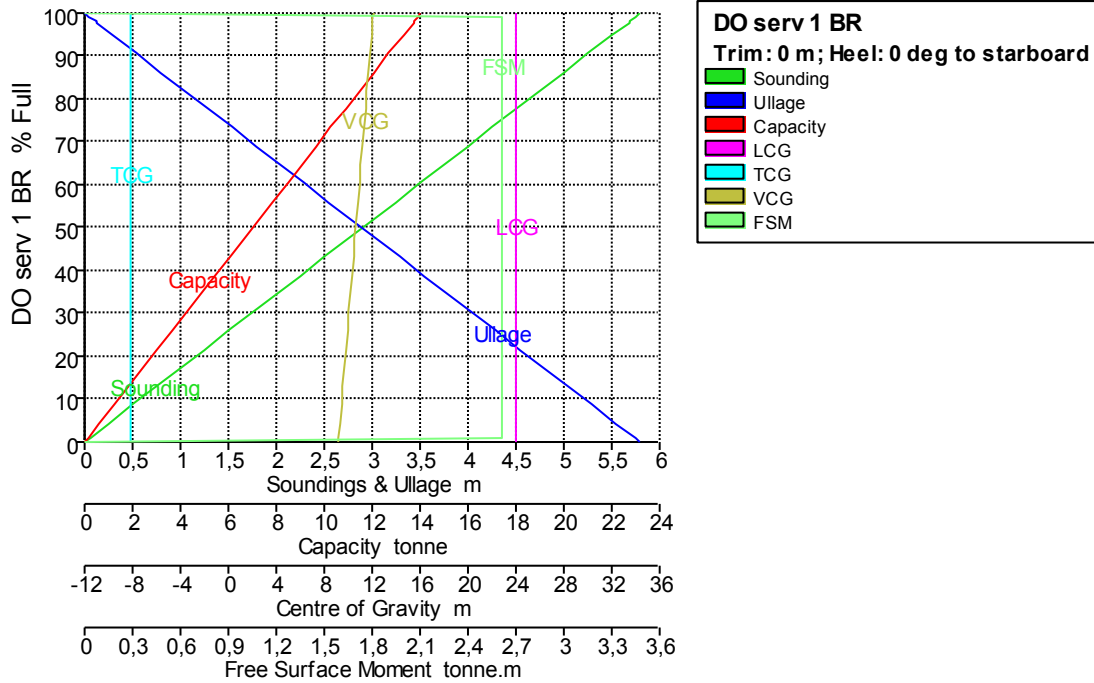


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
DO sed BR	5,800	0,000	100,000	33,408	28,063	25,200	-8,200	12,100	0,000
	5,750	0,050	99,138	33,120	27,821	25,200	-8,200	12,075	5,225
	5,684	0,116	98,000	32,740	27,501	25,200	-8,200	12,042	5,225
	5,678	0,122	97,900	32,706	27,473	25,200	-8,200	12,039	5,225
	5,500	0,300	94,828	31,680	26,611	25,200	-8,200	11,950	5,225
	5,250	0,550	90,517	30,240	25,402	25,200	-8,200	11,825	5,225
	5,000	0,800	86,207	28,800	24,192	25,200	-8,200	11,700	5,225
	4,750	1,050	81,897	27,360	22,982	25,200	-8,200	11,575	5,225
	4,500	1,300	77,586	25,920	21,773	25,200	-8,200	11,450	5,225
	4,250	1,550	73,276	24,480	20,563	25,200	-8,200	11,325	5,225
	4,000	1,800	68,966	23,040	19,354	25,200	-8,200	11,200	5,225
	3,750	2,050	64,655	21,600	18,144	25,200	-8,200	11,075	5,225
	3,500	2,300	60,345	20,160	16,934	25,200	-8,200	10,950	5,225
	3,250	2,550	56,034	18,720	15,725	25,200	-8,200	10,825	5,225
	3,000	2,800	51,724	17,280	14,515	25,200	-8,200	10,700	5,225
	2,750	3,050	47,414	15,840	13,306	25,200	-8,200	10,575	5,225
	2,500	3,300	43,103	14,400	12,096	25,200	-8,200	10,450	5,225
	2,250	3,550	38,793	12,960	10,886	25,200	-8,200	10,325	5,225
	2,000	3,800	34,483	11,520	9,677	25,200	-8,200	10,200	5,225
	1,750	4,050	30,172	10,080	8,467	25,200	-8,200	10,075	5,225
	1,500	4,300	25,862	8,640	7,258	25,200	-8,200	9,950	5,225
	1,250	4,550	21,552	7,200	6,048	25,200	-8,200	9,825	5,225
	1,000	4,800	17,241	5,760	4,838	25,200	-8,200	9,700	5,225
	0,750	5,050	12,931	4,320	3,629	25,200	-8,200	9,575	5,225
	0,500	5,300	8,621	2,880	2,419	25,200	-8,200	9,450	5,225
	0,250	5,550	4,310	1,440	1,210	25,200	-8,200	9,325	5,225
	0,058	5,742	1,000	0,334	0,281	25,200	-8,200	9,229	5,225
	0,000	5,800	0,000	0,000	0,000	25,200	-8,200	9,200	0,000

Tank Calibrations - DO serv 1 BR

Fluid Type = Diesel Specific gravity = 0,84

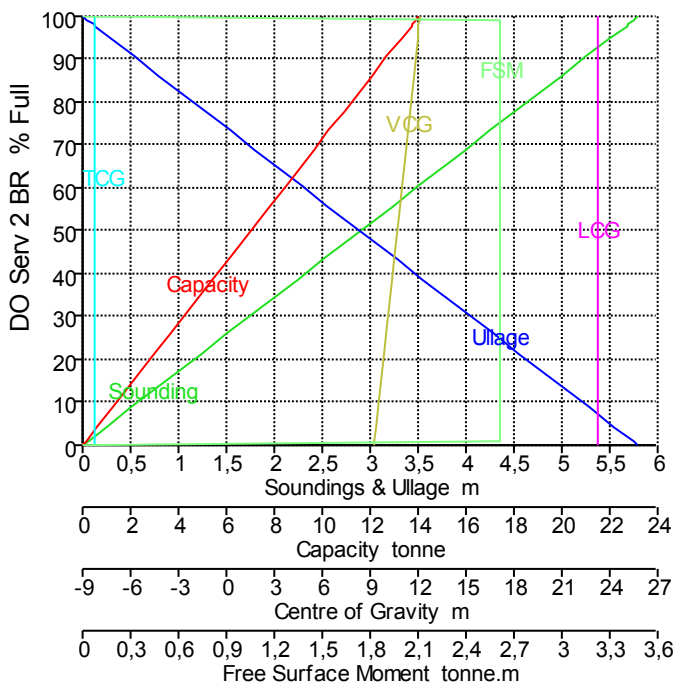
Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
DO serv 1 BR	5,800	0,000	100,000	16,704	14,031	24,000	-8,200	12,100	0,000
	5,750	0,050	99,138	16,560	13,910	24,000	-8,200	12,075	2,613
	5,684	0,116	98,000	16,370	13,751	24,000	-8,200	12,042	2,613
	5,678	0,122	97,900	16,353	13,737	24,000	-8,200	12,039	2,613
	5,500	0,300	94,828	15,840	13,306	24,000	-8,200	11,950	2,613
	5,250	0,550	90,517	15,120	12,701	24,000	-8,200	11,825	2,613
	5,000	0,800	86,207	14,400	12,096	24,000	-8,200	11,700	2,613
	4,750	1,050	81,897	13,680	11,491	24,000	-8,200	11,575	2,613
	4,500	1,300	77,586	12,960	10,886	24,000	-8,200	11,450	2,613
	4,250	1,550	73,276	12,240	10,282	24,000	-8,200	11,325	2,613
	4,000	1,800	68,966	11,520	9,677	24,000	-8,200	11,200	2,613
	3,750	2,050	64,655	10,800	9,072	24,000	-8,200	11,075	2,613
	3,500	2,300	60,345	10,080	8,467	24,000	-8,200	10,950	2,613
	3,250	2,550	56,034	9,360	7,862	24,000	-8,200	10,825	2,613
	3,000	2,800	51,724	8,640	7,258	24,000	-8,200	10,700	2,613
	2,750	3,050	47,414	7,920	6,653	24,000	-8,200	10,575	2,613
	2,500	3,300	43,103	7,200	6,048	24,000	-8,200	10,450	2,613
	2,250	3,550	38,793	6,480	5,443	24,000	-8,200	10,325	2,613
	2,000	3,800	34,483	5,760	4,838	24,000	-8,200	10,200	2,613
	1,750	4,050	30,172	5,040	4,234	24,000	-8,200	10,075	2,613
	1,500	4,300	25,862	4,320	3,629	24,000	-8,200	9,950	2,613
	1,250	4,550	21,552	3,600	3,024	24,000	-8,200	9,825	2,613
	1,000	4,800	17,241	2,880	2,419	24,000	-8,200	9,700	2,613
	0,750	5,050	12,931	2,160	1,814	24,000	-8,200	9,575	2,613
	0,500	5,300	8,621	1,440	1,210	24,000	-8,200	9,450	2,613
	0,250	5,550	4,310	0,720	0,605	24,000	-8,200	9,325	2,613
	0,058	5,742	1,000	0,167	0,140	24,000	-8,200	9,229	2,613
	0,000	5,800	0,000	0,000	0,000	24,000	-8,200	9,200	0,000

Tank Calibrations - DO Serv 2 BR

Fluid Type = Diesel Specific gravity = 0,84
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



DO Serv 2 BR
 Trim: 0 m; Heel: 0 deg to starboard

- █ Sounding
- █ Ullage
- █ Capacity
- █ LCG
- █ TCG
- █ VCG
- █ FSM

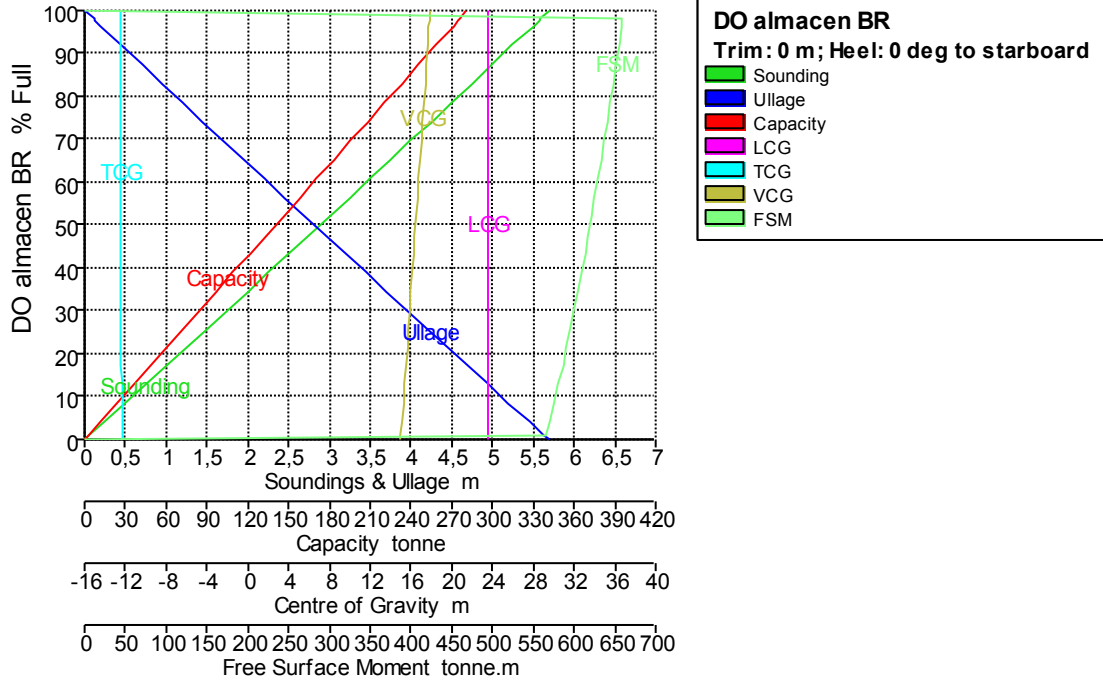
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
DO Serv 2 BR	5,800	0,000	100,000	16,704	14,031	23,200	-8,200	12,100	0,000
	5,750	0,050	99,138	16,560	13,910	23,200	-8,200	12,075	2,613
	5,684	0,116	98,000	16,370	13,751	23,200	-8,200	12,042	2,613
	5,678	0,122	97,900	16,353	13,737	23,200	-8,200	12,039	2,613
	5,500	0,300	94,828	15,840	13,306	23,200	-8,200	11,950	2,613
	5,250	0,550	90,517	15,120	12,701	23,200	-8,200	11,825	2,613
	5,000	0,800	86,207	14,400	12,096	23,200	-8,200	11,700	2,613
	4,750	1,050	81,897	13,680	11,491	23,200	-8,200	11,575	2,613
	4,500	1,300	77,586	12,960	10,886	23,200	-8,200	11,450	2,613
	4,250	1,550	73,276	12,240	10,282	23,200	-8,200	11,325	2,613
	4,000	1,800	68,966	11,520	9,677	23,200	-8,200	11,200	2,613
	3,750	2,050	64,655	10,800	9,072	23,200	-8,200	11,075	2,613
	3,500	2,300	60,345	10,080	8,467	23,200	-8,200	10,950	2,613
	3,250	2,550	56,034	9,360	7,862	23,200	-8,200	10,825	2,613
	3,000	2,800	51,724	8,640	7,258	23,200	-8,200	10,700	2,613
	2,750	3,050	47,414	7,920	6,653	23,200	-8,200	10,575	2,613
	2,500	3,300	43,103	7,200	6,048	23,200	-8,200	10,450	2,613
	2,250	3,550	38,793	6,480	5,443	23,200	-8,200	10,325	2,613
	2,000	3,800	34,483	5,760	4,838	23,200	-8,200	10,200	2,613
	1,750	4,050	30,172	5,040	4,234	23,200	-8,200	10,075	2,613
	1,500	4,300	25,862	4,320	3,629	23,200	-8,200	9,950	2,613
	1,250	4,550	21,552	3,600	3,024	23,200	-8,200	9,825	2,613
	1,000	4,800	17,241	2,880	2,419	23,200	-8,200	9,700	2,613
	0,750	5,050	12,931	2,160	1,814	23,200	-8,200	9,575	2,613
	0,500	5,300	8,621	1,440	1,210	23,200	-8,200	9,450	2,613
	0,250	5,550	4,310	0,720	0,605	23,200	-8,200	9,325	2,613
	0,058	5,742	1,000	0,167	0,140	23,200	-8,200	9,229	2,613
	0,000	5,800	0,000	0,000	0,000	23,200	-8,200	9,200	0,000

Tank Calibrations - DO almacén BR

Fluid Type = Diesel Specific gravity = 0,84

Permeability = 100 %

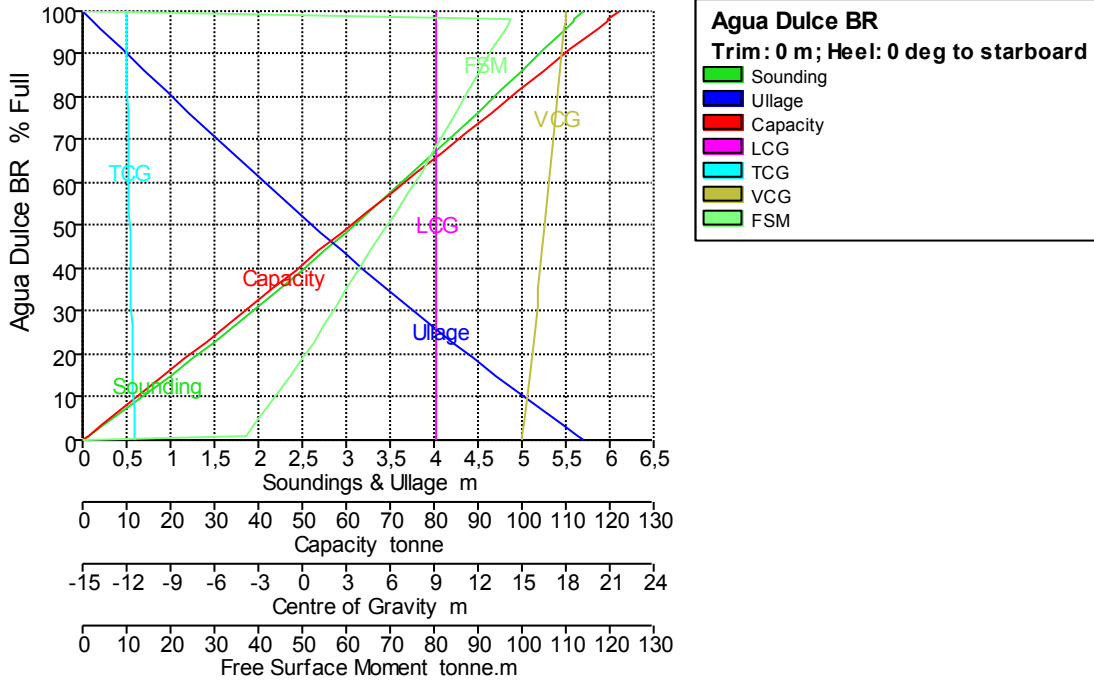
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
DO almacén BR	5,700	0,000	100,000	334,583	281,050	23,632	-12,519	17,875	0,000
	5,589	0,111	98,000	327,892	275,429	23,632	-12,516	17,818	659,563
	5,583	0,117	97,900	327,557	275,148	23,632	-12,516	17,815	659,483
	5,500	0,200	96,410	322,574	270,962	23,632	-12,514	17,773	658,296
	5,250	0,450	91,931	307,586	258,372	23,632	-12,507	17,646	654,732
	5,000	0,700	87,459	292,625	245,805	23,632	-12,501	17,520	651,180
	4,750	0,950	82,996	277,692	233,261	23,632	-12,494	17,393	647,642
	4,500	1,200	78,541	262,785	220,740	23,632	-12,487	17,266	644,116
	4,250	1,450	74,094	247,906	208,241	23,632	-12,480	17,140	640,603
	4,000	1,700	69,656	233,056	195,767	23,632	-12,473	17,013	636,696
	3,750	1,950	65,226	218,237	183,319	23,633	-12,466	16,887	632,739
	3,500	2,200	60,806	203,448	170,897	23,633	-12,459	16,760	628,800
	3,250	2,450	56,396	188,691	158,500	23,633	-12,452	16,634	624,877
	3,000	2,700	51,994	173,964	146,130	23,633	-12,444	16,508	620,971
	2,750	2,950	47,602	159,269	133,786	23,633	-12,437	16,382	617,081
	2,500	3,200	43,219	144,605	121,468	23,633	-12,429	16,256	613,207
	2,250	3,450	38,846	129,973	109,177	23,633	-12,421	16,130	608,854
	2,000	3,700	34,484	115,377	96,917	23,634	-12,413	16,004	604,341
	1,750	3,950	30,132	100,818	84,687	23,634	-12,405	15,878	599,850
	1,500	4,200	25,792	86,295	72,488	23,634	-12,397	15,752	595,383
	1,250	4,450	21,462	71,809	60,320	23,634	-12,388	15,627	590,938
	1,000	4,700	17,144	57,360	48,182	23,634	-12,379	15,501	586,258
	0,750	4,950	12,838	42,953	36,080	23,635	-12,370	15,376	580,897
	0,500	5,200	8,545	28,591	24,016	23,635	-12,360	15,250	575,568
	0,250	5,450	4,266	14,273	11,989	23,635	-12,351	15,125	570,274
	0,059	5,641	1,000	3,346	2,811	23,635	-12,344	15,029	566,215
	0,000	5,700	0,000	0,000	0,000	23,636	-12,341	15,000	0,000

Tank Calibrations - Agua Dulce BR

Fluid Type = Fresh Water Specific gravity = 1
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Agua Dulce BR	5,700	0,000	100,000	122,135	122,135	9,076	-12,020	18,008	0,000
	5,601	0,099	98,000	119,692	119,692	9,077	-12,011	17,954	97,383
	5,596	0,104	97,900	119,570	119,570	9,077	-12,011	17,951	97,324
	5,500	0,200	95,972	117,215	117,215	9,077	-12,003	17,899	96,191
	5,250	0,450	90,985	111,124	111,124	9,078	-11,981	17,763	93,281
	5,000	0,700	86,050	105,097	105,097	9,080	-11,960	17,628	90,434
	4,750	0,950	81,168	99,134	99,134	9,081	-11,938	17,493	87,647
	4,500	1,200	76,338	93,236	93,236	9,082	-11,916	17,358	84,920
	4,250	1,450	71,561	87,402	87,402	9,083	-11,893	17,223	82,253
	4,000	1,700	66,837	81,632	81,632	9,085	-11,870	17,089	79,644
	3,750	1,950	62,166	75,926	75,926	9,086	-11,847	16,955	77,092
	3,500	2,200	57,552	70,291	70,291	9,087	-11,823	16,821	74,147
	3,250	2,450	53,001	64,733	64,733	9,089	-11,799	16,687	71,182
	3,000	2,700	48,516	59,254	59,254	9,090	-11,775	16,554	68,299
	2,750	2,950	44,094	53,854	53,854	9,091	-11,750	16,422	65,499
	2,500	3,200	39,737	48,533	48,533	9,093	-11,726	16,290	62,780
	2,250	3,450	35,445	43,290	43,290	9,095	-11,701	16,158	60,141
	2,000	3,700	31,216	38,126	38,126	9,096	-11,676	16,027	57,579
	1,750	3,950	27,052	33,041	33,041	9,098	-11,650	15,897	55,096
	1,500	4,200	22,953	28,034	28,034	9,100	-11,623	15,766	52,688
	1,250	4,450	18,920	23,109	23,109	9,102	-11,595	15,637	50,119
	1,000	4,700	14,968	18,281	18,281	9,104	-11,566	15,508	47,179
	0,750	4,950	11,100	13,557	13,557	9,105	-11,537	15,379	44,358
	0,500	5,200	7,316	8,935	8,935	9,107	-11,509	15,252	41,657
	0,250	5,450	3,616	4,416	4,416	9,109	-11,481	15,125	39,073
	0,070	5,630	1,000	1,221	1,221	9,111	-11,460	15,035	37,280

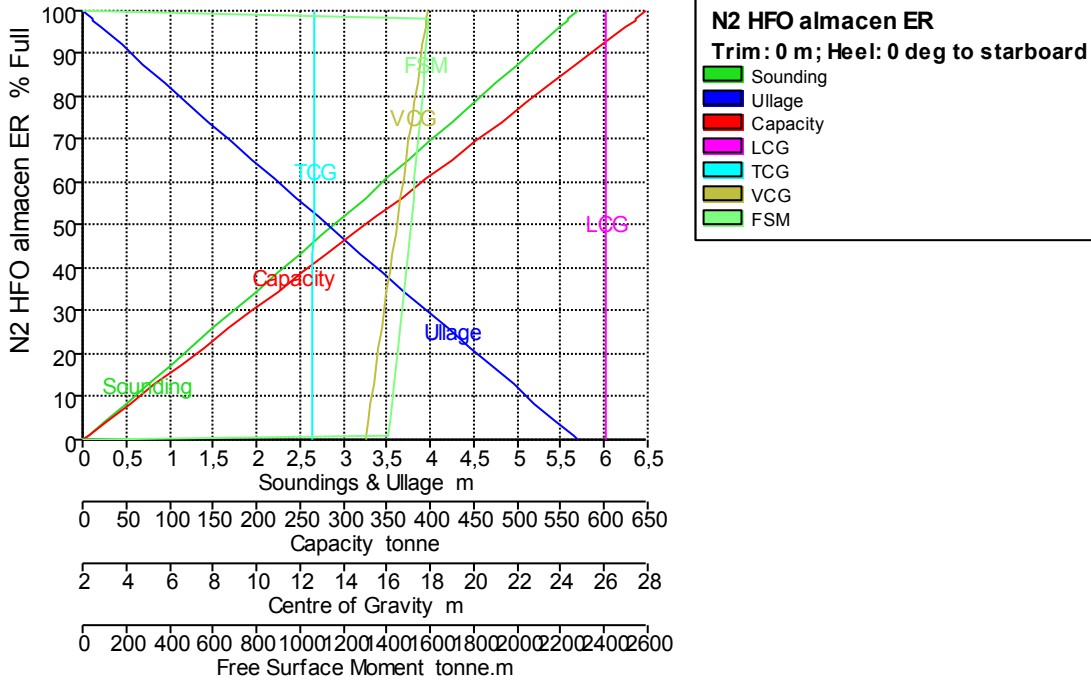
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,000	5,700	0,000	0,000	0,000	9,111	-11,453	15,000	0,000

Tank Calibrations - N2 HFO almacén ER

Fluid Type = Fuel Oil Specific gravity = 0,9443

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
N2 HFO almacén ER	5,700	0,000	100,000	687,107	648,836	26,085	12,686	17,871	0,000
	5,588	0,112	98,000	673,365	635,859	26,086	12,683	17,814	1592,806
	5,583	0,117	97,900	672,678	635,210	26,086	12,683	17,811	1592,638
	5,500	0,200	96,422	662,525	625,622	26,086	12,681	17,769	1590,149
	5,250	0,450	91,957	631,840	596,647	26,086	12,675	17,643	1582,637
	5,000	0,700	87,498	601,205	567,718	26,087	12,670	17,516	1575,149
	4,750	0,950	83,047	570,619	538,835	26,087	12,664	17,390	1567,687
	4,500	1,200	78,602	540,082	509,999	26,088	12,658	17,264	1560,249
	4,250	1,450	74,165	509,594	481,210	26,088	12,652	17,137	1552,836
	4,000	1,700	69,736	479,158	452,469	26,089	12,646	17,011	1544,872
	3,750	1,950	65,314	448,775	423,778	26,090	12,640	16,885	1536,848
	3,500	2,200	60,900	418,447	395,139	26,090	12,634	16,759	1528,853
	3,250	2,450	56,494	388,172	366,551	26,091	12,628	16,633	1520,889
	3,000	2,700	52,095	357,951	338,013	26,091	12,622	16,507	1512,955
	2,750	2,950	47,705	327,784	309,527	26,092	12,615	16,381	1505,050
	2,500	3,200	43,322	297,671	281,091	26,093	12,609	16,255	1497,176
	2,250	3,450	38,948	267,615	252,708	26,094	12,602	16,129	1488,533
	2,000	3,700	34,583	237,619	224,384	26,094	12,596	16,003	1479,622
	1,750	3,950	30,226	207,686	196,118	26,095	12,589	15,877	1470,751
	1,500	4,200	25,879	177,814	167,910	26,096	12,582	15,752	1461,919
	1,250	4,450	21,540	148,005	139,761	26,097	12,575	15,626	1453,128
	1,000	4,700	17,211	118,257	111,670	26,097	12,567	15,501	1443,977
	0,750	4,950	12,892	88,581	83,647	26,098	12,559	15,375	1433,480

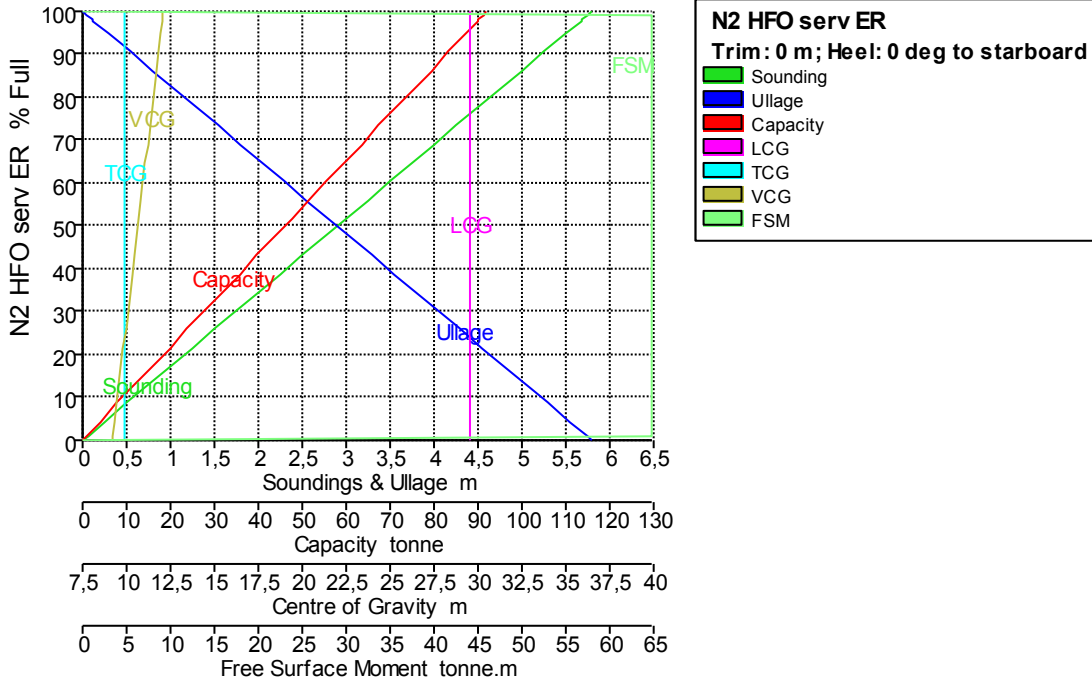
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,500	5,200	8,584	58,979	55,694	26,099	12,552	15,250	1423,041
	0,250	5,450	4,286	29,452	27,812	26,100	12,544	15,125	1412,660
	0,058	5,642	1,000	6,871	6,488	26,101	12,538	15,029	1404,710
	0,000	5,700	0,000	0,000	0,000	26,101	12,536	15,000	0,000

Tank Calibrations - N2 HFO serv ER

Fluid Type = Fuel Oil Specific gravity = 0,9443

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
N2 HFO serv ER	5,800	0,000	100,000	97,440	92,013	29,600	9,900	12,100	0,000
	5,750	0,050	99,138	96,600	91,219	29,600	9,900	12,075	64,779
	5,684	0,116	98,000	95,491	90,172	29,600	9,900	12,042	64,779
	5,678	0,122	97,900	95,394	90,080	29,600	9,900	12,039	64,779
	5,500	0,300	94,828	92,400	87,253	29,600	9,900	11,950	64,779
	5,250	0,550	90,517	88,200	83,287	29,600	9,900	11,825	64,779
	5,000	0,800	86,207	84,000	79,321	29,600	9,900	11,700	64,779
	4,750	1,050	81,897	79,800	75,355	29,600	9,900	11,575	64,779
	4,500	1,300	77,586	75,600	71,389	29,600	9,900	11,450	64,779
	4,250	1,550	73,276	71,400	67,423	29,600	9,900	11,325	64,779
	4,000	1,800	68,966	67,200	63,457	29,600	9,900	11,200	64,779
	3,750	2,050	64,655	63,000	59,491	29,600	9,900	11,075	64,779
	3,500	2,300	60,345	58,800	55,525	29,600	9,900	10,950	64,779
	3,250	2,550	56,034	54,600	51,559	29,600	9,900	10,825	64,779
	3,000	2,800	51,724	50,400	47,593	29,600	9,900	10,700	64,779
	2,750	3,050	47,414	46,200	43,627	29,600	9,900	10,575	64,779
	2,500	3,300	43,103	42,000	39,661	29,600	9,900	10,450	64,779
	2,250	3,550	38,793	37,800	35,695	29,600	9,900	10,325	64,779
	2,000	3,800	34,483	33,600	31,728	29,600	9,900	10,200	64,779
	1,750	4,050	30,172	29,400	27,762	29,600	9,900	10,075	64,779

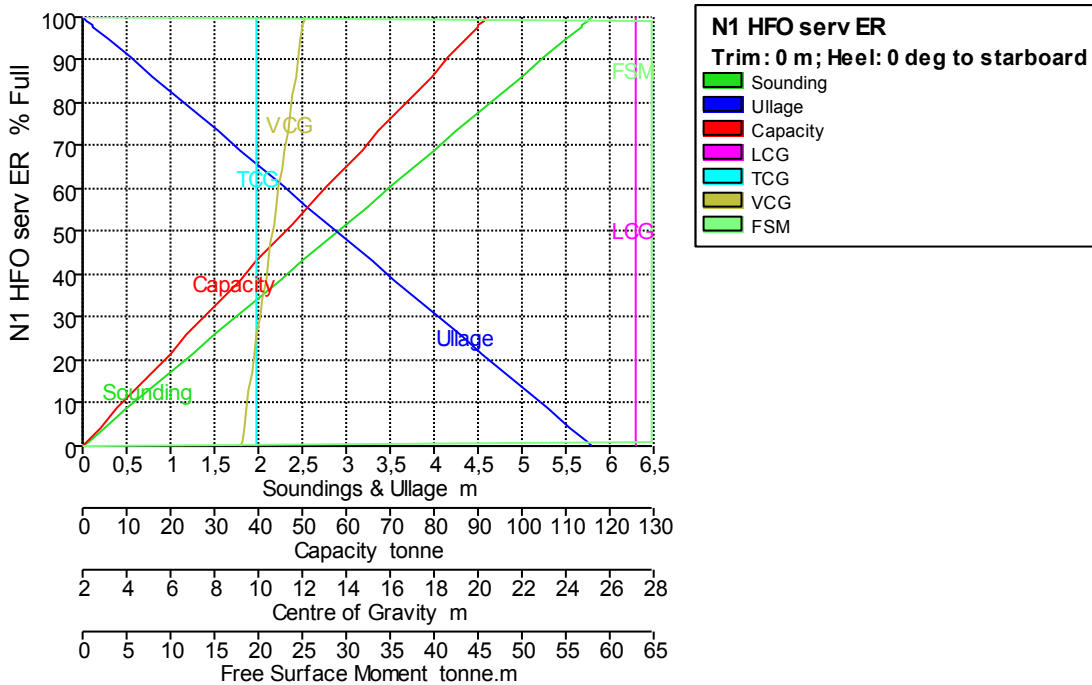
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	1,500	4,300	25,862	25,200	23,796	29,600	9,900	9,950	64,779
	1,250	4,550	21,552	21,000	19,830	29,600	9,900	9,825	64,779
	1,000	4,800	17,241	16,800	15,864	29,600	9,900	9,700	64,779
	0,750	5,050	12,931	12,600	11,898	29,600	9,900	9,575	64,779
	0,500	5,300	8,621	8,400	7,932	29,600	9,900	9,450	64,779
	0,250	5,550	4,310	4,200	3,966	29,600	9,900	9,325	64,779
	0,058	5,742	1,000	0,974	0,920	29,600	9,900	9,229	64,779
	0,000	5,800	0,000	0,000	0,000	29,600	9,900	9,200	0,000

Tank Calibrations - N1 HFO serv ER

Fluid Type = Fuel Oil Specific gravity = 0,9443

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
N1 HFO serv ER	5,800	0,000	100,000	97,440	92,013	27,200	9,900	12,100	0,000
	5,750	0,050	99,138	96,600	91,219	27,200	9,900	12,075	64,779
	5,684	0,116	98,000	95,491	90,172	27,200	9,900	12,042	64,779
	5,678	0,122	97,900	95,394	90,080	27,200	9,900	12,039	64,779
	5,500	0,300	94,828	92,400	87,253	27,200	9,900	11,950	64,779
	5,250	0,550	90,517	88,200	83,287	27,200	9,900	11,825	64,779
	5,000	0,800	86,207	84,000	79,321	27,200	9,900	11,700	64,779
	4,750	1,050	81,897	79,800	75,355	27,200	9,900	11,575	64,779
	4,500	1,300	77,586	75,600	71,389	27,200	9,900	11,450	64,779
	4,250	1,550	73,276	71,400	67,423	27,200	9,900	11,325	64,779
	4,000	1,800	68,966	67,200	63,457	27,200	9,900	11,200	64,779
	3,750	2,050	64,655	63,000	59,491	27,200	9,900	11,075	64,779
	3,500	2,300	60,345	58,800	55,525	27,200	9,900	10,950	64,779
	3,250	2,550	56,034	54,600	51,559	27,200	9,900	10,825	64,779
	3,000	2,800	51,724	50,400	47,593	27,200	9,900	10,700	64,779
	2,750	3,050	47,414	46,200	43,627	27,200	9,900	10,575	64,779

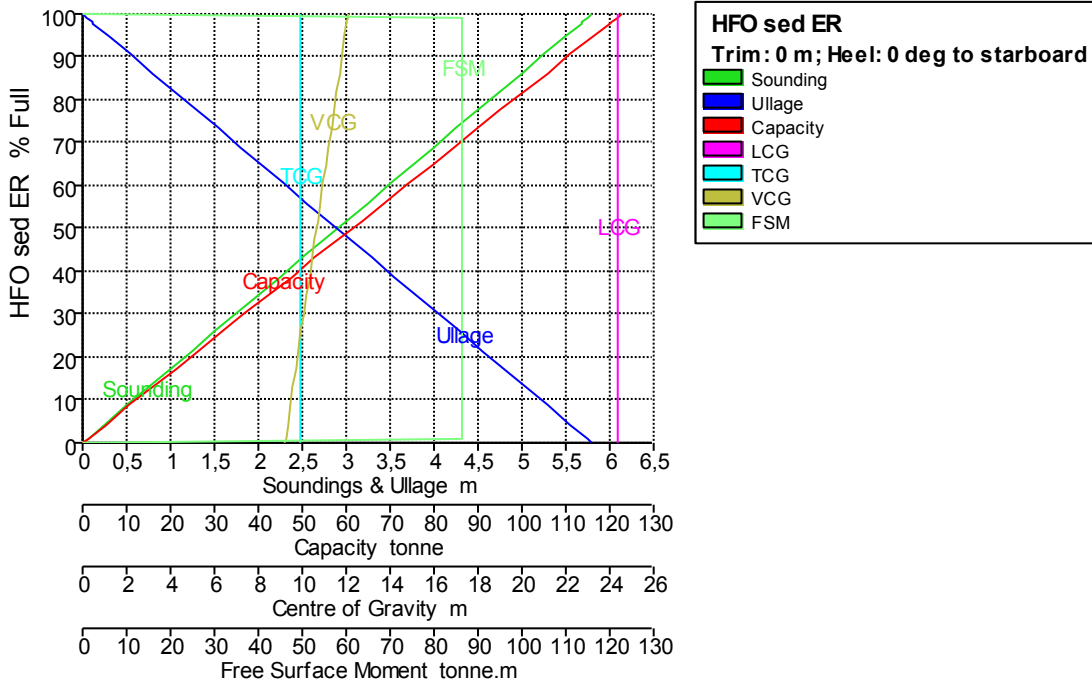
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	2,500	3,300	43,103	42,000	39,661	27,200	9,900	10,450	64,779
	2,250	3,550	38,793	37,800	35,695	27,200	9,900	10,325	64,779
	2,000	3,800	34,483	33,600	31,728	27,200	9,900	10,200	64,779
	1,750	4,050	30,172	29,400	27,762	27,200	9,900	10,075	64,779
	1,500	4,300	25,862	25,200	23,796	27,200	9,900	9,950	64,779
	1,250	4,550	21,552	21,000	19,830	27,200	9,900	9,825	64,779
	1,000	4,800	17,241	16,800	15,864	27,200	9,900	9,700	64,779
	0,750	5,050	12,931	12,600	11,898	27,200	9,900	9,575	64,779
	0,500	5,300	8,621	8,400	7,932	27,200	9,900	9,450	64,779
	0,250	5,550	4,310	4,200	3,966	27,200	9,900	9,325	64,779
	0,058	5,742	1,000	0,974	0,920	27,200	9,900	9,229	64,779
	0,000	5,800	0,000	0,000	0,000	27,200	9,900	9,200	0,000

Tank Calibrations - HFO sed ER

Fluid Type = Fuel Oil Specific gravity = 0,9443

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

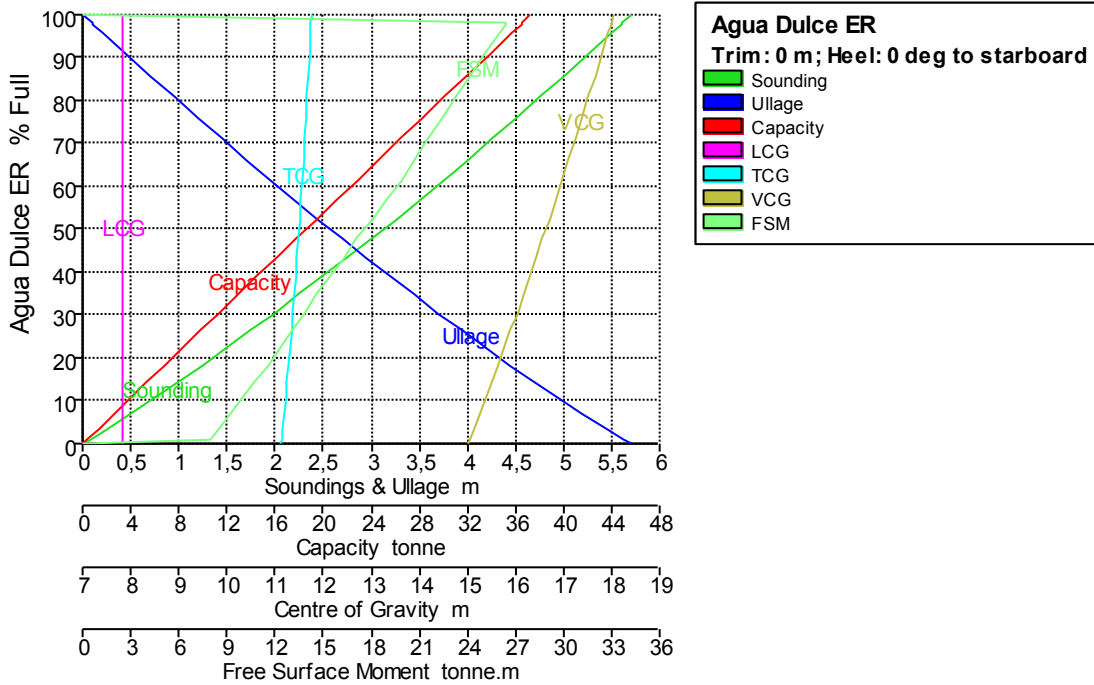


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO sed ER	5,800	0,000	100,000	129,920	122,683	24,400	9,900	12,100	0,000
	5,750	0,050	99,138	128,800	121,626	24,400	9,900	12,075	86,372
	5,684	0,116	98,000	127,322	120,230	24,400	9,900	12,042	86,372
	5,678	0,122	97,900	127,192	120,107	24,400	9,900	12,039	86,372
	5,500	0,300	94,828	123,200	116,338	24,400	9,900	11,950	86,372
	5,250	0,550	90,517	117,600	111,050	24,400	9,900	11,825	86,372
	5,000	0,800	86,207	112,000	105,762	24,400	9,900	11,700	86,372
	4,750	1,050	81,897	106,400	100,474	24,400	9,900	11,575	86,372
	4,500	1,300	77,586	100,800	95,185	24,400	9,900	11,450	86,372
	4,250	1,550	73,276	95,200	89,897	24,400	9,900	11,325	86,372
	4,000	1,800	68,966	89,600	84,609	24,400	9,900	11,200	86,372
	3,750	2,050	64,655	84,000	79,321	24,400	9,900	11,075	86,372

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	3,500	2,300	60,345	78,400	74,033	24,400	9,900	10,950	86,372
	3,250	2,550	56,034	72,800	68,745	24,400	9,900	10,825	86,372
	3,000	2,800	51,724	67,200	63,457	24,400	9,900	10,700	86,372
	2,750	3,050	47,414	61,600	58,169	24,400	9,900	10,575	86,372
	2,500	3,300	43,103	56,000	52,881	24,400	9,900	10,450	86,372
	2,250	3,550	38,793	50,400	47,593	24,400	9,900	10,325	86,372
	2,000	3,800	34,483	44,800	42,305	24,400	9,900	10,200	86,372
	1,750	4,050	30,172	39,200	37,017	24,400	9,900	10,075	86,372
	1,500	4,300	25,862	33,600	31,728	24,400	9,900	9,950	86,372
	1,250	4,550	21,552	28,000	26,440	24,400	9,900	9,825	86,372
	1,000	4,800	17,241	22,400	21,152	24,400	9,900	9,700	86,372
	0,750	5,050	12,931	16,800	15,864	24,400	9,900	9,575	86,372
	0,500	5,300	8,621	11,200	10,576	24,400	9,900	9,450	86,372
	0,250	5,550	4,310	5,600	5,288	24,400	9,900	9,325	86,372
	0,058	5,742	1,000	1,299	1,227	24,400	9,900	9,229	86,372
	0,000	5,800	0,000	0,000	0,000	24,400	9,900	9,200	0,000

Tank Calibrations - Agua Dulce ER

Fluid Type = Fresh Water Specific gravity = 1
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

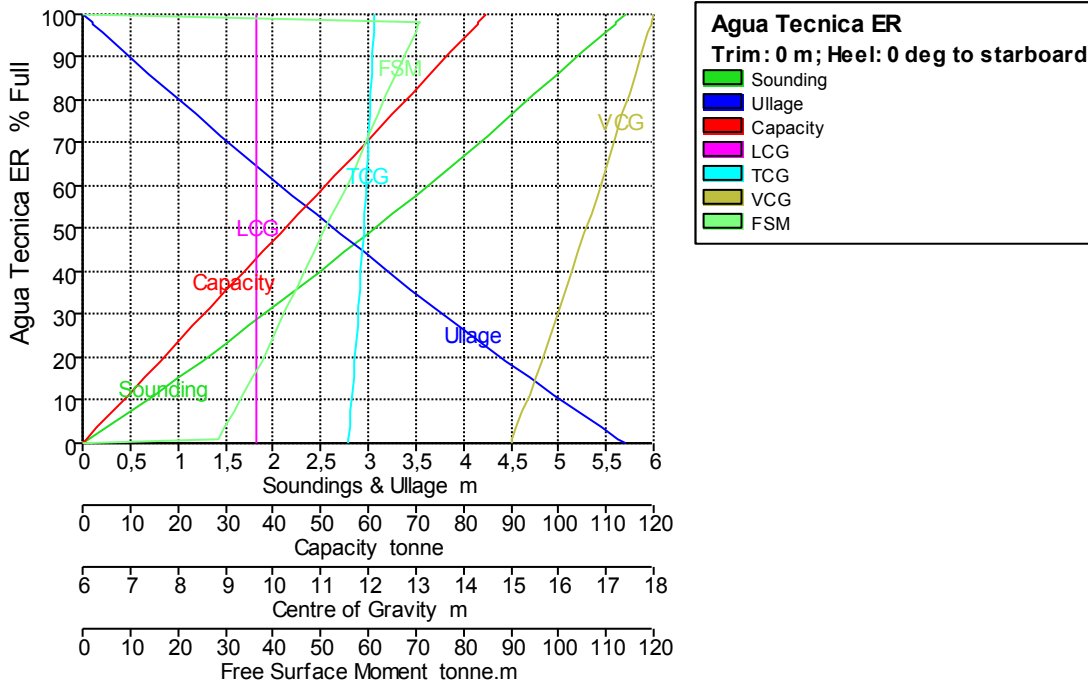


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Agua Dulce ER	5,700	0,000	100,000	37,247	37,247	7,810	11,761	18,039	0,000
	5,603	0,097	98,000	36,502	36,502	7,810	11,752	17,985	26,427
	5,599	0,101	97,900	36,464	36,464	7,810	11,751	17,983	26,408
	5,500	0,200	95,869	35,708	35,708	7,810	11,742	17,928	26,028
	5,250	0,450	90,762	33,806	33,806	7,810	11,718	17,791	25,081
	5,000	0,700	85,719	31,927	31,927	7,810	11,693	17,653	24,157
	4,750	0,950	80,739	30,072	30,072	7,811	11,669	17,516	23,257
	4,500	1,200	75,822	28,241	28,241	7,811	11,644	17,379	22,379

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	4,250	1,450	70,969	26,433	26,433	7,811	11,618	17,243	21,523
	4,000	1,700	66,179	24,649	24,649	7,811	11,592	17,107	20,690
	3,750	1,950	61,452	22,889	22,889	7,811	11,566	16,971	19,876
	3,500	2,200	56,796	21,155	21,155	7,812	11,539	16,835	18,927
	3,250	2,450	52,216	19,449	19,449	7,812	11,512	16,700	18,007
	3,000	2,700	47,713	17,771	17,771	7,812	11,485	16,565	17,118
	2,750	2,950	43,286	16,122	16,122	7,812	11,458	16,431	16,259
	2,500	3,200	38,935	14,502	14,502	7,813	11,431	16,298	15,429
	2,250	3,450	34,662	12,910	12,910	7,813	11,403	16,165	14,628
	2,000	3,700	30,464	11,347	11,347	7,813	11,375	16,033	13,856
	1,750	3,950	26,343	9,812	9,812	7,813	11,346	15,901	13,111
	1,500	4,200	22,299	8,306	8,306	7,814	11,316	15,770	12,394
	1,250	4,450	18,337	6,830	6,830	7,814	11,284	15,639	11,565
	1,000	4,700	14,473	5,391	5,391	7,814	11,252	15,509	10,721
	0,750	4,950	10,707	3,988	3,988	7,815	11,221	15,380	9,919
	0,500	5,200	7,039	2,622	2,622	7,815	11,190	15,252	9,159
	0,250	5,450	3,471	1,293	1,293	7,815	11,159	15,126	8,439
	0,073	5,627	1,000	0,372	0,372	7,815	11,137	15,036	7,952
	0,000	5,700	0,000	0,000	0,000	7,815	11,128	15,000	0,000

Tank Calibrations - Agua Tecnica ER

Fluid Type = Fresh Water Specific gravity = 1
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Agua Tecnica ER	5,700	0,000	100,000	84,920	84,920	9,632	12,135	17,995	0,000
	5,600	0,100	98,000	83,221	83,221	9,632	12,127	17,941	70,736
	5,595	0,105	97,900	83,136	83,136	9,632	12,126	17,938	70,695
	5,500	0,200	96,012	81,533	81,533	9,632	12,118	17,887	69,916
	5,250	0,450	91,072	77,338	77,338	9,633	12,098	17,752	67,892

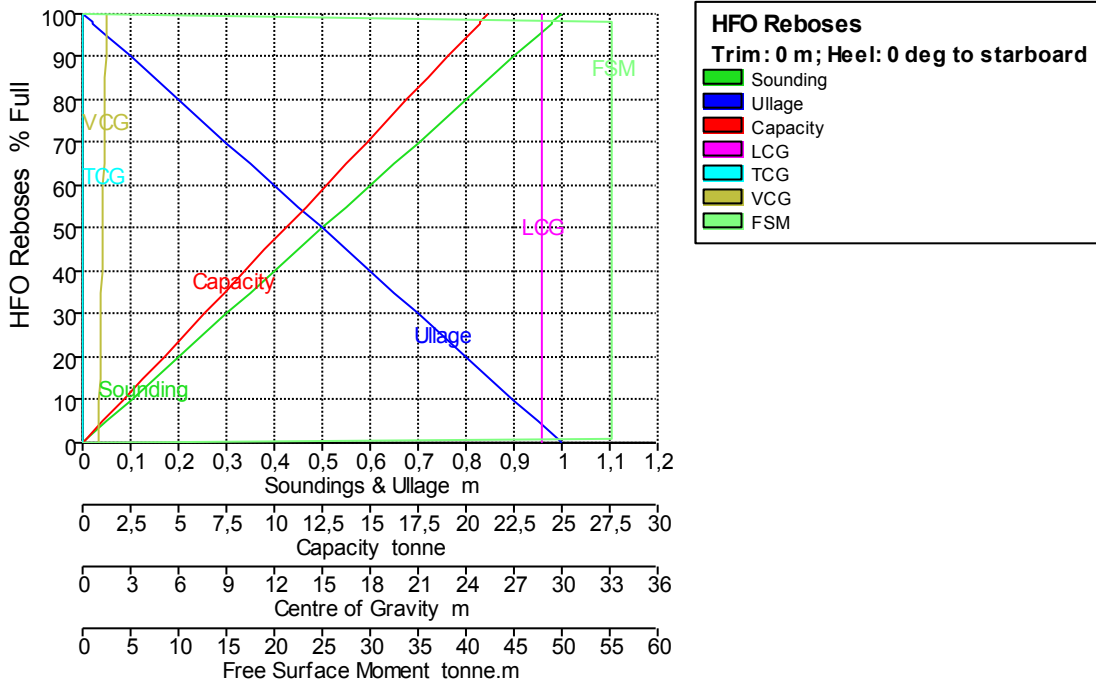
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	5,000	0,700	86,180	73,184	73,184	9,633	12,077	17,617	65,908
	4,750	0,950	81,338	69,072	69,072	9,634	12,056	17,483	63,963
	4,500	1,200	76,545	65,001	65,001	9,634	12,034	17,349	62,058
	4,250	1,450	71,800	60,972	60,972	9,635	12,012	17,215	60,192
	4,000	1,700	67,105	56,985	56,985	9,635	11,990	17,081	58,364
	3,750	1,950	62,458	53,039	53,039	9,636	11,968	16,947	56,574
	3,500	2,200	57,864	49,138	49,138	9,636	11,945	16,814	54,550
	3,250	2,450	53,328	45,286	45,286	9,637	11,922	16,682	52,494
	3,000	2,700	48,851	41,484	41,484	9,637	11,899	16,549	50,490
	2,750	2,950	44,434	37,733	37,733	9,638	11,875	16,417	48,539
	2,500	3,200	40,075	34,032	34,032	9,639	11,852	16,286	46,639
	2,250	3,450	35,776	30,381	30,381	9,639	11,828	16,155	44,791
	2,000	3,700	31,536	26,780	26,780	9,640	11,804	16,025	42,993
	1,750	3,950	27,354	23,229	23,229	9,640	11,779	15,895	41,245
	1,500	4,200	23,232	19,728	19,728	9,641	11,753	15,765	39,546
	1,250	4,450	19,170	16,279	16,279	9,642	11,725	15,636	37,777
	1,000	4,700	15,180	12,891	12,891	9,643	11,697	15,507	35,675
	0,750	4,950	11,268	9,569	9,569	9,643	11,669	15,379	33,653
	0,500	5,200	7,434	6,313	6,313	9,644	11,641	15,252	31,709
	0,250	5,450	3,678	3,123	3,123	9,645	11,614	15,125	29,843
	0,068	5,632	1,000	0,849	0,849	9,645	11,594	15,034	28,537
	0,000	5,700	0,000	0,000	0,000	9,646	11,586	15,000	0,000

Tank Calibrations - HFO Rebores

Fluid Type = Fuel Oil Specific gravity = 0,9443

Permeability = 100 %

Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

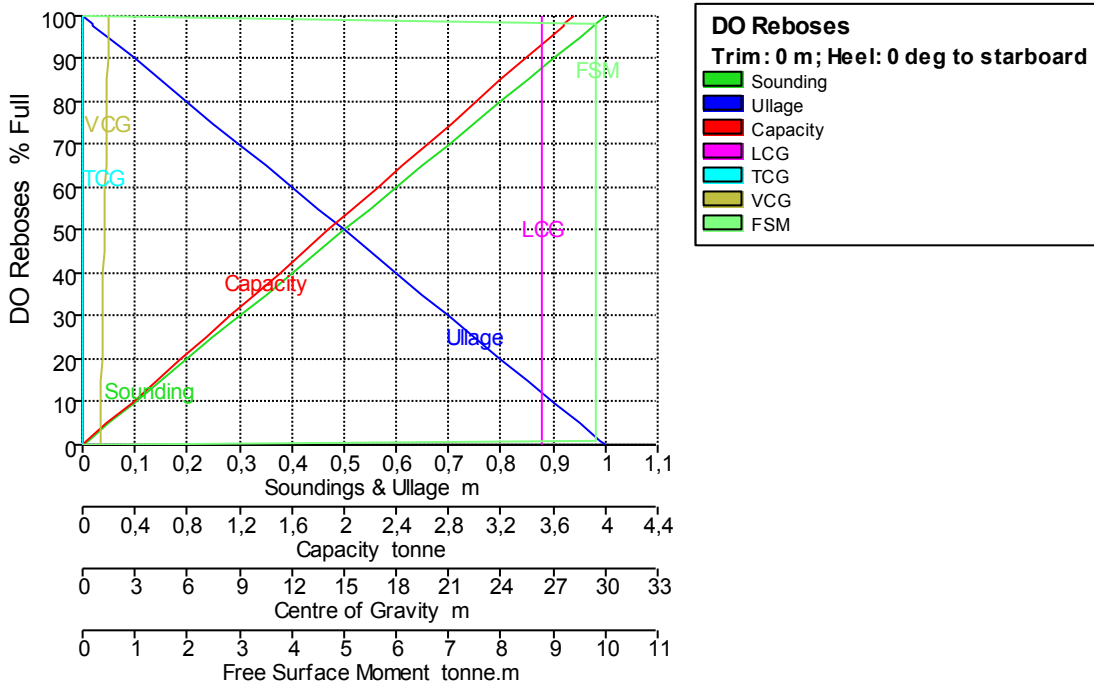


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO Rebores	1,000	0,000	100,000	22,400	21,152	28,800	0,000	1,500	0,000
	0,980	0,020	98,000	21,952	20,729	28,800	0,000	1,490	55,278

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,979	0,021	97,900	21,930	20,708	28,800	0,000	1,490	55,278
	0,950	0,050	95,000	21,280	20,095	28,800	0,000	1,475	55,278
	0,900	0,100	90,000	20,160	19,037	28,800	0,000	1,450	55,278
	0,850	0,150	85,000	19,040	17,979	28,800	0,000	1,425	55,278
	0,800	0,200	80,000	17,920	16,922	28,800	0,000	1,400	55,278
	0,750	0,250	75,000	16,800	15,864	28,800	0,000	1,375	55,278
	0,700	0,300	70,000	15,680	14,807	28,800	0,000	1,350	55,278
	0,650	0,350	65,000	14,560	13,749	28,800	0,000	1,325	55,278
	0,600	0,400	60,000	13,440	12,691	28,800	0,000	1,300	55,278
	0,550	0,450	55,000	12,320	11,634	28,800	0,000	1,275	55,278
	0,500	0,500	50,000	11,200	10,576	28,800	0,000	1,250	55,278
	0,450	0,550	45,000	10,080	9,519	28,800	0,000	1,225	55,278
	0,400	0,600	40,000	8,960	8,461	28,800	0,000	1,200	55,278
	0,350	0,650	35,000	7,840	7,403	28,800	0,000	1,175	55,278
	0,300	0,700	30,000	6,720	6,346	28,800	0,000	1,150	55,278
	0,250	0,750	25,000	5,600	5,288	28,800	0,000	1,125	55,278
	0,200	0,800	20,000	4,480	4,230	28,800	0,000	1,100	55,278
	0,150	0,850	15,000	3,360	3,173	28,800	0,000	1,075	55,278
	0,100	0,900	10,000	2,240	2,115	28,800	0,000	1,050	55,278
	0,050	0,950	5,000	1,120	1,058	28,800	0,000	1,025	55,278
	0,010	0,990	1,000	0,224	0,212	28,800	0,000	1,005	55,278
	0,000	1,000	0,000	0,000	0,000	28,800	0,000	1,000	0,000

Tank Calibrations - DO Rebores

Fluid Type = Diesel Specific gravity = 0,84
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

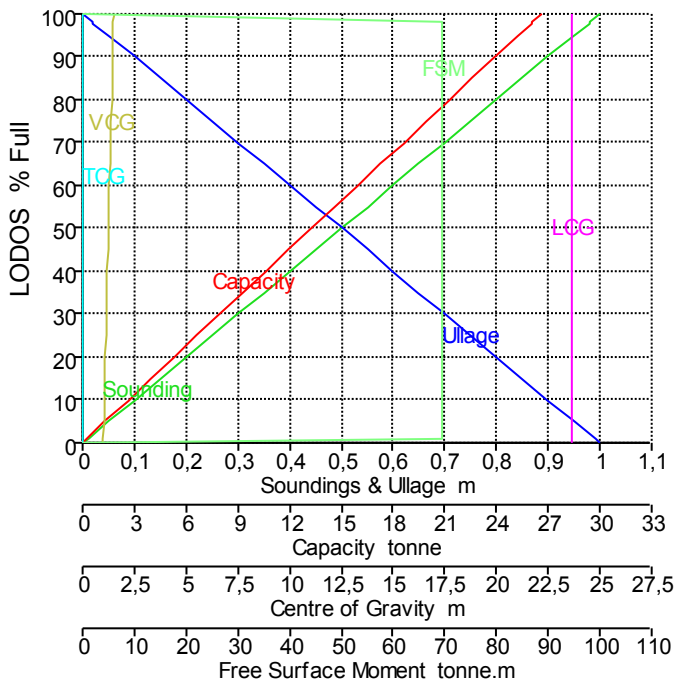


Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
DO Rebores	1,000	0,000	100,000	4,480	3,763	26,400	0,000	1,500	0,000
	0,980	0,020	98,000	4,390	3,688	26,400	0,000	1,490	9,834

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,979	0,021	97,900	4,386	3,684	26,400	0,000	1,490	9,834
	0,950	0,050	95,000	4,256	3,575	26,400	0,000	1,475	9,834
	0,900	0,100	90,000	4,032	3,387	26,400	0,000	1,450	9,834
	0,850	0,150	85,000	3,808	3,199	26,400	0,000	1,425	9,834
	0,800	0,200	80,000	3,584	3,011	26,400	0,000	1,400	9,834
	0,750	0,250	75,000	3,360	2,822	26,400	0,000	1,375	9,834
	0,700	0,300	70,000	3,136	2,634	26,400	0,000	1,350	9,834
	0,650	0,350	65,000	2,912	2,446	26,400	0,000	1,325	9,834
	0,600	0,400	60,000	2,688	2,258	26,400	0,000	1,300	9,834
	0,550	0,450	55,000	2,464	2,070	26,400	0,000	1,275	9,834
	0,500	0,500	50,000	2,240	1,882	26,400	0,000	1,250	9,834
	0,450	0,550	45,000	2,016	1,693	26,400	0,000	1,225	9,834
	0,400	0,600	40,000	1,792	1,505	26,400	0,000	1,200	9,834
	0,350	0,650	35,000	1,568	1,317	26,400	0,000	1,175	9,834
	0,300	0,700	30,000	1,344	1,129	26,400	0,000	1,150	9,834
	0,250	0,750	25,000	1,120	0,941	26,400	0,000	1,125	9,834
	0,200	0,800	20,000	0,896	0,753	26,400	0,000	1,100	9,834
	0,150	0,850	15,000	0,672	0,564	26,400	0,000	1,075	9,834
	0,100	0,900	10,000	0,448	0,376	26,400	0,000	1,050	9,834
	0,050	0,950	5,000	0,224	0,188	26,400	0,000	1,025	9,834
	0,010	0,990	1,000	0,045	0,038	26,400	0,000	1,005	9,834
	0,000	1,000	0,000	0,000	0,000	26,400	0,000	1,000	0,000

Tank Calibrations - LODOS

Fluid Type = LODOS Specific gravity = 0,99
 Permeability = 100 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



LODOS
 Trim: 0 m; Heel: 0 deg to starboard

- █ Sounding
- █ Ullage
- █ Capacity
- █ LCG
- █ TCG
- █ VCG
- █ FSM

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
LODOS	1,000	0,000	100,000	26,880	26,611	23,600	0,000	1,500	0,000
	0,980	0,020	98,000	26,342	26,079	23,600	0,000	1,490	69,544

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,979	0,021	97,900	26,316	26,052	23,600	0,000	1,490	69,544
	0,950	0,050	95,000	25,536	25,281	23,600	0,000	1,475	69,544
	0,900	0,100	90,000	24,192	23,950	23,600	0,000	1,450	69,544
	0,850	0,150	85,000	22,848	22,620	23,600	0,000	1,425	69,544
	0,800	0,200	80,000	21,504	21,289	23,600	0,000	1,400	69,544
	0,750	0,250	75,000	20,160	19,958	23,600	0,000	1,375	69,544
	0,700	0,300	70,000	18,816	18,628	23,600	0,000	1,350	69,544
	0,650	0,350	65,000	17,472	17,297	23,600	0,000	1,325	69,544
	0,600	0,400	60,000	16,128	15,967	23,600	0,000	1,300	69,544
	0,550	0,450	55,000	14,784	14,636	23,600	0,000	1,275	69,544
	0,500	0,500	50,000	13,440	13,306	23,600	0,000	1,250	69,544
	0,450	0,550	45,000	12,096	11,975	23,600	0,000	1,225	69,544
	0,400	0,600	40,000	10,752	10,644	23,600	0,000	1,200	69,544
	0,350	0,650	35,000	9,408	9,314	23,600	0,000	1,175	69,544
	0,300	0,700	30,000	8,064	7,983	23,600	0,000	1,150	69,544
	0,250	0,750	25,000	6,720	6,653	23,600	0,000	1,125	69,544
	0,200	0,800	20,000	5,376	5,322	23,600	0,000	1,100	69,544
	0,150	0,850	15,000	4,032	3,992	23,600	0,000	1,075	69,544
	0,100	0,900	10,000	2,688	2,661	23,600	0,000	1,050	69,544
	0,050	0,950	5,000	1,344	1,331	23,600	0,000	1,025	69,544
	0,010	0,990	1,000	0,269	0,266	23,600	0,000	1,005	69,544
	0,000	1,000	0,000	0,000	0,000	23,600	0,000	1,000	0,000