



UNIVERSIDADE DA CORUÑA



Escola Politécnica Superior

Trabajo Fin de Grado
CURSO 2021/22

BUQUE PORTACONTENEDORES
16000 TEUs

Grado en Ingeniería Naval y Oceánica

ALUMNA/O

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TUTORAS/ES

Alicia Munín Doce

FECHA

Septiembre 2022



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Escola Politécnica Superior

**TRABAJO FIN DE GRADO
CURSO 2020/21**

*BUQUE PORTACONTENEDORES
16000 TEUs*

Grado en Ingeniería Naval y Oceánica

**CUADERNO 4.
CÁLCULOS DE ARQUITECTURA NAVAL**



TIPO DE BUQUE: Portacontenedores

CLASIFICACIÓN, COTA Y REGLAMENTOS DE APLICACIÓN: DNV, SOLAS, MARPOL

CARACTERÍSTICAS DE LA CARGA: 16000 TEUS

VELOCIDAD Y AUTONOMÍA: 22 nudos de velocidad de servicio con una autonomía de 20000 millas.

SISTEMAS Y EQUIPOS DE CARGA / DESCARGA: Sin grúas

PROPULSIÓN: Motor Diesel acoplado a línea de ejes

TRIPULACIÓN Y PASAJE: 30

OTROS EQUIPOS E INSTALACIONES:

ALUMNO: D. Javier García Ávila

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ACRÓNIMOS USADOS

SÍMBOLO	SIGNIFICADO	UNIDADES
Δ	Desplazamiento	Tn
B	Manga del buque	m
Cb	Coeficiente de bloque	-
Cf	Coeficiente de la flotación	-
Cm	Coeficiente de la maestra	-
Cp	Coeficiente prismático	-
D	Puntal	m
Dp	Diámetro Hélice	m
Fb	Francobordo	m
Fn	Número de Fraude	-
g	Gravedad	m/s^2
GM	Radio metacéntrico	m
KB	Posición vertical del centro de carena	-
KG	Posición vertical del centro de gravedad	-
KM	Posición vertical del metacentro	-
Lpp	Longitud entre perpendiculares del buque	-
Loa	Longitud total del buque	-
P	Potencia	KW
PM	Peso muerto	Tn
PR	Peso en Rosca	Tn
T	Calado	m
Vmx	Velocidad máxima	m/s o Kn
Vsv	Velocidad servicio	m/s o Kn
XB, XC	Posición longitudinal del centro de carena	m
XG	Posición longitudinal del centro de gravedad	m

1. INTRODUCCIÓN

En este cuaderno se procederá a explicar el proceso de cálculos de curvas hidrostáticas, de estabilidad y puntos de inundación progresivos. Así mismo, se diseñará el compartimentado del buque.

Para el cálculo de curvas hidrostáticas y brazos adrizantes, se variarán distintos calados, luego también se intentará calcular las distintas condiciones de carga del buque.

Partiendo de las dimensiones del buque y sus formas, obtenidas del Cuaderno 3. Diseño de las formas del buque, empleando el software "Maxsurf Stability" se realizarán los cálculos y los diagramas que permitan definir las curvas hidrostáticas y el compartimentado del buque.

TEUs Totales	16000 TEUs	Cb	0,7 [-]
TEUs Bodega	6963 TEUs	Cm	0,998[-]
Lpp	356 [m]	Cp	0,705 [-]
Loa	374 [m]	V	22 [Kn]
B	53 [m]	Fn	0.192 [-]
D	31 [m]	Δ	210499 [t]
T	15,5 [m]		

Ilustración 1. Dimensiones obtenidas de la generación de formas

2. CÁLCULO DE HIDROSTÁTICAS

A partir del modelo obtenido en el Cuaderno 3, se emplea el software MAXSURF Stability para el cálculo de las tablas hidrostáticas con la herramienta “*Analysis, Upright Hydrostatics*”.

Se calcularán las hidrostáticas correspondientes a distintos trimados, se opta por calcular hasta un 2% de la eslora como trimado.

$$2\% \cdot 356 = 7[m]$$

Luego se toman los siguientes asientos:

- A popa: 1[m], 2,5 [m], 5 [m] y 7 [m].
- Asiento neutro: 0[m]
- A proa: -1[m], -2,5 [m], -5 [m] y -7 [m].

En primer lugar se obtienen las siguientes hidrostáticas para el calado de escantillonado:

Displacement	210499	<i>t</i>
Draft at LCF	15,551	<i>m</i>
Trim (+ve by stern)	0	<i>m</i>
Sect. area amidships	815,946	<i>m</i> ²
Wetted Area	23448,463	<i>m</i> ²
Waterpl. Area	15236,708	<i>m</i> ²
Block coeff. (Cb)	0,698	-
LCB from zero pt. (+ve fwd)	174,296	<i>m</i>
LCF from zero pt. (+ve fwd)	163,787	<i>m</i>
KB	8,172	<i>m</i>
BMt	14,435	<i>m</i>
BML	570,043	<i>m</i>
KMt	22,598	<i>m</i>
KML	576,997	<i>m</i>
Immersion (TPc)	155,997	<i>t/cm</i>
MTc	3411,726	<i>t · m</i>

Tabla 1. Hidrostáticas al calado de escantillonado sin trimado.

Es necesario a continuación calcular los calados máximos y mínimos de la operación del buque, el calado máximo se obtendrá a partir del puntal y el francobordo mínimo de invierno al ser la situación más desfavorable.

$$T_{mx} = 31 - 8,191 = 22,8[m]$$

Obteniendo las siguientes hidrostáticas:

Displacement	335123	t
Draft at LCF	22,8	m
Trim (+ve by stern)	0	m
Sect. area amidships	1199,584	m^2
Wetted Area	30154,295	m^2
Waterpl. Area	17782,147	m^2
Block coeff. (Cb)	0,724	-
LCB from zero pt. (+ve fwd)	168,382	m
LCF from zero pt. (+ve fwd)	159,265	m
KB	12,31	m
BMt	11,543	m
BML	541,075	m
KMt	23,853	m
KML	553,385	m
Immersion (TPc)	182,267	t/cm
MTc	5063,423	$t \cdot m$

Tabla 2. Hidrostáticas al calado máximo sin trimado

El calado mínimo se considerará como el calado que tiene el buque en caso de estar completamente vacío, es decir, con un desplazamiento igual al peso en rosca. En el Cuaderno 2 se obtuvo un peso en rosca de 60900 [t], obteniendo un $T_{min} = 5$ [m]

Displacement	60900	t
Draft at LCF	5,007	m
Trim (+ve by stern)	0	m
Sect. area amidships	262,797	m^2
Wetted Area	14698,81	m^2
Waterpl. Area	12962,37	m^2
Block coeff. (Cb)	0,617	-
LCB from zero pt. (+ve fwd)	177,929	m
LCF from zero pt. (+ve fwd)	178,225	m
KB	2,68	m
BMt	39,221	m
BML	1339,322	m
KMt	41,901	m
KML	1342,002	m
Immersion (TPc)	132,864	t/cm
MTc	2269,214	$t \cdot m$

Tabla 3. Hidrostáticas al calado mínimo sin trimado

2.1 Hidrostáticas asiento nulo

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	59741	5	0	258,186	14629,758	12940,568	0,616	177,923	178,248	2,634	39,888	1359,606	42,523	1362,241	132,641	2259,977
5,4	65067	5,4	0	279,309	14944,912	13037,183	0,621	177,945	178,136	2,844	37,005	1271,706	39,849	1274,551	133,631	2301,194
5,8	70432	5,8	0	300,438	15258,534	13128,003	0,626	177,955	177,981	3,054	34,52	1195,325	37,574	1198,38	134,562	2340,227
6,2	75832	6,2	0	321,57	15570,132	13212,478	0,63	177,951	177,788	3,264	32,355	1127,905	35,619	1131,169	135,428	2376,51
6,6	81267	6,6	0	342,705	15881,204	13292,864	0,634	177,933	177,559	3,474	30,454	1068,322	33,928	1071,796	136,252	2411,295
7	86734	7	0	363,842	16191,723	13369,471	0,638	177,902	177,297	3,684	28,773	1015,152	32,457	1018,835	137,037	2444,474
7,4	92232	7,4	0	384,981	16501,686	13442,267	0,642	177,859	177,004	3,893	27,277	967,209	31,171	971,102	137,783	2475,754
7,8	97759	7,8	0	406,122	16812,149	13512,87	0,646	177,802	176,671	4,103	25,94	923,999	30,042	928,101	138,507	2506,037
8,2	103315	8,2	0	427,264	17122,334	13580,525	0,65	177,733	176,316	4,312	24,734	884,651	29,047	888,963	139,2	2534,874
8,6	108898	8,6	0	448,407	17433,57	13646,47	0,653	177,652	175,921	4,522	23,647	848,71	28,169	853,232	139,876	2562,562
9	114508	9	0	469,551	17745,582	13711,047	0,657	177,559	175,492	4,731	22,66	815,811	27,392	820,543	140,538	2589,432
9,4	120144	9,4	0	490,696	18058,964	13774,088	0,661	177,453	175,025	4,941	21,762	785,406	26,704	790,347	141,184	2614,986
9,8	125806	9,8	0	511,841	18374,198	13836,04	0,664	177,334	174,513	5,151	20,943	757,229	26,094	762,38	141,819	2639,39
10,2	131494	10,2	0	532,988	18691,201	13896,798	0,668	177,202	173,964	5,36	20,192	730,978	25,552	736,338	142,442	2662,518
10,6	137206	10,6	0	554,136	19010,561	13958,288	0,671	177,057	173,373	5,57	19,504	706,744	25,075	712,314	143,072	2685,593
11	142944	11	0	575,284	19332,439	14019,711	0,675	176,898	172,749	5,78	18,872	684,143	24,652	689,923	143,702	2707,992
11,4	148707	11,4	0	596,433	19657,195	14083,897	0,678	176,727	172,089	5,99	18,29	663,5	24,28	669,49	144,36	2731,813
11,8	154496	11,8	0	617,583	19985,217	14150,197	0,682	176,541	171,406	6,2	17,754	644,488	23,954	650,688	145,04	2756,58
12,2	160315	12,2	0	638,733	20312,892	14223,145	0,686	176,341	170,719	6,411	17,259	627,814	23,67	634,224	145,787	2786,251
12,6	166164	12,6	0	659,885	20642,289	14302,181	0,689	176,13	170,017	6,622	16,803	613,063	23,425	619,684	146,597	2820,044
13	172047	13	0	681,037	20975,002	14387,814	0,693	175,908	169,291	6,833	16,382	600,093	23,215	606,926	147,475	2858,226
13,4	177967	13,4	0	702,19	21317,722	14481,531	0,695	175,674	168,49	7,044	15,995	588,806	23,039	595,85	148,436	2901,208
13,8	183928	13,8	0	723,344	21647,02	14587,642	0,696	175,428	167,641	7,257	15,638	579,82	22,895	587,078	149,523	2953,071

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,2	189936	14,2	0	744,499	22008,751	14711,694	0,697	175,17	166,765	7,471	15,31	573,888	22,781	581,359	150,795	3019,012
14,6	195999	14,6	0	765,654	22383,829	14854,524	0,698	174,896	165,824	7,685	15,01	570,793	22,695	578,478	152,259	3099,533
15	202123	15	0	786,811	22765,587	15008,613	0,697	174,607	164,883	7,901	14,736	569,357	22,636	577,258	153,838	3189,439
15,4	208312	15,4	0	807,969	23154,088	15175,871	0,696	174,304	163,932	8,117	14,486	569,738	22,603	577,856	155,553	3290,605
15,8	214571	15,8	0	829,127	23550,043	15353,475	0,695	173,989	162,983	8,336	14,257	571,45	22,593	579,786	157,373	3401,11
16,2	220906	16,2	0	850,287	23951,508	15538,071	0,694	173,659	162,047	8,556	14,049	573,964	22,605	582,52	159,265	3518,49
16,6	227318	16,6	0	871,448	24360,72	15731,09	0,693	173,319	161,099	8,777	13,86	577,431	22,637	586,208	161,244	3644,158
17	233811	17	0	892,61	24772,89	15927,191	0,691	172,965	160,182	8,999	13,689	581,122	22,688	590,121	163,254	3773,954
17,4	240382	17,4	0	913,772	25183,453	16118,924	0,69	172,605	159,367	9,224	13,533	584,146	22,756	593,369	165,219	3901,95
17,8	247029	17,8	0	934,936	25584,688	16297,814	0,691	172,239	158,727	9,449	13,39	585,551	22,839	595	167,053	4021,168
18,2	253749	18,2	0	956,102	25980,492	16465,818	0,694	171,874	158,242	9,675	13,258	585,739	22,933	595,415	168,775	4133,506
18,6	260537	18,6	0	977,268	26367,988	16623,583	0,697	171,513	157,882	9,903	13,132	584,859	23,034	594,762	170,392	4239,308
19	267391	19	0	998,435	26750,556	16773	0,699	171,158	157,624	10,131	13,009	583,214	23,139	593,345	171,923	4340,179
19,4	274307	19,4	0	1019,604	27128,563	16914,274	0,702	170,812	157,455	10,359	12,887	580,877	23,246	591,236	173,371	4436,19
19,8	281282	19,8	0	1040,774	27503,177	17048,673	0,705	170,476	157,358	10,588	12,764	578,036	23,352	588,625	174,749	4528,368
20,2	288312	20,2	0	1061,944	27873,477	17177,205	0,707	170,15	157,342	10,818	12,639	574,901	23,457	585,718	176,066	4618,004
20,6	295396	20,6	0	1083,117	28240,063	17299,107	0,71	169,835	157,405	11,047	12,509	571,443	23,556	582,49	177,316	4704,672
21	302529	21	0	1104,29	28600,051	17409,887	0,713	169,534	157,56	11,277	12,364	567,274	23,641	578,551	178,451	4784,816
21,4	309708	21,4	0	1125,464	28950,892	17505,6	0,715	169,248	157,842	11,507	12,194	562,094	23,701	573,601	179,432	4855,286
21,8	316925	21,8	0	1146,64	29295,897	17589,144	0,718	168,979	158,221	11,737	12,007	556,14	23,744	567,877	180,289	4917,472
22,2	324179	22,2	0	1167,816	29640,11	17670,249	0,72	168,728	158,61	11,966	11,823	550,243	23,789	562,209	181,12	4978,412
22,6	331467	22,6	0	1188,994	29982,92	17744,879	0,722	168,493	159,046	12,196	11,635	544,08	23,83	556,276	181,885	5035,09
23	338788	23	0	1210,173	30325,592	17819,321	0,725	168,276	159,482	12,425	11,454	538,116	23,878	550,54	182,648	5091,716

Tabla 4. Hidrostáticas con asiento nulo.

2.2 Hidrostáticas asiento 1 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	59747	5,002	1	258,186	14622,303	12946,918	0,578	174,106	177,398	2,64	39,997	1357,903	42,636	1360,537	132,706	2257,352
5,4	65077	5,402	1	279,309	14939,047	13047,568	0,585	174,373	177,333	2,85	37,109	1271,39	39,959	1274,235	133,738	2300,949
5,8	70446	5,802	1	300,438	15253,641	13141,85	0,592	174,595	177,23	3,06	34,62	1196,115	37,679	1199,17	134,704	2342,262
6,2	75853	6,203	1	321,57	15567,273	13231,148	0,598	174,778	177,083	3,269	32,451	1130,083	35,721	1133,348	135,619	2381,804
6,6	81296	6,603	1	342,705	15879,505	13314,708	0,604	174,927	176,889	3,479	30,545	1071,189	34,024	1074,664	136,476	2418,696
7	86773	7,004	1	363,842	16190,966	13394,34	0,61	175,044	176,663	3,689	28,859	1018,596	32,548	1022,281	137,292	2453,953
7,4	92281	7,405	1	384,981	16502,605	13471,59	0,615	175,134	176,394	3,899	27,361	971,533	31,26	975,428	138,084	2488,286
7,8	97821	7,805	1	406,122	16813,526	13544,959	0,62	175,198	176,096	4,109	26,017	928,772	30,126	932,877	138,836	2520,74
8,2	103390	8,206	1	427,264	17125,277	13616,45	0,625	175,238	175,756	4,319	24,81	889,982	29,128	894,297	139,569	2552,213
8,6	108989	8,607	1	448,407	17437,362	13686,26	0,629	175,256	175,382	4,529	23,718	854,662	28,247	859,187	140,284	2582,926
9	114616	9,009	1	469,551	17750,498	13754,655	0,634	175,254	174,971	4,739	22,728	822,289	27,467	827,024	140,985	2612,729
9,4	120271	9,41	1	490,696	18064,927	13821,99	0,638	175,232	174,52	4,949	21,827	792,519	26,776	797,465	141,675	2641,772
9,8	125953	9,811	1	511,841	18380,895	13888,341	0,642	175,19	174,033	5,159	21,005	765,006	26,164	770,162	142,355	2669,99
10,2	131663	10,213	1	532,988	18699,21	13954,575	0,647	175,13	173,494	5,37	20,252	739,529	25,622	744,896	143,034	2697,578
10,6	137400	10,614	1	554,136	19019,91	14019,716	0,651	175,052	172,912	5,58	19,561	715,679	25,141	721,257	143,702	2723,876
11	143163	11,016	1	575,284	19343,354	14086,854	0,655	174,955	172,277	5,791	18,927	693,814	24,718	699,602	144,39	2751,051
11,4	148955	11,418	1	596,433	19670,426	14154,637	0,659	174,839	171,604	6,002	18,343	673,443	24,345	679,442	145,085	2778,002
11,8	154776	11,82	1	617,583	20001,001	14225,315	0,663	174,705	170,884	6,213	17,805	654,761	24,018	660,972	145,809	2806,257
12,2	160627	12,222	1	638,733	20335,224	14301,024	0,667	174,552	170,122	6,425	17,31	637,98	23,735	644,402	146,585	2837,567
12,6	166508	12,624	1	659,885	20671,152	14382,892	0,67	174,381	169,327	6,636	16,855	623,125	23,491	629,759	147,425	2872,979
13	172426	13,027	1	681,037	21014,944	14476,235	0,672	174,192	168,485	6,849	16,435	610,864	23,284	617,711	148,381	2916,726
13,4	178384	13,429	1	702,19	21342,22	14579,964	0,674	173,986	167,58	7,062	16,049	600,676	23,111	607,736	149,445	2967,519
13,8	184386	13,832	1	723,344	21706,95	14697,792	0,676	173,762	166,545	7,276	15,695	592,807	22,971	600,081	150,652	3027,717

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,2	190442	14,235	1	744,499	22084,468	14829,71	0,677	173,514	165,431	7,491	15,373	587,137	22,863	594,626	152,005	3097,968
14,6	196553	14,638	1	765,654	22471,083	14975,123	0,677	173,247	164,314	7,707	15,078	583,639	22,785	591,344	153,495	3179,26
15	202727	15,042	1	786,811	22863,841	15133,649	0,677	172,959	163,215	7,924	14,81	582,141	22,734	590,063	155,12	3271,833
15,4	208968	15,445	1	807,969	23263,849	15303,298	0,677	172,653	162,114	8,143	14,565	582,201	22,708	590,342	156,859	3374,181
15,8	215281	15,848	1	829,127	23666,347	15481,689	0,677	172,328	161,057	8,363	14,343	583,456	22,706	591,816	158,687	3485,028
16,2	221669	16,251	1	850,287	24075,772	15670,033	0,677	171,988	160,002	8,584	14,141	585,959	22,725	594,541	160,618	3605,399
16,6	228136	16,653	1	871,448	24486,635	15861,171	0,676	171,634	159,015	8,807	13,958	588,728	22,766	597,533	162,577	3729,744
17	234678	17,056	1	892,61	24892,096	16044,381	0,676	171,27	158,183	9,031	13,792	590,437	22,824	599,466	164,455	3849,437
17,4	241294	17,457	1	913,772	25288,904	16216,206	0,678	170,902	157,532	9,257	13,64	590,792	22,897	600,047	166,216	3961,885
17,8	247979	17,859	1	934,936	25678,097	16377,437	0,681	170,534	157,038	9,483	13,497	590,013	22,98	599,494	167,869	4067,795
18,2	254730	18,26	1	956,102	26061,45	16530,197	0,684	170,169	156,665	9,711	13,36	588,408	23,071	598,117	169,435	4168,675
18,6	261544	18,661	1	977,268	26441,362	16675,213	0,688	169,81	156,406	9,939	13,227	586,158	23,166	596,094	170,921	4265,319
19	268418	19,061	1	998,435	26816,934	16813,594	0,691	169,46	156,234	10,167	13,096	583,406	23,263	593,57	172,339	4358,397
19,4	275351	19,461	1	1019,604	27188,668	16945,301	0,694	169,121	156,142	10,396	12,964	580,204	23,36	590,597	173,689	4447,965
19,8	282340	19,861	1	1040,774	27557,401	17070,482	0,696	168,793	156,12	10,625	12,83	576,607	23,455	587,23	174,972	4534,148
20,2	289382	20,261	1	1061,944	27922,758	17188,229	0,699	168,478	156,169	10,855	12,689	572,592	23,544	583,444	176,179	4616,459
20,6	296473	20,661	1	1083,117	28280,413	17294,022	0,702	168,176	156,337	11,084	12,53	567,86	23,614	578,942	177,264	4692,063
21	303605	21,06	1	1104,29	28630,337	17386,441	0,705	167,89	156,655	11,314	12,345	562,373	23,659	573,684	178,211	4760,103
21,4	310776	21,459	1	1125,464	28976,216	17469,909	0,708	167,622	157,047	11,543	12,149	556,395	23,692	567,936	179,067	4822,344
21,8	317983	21,858	1	1146,64	29321,641	17550,483	0,71	167,372	157,457	11,772	11,956	550,464	23,728	562,234	179,892	4883,238
22,2	325225	22,256	1	1167,816	29665,924	17625,324	0,713	167,139	157,909	12,001	11,759	544,323	23,76	556,322	180,66	4940,433
22,6	332499	22,655	1	1188,994	30009,793	17699,819	0,715	166,924	158,353	12,23	11,571	538,351	23,801	550,578	181,423	4997,292
23	339807	23,054	1	1210,173	30353,31	17774,01	0,718	166,724	158,792	12,458	11,391	532,548	23,849	545,004	182,184	5053,91

Tabla 5. Hidrostáticas con asiento 1 [m].

2.3 Hidrostáticas asiento 2,5 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	59819	5,014	2,5	258,186	14608,703	12947,875	0,528	168,405	176,025	2,671	40,1	1350,74	42,77	1353,377	132,716	2247,985
5,4	65150	5,414	2,5	279,309	14928,353	13055,617	0,538	169,029	176,043	2,879	37,221	1267,168	40,099	1270,015	133,82	2295,776
5,8	70524	5,814	2,5	300,438	15245,716	13156,366	0,547	169,563	176,015	3,087	34,735	1194,205	37,822	1197,263	134,853	2341,027
6,2	75938	6,215	2,5	321,57	15561,982	13251,928	0,555	170,019	175,925	3,296	32,567	1130,083	35,862	1133,351	135,832	2384,426
6,6	81391	6,615	2,5	342,705	15876,345	13341,565	0,563	170,411	175,801	3,505	30,659	1072,954	34,164	1076,432	136,751	2425,498
7	86879	7,017	2,5	363,842	16190,825	13428,47	0,57	170,746	175,62	3,714	28,973	1022,179	32,686	1025,868	137,642	2465,672
7,4	92403	7,418	2,5	384,981	16504,011	13510,375	0,577	171,032	175,402	3,924	27,47	976,035	31,393	979,935	138,481	2503,204
7,8	97959	7,82	2,5	406,122	16817,653	13590,485	0,583	171,272	175,131	4,133	26,125	934,578	30,257	938,688	139,302	2540,241
8,2	103548	8,222	2,5	427,264	17131,476	13668,108	0,589	171,473	174,825	4,343	24,914	896,89	29,257	901,211	140,098	2576,166
8,6	109169	8,625	2,5	448,407	17445,839	13743,862	0,595	171,638	174,475	4,553	23,82	862,497	28,372	867,029	140,875	2611,181
9	114821	9,028	2,5	469,551	17761,262	13818,353	0,601	171,769	174,083	4,764	22,827	831,01	27,59	835,753	141,638	2645,487
9,4	120503	9,431	2,5	490,696	18077,982	13892,237	0,606	171,869	173,652	4,974	21,923	802,194	26,897	807,149	142,395	2679,578
9,8	126215	9,834	2,5	511,841	18396,692	13965,79	0,611	171,941	173,174	5,185	21,099	775,679	26,283	780,845	143,149	2713,347
10,2	131957	10,238	2,5	532,988	18717,522	14039,966	0,616	171,985	172,644	5,396	20,344	751,351	25,739	756,728	143,91	2747,403
10,6	137731	10,642	2,5	554,136	19041,246	14114,277	0,621	172,002	172,072	5,607	19,651	728,819	25,258	734,409	144,671	2781,262
11	143536	11,046	2,5	575,284	19368,824	14190,437	0,626	171,992	171,428	5,819	19,015	708,1	24,834	713,901	145,452	2815,801
11,4	149373	11,451	2,5	596,433	19699,506	14267,472	0,631	171,957	170,725	6,031	18,43	688,8	24,461	694,815	146,242	2850,209
11,8	155242	11,856	2,5	617,583	20033,962	14348,695	0,635	171,897	169,957	6,244	17,893	671,324	24,136	677,551	147,074	2886,914
12,2	161146	12,263	2,5	638,733	20377,313	14436,25	0,637	171,811	169,094	6,457	17,399	655,774	23,856	662,214	147,972	2927,271
12,6	167087	12,669	2,5	659,885	20707,776	14532,122	0,64	171,698	168,128	6,671	16,946	642,256	23,616	648,911	148,954	2972,752
13	173068	13,077	2,5	681,037	21072,449	14640,512	0,642	171,558	167,046	6,885	16,53	631,249	23,415	638,118	150,065	3026,688
13,4	179097	13,485	2,5	702,19	21449,633	14764,76	0,643	171,385	165,848	7,101	16,151	623,046	23,251	630,131	151,339	3091,942
13,8	185179	13,894	2,5	723,344	21832,699	14899,531	0,644	171,183	164,615	7,317	15,805	616,731	23,121	624,032	152,72	3165,204
14,2	191318	14,303	2,5	744,499	22224,576	15044,25	0,646	170,952	163,332	7,535	15,49	611,982	23,025	619,502	154,204	3245,781

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,6	197518	14,712	2,5	765,654	22625,489	15196,422	0,647	170,692	161,995	7,754	15,204	608,269	22,957	616,007	155,763	3331,563
15	203783	15,122	2,5	786,811	23032,08	15355,441	0,648	170,405	160,666	7,974	14,945	605,565	22,918	613,524	157,393	3423,015
15,4	210116	15,531	2,5	807,969	23445,279	15526,487	0,649	170,092	159,363	8,195	14,709	604,695	22,904	612,875	159,146	3525,558
15,8	216522	15,939	2,5	829,127	23859,412	15703,278	0,65	169,756	158,147	8,418	14,497	604,714	22,914	613,118	160,959	3634,492
16,2	222997	16,347	2,5	850,287	24266,41	15873,986	0,651	169,405	157,113	8,642	14,303	604,025	22,946	612,653	162,708	3740,258
16,6	229541	16,752	2,5	871,448	24661,267	16035,655	0,655	169,042	156,298	8,868	14,127	602,419	22,995	611,272	164,365	3841,091
17	236150	17,157	2,5	892,61	25047,697	16188,89	0,659	168,676	155,669	9,094	13,963	600,047	23,057	609,127	165,936	3937,447
17,4	242822	17,56	2,5	913,772	25427,696	16334,603	0,663	168,309	155,189	9,321	13,806	597,083	23,127	606,39	167,43	4030,012
17,8	249555	17,963	2,5	934,936	25802,826	16473,903	0,667	167,947	154,836	9,549	13,655	593,694	23,204	603,228	168,858	4119,565
18,2	256346	18,364	2,5	956,102	26173,94	16607,375	0,67	167,592	154,588	9,777	13,507	589,973	23,283	599,735	170,226	4206,495
18,6	263192	18,766	2,5	977,268	26542,107	16735,602	0,674	167,245	154,431	10,006	13,359	586,009	23,365	596,001	171,54	4291,216
19	270093	19,166	2,5	998,435	26907,146	16858,341	0,677	166,909	154,356	10,235	13,211	581,802	23,445	592,022	172,798	4373,523
19,4	277046	19,566	2,5	1019,604	27271,306	16975,353	0,681	166,585	154,364	10,464	13,058	577,392	23,521	587,842	173,997	4453,557
19,8	284048	19,965	2,5	1040,774	27628,002	17081,282	0,684	166,275	154,486	10,693	12,888	572,328	23,581	583,007	175,083	4527,524
20,2	291094	20,363	2,5	1061,944	27976,921	17173,066	0,687	165,981	154,746	10,922	12,693	566,389	23,615	577,297	176,024	4593,132
20,6	298179	20,761	2,5	1083,117	28321,853	17253,797	0,69	165,706	155,111	11,151	12,48	559,846	23,631	570,983	176,851	4652,019
21	305301	21,158	2,5	1104,29	28667,866	17333,635	0,693	165,45	155,487	11,38	12,274	553,531	23,654	564,897	177,67	4710,922
21,4	312456	21,555	2,5	1125,464	29012,742	17407,276	0,696	165,211	155,933	11,608	12,061	547,092	23,669	558,687	178,425	4766,804
21,8	319644	21,952	2,5	1146,64	29358,417	17482,162	0,699	164,99	156,395	11,836	11,858	541,063	23,693	552,885	179,192	4824,352
22,2	326865	22,349	2,5	1167,816	29704,001	17556,978	0,701	164,786	156,853	12,064	11,663	535,23	23,726	547,28	179,959	4881,863
22,6	334119	22,745	2,5	1188,994	30049,473	17631,73	0,704	164,597	157,307	12,291	11,476	529,588	23,767	541,866	180,725	4939,383
23	341407	23,142	2,5	1210,173	30394,624	17704,138	0,706	164,424	157,771	12,518	11,294	523,985	23,812	536,49	181,467	4995,551

Tabla 6. Hidrostáticas con asiento 2,5 [m].

2.4 Hidrostáticas asiento 5 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	60119	5,063	5	258,186	14580,602	12929,718	0,46	159,051	173,5	2,781	40,113	1328,038	42,89	1330,688	132,53	2220,763
5,4	65445	5,461	5	279,309	14905,671	13048,714	0,472	160,235	173,624	2,983	37,281	1249,444	40,261	1252,304	133,749	2273,453
5,8	70819	5,86	5	300,438	15229,899	13163,803	0,483	161,254	173,718	3,187	34,827	1182,428	38,01	1185,498	134,929	2327,239
6,2	76238	6,26	5	321,57	15551,192	13271,064	0,493	162,141	173,747	3,391	32,679	1122,675	36,066	1125,955	136,028	2377,829
6,6	81701	6,66	5	342,705	15871,702	13374,166	0,503	162,915	173,705	3,596	30,788	1069,729	34,381	1073,22	137,085	2427,182
7	87204	7,062	5	363,842	16190,693	13472,333	0,512	163,593	173,614	3,802	29,11	1022,143	32,91	1025,845	138,091	2474,649
7,4	92747	7,464	5	384,981	16509,832	13567,446	0,521	164,187	173,458	4,009	27,615	979,351	31,621	983,264	139,066	2521,03
7,8	98329	7,867	5	406,122	16828,479	13659,163	0,529	164,708	173,254	4,217	26,273	940,517	30,487	944,641	140,006	2566,08
8,2	103948	8,27	5	427,264	17147,972	13749,267	0,537	165,163	172,998	4,425	25,065	905,38	29,487	909,716	140,93	2610,749
8,6	109604	8,675	5	448,407	17468,222	13837,296	0,544	165,56	172,679	4,634	23,973	873,157	28,604	877,704	141,832	2654,245
9	115295	9,08	5	469,551	17789,447	13924,601	0,551	165,903	172,303	4,843	22,981	843,808	27,822	848,568	142,727	2697,717
9,4	121023	9,486	5	490,696	18113,522	14012,362	0,558	166,196	171,871	5,053	22,079	817,137	27,13	822,109	143,627	2741,804
9,8	126788	9,893	5	511,841	18439,665	14100,429	0,564	166,443	171,38	5,264	21,255	792,74	26,517	797,926	144,529	2786,279
10,2	132589	10,301	5	532,988	18768,193	14189,613	0,57	166,647	170,828	5,475	20,502	770,435	25,975	775,834	145,444	2831,488
10,6	138427	10,71	5	554,136	19099,997	14282,085	0,576	166,81	170,199	5,688	19,813	750,355	25,498	755,968	146,391	2878,924
11	144305	11,12	5	575,284	19439,638	14379,941	0,58	166,933	169,472	5,9	19,181	732,576	25,08	738,405	147,394	2929,968
11,4	150224	11,532	5	596,433	19765,912	14485,537	0,583	167,017	168,626	6,115	18,602	717,193	24,715	723,237	148,477	2986,151
11,8	156188	11,946	5	617,583	20127,323	14602,342	0,586	167,062	167,628	6,329	18,074	704,505	24,401	710,765	149,674	3049,968
12,2	162203	12,362	5	638,733	20504,295	14731,492	0,589	167,062	166,456	6,545	17,591	694,32	24,134	700,797	150,998	3122,009
12,6	168272	12,78	5	659,885	20891,751	14867,22	0,59	167,019	165,179	6,763	17,15	685,512	23,911	692,207	152,389	3198,211
13	174398	13,199	5	681,037	21288,367	15010,219	0,592	166,932	163,807	6,982	16,75	678,074	23,73	684,989	153,855	3279,281
13,4	180584	13,62	5	702,19	21694,485	15159,97	0,594	166,802	162,353	7,202	16,386	671,804	23,586	678,94	155,39	3364,905
13,8	186834	14,041	5	723,344	22106,964	15313,166	0,596	166,629	160,854	7,423	16,056	666,097	23,478	673,454	156,96	3452,543
14,2	193147	14,463	5	744,499	22527,398	15473,746	0,598	166,414	159,308	7,646	15,758	661,603	23,403	669,184	158,606	3546,03

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,6	199525	14,883	5	765,654	22945,15	15631,29	0,6	166,164	157,833	7,871	15,488	656,73	23,358	664,536	160,221	3637,042
15	205965	15,301	5	786,811	23350,4	15779,544	0,602	165,883	156,554	8,097	15,244	650,863	23,339	658,895	161,74	3721,774
15,4	212464	15,717	5	807,969	23745,761	15915,58	0,608	165,579	155,458	8,324	15,02	643,659	23,342	651,919	163,135	3797,551
15,8	219018	16,13	5	829,127	24133,399	16040,234	0,614	165,26	154,505	8,551	14,812	635,33	23,362	643,819	164,412	3864,828
16,2	225624	16,541	5	850,287	24514,517	16156,427	0,62	164,931	153,692	8,779	14,615	626,454	23,393	635,171	165,603	3926,547
16,6	232279	16,951	5	871,448	24889,82	16269,297	0,626	164,596	153,037	9,007	14,426	617,911	23,432	626,857	166,76	3988,085
17	238982	17,358	5	892,61	25259,655	16380,492	0,632	164,26	152,539	9,236	14,243	609,956	23,478	619,132	167,9	4051,281
17,4	245733	17,763	5	913,772	25624,621	16489,117	0,637	163,926	152,166	9,465	14,063	602,379	23,526	611,784	169,013	4114,958
17,8	252530	18,166	5	934,936	25984,258	16596,068	0,642	163,598	151,912	9,693	13,883	595,296	23,575	604,931	170,11	4180,132
18,2	259373	18,568	5	956,102	26340,148	16699,862	0,646	163,277	151,772	9,922	13,701	588,528	23,622	598,392	171,174	4245,733
18,6	266260	18,968	5	977,268	26688,288	16793,338	0,651	162,968	151,79	10,151	13,498	581,39	23,648	591,484	172,132	4306,767
19	273187	19,366	5	998,435	27030,025	16876,033	0,655	162,673	151,958	10,38	13,273	573,829	23,651	584,152	172,979	4362,5
19,4	280148	19,762	5	1019,604	27368,041	16949,285	0,659	162,395	152,25	10,608	13,03	566,003	23,637	576,555	173,73	4413,841
19,8	287142	20,157	5	1040,774	27707,548	17023,082	0,662	162,136	152,572	10,836	12,796	558,651	23,63	569,432	174,487	4466,552
20,2	294170	20,552	5	1061,944	28047,208	17091,665	0,666	161,894	152,964	11,063	12,557	551,334	23,619	562,343	175,19	4517,249
20,6	301228	20,946	5	1083,117	28389,716	17160,641	0,669	161,67	153,382	11,29	12,326	544,424	23,615	555,66	175,897	4569,06
21	308319	21,34	5	1104,29	28732,922	17230,699	0,673	161,463	153,808	11,517	12,106	537,885	23,621	549,348	176,615	4621,918
21,4	315442	21,734	5	1125,464	29077,018	17301,607	0,676	161,274	154,242	11,743	11,896	531,672	23,638	543,363	177,341	4675,639
21,8	322599	22,127	5	1146,64	29422,235	17372,001	0,679	161,1	154,687	11,969	11,693	525,651	23,661	537,568	178,063	4729,18
22,2	329788	22,521	5	1167,816	29768,463	17440,63	0,682	160,942	155,149	12,194	11,495	519,779	23,688	531,922	178,766	4782,236
22,6	337008	22,914	5	1188,994	30114,732	17509,578	0,685	160,798	155,618	12,419	11,304	514,171	23,722	526,539	179,473	4835,952
23	344258	23,308	5	1210,173	30461,9	17580,348	0,687	160,666	156,104	12,644	11,121	508,966	23,765	521,56	180,199	4891,814

Tabla 7. Hidrostáticas con asiento 5 [m].

2.5 Hidrostáticas asiento 7 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	60542	5,137	7	258,186	14545,218	12885,216	0,417	151,805	171,055	2,921	39,967	1293,236	42,88	1295,907	132,073	2177,039
5,4	65854	5,53	7	279,309	14882,247	13025,129	0,429	153,372	171,408	3,116	37,208	1225,77	40,317	1228,648	133,508	2243,651
5,8	71220	5,925	7	300,438	15215,026	13155,976	0,441	154,739	171,635	3,313	34,804	1165,864	38,109	1168,951	134,849	2307,1
6,2	76639	6,322	7	321,57	15543,059	13277,374	0,453	155,939	171,772	3,511	32,692	1111,703	36,197	1114,999	136,093	2366,507
6,6	82105	6,723	7	342,705	15867,964	13389,386	0,463	156,993	171,762	3,712	30,828	1061,454	34,534	1064,961	137,241	2419,925
7	87617	7,123	7	363,842	16193,003	13499,373	0,473	157,921	171,734	3,914	29,17	1017,536	33,079	1021,253	138,369	2474,826
7,4	93173	7,525	7	384,981	16517,607	13605,755	0,483	158,741	171,629	4,117	27,69	977,852	31,802	981,78	139,459	2528,474
7,8	98772	7,929	7	406,122	16842,677	13709,739	0,492	159,467	171,46	4,322	26,361	942,002	30,678	946,141	140,525	2581,559
8,2	104413	8,333	7	427,264	17168,358	13812,187	0,5	160,109	171,222	4,528	25,163	909,559	29,686	913,911	141,575	2634,487
8,6	110097	8,739	7	448,407	17496,031	13912,979	0,508	160,674	170,92	4,735	24,079	879,902	28,809	884,467	142,608	2686,865
9	115823	9,147	7	469,551	17825,568	14014,578	0,516	161,17	170,541	4,943	23,095	853,199	28,033	857,977	143,649	2740,429
9,4	121591	9,556	7	490,696	18156,905	14116,61	0,523	161,603	170,089	5,152	22,2	828,89	27,347	833,881	144,695	2794,608
9,8	127401	9,966	7	511,841	18491,598	14221,151	0,529	161,977	169,543	5,362	21,384	807,016	26,742	812,222	145,767	2850,641
10,2	133255	10,379	7	532,988	18837,461	14331,987	0,534	162,294	168,879	5,573	20,639	788,017	26,209	793,438	146,903	2911,329
10,6	139155	10,795	7	554,136	19164,968	14449,907	0,538	162,558	168,094	5,786	19,96	771,63	25,743	777,268	148,112	2977,04
11	145106	11,214	7	575,284	19533,944	14583,062	0,543	162,766	167,101	6,001	19,341	758,989	25,338	764,843	149,476	3053,726
11,4	151115	11,636	7	596,433	19913,938	14724,482	0,546	162,916	165,984	6,216	18,777	748,458	24,99	754,53	150,926	3136,409
11,8	157184	12,061	7	617,583	20306,365	14875,803	0,548	163,011	164,732	6,434	18,264	740,109	24,694	746,4	152,477	3226,468
12,2	163315	12,487	7	638,733	20707,489	15033,004	0,551	163,052	163,389	6,653	17,798	733,033	24,448	739,545	154,088	3320,868
12,6	169513	12,915	7	659,885	21116,154	15194,959	0,553	163,039	161,973	6,874	17,376	726,916	24,247	733,65	155,748	3418,825
13	175778	13,344	7	681,037	21532,548	15361,274	0,556	162,976	160,482	7,097	16,992	721,608	24,086	728,565	157,453	3520,063
13,4	182113	13,774	7	702,19	21953,061	15528,129	0,558	162,863	158,963	7,322	16,646	716,388	23,964	723,572	159,163	3621,357
13,8	188512	14,202	7	723,344	22367,501	15682,44	0,561	162,708	157,552	7,548	16,331	709,308	23,876	716,719	160,745	3712,296
14,2	194972	14,627	7	744,499	22770,778	15819,991	0,566	162,517	156,305	7,776	16,044	700,004	23,817	707,644	162,155	3789,779
14,6	201487	15,048	7	765,654	23165,792	15943,99	0,572	162,298	155,192	8,004	15,781	689,175	23,782	697,046	163,426	3856,392

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
15	208051	15,468	7	786,811	23553,036	16055,829	0,578	162,056	154,202	8,233	15,533	677,278	23,763	685,38	164,572	3913,816
15,4	214661	15,885	7	807,969	23933,798	16158,162	0,584	161,797	153,323	8,462	15,297	664,825	23,757	673,159	165,621	3964,418
15,8	221313	16,3	7	829,127	24306,005	16255,041	0,59	161,525	152,567	8,692	15,072	652,54	23,76	661,105	166,614	4012,293
16,2	228007	16,713	7	850,287	24672,036	16347,606	0,596	161,245	151,919	8,921	14,853	640,544	23,772	649,341	167,563	4058,248
16,6	234740	17,124	7	871,448	25034,566	16435,473	0,603	160,961	151,361	9,151	14,64	628,734	23,788	637,763	168,464	4101,694
17	241511	17,534	7	892,61	25395,005	16517,449	0,609	160,674	150,867	9,38	14,429	616,9	23,806	626,161	169,304	4141,249
17,4	248319	17,941	7	913,772	25751,595	16595,476	0,615	160,389	150,49	9,609	14,215	605,54	23,821	615,032	170,104	4180,306
17,8	255161	18,344	7	934,936	26095,645	16662,693	0,621	160,108	150,359	9,838	13,967	594,308	23,803	604,031	170,793	4216,565
18,2	262031	18,743	7	956,102	26433,969	16721,97	0,626	159,838	150,396	10,066	13,7	583,285	23,764	593,238	171,4	4250,607
18,6	268928	19,14	7	977,268	26769,82	16780,437	0,632	159,581	150,53	10,294	13,433	573,032	23,724	583,215	171,999	4286,72
19	275853	19,536	7	998,435	27104,505	16840,503	0,636	159,338	150,745	10,521	13,171	563,652	23,69	574,064	172,615	4326,143
19,4	282805	19,93	7	1019,604	27439,368	16898,509	0,641	159,11	151,043	10,748	12,909	554,824	23,654	565,464	173,21	4366,807
19,8	289785	20,323	7	1040,774	27775,571	16958,796	0,645	158,898	151,38	10,974	12,657	546,703	23,628	557,572	173,828	4410,289
20,2	296793	20,716	7	1061,944	28113,24	17021,602	0,649	158,702	151,742	11,199	12,418	539,204	23,615	550,299	174,471	4456,274
20,6	303831	21,109	7	1083,117	28452,368	17086,057	0,653	158,521	152,128	11,424	12,189	532,197	23,611	543,519	175,132	4504,041
21	310899	21,501	7	1104,29	28792,863	17151,324	0,656	158,354	152,541	11,649	11,969	525,586	23,615	537,134	175,801	4553,018
21,4	317998	21,892	7	1125,464	29134,781	17216,483	0,66	158,202	152,976	11,873	11,755	519,294	23,626	531,067	176,469	4602,739
21,8	325126	22,283	7	1146,64	29479,651	17282,413	0,663	158,064	153,428	12,097	11,55	513,362	23,645	525,36	177,145	4653,765
22,2	332286	22,674	7	1167,816	29824,375	17349,08	0,666	157,94	153,885	12,321	11,353	507,707	23,672	519,929	177,828	4705,526
22,6	339478	23,065	7	1188,994	30170,317	17416,487	0,669	157,829	154,348	12,544	11,166	502,311	23,708	514,758	178,519	4758,022
23	346701	23,456	7	1210,173	30517,303	17484,155	0,672	157,73	154,811	12,767	10,986	497,113	23,751	509,784	179,213	4810,794

Tabla 8. Hidrostáticas con asiento 7 [m].

2.6 Hidrostáticas asiento -1 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	59765	5,003	-1	258,186	14636,207	12929,863	0,562	181,741	179,062	2,641	39,753	1359,003	42,394	1361,639	132,531	2259,897
5,4	65087	5,402	-1	279,309	14950,238	13023,176	0,57	181,516	178,888	2,85	36,879	1270,094	39,729	1272,94	133,488	2298,938
5,8	70445	5,802	-1	300,438	15262,16	13109,611	0,578	181,31	178,686	3,06	34,401	1192,491	37,461	1195,546	134,374	2335,048
6,2	75838	6,201	-1	321,57	15573,288	13191,699	0,585	181,116	178,449	3,269	32,247	1124,593	35,516	1127,858	135,215	2369,61
6,6	81263	6,601	-1	342,705	15882,973	13268,347	0,591	180,931	178,187	3,478	30,352	1064,302	33,829	1067,776	136,001	2401,985
7	86719	7	-1	363,842	16192,41	13341,436	0,597	180,75	177,889	3,687	28,677	1010,48	32,364	1014,163	136,75	2432,669
7,4	92205	7,399	-1	384,981	16501,815	13411,542	0,603	180,572	177,563	3,896	27,189	962,157	31,085	966,05	137,468	2461,941
7,8	97719	7,798	-1	406,122	16810,938	13478,284	0,609	180,394	177,212	4,105	25,855	918,357	29,96	922,458	138,152	2489,516
8,2	103260	8,197	-1	427,264	17120,887	13543,116	0,614	180,214	176,822	4,314	24,657	878,598	28,97	882,908	138,817	2515,964
8,6	108827	8,596	-1	448,407	17431,08	13605,593	0,619	180,032	176,409	4,523	23,573	842,22	28,096	846,739	139,457	2541,047
9	114420	8,994	-1	469,551	17742,558	13665,739	0,624	179,846	175,955	4,731	22,591	808,585	27,322	813,314	140,074	2564,2
9,4	120037	9,393	-1	490,696	18055,611	13724,622	0,628	179,654	175,458	4,94	21,697	777,551	26,637	782,488	140,677	2586,143
9,8	125678	9,791	-1	511,841	18369,945	13782,202	0,633	179,456	174,931	5,149	20,881	748,785	26,03	753,931	141,268	2606,862
10,2	131342	10,19	-1	532,988	18686,153	13839,793	0,638	179,251	174,369	5,358	20,135	722,219	25,492	727,574	141,858	2627,121
10,6	137031	10,588	-1	554,136	19004,512	13896,509	0,642	179,037	173,774	5,567	19,449	697,38	25,015	702,944	142,439	2646,09
11	142742	10,986	-1	575,284	19325,271	13955,624	0,647	178,816	173,16	5,775	18,82	674,72	24,595	680,492	143,045	2666,361
11,4	148478	11,385	-1	596,433	19648,436	14016,029	0,651	178,586	172,524	5,984	18,241	653,767	24,225	659,749	143,664	2686,984
11,8	154238	11,783	-1	617,583	19968,511	14083,156	0,656	178,349	171,911	6,193	17,707	635,483	23,9	641,674	144,352	2712,929
12,2	160028	12,181	-1	638,733	20291,42	14153,807	0,66	178,104	171,29	6,403	17,214	618,859	23,616	625,259	145,077	2740,977
12,6	165848	12,579	-1	659,885	20618,469	14229,878	0,665	177,853	170,647	6,613	16,758	603,995	23,371	610,605	145,856	2772,402
13	171701	12,977	-1	681,037	20949,493	14310,315	0,669	177,596	169,977	6,823	16,337	590,503	23,16	597,323	146,681	2806,183
13,4	177589	13,376	-1	702,19	21283,544	14399,138	0,674	177,333	169,31	7,033	15,948	579,001	22,981	586,032	147,591	2846,092
13,8	183517	13,774	-1	723,344	21624,317	14503,396	0,676	177,064	168,667	7,244	15,59	570,491	22,834	577,733	148,66	2898,316
14,2	189490	14,172	-1	744,499	21979,377	14620,775	0,677	176,789	167,993	7,456	15,258	564,24	22,715	571,694	149,863	2960,51

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,6	195512	14,57	-1	765,654	22308,543	14752,762	0,679	176,508	167,29	7,67	14,953	560,287	22,623	567,954	151,216	3034,063
15	201593	14,968	-1	786,811	22679,377	14904,424	0,679	176,219	166,498	7,884	14,674	559,112	22,557	566,994	152,77	3122,997
15,4	207739	15,365	-1	807,969	23057,259	15065,932	0,679	175,919	165,707	8,099	14,417	559,27	22,517	567,367	154,426	3220,388
15,8	213953	15,763	-1	829,127	23445,521	15239,481	0,678	175,611	164,874	8,316	14,183	560,91	22,5	569,224	156,205	3327,884
16,2	220239	16,161	-1	850,287	23841,339	15421,437	0,677	175,293	164,03	8,535	13,97	563,512	22,504	572,045	158,07	3443,116
16,6	226602	16,558	-1	871,448	24243,922	15610,268	0,676	174,965	163,174	8,754	13,775	566,831	22,529	575,583	160,005	3565,123
17	233043	16,956	-1	892,61	24652,325	15804,717	0,675	174,627	162,314	8,975	13,597	570,697	22,573	579,67	161,998	3693,223
17,4	239568	17,353	-1	913,772	25068,282	16005,837	0,674	174,278	161,428	9,198	13,436	575,194	22,634	584,389	164,06	3828,391
17,8	246172	17,751	-1	934,936	25482,333	16201,67	0,673	173,923	160,646	9,422	13,29	578,87	22,712	588,29	166,067	3960,9
18,2	252855	18,149	-1	956,102	25888,784	16386,88	0,673	173,564	160,003	9,648	13,157	581,151	22,804	590,796	167,966	4086,234
18,6	259612	18,548	-1	977,268	26286,988	16559,666	0,676	173,205	159,512	9,874	13,033	581,993	22,907	591,864	169,737	4203,243
19	266441	18,947	-1	998,435	26678,386	16721,593	0,679	172,849	159,14	10,101	12,916	581,673	23,017	591,772	171,396	4313,117
19,4	273336	19,346	-1	1019,604	27063,744	16873,886	0,682	172,5	158,875	10,329	12,801	580,427	23,131	590,754	172,957	4416,923
19,8	280292	19,746	-1	1040,774	27443,737	17019,549	0,685	172,156	158,712	10,558	12,689	578,704	23,246	589,26	174,45	4517,567
20,2	287307	20,146	-1	1061,944	27819,117	17157,847	0,688	171,822	158,631	10,787	12,575	576,419	23,362	587,204	175,868	4614,056
20,6	294380	20,546	-1	1083,117	28190,03	17288,724	0,691	171,498	158,613	11,017	12,458	573,602	23,475	584,616	177,209	4706,255
21	301508	20,946	-1	1104,29	28556,561	17411,885	0,693	171,185	158,658	11,247	12,336	570,3	23,583	581,544	178,472	4794,187
21,4	308686	21,346	-1	1125,464	28917,098	17524,659	0,696	170,885	158,78	11,477	12,203	566,33	23,68	577,805	179,628	4875,903
21,8	315909	21,747	-1	1146,64	29268,332	17622,736	0,699	170,6	159,021	11,707	12,047	561,357	23,754	573,061	180,633	4947,922
22,2	323173	22,148	-1	1167,816	29612,75	17707,553	0,702	170,33	159,372	11,937	11,871	555,532	23,808	567,466	181,502	5010,901
22,6	330472	22,549	-1	1188,994	29956,048	17788,922	0,704	170,077	159,754	12,167	11,696	549,678	23,863	561,843	182,336	5071,887
23	337812	22,95	-1	1210,173	30300,922	17864,889	0,707	169,843	160,175	12,397	11,516	543,657	23,913	556,052	183,115	5129,581

Tabla 9. Hidrostáticas con asiento -1 [m].

2.7 Hidrostáticas asiento -2,5 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	59859	5,016	-2,5	258,186	14641,992	12900,576	0,498	187,447	180,246	2,672	39,494	1351,575	42,166	1354,214	132,231	2250,899
5,4	65168	5,414	-2,5	279,309	14955,991	12992,644	0,508	186,85	179,956	2,88	36,649	1263,254	39,528	1266,102	133,175	2289,24
5,8	70513	5,812	-2,5	300,438	15267,155	13076,332	0,519	186,319	179,67	3,087	34,194	1185,597	37,28	1188,655	134,032	2323,606
6,2	75891	6,21	-2,5	321,57	15577,036	13153,749	0,528	185,839	179,369	3,294	32,058	1116,931	35,351	1120,197	134,826	2354,904
6,6	81300	6,607	-2,5	342,705	15886,078	13226,471	0,537	185,399	179,046	3,501	30,181	1056,074	33,681	1059,549	135,571	2384,248
7	86738	7,005	-2,5	363,842	16194,198	13294,824	0,545	184,992	178,704	3,708	28,519	1001,63	32,227	1005,314	136,272	2411,593
7,4	92204	7,402	-2,5	384,981	16502,855	13360,647	0,553	184,611	178,325	3,916	27,044	952,75	30,959	956,642	136,947	2437,504
7,8	97696	7,8	-2,5	406,122	16811,132	13422,789	0,56	184,248	177,932	4,123	25,721	908,376	29,843	912,476	137,584	2461,496
8,2	103214	8,196	-2,5	427,264	17120,58	13482,509	0,567	183,901	177,493	4,33	24,532	867,881	28,862	872,189	138,196	2483,711
8,6	108755	8,593	-2,5	448,407	17430,671	13538,953	0,574	183,565	177,029	4,537	23,459	830,504	27,996	835,02	138,774	2503,511
9	114319	8,99	-2,5	469,551	17741,971	13594,313	0,58	183,237	176,528	4,744	22,485	796,291	27,228	801,015	139,342	2522,406
9,4	119906	9,386	-2,5	490,696	18054,187	13647,828	0,586	182,914	176,006	4,951	21,599	764,605	26,55	769,537	139,89	2539,656
9,8	125514	9,782	-2,5	511,841	18368,309	13700,205	0,592	182,595	175,45	5,158	20,79	735,219	25,948	740,359	140,427	2555,574
10,2	131144	10,178	-2,5	532,988	18683,883	13753,563	0,598	182,278	174,88	5,365	20,051	708,33	25,416	713,678	140,974	2571,92
10,6	136795	10,574	-2,5	554,136	19001,231	13807,469	0,604	181,961	174,294	5,572	19,372	683,511	24,944	689,066	141,527	2588,181
11	142469	10,97	-2,5	575,284	19314,949	13866,121	0,609	181,645	173,743	5,779	18,748	661,506	24,527	667,269	142,128	2608,307
11,4	148168	11,366	-2,5	596,433	19630,514	13927,805	0,615	181,33	173,189	5,986	18,174	641,485	24,16	647,455	142,76	2630,174
11,8	153892	11,762	-2,5	617,583	19948,07	13992,742	0,62	181,017	172,636	6,194	17,644	623,292	23,837	629,471	143,426	2654,051
12,2	159644	12,158	-2,5	638,733	20269,187	14060,056	0,626	180,705	172,066	6,402	17,154	606,46	23,555	612,847	144,116	2678,708
12,6	165425	12,554	-2,5	659,885	20592,862	14134,257	0,631	180,395	171,511	6,61	16,701	591,782	23,31	598,377	144,876	2708,482
13	171239	12,951	-2,5	681,037	20918,676	14217,877	0,637	180,087	171,026	6,818	16,281	579,597	23,098	586,401	145,733	2746,081
13,4	177090	13,348	-2,5	702,19	21246,707	14310,169	0,641	179,78	170,571	7,027	15,891	569,439	22,917	576,452	146,679	2790,43
13,8	182980	13,745	-2,5	723,344	21577,3	14412,19	0,646	179,476	170,13	7,237	15,53	561,23	22,767	568,453	147,725	2842,135
14,2	188914	14,142	-2,5	744,499	21909,412	14524,383	0,65	179,176	169,709	7,448	15,196	554,932	22,643	562,366	148,875	2902,011

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,6	194896	14,539	-2,5	765,654	22250,921	14648,138	0,651	178,878	169,265	7,659	14,886	550,529	22,545	558,175	150,143	2970,976
15	200932	14,935	-2,5	786,811	22579,198	14784,44	0,652	178,582	168,776	7,872	14,599	547,956	22,471	555,815	151,541	3049,673
15,4	207024	15,331	-2,5	807,969	22940,758	14933,988	0,653	178,287	168,221	8,086	14,335	547,158	22,42	555,23	153,073	3138,749
15,8	213182	15,727	-2,5	829,127	23316,334	15098,47	0,653	177,986	167,572	8,301	14,092	548,188	22,393	556,475	154,759	3239,585
16,2	219409	16,122	-2,5	850,287	23699,723	15271,058	0,653	177,681	166,897	8,517	13,871	550,123	22,388	558,627	156,528	3347,485
16,6	225709	16,517	-2,5	871,448	24092,762	15453,059	0,652	177,37	166,168	8,735	13,669	553,071	22,403	561,792	158,394	3463,684
17	232084	16,912	-2,5	892,61	24494,817	15641,526	0,652	177,053	165,417	8,954	13,482	556,69	22,436	565,631	160,326	3586,55
17,4	238539	17,306	-2,5	913,772	24901,987	15835,765	0,651	176,727	164,636	9,175	13,312	560,808	22,487	569,969	162,317	3715,388
17,8	245074	17,701	-2,5	934,936	25312,964	16033,023	0,651	176,396	163,859	9,397	13,158	565,067	22,555	574,449	164,338	3848,035
18,2	251695	18,095	-2,5	956,102	25729,33	16234,245	0,65	176,055	163,062	9,62	13,019	569,588	22,638	579,194	166,401	3985,554
18,6	258395	18,49	-2,5	977,268	26146,227	16433,03	0,65	175,711	162,31	9,845	12,891	573,643	22,736	583,474	168,439	4122,739
19	265173	18,886	-2,5	998,435	26553,294	16619,618	0,65	175,361	161,73	10,071	12,775	576,232	22,846	586,289	170,351	4251,862
19,4	272025	19,283	-2,5	1019,604	26951,715	16793,92	0,653	175,011	161,295	10,298	12,666	577,452	22,964	587,736	172,138	4372,803
19,8	278947	19,68	-2,5	1040,774	27342,276	16957,032	0,657	174,665	160,972	10,526	12,562	577,49	23,088	588,001	173,81	4486,175
20,2	285934	20,079	-2,5	1061,944	27726,076	17110,324	0,66	174,324	160,744	10,754	12,461	576,579	23,215	587,319	175,381	4593,096
20,6	292985	20,478	-2,5	1083,117	28103,896	17254,402	0,663	173,991	160,593	10,984	12,359	574,858	23,343	585,827	176,858	4694,093
21	300094	20,877	-2,5	1104,29	28476,304	17390,114	0,666	173,666	160,509	11,213	12,256	572,474	23,469	583,673	178,249	4789,857
21,4	307259	21,277	-2,5	1125,464	28843,942	17517,92	0,669	173,351	160,487	11,443	12,148	569,538	23,591	580,967	179,559	4880,885
21,8	314477	21,677	-2,5	1146,64	29207,147	17638,045	0,672	173,047	160,533	11,674	12,035	566,139	23,709	577,799	180,79	4967,571
22,2	321749	22,078	-2,5	1167,816	29567,052	17747,843	0,675	172,757	160,666	11,904	11,91	562,097	23,813	573,987	181,915	5048,009
22,6	329067	22,48	-2,5	1188,994	29918,871	17843,767	0,678	172,482	160,922	12,134	11,763	557,144	23,897	569,264	182,899	5119,175
23	336424	22,883	-2,5	1210,173	30272,234	17929,495	0,681	172,222	161,299	12,365	11,597	551,711	23,962	564,062	183,777	5184,485

Tabla 10. Hidrostáticas con asiento -2,5 [m].

2.8 Hidrostáticas asiento -5 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	60154	5,058	-5	258,186	14647,74	12825,412	0,421	196,813	182,1	2,783	38,93	1326,842	41,71	1329,494	131,46	2220,069
5,4	65433	5,451	-5	279,309	14963,865	12916,811	0,434	195,608	181,622	2,982	36,163	1240,966	39,142	1243,825	132,397	2257,43
5,8	70747	5,844	-5	300,438	15277,527	12999,338	0,446	194,541	181,164	3,182	33,77	1165,095	36,95	1168,162	133,243	2290,427
6,2	76090	6,239	-5	321,57	15581,703	13070,149	0,457	193,595	180,766	3,383	31,684	1096,008	35,064	1099,283	133,969	2316,21
6,6	81464	6,632	-5	342,705	15891,266	13139,641	0,467	192,737	180,308	3,585	29,847	1035,951	33,429	1039,434	134,681	2342,856
7	86866	7,026	-5	363,842	16200,145	13202,743	0,477	191,952	179,841	3,787	28,223	981,27	32,006	984,96	135,328	2365,291
7,4	92292	7,419	-5	384,981	16508,924	13260,519	0,487	191,229	179,363	3,989	26,776	931,391	30,762	935,288	135,92	2384,282
7,8	97741	7,812	-5	406,122	16817,841	13315,084	0,496	190,556	178,865	4,191	25,48	886,118	29,669	890,222	136,48	2401,346
8,2	103213	8,205	-5	427,264	17127,454	13367,397	0,504	189,926	178,345	4,393	24,316	844,845	28,707	849,155	137,016	2416,718
8,6	108705	8,597	-5	448,407	17438,135	13417,031	0,513	189,329	177,8	4,596	23,263	806,873	27,856	811,389	137,525	2430,017
9	114217	8,99	-5	469,551	17749,616	13466,702	0,52	188,762	177,255	4,798	22,309	772,403	27,105	777,126	138,034	2443,326
9,4	119749	9,382	-5	490,696	18061,5	13516,232	0,528	188,218	176,704	5,001	21,442	740,845	26,44	745,772	138,541	2456,218
9,8	125302	9,775	-5	511,841	18369,36	13568,613	0,536	187,697	176,196	5,204	20,649	712,683	25,851	717,816	139,078	2471,728
10,2	130877	10,167	-5	532,988	18678,717	13623,283	0,543	187,196	175,685	5,407	19,924	687,121	25,329	692,46	139,639	2488,493
10,6	136474	10,561	-5	554,136	18989,062	13678,612	0,55	186,714	175,189	5,61	19,257	663,586	24,865	669,13	140,206	2505,499
11	142095	10,953	-5	575,284	19302,147	13736,563	0,557	186,248	174,683	5,814	18,645	642,045	24,457	647,795	140,8	2523,551
11,4	147741	11,347	-5	596,433	19616,236	13798,74	0,564	185,799	174,22	6,017	18,079	622,803	24,095	628,759	141,437	2544,842
11,8	153415	11,742	-5	617,583	19930,857	13870,489	0,57	185,366	173,841	6,222	17,557	606,683	23,777	612,844	142,173	2574,011
12,2	159118	12,137	-5	638,733	20246,28	13948,069	0,576	184,948	173,507	6,427	17,073	592,605	23,498	598,973	142,968	2607,732
12,6	164855	12,533	-5	659,885	20562,305	14032,338	0,582	184,545	173,221	6,632	16,624	580,516	23,254	587,091	143,831	2646,746
13	170628	12,93	-5	681,037	20878,873	14124,067	0,587	184,158	172,983	6,839	16,206	570,355	23,043	577,137	144,772	2691,74
13,4	176440	13,327	-5	702,19	21198,078	14222,145	0,592	183,787	172,781	7,046	15,818	561,719	22,862	568,709	145,777	2741,675
13,8	182293	13,724	-5	723,344	21521,072	14327,664	0,597	183,432	172,588	7,254	15,457	554,649	22,709	561,848	146,859	2797,51
14,2	188190	14,122	-5	744,499	21847,82	14438,113	0,601	183,089	172,412	7,463	15,119	548,646	22,58	556,054	147,991	2857,416

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,6	194135	14,519	-5	765,654	22179	14554,638	0,605	182,759	172,229	7,673	14,805	543,746	22,476	551,365	149,185	2922,132
15	200129	14,916	-5	786,811	22513,796	14677,625	0,609	182,44	172,035	7,883	14,512	539,896	22,394	547,727	150,446	2991,922
15,4	206175	15,313	-5	807,969	22853,782	14808,188	0,613	182,131	171,809	8,095	14,241	537,113	22,335	545,156	151,784	3067,442
15,8	212277	15,709	-5	829,127	23205,82	14947,738	0,614	181,831	171,53	8,309	13,989	535,553	22,296	543,809	153,214	3150,209
16,2	218438	16,104	-5	850,287	23542,176	15096,563	0,615	181,535	171,181	8,523	13,755	535,131	22,277	543,602	154,74	3240,396
16,6	224661	16,498	-5	871,448	23911,411	15256,231	0,617	181,244	170,744	8,739	13,539	535,974	22,276	544,659	156,376	3339,413
17	230954	16,89	-5	892,61	24293,273	15427,836	0,618	180,952	170,202	8,955	13,34	538,118	22,294	547,021	158,135	3448,303
17,4	237319	17,282	-5	913,772	24681,478	15605,318	0,618	180,658	169,624	9,173	13,159	540,774	22,331	549,894	159,955	3562,525
17,8	243757	17,674	-5	934,936	25077,841	15792,236	0,618	180,358	169,003	9,393	12,994	544,439	22,385	553,778	161,87	3685,788
18,2	250271	18,064	-5	956,102	25479,671	15984,145	0,618	180,055	168,349	9,613	12,841	548,523	22,454	558,082	163,837	3814,57
18,6	256864	18,455	-5	977,268	25885,992	16179,968	0,618	179,745	167,66	9,835	12,702	552,874	22,536	562,654	165,845	3948,094
19	263538	18,845	-5	998,435	26295,19	16377,912	0,618	179,429	166,956	10,058	12,575	557,295	22,632	567,298	167,874	4085,088
19,4	270295	19,234	-5	1019,604	26710,038	16580,61	0,619	179,105	166,201	10,283	12,459	562,073	22,74	572,301	169,951	4227,843
19,8	277132	19,624	-5	1040,774	27121,19	16778,004	0,619	178,776	165,498	10,509	12,353	566,09	22,86	576,543	171,975	4367,854
20,2	284047	20,016	-5	1061,944	27526,214	16965,081	0,619	178,443	164,898	10,735	12,255	568,86	22,989	579,54	173,892	4500,791
20,6	291037	20,41	-5	1083,117	27922,046	17138,736	0,622	178,11	164,438	10,963	12,164	570,156	23,126	581,063	175,672	4624,041
21	298101	20,805	-5	1104,29	28312,206	17300,942	0,625	177,781	164,091	11,191	12,077	570,278	23,267	581,413	177,335	4739,235
21,4	305230	21,201	-5	1125,464	28697,776	17454,045	0,629	177,457	163,849	11,42	11,992	569,576	23,411	580,941	178,904	4848,571
21,8	312423	21,599	-5	1146,64	29083,425	17599,654	0,632	177,139	163,706	11,65	11,906	568,291	23,555	579,885	180,396	4953,603
22,2	319676	21,998	-5	1167,816	29465,184	17737,773	0,636	176,83	163,64	11,88	11,819	566,447	23,698	578,271	181,812	5054,145
22,6	326986	22,398	-5	1188,994	29841,055	17866,56	0,639	176,531	163,637	12,111	11,725	563,983	23,835	576,038	183,132	5149,244
23	334350	22,799	-5	1210,173	30212,099	17986,348	0,643	176,241	163,693	12,341	11,624	560,937	23,964	573,223	184,36	5238,802

Tabla 11. Hidrostáticas con asiento -5 [m].

2.9 Hidrostáticas asiento -7 [m]

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m</i> ²	Wetted Area <i>m</i> ²	Waterpl. Area <i>m</i> ²	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
5	60515	5,111	-7	258,186	14637,137	12726,902	0,378	204,069	183,666	2,92	38,358	1290,21	41,271	1292,881	130,451	2170,935
5,4	65754	5,498	-7	279,309	14958,69	12824,372	0,39	202,419	182,971	3,11	35,687	1209,95	38,79	1212,826	131,45	2211,035
5,8	71030	5,886	-7	300,438	15274,566	12907,868	0,402	200,955	182,35	3,302	33,367	1136,952	36,663	1140,034	132,306	2243,235
6,2	76338	6,273	-7	321,57	15588,719	12982,438	0,414	199,643	181,737	3,495	31,335	1071,441	34,824	1074,73	133,07	2270,88
6,6	81676	6,662	-7	342,705	15901,865	13049,645	0,425	198,455	181,134	3,689	29,545	1012,21	33,229	1015,704	133,759	2294,278
7	87038	7,051	-7	363,842	16206,886	13106,884	0,435	197,376	180,597	3,885	27,96	957,147	31,839	960,846	134,346	2310,803
7,4	92425	7,439	-7	384,981	16517,997	13163,327	0,445	196,384	179,997	4,08	26,547	908,286	30,622	912,191	134,924	2327,508
7,8	97833	7,828	-7	406,122	16828,763	13216,168	0,455	195,465	179,414	4,277	25,279	863,782	29,551	867,892	135,466	2341,997
8,2	103262	8,217	-7	427,264	17139,593	13265,717	0,464	194,608	178,845	4,474	24,139	822,904	28,609	827,219	135,974	2354,009
8,6	108711	8,606	-7	448,407	17446,753	13316,504	0,474	193,805	178,313	4,671	23,109	786,43	27,775	790,949	136,494	2367,493
9	114181	8,996	-7	469,551	17753,068	13368,118	0,482	193,051	177,798	4,869	22,174	753,485	27,038	758,209	137,023	2381,635
9,4	119672	9,386	-7	490,696	18060,361	13421,174	0,491	192,339	177,296	5,067	21,323	723,651	26,386	728,579	137,567	2396,601
9,8	125186	9,776	-7	511,841	18368,964	13473,91	0,499	191,666	176,795	5,266	20,545	696,105	25,807	701,237	138,108	2410,892
10,2	130722	10,167	-7	532,988	18679,158	13529,749	0,507	191,028	176,319	5,465	19,832	671,301	25,294	676,637	138,68	2427,21
10,6	136282	10,559	-7	554,136	18989,13	13591,146	0,514	190,421	175,925	5,665	19,177	649,615	24,838	655,155	139,309	2448,254
11	141870	10,953	-7	575,284	19299,843	13660,043	0,522	189,845	175,587	5,865	18,574	630,938	24,436	636,682	140,015	2475,042
11,4	147486	11,347	-7	596,433	19610,201	13733,878	0,528	189,298	175,316	6,067	18,016	614,514	24,079	620,462	140,772	2505,855
11,8	153134	11,743	-7	617,583	19919,701	13814,673	0,535	188,779	175,102	6,269	17,5	600,448	23,765	606,6	141,6	2542,218
12,2	158816	12,14	-7	638,733	20230,352	13901,349	0,541	188,287	174,942	6,472	17,02	588,328	23,488	594,685	142,489	2583,424
12,6	164534	12,537	-7	659,885	20543,267	13993,545	0,546	187,822	174,817	6,675	16,574	577,843	23,246	584,407	143,434	2628,974
13	170291	12,936	-7	681,037	20858,819	14090,725	0,552	187,381	174,722	6,88	16,159	568,726	23,037	575,497	144,43	2678,377
13,4	176090	13,334	-7	702,19	21177,31	14192,61	0,557	186,963	174,648	7,086	15,773	560,822	22,856	567,8	145,474	2731,533
13,8	181930	13,733	-7	723,344	21498,904	14298,664	0,562	186,567	174,585	7,293	15,412	553,958	22,702	561,144	146,561	2788,154
14,2	187815	14,132	-7	744,499	21823,523	14408,431	0,566	186,191	174,527	7,501	15,074	547,961	22,572	555,356	147,686	2847,841

Draft Amidships <i>m</i>	Displacement <i>t</i>	Draft at LCF <i>m</i>	Trim <i>m</i>	Sect. area amidships <i>m²</i>	Wetted Area <i>m²</i>	Waterpl. Area <i>m²</i>	Block coeff. (Cb) -	LCB <i>m</i>	LCF <i>m</i>	KB <i>m</i>	BMt <i>m</i>	BML <i>m</i>	KMt <i>m</i>	KML <i>m</i>	Immersion (TPc) <i>t/cm</i>	MTc <i>t · m</i>
14,6	193746	14,53	-7	765,654	22153,627	14523,762	0,571	185,833	174,46	7,71	14,759	542,973	22,466	550,578	148,869	2911,799
15	199725	14,929	-7	786,811	22485,753	14642,271	0,575	185,493	174,397	7,92	14,465	538,601	22,383	546,417	150,083	2978,343
15,4	205756	15,327	-7	807,969	22822,67	14766,55	0,579	185,167	174,303	8,131	14,192	535,11	22,32	543,138	151,357	3049,352
15,8	211838	15,725	-7	829,127	23162,919	14894,655	0,583	184,854	174,186	8,344	13,935	532,228	22,276	540,468	152,67	3123,654
16,2	217976	16,122	-7	850,287	23506,707	15028,136	0,587	184,553	174,029	8,557	13,696	530,084	22,251	538,539	154,038	3202,37
16,6	224168	16,518	-7	871,448	23856,769	15169,244	0,59	184,26	173,827	8,771	13,474	528,924	22,243	537,593	155,485	3287,421
17	230419	16,913	-7	892,61	24221,402	15320,777	0,591	183,973	173,561	8,987	13,269	528,999	22,253	537,883	157,038	3381,009
17,4	236732	17,306	-7	913,772	24561,026	15479,489	0,593	183,691	173,227	9,204	13,078	529,845	22,279	538,946	158,665	3480,75
17,8	243113	17,697	-7	934,936	24939,28	15650,965	0,595	183,41	172,763	9,421	12,902	532,083	22,321	541,402	160,422	3591,368
18,2	249566	18,087	-7	956,102	25322,791	15827,344	0,595	183,126	172,252	9,641	12,741	534,717	22,379	544,254	162,23	3706,733
18,6	256090	18,475	-7	977,268	25715,223	16011,146	0,596	182,84	171,662	9,861	12,594	538,056	22,452	547,813	164,114	3829,283
19	262690	18,863	-7	998,435	26108,763	16197,561	0,596	182,549	171,042	10,082	12,457	541,541	22,537	551,519	166,025	3955,362
19,4	269366	19,25	-7	1019,604	26508,464	16388,421	0,597	182,254	170,377	10,305	12,332	545,398	22,634	555,598	167,981	4086,797
19,8	276125	19,637	-7	1040,774	26912,531	16580,94	0,597	181,954	169,702	10,528	12,217	549,299	22,743	559,721	169,955	4221,388
20,2	282964	20,023	-7	1061,944	27321,519	16777,472	0,598	181,649	168,981	10,753	12,111	553,495	22,862	564,141	171,969	4361,126
20,6	289888	20,409	-7	1083,117	27740,363	16976,898	0,598	181,337	168,29	10,979	12,016	557,917	22,992	568,788	174,013	4505,722
21	296889	20,796	-7	1104,29	28159,14	17172,627	0,599	181,023	167,644	11,206	11,929	561,789	23,132	572,886	176,019	4648,778
21,4	303968	21,187	-7	1125,464	28567,66	17354,533	0,6	180,705	167,152	11,433	11,848	564,113	23,279	575,437	177,884	4781,463
21,8	311120	21,579	-7	1146,64	28967,29	17523,591	0,604	180,389	166,777	11,662	11,771	565,117	23,431	576,67	179,617	4904,797
22,2	318340	21,974	-7	1167,816	29359,805	17680,438	0,607	180,077	166,498	11,891	11,695	565,021	23,584	576,803	181,224	5019,87
22,6	325625	22,37	-7	1188,994	29747,493	17827,584	0,611	179,769	166,301	12,121	11,617	564,098	23,736	576,11	182,733	5128,452
23	332969	22,768	-7	1210,173	30129,939	17965,351	0,615	179,468	166,177	12,352	11,538	562,411	23,888	574,654	184,145	5230,562

Tabla 12. Hidrostáticas con asiento -7 [m].

3. CÁLCULO DE CURVAS KN

A continuación se calculan las tablas correspondientes a las curvas pantocarenas del buque.

Para ello se empleará de igual manera el software MAXSURF Stability, esta vez con la herramienta de cálculo “*KN Values*” que permitirá la obtención de estos datos para las siguientes condiciones:

Trimado:

- A proa: 1 [m], 2,5 [m], 5 [m] y 7[m]
- Asiento neutro: 0 [m]
- A popa: -1[m], -2,5 [m], -5 [m] y -7[m].

Escora:

5°, 10°, 15°, 20°, 25°, 30°, 35°, 40°, 50°, 60° y 70°.

Para el cálculo se emplearán los siguientes valores:

$$TCG = 0 [m]$$

$$VCG = D/2 = 31/2 = 15,5 [m]$$

Con estos datos se obtienen las tablas pantocarenas que se muestran a continuación.

3.1 KN con asiento nulo

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
59741	5	0	177,923	15	3,703	7,29	10,287	12,431	14,059	15,354	16,399	17,235	18,5	19,681	20,518
65067	5,4	0	177,945	15	3,474	6,88	9,867	12,071	13,754	15,108	16,221	17,138	18,576	19,942	20,725
70432	5,8	0	177,955	15	3,278	6,521	9,475	11,735	13,474	14,882	16,058	17,051	18,655	20,167	20,892
75832	6,2	0	177,951	15	3,109	6,206	9,109	11,421	13,213	14,674	15,91	16,976	18,735	20,356	21,022
81267	6,6	0	177,933	15	2,963	5,927	8,769	11,126	12,97	14,484	15,777	16,911	18,816	20,513	21,122
86734	7	0	177,902	15	2,835	5,681	8,454	10,847	12,744	14,31	15,658	16,855	18,901	20,642	21,196
92232	7,4	0	177,859	15	2,723	5,463	8,166	10,584	12,531	14,149	15,554	16,806	18,987	20,747	21,248
97759	7,8	0	177,802	15	2,625	5,27	7,906	10,335	12,333	14,002	15,461	16,764	19,075	20,828	21,281
103315	8,2	0	177,733	15	2,538	5,099	7,671	10,1	12,146	13,867	15,378	16,729	19,156	20,889	21,298
108898	8,6	0	177,652	15	2,462	4,947	7,458	9,879	11,971	13,745	15,303	16,7	19,231	20,933	21,302
114508	9	0	177,559	15	2,394	4,812	7,266	9,672	11,806	13,633	15,235	16,676	19,296	20,959	21,293
120144	9,4	0	177,453	15	2,334	4,692	7,093	9,479	11,652	13,529	15,173	16,658	19,351	20,972	21,275
125806	9,8	0	177,334	15	2,281	4,586	6,937	9,301	11,509	13,432	15,118	16,644	19,394	20,972	21,248
131494	10,2	0	177,202	15	2,234	4,492	6,798	9,139	11,375	13,342	15,067	16,635	19,428	20,962	21,213
137206	10,6	0	177,057	15	2,192	4,408	6,674	8,992	11,25	13,257	15,022	16,625	19,45	20,943	21,173
142944	11	0	176,898	15	2,155	4,334	6,565	8,86	11,133	13,177	14,981	16,622	19,462	20,915	21,128
148707	11,401	0	176,726	15	2,122	4,269	6,468	8,744	11,024	13,103	14,945	16,623	19,464	20,879	21,078
154496	11,801	0	176,54	15	2,094	4,212	6,383	8,639	10,922	13,033	14,912	16,627	19,455	20,836	21,025
160315	12,2	0	176,341	15	2,069	4,163	6,31	8,546	10,828	12,967	14,884	16,633	19,438	20,787	20,969
166164	12,6	0	176,13	15	2,048	4,12	6,247	8,466	10,741	12,906	14,852	16,643	19,412	20,733	20,91
172047	13	0	175,908	15	2,03	4,084	6,195	8,396	10,662	12,848	14,828	16,651	19,379	20,673	20,848
177967	13,4	0	175,674	15	2,014	4,054	6,151	8,336	10,591	12,794	14,806	16,658	19,339	20,607	20,783
183928	13,8	0	175,428	15	2,002	4,029	6,114	8,284	10,526	12,744	14,787	16,66	19,293	20,537	20,716
189936	14,2	0	175,17	15	1,992	4,011	6,085	8,24	10,469	12,692	14,77	16,658	19,242	20,464	20,646

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
195999	14,6	0	174,896	15	1,985	3,996	6,063	8,204	10,419	12,647	14,755	16,65	19,185	20,387	20,574
202123	15	0	174,607	15	1,98	3,986	6,047	8,173	10,375	12,606	14,742	16,635	19,124	20,307	20,499
208312	15,4	0	174,304	15	1,977	3,98	6,036	8,149	10,337	12,569	14,731	16,611	19,058	20,227	20,422
214571	15,8	0	173,989	15	1,976	3,978	6,029	8,13	10,306	12,536	14,72	16,58	18,988	20,141	20,342
220906	16,2	0	173,659	15	1,977	3,98	6,025	8,116	10,28	12,506	14,705	16,54	18,912	20,054	20,26
227318	16,6	0	173,319	15	1,98	3,985	6,024	8,107	10,253	12,481	14,687	16,493	18,833	19,964	20,176
233811	17	0	172,965	15	1,984	3,992	6,027	8,102	10,237	12,46	14,662	16,438	18,748	19,873	20,091
240382	17,4	0	172,605	15	1,99	4	6,031	8,1	10,225	12,442	14,629	16,376	18,66	19,78	20,006
247029	17,8	0	172,239	15	1,997	4,009	6,038	8,102	10,218	12,429	14,587	16,307	18,567	19,685	19,921
253749	18,2	0	171,874	15	2,005	4,02	6,047	8,108	10,215	12,419	14,538	16,23	18,47	19,589	19,836
260537	18,6	0	171,513	15	2,013	4,03	6,058	8,11	10,216	12,412	14,482	16,146	18,369	19,491	19,752
267391	19	0	171,158	15	2,021	4,042	6,07	8,119	10,22	12,405	14,419	16,056	18,264	19,391	19,668
274307	19,4	0	170,812	15	2,029	4,054	6,083	8,13	10,228	12,393	14,351	15,959	18,154	19,289	19,585
281282	19,8	0	170,476	15	2,037	4,066	6,098	8,144	10,239	12,374	14,276	15,857	18,043	19,185	19,501
288312	20,2	0	170,15	15	2,044	4,078	6,114	8,159	10,253	12,35	14,198	15,75	17,925	19,079	19,418
295396	20,6	0	169,835	15	2,051	4,09	6,126	8,176	10,269	12,319	14,114	15,638	17,804	18,971	19,334
302529	21	0	169,534	15	2,057	4,103	6,143	8,195	10,289	12,284	14,027	15,521	17,679	18,862	19,249
309708	21,4	0	169,248	15	2,063	4,116	6,16	8,216	10,306	12,243	13,936	15,401	17,551	18,75	19,165
316925	21,8	0	168,979	15	2,069	4,128	6,178	8,238	10,317	12,197	13,843	15,277	17,42	18,637	19,08
324179	22,2	0	168,728	15	2,075	4,141	6,196	8,261	10,319	12,146	13,747	15,152	17,286	18,522	18,995
331467	22,6	0	168,493	15	2,08	4,154	6,215	8,286	10,314	12,09	13,65	15,025	17,149	18,406	18,91
338788	23	0	168,276	15	2,085	4,167	6,235	8,311	10,301	12,03	13,55	14,896	17,01	18,288	18,824

Tabla 13. KN con asiento nulo

3.2 KN con asiento 1 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
59741	5,000	0,000	177,923	0,000	3,703	7,290	10,287	12,431	14,060	15,356	16,401	17,239	18,504	19,682	20,518
65067	5,400	0,000	177,945	0,000	3,474	6,880	9,868	12,071	13,755	15,109	16,223	17,141	18,580	19,943	20,726
70432	5,800	0,000	177,955	0,000	3,278	6,521	9,476	11,736	13,475	14,883	16,060	17,055	18,659	20,169	20,893
75832	6,200	0,000	177,951	0,000	3,109	6,206	9,110	11,422	13,214	14,676	15,912	16,979	18,739	20,358	21,024
81267	6,600	0,000	177,933	0,000	2,963	5,927	8,769	11,126	12,971	14,485	15,779	16,914	18,820	20,516	21,123
86734	7,000	0,000	177,902	0,000	2,835	5,681	8,454	10,847	12,745	14,311	15,661	16,858	18,905	20,645	21,197
92232	7,400	0,000	177,859	0,000	2,723	5,464	8,167	10,584	12,532	14,151	15,556	16,809	18,990	20,750	21,249
97759	7,800	0,000	177,802	0,000	2,625	5,271	7,906	10,336	12,334	14,003	15,464	16,767	19,078	20,831	21,282
103315	8,200	0,000	177,733	0,000	2,538	5,099	7,671	10,101	12,147	13,869	15,380	16,732	19,158	20,893	21,300
108898	8,600	0,000	177,652	0,000	2,462	4,947	7,458	9,880	11,972	13,747	15,305	16,703	19,234	20,936	21,303
114508	9,000	0,000	177,559	0,000	2,394	4,812	7,266	9,672	11,807	13,635	15,237	16,679	19,299	20,962	21,295
120144	9,400	0,000	177,453	0,000	2,334	4,692	7,093	9,479	11,653	13,531	15,176	16,660	19,353	20,975	21,277
125806	9,800	0,000	177,334	0,000	2,281	4,586	6,937	9,302	11,511	13,434	15,120	16,646	19,397	20,975	21,249
131494	10,200	0,000	177,202	0,000	2,234	4,492	6,798	9,140	11,376	13,344	15,070	16,637	19,430	20,965	21,215
137206	10,600	0,000	177,057	0,000	2,192	4,408	6,675	8,993	11,251	13,259	15,024	16,627	19,453	20,945	21,174
142944	11,000	0,000	176,898	0,000	2,155	4,334	6,565	8,861	11,135	13,179	14,984	16,624	19,465	20,917	21,129
148707	11,401	0,000	176,726	0,000	2,123	4,269	6,468	8,744	11,026	13,105	14,947	16,625	19,466	20,881	21,080
154496	11,801	0,000	176,540	0,000	2,094	4,212	6,384	8,639	10,924	13,035	14,915	16,628	19,457	20,838	21,026
160315	12,200	0,000	176,341	0,000	2,069	4,163	6,310	8,547	10,829	12,969	14,881	16,635	19,440	20,789	20,970
166164	12,600	0,000	176,130	0,000	2,048	4,120	6,247	8,466	10,742	12,908	14,854	16,644	19,414	20,734	20,911
172047	13,000	0,000	175,908	0,000	2,030	4,084	6,196	8,397	10,663	12,850	14,830	16,653	19,380	20,674	20,849
177967	13,400	0,000	175,674	0,000	2,014	4,054	6,151	8,337	10,592	12,796	14,808	16,659	19,340	20,608	20,784
183928	13,800	0,000	175,428	0,000	2,002	4,029	6,115	8,285	10,528	12,745	14,788	16,662	19,294	20,538	20,717
189936	14,200	0,000	175,170	0,000	1,992	4,011	6,086	8,241	10,470	12,693	14,771	16,660	19,243	20,465	20,647

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
195999	14,600	0,000	174,896	0,000	1,985	3,996	6,064	8,205	10,420	12,649	14,756	16,651	19,186	20,388	20,575
202123	15,000	0,000	174,607	0,000	1,980	3,986	6,048	8,174	10,376	12,607	14,743	16,636	19,125	20,307	20,500
208312	15,400	0,000	174,304	0,000	1,977	3,980	6,037	8,150	10,338	12,570	14,732	16,612	19,059	20,227	20,422
214571	15,800	0,000	173,989	0,000	1,976	3,978	6,029	8,131	10,307	12,536	14,720	16,581	18,988	20,142	20,342
220906	16,200	0,000	173,659	0,000	1,977	3,980	6,025	8,117	10,281	12,507	14,706	16,541	18,913	20,054	20,260
227318	16,600	0,000	173,319	0,000	1,980	3,985	6,025	8,108	10,254	12,481	14,688	16,494	18,833	19,964	20,176
233811	17,000	0,000	172,965	0,000	1,984	3,992	6,027	8,102	10,238	12,460	14,663	16,439	18,749	19,873	20,091
240382	17,400	0,000	172,605	0,000	1,990	4,000	6,032	8,101	10,226	12,443	14,629	16,376	18,660	19,780	20,006
247029	17,800	0,000	172,239	0,000	1,997	4,010	6,039	8,103	10,219	12,429	14,587	16,307	18,567	19,685	19,921
253749	18,200	0,000	171,874	0,000	2,005	4,020	6,047	8,108	10,216	12,419	14,538	16,230	18,470	19,589	19,836
260537	18,600	0,000	171,513	0,000	2,013	4,031	6,058	8,110	10,216	12,413	14,482	16,146	18,369	19,491	19,752
267391	19,000	0,000	171,158	0,000	2,021	4,042	6,070	8,119	10,221	12,405	14,419	16,056	18,264	19,391	19,668
274307	19,400	0,000	170,812	0,000	2,029	4,054	6,084	8,130	10,228	12,393	14,351	15,959	18,154	19,289	19,585
281282	19,800	0,000	170,476	0,000	2,037	4,066	6,098	8,144	10,239	12,374	14,276	15,857	18,043	19,185	19,501
288312	20,200	0,000	170,150	0,000	2,044	4,078	6,114	8,159	10,253	12,350	14,197	15,750	17,925	19,079	19,418
295396	20,600	0,000	169,835	0,000	2,051	4,090	6,126	8,176	10,269	12,319	14,114	15,638	17,804	18,971	19,334
302529	21,000	0,000	169,534	0,000	2,057	4,103	6,143	8,195	10,289	12,284	14,027	15,521	17,679	18,862	19,249
309708	21,400	0,000	169,248	0,000	2,063	4,116	6,160	8,216	10,306	12,243	13,937	15,401	17,551	18,750	19,165
316925	21,800	0,000	168,979	0,000	2,069	4,128	6,178	8,238	10,317	12,197	13,843	15,278	17,420	18,637	19,080
324179	22,200	0,000	168,728	0,000	2,075	4,141	6,196	8,261	10,319	12,146	13,748	15,153	17,286	18,523	18,995
331467	22,600	0,000	168,493	0,000	2,080	4,154	6,215	8,286	10,314	12,090	13,650	15,026	17,150	18,406	18,910
338788	23,000	0,000	168,276	0,000	2,085	4,167	6,235	8,311	10,301	12,030	13,551	14,897	17,011	18,289	18,825

Tabla 14. KN con asiento nulo

3.3 KN con asiento 2,5 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
59819	5	2,500 (fixed)	168,492	15	3,724	7,334	10,373	12,573	14,257	15,618	16,754	17,738	19,172	20,181	20,842
65150	5,4	2,500 (fixed)	169,114	15	3,496	6,925	9,949	12,208	13,95	15,372	16,593	17,669	19,268	20,421	21,015
70524	5,8	2,500 (fixed)	169,646	15	3,3	6,566	9,554	11,868	13,666	15,149	16,452	17,601	19,354	20,633	21,152
75938	6,2	2,500 (fixed)	170,102	15	3,131	6,25	9,185	11,55	13,405	14,948	16,324	17,533	19,431	20,812	21,256
81391	6,6	2,500 (fixed)	170,492	15	2,984	5,971	8,843	11,252	13,162	14,771	16,207	17,469	19,499	20,96	21,336
86879	7	2,500 (fixed)	170,825	15	2,856	5,725	8,528	10,971	12,937	14,613	16,098	17,408	19,561	21,077	21,393
92403	7,4	2,500 (fixed)	171,109	15	2,743	5,506	8,24	10,706	12,729	14,469	15,998	17,344	19,616	21,167	21,432
97959	7,8	2,500 (fixed)	171,349	15	2,644	5,312	7,979	10,458	12,536	14,335	15,906	17,289	19,667	21,233	21,456
103548	8,2	2,500 (fixed)	171,548	15	2,557	5,14	7,743	10,223	12,36	14,21	15,82	17,239	19,712	21,277	21,466
109169	8,6	2,500 (fixed)	171,711	15	2,48	4,988	7,53	10,004	12,196	14,092	15,74	17,193	19,748	21,301	21,464
114821	9	2,500 (fixed)	171,841	15	2,412	4,852	7,338	9,799	12,043	13,981	15,666	17,151	19,775	21,308	21,452
120503	9,4	2,500 (fixed)	171,94	15	2,352	4,732	7,165	9,611	11,899	13,875	15,587	17,113	19,791	21,3	21,431
126215	9,8	2,500 (fixed)	172,01	15	2,298	4,625	7,01	9,441	11,762	13,775	15,519	17,079	19,795	21,277	21,401
131957	10,2	2,500 (fixed)	172,052	15	2,251	4,531	6,873	9,285	11,63	13,679	15,455	17,049	19,789	21,243	21,364
137731	10,6	2,500 (fixed)	172,068	15	2,209	4,447	6,751	9,146	11,505	13,587	15,395	17,022	19,774	21,198	21,321
143536	11	2,500 (fixed)	172,057	15	2,172	4,374	6,644	9,022	11,385	13,499	15,338	16,999	19,75	21,143	21,271
149373	11,4	2,500 (fixed)	172,02	15	2,139	4,309	6,552	8,91	11,271	13,407	15,285	16,978	19,718	21,081	21,215
155242	11,8	2,500 (fixed)	171,959	15	2,111	4,253	6,471	8,809	11,163	13,324	15,234	16,96	19,679	21,012	21,154
161146	12,2	2,500 (fixed)	171,871	15	2,086	4,206	6,402	8,717	11,062	13,244	15,186	16,944	19,634	20,938	21,088
167087	12,6	2,500 (fixed)	171,756	15	2,066	4,166	6,344	8,635	10,966	13,167	15,141	16,928	19,583	20,859	21,016
173068	13	2,500 (fixed)	171,615	15	2,048	4,132	6,296	8,561	10,878	13,094	15,098	16,91	19,526	20,777	20,941
179097	13,4	2,500 (fixed)	171,441	15	2,035	4,105	6,256	8,495	10,797	13,023	15,058	16,889	19,465	20,692	20,862
185179	13,8	2,500 (fixed)	171,237	15	2,024	4,084	6,222	8,438	10,722	12,956	15,02	16,863	19,399	20,604	20,779
191318	14,2	2,500 (fixed)	171,004	15	2,015	4,068	6,193	8,387	10,644	12,891	14,983	16,831	19,329	20,515	20,694

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
197518	14,6	2,500 (fixed)	170,743	15	2,01	4,057	6,169	8,343	10,58	12,83	14,949	16,794	19,255	20,424	20,606
203783	15	2,500 (fixed)	170,454	15	2,006	4,05	6,15	8,305	10,522	12,772	14,915	16,75	19,177	20,332	20,518
210116	15,4	2,500 (fixed)	170,14	15	2,005	4,047	6,134	8,272	10,471	12,719	14,879	16,7	19,095	20,238	20,428
216522	15,8	2,500 (fixed)	169,803	15	2,006	4,046	6,122	8,246	10,425	12,669	14,842	16,643	19,009	20,142	20,339
222997	16,2	2,500 (fixed)	169,449	15	2,009	4,046	6,113	8,224	10,386	12,625	14,8	16,581	18,919	20,046	20,249
229541	16,6	2,500 (fixed)	169,085	15	2,013	4,048	6,106	8,198	10,353	12,585	14,753	16,513	18,826	19,949	20,16
236150	17	2,500 (fixed)	168,717	15	2,017	4,051	6,103	8,184	10,326	12,55	14,702	16,439	18,73	19,85	20,071
242822	17,4	2,500 (fixed)	168,349	15	2,022	4,055	6,102	8,173	10,304	12,52	14,645	16,36	18,63	19,75	19,983
249555	17,8	2,500 (fixed)	167,985	15	2,028	4,06	6,103	8,166	10,287	12,492	14,584	16,275	18,528	19,649	19,896
256346	18,2	2,500 (fixed)	167,628	15	2,033	4,065	6,106	8,162	10,275	12,465	14,518	16,186	18,422	19,55	19,809
263192	18,6	2,500 (fixed)	167,28	15	2,039	4,071	6,111	8,162	10,268	12,439	14,447	16,092	18,314	19,447	19,722
270093	19	2,500 (fixed)	166,943	15	2,043	4,078	6,112	8,164	10,265	12,412	14,373	15,994	18,203	19,343	19,636
277046	19,4	2,500 (fixed)	166,617	15	2,048	4,085	6,119	8,17	10,267	12,382	14,296	15,891	18,089	19,239	19,551
284048	19,8	2,500 (fixed)	166,305	15	2,052	4,093	6,127	8,178	10,271	12,35	14,215	15,784	17,973	19,133	19,466
291094	20,2	2,500 (fixed)	166,01	15	2,056	4,101	6,137	8,188	10,278	12,315	14,131	15,674	17,855	19,026	19,381
298179	20,6	2,500 (fixed)	165,733	15	2,06	4,109	6,148	8,2	10,286	12,277	14,045	15,561	17,735	18,919	19,297
305301	21	2,500 (fixed)	165,476	15	2,063	4,118	6,16	8,215	10,292	12,235	13,957	15,445	17,614	18,811	19,214
312456	21,4	2,500 (fixed)	165,235	15	2,066	4,126	6,173	8,231	10,295	12,19	13,866	15,326	17,489	18,703	19,132
319644	21,8	2,500 (fixed)	165,012	15	2,07	4,136	6,188	8,25	10,293	12,142	13,775	15,207	17,361	18,593	19,05
326865	22,2	2,500 (fixed)	164,806	15	2,073	4,145	6,203	8,27	10,287	12,09	13,682	15,085	17,231	18,482	18,968
334119	22,6	2,500 (fixed)	164,616	15	2,077	4,155	6,22	8,29	10,275	12,034	13,588	14,963	17,1	18,37	18,887
341407	23	2,500 (fixed)	164,441	15	2,081	4,166	6,237	8,31	10,258	11,975	13,493	14,84	16,966	18,258	18,805

Tabla 15. KN con asiento 2,5 [m]

3.4 KN con asiento 5 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
60119	5,000	5,000 (fixed)	159,223	15,000	3,733	7,346	10,394	12,628	14,337	15,716	16,897	17,907	19,392	20,422	20,930
65445	5,400	5,000 (fixed)	160,404	15,000	3,509	6,946	9,978	12,271	14,043	15,497	16,772	17,851	19,480	20,623	21,079
70819	5,800	5,000 (fixed)	161,420	15,000	3,316	6,594	9,590	11,938	13,771	15,305	16,652	17,796	19,559	20,795	21,197
76238	6,200	5,000 (fixed)	162,304	15,000	3,148	6,282	9,228	11,625	13,519	15,132	16,538	17,741	19,629	20,939	21,288
81701	6,600	5,000 (fixed)	163,075	15,000	3,002	6,006	8,892	11,331	13,288	14,972	16,429	17,676	19,691	21,056	21,356
87204	7,000	5,000 (fixed)	163,750	15,000	2,875	5,762	8,583	11,055	13,078	14,822	16,325	17,619	19,746	21,150	21,405
92747	7,400	5,000 (fixed)	164,342	15,000	2,763	5,545	8,300	10,796	12,886	14,681	16,226	17,562	19,795	21,220	21,437
98329	7,800	5,000 (fixed)	164,859	15,000	2,665	5,353	8,043	10,554	12,708	14,548	16,133	17,508	19,835	21,271	21,455
103948	8,200	5,000 (fixed)	165,312	15,000	2,578	5,182	7,810	10,328	12,540	14,422	16,035	17,456	19,865	21,302	21,460
109604	8,600	5,000 (fixed)	165,705	15,000	2,501	5,031	7,599	10,119	12,380	14,301	15,949	17,407	19,886	21,317	21,455
115295	9,000	5,000 (fixed)	166,046	15,000	2,433	4,896	7,411	9,925	12,228	14,187	15,868	17,362	19,896	21,316	21,439
121023	9,400	5,000 (fixed)	166,336	15,000	2,372	4,777	7,242	9,748	12,082	14,077	15,790	17,319	19,897	21,301	21,415
126788	9,800	5,000 (fixed)	166,579	15,000	2,319	4,671	7,092	9,586	11,941	13,972	15,717	17,280	19,888	21,273	21,382
132589	10,200	5,000 (fixed)	166,780	15,000	2,272	4,578	6,961	9,437	11,807	13,860	15,647	17,245	19,870	21,234	21,343
138427	10,600	5,000 (fixed)	166,941	15,000	2,230	4,496	6,845	9,300	11,677	13,761	15,581	17,212	19,844	21,187	21,297
144305	11,000	5,000 (fixed)	167,061	15,000	2,194	4,425	6,743	9,174	11,553	13,664	15,517	17,181	19,810	21,131	21,245
150224	11,400	5,000 (fixed)	167,142	15,000	2,162	4,364	6,656	9,058	11,435	13,571	15,457	17,151	19,769	21,068	21,186
156188	11,800	5,000 (fixed)	167,184	15,000	2,135	4,312	6,581	8,953	11,322	13,482	15,400	17,121	19,721	20,998	21,123
162203	12,200	5,000 (fixed)	167,181	15,000	2,113	4,267	6,515	8,856	11,214	13,395	15,345	17,089	19,668	20,924	21,054
168272	12,600	5,000 (fixed)	167,135	15,000	2,093	4,230	6,458	8,768	11,102	13,311	15,293	17,055	19,609	20,844	20,981
174398	13,000	5,000 (fixed)	167,045	15,000	2,078	4,200	6,407	8,689	11,005	13,230	15,242	17,018	19,546	20,761	20,904
180584	13,400	5,000 (fixed)	166,911	15,000	2,066	4,176	6,363	8,618	10,914	13,152	15,194	16,977	19,477	20,674	20,824
186834	13,800	5,000 (fixed)	166,735	15,000	2,056	4,158	6,324	8,554	10,830	13,077	15,145	16,933	19,403	20,585	20,741
193147	14,200	5,000 (fixed)	166,518	15,000	2,050	4,143	6,290	8,497	10,753	13,005	15,097	16,883	19,325	20,492	20,656

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
199525	14,600	5,000 (fixed)	166,264	15,000	2,046	4,132	6,261	8,447	10,682	12,937	15,047	16,829	19,244	20,398	20,569
205965	15,000	5,000 (fixed)	165,980	15,000	2,044	4,123	6,236	8,403	10,617	12,872	14,995	16,770	19,158	20,303	20,481
212464	15,400	5,000 (fixed)	165,673	15,000	2,044	4,115	6,215	8,354	10,560	12,812	14,941	16,706	19,068	20,206	20,392
219018	15,800	5,000 (fixed)	165,351	15,000	2,045	4,110	6,198	8,320	10,508	12,756	14,884	16,636	18,975	20,107	20,303
225624	16,200	5,000 (fixed)	165,018	15,000	2,046	4,106	6,184	8,290	10,463	12,704	14,824	16,562	18,879	20,007	20,213
232279	16,600	5,000 (fixed)	164,680	15,000	2,049	4,103	6,173	8,266	10,425	12,655	14,761	16,483	18,780	19,906	20,124
238982	17,000	5,000 (fixed)	164,341	15,000	2,051	4,101	6,165	8,246	10,392	12,609	14,694	16,398	18,678	19,804	20,035
245733	17,400	5,000 (fixed)	164,004	15,000	2,053	4,101	6,160	8,231	10,365	12,564	14,623	16,310	18,573	19,702	19,947
252530	17,800	5,000 (fixed)	163,672	15,000	2,055	4,101	6,149	8,219	10,344	12,521	14,549	16,216	18,465	19,598	19,859
259373	18,200	5,000 (fixed)	163,349	15,000	2,056	4,103	6,146	8,211	10,328	12,479	14,471	16,119	18,354	19,493	19,771
266260	18,600	5,000 (fixed)	163,036	15,000	2,058	4,105	6,146	8,207	10,316	12,437	14,391	16,018	18,242	19,388	19,683
273187	19,000	5,000 (fixed)	162,738	15,000	2,059	4,107	6,147	8,205	10,307	12,395	14,308	15,913	18,127	19,284	19,596
280148	19,400	5,000 (fixed)	162,457	15,000	2,060	4,111	6,150	8,207	10,301	12,353	14,223	15,805	18,010	19,177	19,510
287142	19,800	5,000 (fixed)	162,194	15,000	2,061	4,114	6,155	8,211	10,295	12,309	14,136	15,693	17,890	19,070	19,424
294170	20,200	5,000 (fixed)	161,949	15,000	2,062	4,118	6,161	8,218	10,289	12,264	14,048	15,579	17,769	18,962	19,338
301228	20,600	5,000 (fixed)	161,722	15,000	2,063	4,123	6,169	8,227	10,283	12,217	13,957	15,463	17,647	18,853	19,254
308319	21,000	5,000 (fixed)	161,512	15,000	2,064	4,128	6,178	8,238	10,275	12,168	13,866	15,345	17,523	18,744	19,169
315442	21,400	5,000 (fixed)	161,320	15,000	2,066	4,134	6,188	8,250	10,264	12,117	13,773	15,225	17,396	18,634	19,086
322599	21,800	5,000 (fixed)	161,143	15,000	2,068	4,140	6,199	8,261	10,251	12,063	13,679	15,104	17,270	18,523	19,003
329788	22,200	5,000 (fixed)	160,981	15,000	2,081	4,147	6,212	8,272	10,234	12,006	13,585	14,982	17,140	18,412	18,920
337008	22,600	5,000 (fixed)	160,834	15,000	2,085	4,155	6,225	8,281	10,212	11,947	13,490	14,860	17,008	18,300	18,838
344258	23,000	5,000 (fixed)	160,699	15,000	2,089	4,163	6,240	8,287	10,187	11,884	13,394	14,737	16,874	18,187	18,756

Tabla 16. KN con asiento 5 [m]

3.5 KN con asiento 7 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
60542	5	7,000 (fixed)	152,042	15	3,731	7,331	10,375	12,637	14,368	15,777	17,001	18,03	19,569	20,612	21,008
65854	5,4	7,000 (fixed)	153,605	15	3,512	6,947	9,974	12,295	14,097	15,603	16,893	17,982	19,649	20,78	21,136
71220	5,8	7,000 (fixed)	154,969	15	3,323	6,604	9,598	11,973	13,844	15,439	16,79	17,922	19,719	20,921	21,236
76639	6,2	7,000 (fixed)	156,165	15	3,159	6,3	9,248	11,67	13,616	15,282	16,689	17,871	19,78	21,037	21,313
82105	6,6	7,000 (fixed)	157,215	15	3,015	6,03	8,922	11,387	13,408	15,132	16,591	17,82	19,834	21,13	21,369
87617	7	7,000 (fixed)	158,139	15	2,89	5,79	8,622	11,122	13,215	14,988	16,495	17,77	19,879	21,203	21,41
93173	7,4	7,000 (fixed)	158,955	15	2,779	5,576	8,347	10,874	13,033	14,85	16,39	17,72	19,915	21,255	21,435
98772	7,8	7,000 (fixed)	159,677	15	2,681	5,387	8,096	10,647	12,859	14,718	16,295	17,671	19,942	21,29	21,447
104413	8,2	7,000 (fixed)	160,315	15	2,595	5,219	7,87	10,434	12,692	14,591	16,205	17,622	19,959	21,308	21,447
110097	8,6	7,000 (fixed)	160,876	15	2,519	5,069	7,666	10,238	12,532	14,469	16,117	17,574	19,968	21,311	21,437
115823	9	7,000 (fixed)	161,367	15	2,452	4,937	7,486	10,055	12,379	14,353	16,033	17,529	19,968	21,301	21,418
121591	9,4	7,000 (fixed)	161,796	15	2,392	4,82	7,324	9,883	12,231	14,227	15,953	17,485	19,959	21,28	21,39
127401	9,8	7,000 (fixed)	162,166	15	2,339	4,717	7,18	9,722	12,088	14,115	15,876	17,444	19,942	21,247	21,354
133255	10,2	7,000 (fixed)	162,48	15	2,293	4,627	7,055	9,572	11,951	14,007	15,802	17,403	19,917	21,206	21,312
139155	10,6	7,000 (fixed)	162,739	15	2,253	4,55	6,945	9,432	11,818	13,903	15,731	17,364	19,884	21,156	21,263
145106	11	7,000 (fixed)	162,943	15	2,218	4,482	6,849	9,303	11,691	13,802	15,663	17,323	19,844	21,1	21,207
151115	11,4	7,000 (fixed)	163,089	15	2,188	4,424	6,764	9,183	11,557	13,704	15,598	17,281	19,797	21,037	21,146
157184	11,8	7,000 (fixed)	163,18	15	2,163	4,375	6,687	9,073	11,436	13,608	15,536	17,238	19,743	20,968	21,079
163315	12,2	7,000 (fixed)	163,217	15	2,142	4,334	6,618	8,972	11,322	13,516	15,475	17,192	19,683	20,894	21,008
169513	12,6	7,000 (fixed)	163,199	15	2,124	4,3	6,557	8,88	11,213	13,426	15,415	17,143	19,618	20,815	20,934
175778	13	7,000 (fixed)	163,131	15	2,111	4,272	6,502	8,796	11,11	13,34	15,356	17,091	19,548	20,732	20,857
182113	13,4	7,000 (fixed)	163,014	15	2,1	4,248	6,453	8,719	11,014	13,256	15,296	17,035	19,473	20,645	20,777
188512	13,8	7,000 (fixed)	162,854	15	2,092	4,228	6,409	8,651	10,925	13,176	15,235	16,976	19,393	20,555	20,695
194972	14,2	7,000 (fixed)	162,659	15	2,087	4,21	6,371	8,577	10,842	13,099	15,173	16,912	19,309	20,462	20,612

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
201487	14,6	7,000 (fixed)	162,435	15	2,083	4,194	6,337	8,52	10,766	13,025	15,108	16,844	19,22	20,366	20,527
208051	15	7,000 (fixed)	162,189	15	2,08	4,181	6,308	8,469	10,697	12,955	15,042	16,773	19,128	20,268	20,441
214661	15,4	7,000 (fixed)	161,925	15	2,078	4,17	6,283	8,424	10,635	12,887	14,974	16,697	19,033	20,169	20,354
221313	15,8	7,000 (fixed)	161,649	15	2,077	4,16	6,261	8,385	10,579	12,823	14,903	16,616	18,935	20,068	20,266
228007	16,2	7,000 (fixed)	161,365	15	2,076	4,152	6,243	8,352	10,53	12,761	14,829	16,532	18,834	19,966	20,178
234740	16,6	7,000 (fixed)	161,076	15	2,075	4,145	6,22	8,323	10,488	12,701	14,753	16,443	18,729	19,863	20,089
241511	17	7,000 (fixed)	160,785	15	2,074	4,14	6,206	8,299	10,451	12,643	14,674	16,351	18,623	19,758	20
248319	17,4	7,000 (fixed)	160,495	15	2,073	4,135	6,195	8,28	10,42	12,586	14,592	16,254	18,513	19,653	19,911
255161	17,8	7,000 (fixed)	160,21	15	2,071	4,132	6,187	8,265	10,394	12,531	14,508	16,154	18,402	19,547	19,823
262031	18,2	7,000 (fixed)	159,935	15	2,07	4,13	6,181	8,253	10,371	12,477	14,422	16,051	18,288	19,441	19,735
268928	18,6	7,000 (fixed)	159,673	15	2,069	4,129	6,177	8,245	10,351	12,424	14,334	15,944	18,172	19,334	19,647
275853	19	7,000 (fixed)	159,426	15	2,067	4,127	6,175	8,241	10,333	12,371	14,244	15,835	18,054	19,226	19,56
282805	19,4	7,000 (fixed)	159,194	15	2,066	4,127	6,175	8,239	10,316	12,318	14,153	15,722	17,935	19,12	19,473
289785	19,8	7,000 (fixed)	158,978	15	2,065	4,127	6,177	8,24	10,3	12,266	14,062	15,608	17,814	19,011	19,386
296793	20,2	7,000 (fixed)	158,777	15	2,064	4,129	6,18	8,243	10,283	12,212	13,969	15,491	17,691	18,902	19,3
303831	20,6	7,000 (fixed)	158,591	15	2,064	4,131	6,185	8,247	10,266	12,158	13,875	15,372	17,566	18,793	19,215
310899	21	7,000 (fixed)	158,42	15	2,065	4,134	6,192	8,252	10,248	12,103	13,781	15,253	17,441	18,683	19,13
317998	21,4	7,000 (fixed)	158,264	15	2,077	4,138	6,2	8,255	10,227	12,046	13,686	15,132	17,314	18,572	19,046
325126	21,8	7,000 (fixed)	158,121	15	2,079	4,143	6,209	8,258	10,204	11,988	13,591	15,01	17,185	18,461	18,962
332286	22,2	7,000 (fixed)	157,993	15	2,082	4,149	6,219	8,259	10,178	11,927	13,495	14,888	17,056	18,349	18,879
339478	22,6	7,000 (fixed)	157,877	15	2,085	4,155	6,23	8,257	10,15	11,865	13,399	14,766	16,924	18,237	18,796
346701	23	7,000 (fixed)	157,774	15	2,09	4,163	6,241	8,253	10,117	11,799	13,303	14,644	16,79	18,123	18,714

Tabla 17. KN con asiento 7 [m]

3.6 KN con asiento -1 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
59765	5	-1,000 (fixed)	181,706	15	3,692	7,27	10,261	12,419	14,077	15,417	16,528	17,457	18,874	19,893	20,734
65087	5,4	-1,000 (fixed)	181,482	15	3,464	6,861	9,844	12,06	13,771	15,166	16,341	17,359	18,971	20,16	20,931
70445	5,8	-1,000 (fixed)	181,276	15	3,269	6,504	9,455	11,725	13,49	14,937	16,174	17,275	19,061	20,415	21,084
75838	6,2	-1,000 (fixed)	181,083	15	3,101	6,19	9,091	11,412	13,229	14,729	16,026	17,202	19,135	20,638	21,203
81263	6,6	-1,000 (fixed)	180,898	15	2,955	5,913	8,752	11,117	12,986	14,539	15,898	17,136	19,206	20,817	21,293
86719	7	-1,000 (fixed)	180,718	15	2,827	5,668	8,439	10,84	12,76	14,365	15,787	17,077	19,27	20,956	21,359
92205	7,4	-1,000 (fixed)	180,54	15	2,716	5,451	8,153	10,578	12,548	14,207	15,688	17,025	19,33	21,062	21,405
97719	7,8	-1,000 (fixed)	180,363	15	2,618	5,259	7,894	10,33	12,35	14,064	15,599	16,979	19,387	21,14	21,434
103260	8,2	-1,000 (fixed)	180,184	15	2,532	5,088	7,659	10,096	12,165	13,936	15,519	16,939	19,443	21,193	21,449
108827	8,6	-1,000 (fixed)	180,002	15	2,456	4,937	7,448	9,876	11,991	13,819	15,445	16,905	19,498	21,225	21,451
114420	9	-1,000 (fixed)	179,817	15	2,388	4,802	7,256	9,67	11,829	13,712	15,377	16,875	19,552	21,238	21,442
120037	9,4	-1,000 (fixed)	179,626	15	2,328	4,683	7,084	9,478	11,677	13,611	15,315	16,842	19,596	21,234	21,423
125678	9,8	-1,000 (fixed)	179,428	15	2,275	4,577	6,929	9,301	11,538	13,517	15,258	16,818	19,625	21,217	21,395
131342	10,2	-1,000 (fixed)	179,223	15	2,228	4,483	6,79	9,14	11,407	13,428	15,206	16,798	19,639	21,187	21,36
137031	10,601	-1,000 (fixed)	179,01	15	2,187	4,4	6,667	8,994	11,286	13,344	15,157	16,782	19,642	21,147	21,317
142742	11,001	-1,000 (fixed)	178,79	15	2,15	4,326	6,557	8,863	11,172	13,265	15,112	16,768	19,634	21,098	21,268
148478	11,401	-1,000 (fixed)	178,56	15	2,118	4,261	6,461	8,747	11,065	13,189	15,063	16,758	19,617	21,041	21,213
154238	11,801	-1,000 (fixed)	178,323	15	2,089	4,205	6,376	8,644	10,964	13,117	15,023	16,751	19,59	20,978	21,153
160028	12,201	-1,000 (fixed)	178,08	15	2,065	4,155	6,303	8,552	10,87	13,049	14,985	16,746	19,557	20,91	21,088
165848	12,6	-1,000 (fixed)	177,83	15	2,043	4,112	6,24	8,474	10,784	12,985	14,95	16,744	19,517	20,838	21,018
171701	13	-1,000 (fixed)	177,573	15	2,025	4,076	6,188	8,405	10,704	12,923	14,918	16,744	19,472	20,762	20,945
177589	13,4	-1,000 (fixed)	177,31	15	2,009	4,045	6,143	8,347	10,631	12,865	14,888	16,746	19,421	20,683	20,868
183517	13,8	-1,000 (fixed)	177,042	15	1,997	4,02	6,107	8,296	10,566	12,801	14,861	16,744	19,365	20,601	20,789
189490	14,2	-1,000 (fixed)	176,768	15	1,986	4	6,078	8,252	10,506	12,748	14,835	16,734	19,304	20,517	20,707

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
195512	14,6	-1,000 (fixed)	176,488	15	1,978	3,986	6,057	8,216	10,453	12,697	14,812	16,716	19,239	20,432	20,624
201593	15	-1,000 (fixed)	176,199	15	1,973	3,975	6,041	8,185	10,407	12,65	14,791	16,69	19,17	20,345	20,539
207739	15,4	-1,000 (fixed)	175,9	15	1,97	3,969	6,031	8,16	10,366	12,607	14,772	16,658	19,097	20,256	20,454
213953	15,8	-1,000 (fixed)	175,592	15	1,968	3,966	6,024	8,14	10,331	12,568	14,755	16,618	19,02	20,167	20,368
220239	16,2	-1,000 (fixed)	175,275	15	1,969	3,967	6,02	8,124	10,294	12,533	14,737	16,571	18,94	20,075	20,281
226602	16,6	-1,000 (fixed)	174,947	15	1,971	3,972	6,02	8,113	10,269	12,503	14,713	16,517	18,856	19,982	20,194
233043	17	-1,000 (fixed)	174,61	15	1,975	3,979	6,021	8,106	10,249	12,476	14,682	16,458	18,768	19,891	20,107
239568	17,4	-1,000 (fixed)	174,262	15	1,98	3,988	6,026	8,103	10,234	12,455	14,644	16,392	18,677	19,797	20,02
246172	17,8	-1,000 (fixed)	173,908	15	1,987	3,998	6,032	8,103	10,224	12,437	14,599	16,32	18,582	19,7	19,934
252855	18,2	-1,000 (fixed)	173,549	15	1,995	4,008	6,04	8,107	10,218	12,424	14,548	16,242	18,484	19,603	19,849
259612	18,6	-1,000 (fixed)	173,191	15	2,003	4,02	6,05	8,107	10,216	12,416	14,491	16,158	18,384	19,504	19,764
266441	19	-1,000 (fixed)	172,836	15	2,012	4,032	6,062	8,115	10,219	12,407	14,428	16,069	18,279	19,405	19,68
273336	19,4	-1,000 (fixed)	172,487	15	2,021	4,044	6,076	8,125	10,225	12,394	14,361	15,974	18,174	19,304	19,596
280292	19,8	-1,000 (fixed)	172,143	15	2,03	4,057	6,09	8,138	10,235	12,377	14,289	15,875	18,063	19,202	19,513
287307	20,2	-1,000 (fixed)	171,81	15	2,038	4,07	6,106	8,153	10,249	12,354	14,213	15,771	17,949	19,099	19,431
294380	20,6	-1,000 (fixed)	171,487	15	2,046	4,083	6,124	8,171	10,265	12,327	14,133	15,663	17,832	18,995	19,35
301508	21	-1,000 (fixed)	171,175	15	2,054	4,097	6,137	8,19	10,285	12,295	14,05	15,552	17,711	18,889	19,269
308686	21,4	-1,000 (fixed)	170,876	15	2,061	4,111	6,155	8,211	10,305	12,259	13,965	15,436	17,589	18,782	19,188
315909	21,8	-1,000 (fixed)	170,59	15	2,068	4,125	6,174	8,234	10,32	12,218	13,876	15,319	17,462	18,673	19,107
323173	22,2	-1,000 (fixed)	170,321	15	2,075	4,139	6,194	8,259	10,328	12,172	13,786	15,199	17,334	18,563	19,026
330472	22,6	-1,000 (fixed)	170,069	15	2,081	4,153	6,214	8,285	10,329	12,122	13,694	15,077	17,203	18,452	18,945
337812	23	-1,000 (fixed)	169,836	15	2,087	4,168	6,236	8,313	10,321	12,067	13,6	14,956	17,07	18,34	18,863

Tabla 18. KN con asiento -1 [m]

3.7 KN con asiento -2,5 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
59859	5	-2,500 (fixed)	187,36	15	3,673	7,227	10,185	12,329	13,978	15,31	16,41	17,328	18,748	19,808	20,689
65168	5,4	-2,500 (fixed)	186,765	15	3,447	6,824	9,777	11,976	13,679	15,065	16,228	17,223	18,841	20,085	20,892
70513	5,8	-2,500 (fixed)	186,235	15	3,253	6,471	9,395	11,648	13,402	14,841	16,062	17,133	18,925	20,341	21,051
75891	6,2	-2,500 (fixed)	185,756	15	3,086	6,16	9,038	11,34	13,145	14,635	15,914	17,057	19,003	20,561	21,174
81300	6,6	-2,500 (fixed)	185,319	15	2,941	5,885	8,705	11,05	12,907	14,447	15,782	16,994	19,07	20,744	21,267
86738	7	-2,500 (fixed)	184,913	15	2,815	5,643	8,397	10,777	12,683	14,274	15,667	16,939	19,137	20,888	21,336
92204	7,4	-2,500 (fixed)	184,533	15	2,705	5,428	8,115	10,519	12,474	14,116	15,566	16,891	19,201	20,998	21,384
97696	7,8	-2,500 (fixed)	184,172	15	2,608	5,237	7,858	10,275	12,278	13,971	15,478	16,85	19,265	21,079	21,415
103214	8,2	-2,500 (fixed)	183,826	15	2,522	5,068	7,626	10,045	12,094	13,838	15,4	16,815	19,329	21,134	21,431
108755	8,6	-2,500 (fixed)	183,491	15	2,447	4,918	7,417	9,827	11,921	13,719	15,329	16,785	19,393	21,167	21,434
114319	9	-2,500 (fixed)	183,165	15	2,38	4,785	7,227	9,624	11,759	13,61	15,265	16,76	19,451	21,181	21,425
119906	9,4	-2,500 (fixed)	182,844	15	2,321	4,667	7,056	9,433	11,606	13,51	15,207	16,739	19,499	21,18	21,406
125514	9,801	-2,500 (fixed)	182,525	15	2,268	4,562	6,902	9,258	11,464	13,418	15,153	16,723	19,536	21,164	21,379
131144	10,201	-2,500 (fixed)	182,209	15	2,222	4,468	6,765	9,097	11,331	13,332	15,105	16,703	19,56	21,137	21,344
136795	10,601	-2,500 (fixed)	181,894	15	2,18	4,386	6,642	8,951	11,209	13,251	15,06	16,691	19,571	21,1	21,301
142469	11,001	-2,500 (fixed)	181,579	15	2,144	4,313	6,533	8,82	11,095	13,175	15,019	16,683	19,571	21,056	21,251
148168	11,401	-2,500 (fixed)	181,266	15	2,112	4,248	6,437	8,702	10,989	13,103	14,982	16,678	19,561	21,004	21,196
153892	11,801	-2,500 (fixed)	180,955	15	2,084	4,192	6,352	8,596	10,891	13,035	14,948	16,676	19,541	20,946	21,136
159644	12,201	-2,500 (fixed)	180,644	15	2,059	4,142	6,278	8,505	10,801	12,971	14,91	16,676	19,514	20,883	21,07
165425	12,6	-2,500 (fixed)	180,336	15	2,038	4,099	6,215	8,424	10,717	12,911	14,88	16,679	19,479	20,815	21,001
171239	13	-2,500 (fixed)	180,029	15	2,019	4,063	6,16	8,354	10,641	12,854	14,852	16,684	19,438	20,743	20,93
177090	13,4	-2,500 (fixed)	179,724	15	2,004	4,031	6,114	8,295	10,572	12,8	14,827	16,688	19,392	20,667	20,855
182980	13,8	-2,500 (fixed)	179,422	15	1,99	4,005	6,077	8,246	10,51	12,749	14,804	16,689	19,34	20,589	20,778
188914	14,2	-2,500 (fixed)	179,123	15	1,98	3,984	6,047	8,205	10,454	12,702	14,784	16,684	19,283	20,508	20,699

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
194896	14,6	-2,500 (fixed)	178,827	15	1,971	3,968	6,023	8,17	10,404	12,65	14,765	16,673	19,221	20,426	20,619
200932	15	-2,500 (fixed)	178,532	15	1,965	3,956	6,005	8,142	10,361	12,607	14,749	16,654	19,156	20,341	20,537
207024	15,4	-2,500 (fixed)	178,238	15	1,961	3,948	5,994	8,119	10,324	12,569	14,735	16,628	19,087	20,255	20,454
213182	15,8	-2,500 (fixed)	177,939	15	1,958	3,944	5,987	8,101	10,292	12,534	14,722	16,594	19,014	20,167	20,37
219409	16,2	-2,500 (fixed)	177,636	15	1,958	3,943	5,985	8,088	10,266	12,503	14,706	16,553	18,937	20,081	20,286
225709	16,6	-2,500 (fixed)	177,326	15	1,96	3,946	5,986	8,08	10,245	12,476	14,686	16,506	18,856	19,991	20,201
232084	17	-2,500 (fixed)	177,01	15	1,963	3,952	5,99	8,075	10,223	12,454	14,662	16,451	18,772	19,899	20,116
238539	17,4	-2,500 (fixed)	176,687	15	1,967	3,961	5,996	8,074	10,211	12,436	14,63	16,391	18,684	19,806	20,031
245074	17,8	-2,500 (fixed)	176,357	15	1,973	3,972	6,004	8,076	10,203	12,422	14,592	16,323	18,593	19,712	19,946
251695	18,2	-2,500 (fixed)	176,018	15	1,98	3,984	6,015	8,081	10,2	12,412	14,546	16,25	18,499	19,617	19,861
258395	18,6	-2,500 (fixed)	175,675	15	1,989	3,998	6,027	8,09	10,201	12,404	14,495	16,171	18,401	19,52	19,777
265173	19	-2,500 (fixed)	175,326	15	1,998	4,012	6,04	8,102	10,205	12,397	14,437	16,085	18,302	19,423	19,694
272025	19,4	-2,500 (fixed)	174,978	15	2,008	4,026	6,056	8,11	10,214	12,388	14,373	15,994	18,197	19,324	19,612
278947	19,8	-2,500 (fixed)	174,633	15	2,018	4,041	6,073	8,125	10,226	12,375	14,306	15,899	18,088	19,224	19,53
285934	20,2	-2,500 (fixed)	174,294	15	2,028	4,056	6,091	8,142	10,242	12,358	14,233	15,798	17,976	19,122	19,449
292985	20,6	-2,500 (fixed)	173,962	15	2,038	4,071	6,11	8,161	10,26	12,335	14,156	15,692	17,861	19,019	19,369
300094	21	-2,500 (fixed)	173,639	15	2,047	4,087	6,13	8,183	10,282	12,307	14,076	15,583	17,742	18,915	19,288
307259	21,4	-2,500 (fixed)	173,326	15	2,056	4,103	6,151	8,206	10,302	12,274	13,993	15,47	17,62	18,808	19,208
314477	21,8	-2,500 (fixed)	173,023	15	2,065	4,119	6,169	8,231	10,319	12,236	13,907	15,354	17,496	18,701	19,128
321749	22,2	-2,500 (fixed)	172,736	15	2,073	4,135	6,191	8,258	10,331	12,193	13,817	15,237	17,368	18,591	19,047
329067	22,6	-2,500 (fixed)	172,461	15	2,081	4,151	6,213	8,286	10,336	12,145	13,726	15,116	17,237	18,481	18,966
336424	23	-2,500 (fixed)	172,204	15	2,088	4,167	6,236	8,315	10,333	12,092	13,633	14,994	17,105	18,368	18,884

Tabla 19. KN con asiento -2,5 [m]

3.8 KN con asiento -5 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
60154	5	-5,000 (fixed)	196,641	15	3,631	7,133	10,024	12,147	13,785	15,104	16,19	17,098	18,544	19,735	20,609
65433	5,4	-5,000 (fixed)	195,439	15	3,412	6,748	9,638	11,813	13,503	14,877	16,023	16,998	18,62	20,004	20,82
70747	5,8	-5,000 (fixed)	194,375	15	3,223	6,406	9,275	11,499	13,241	14,667	15,871	16,911	18,695	20,239	20,985
76090	6,2	-5,000 (fixed)	193,432	15	3,061	6,104	8,935	11,205	12,997	14,474	15,733	16,837	18,769	20,44	21,113
81464	6,6	-5,000 (fixed)	192,576	15	2,919	5,837	8,618	10,928	12,768	14,295	15,608	16,775	18,845	20,609	21,21
86866	7	-5,000 (fixed)	191,795	15	2,796	5,6	8,323	10,666	12,554	14,129	15,495	16,724	18,922	20,747	21,282
92292	7,4	-5,000 (fixed)	191,074	15	2,687	5,39	8,051	10,418	12,353	13,976	15,394	16,684	19,001	20,857	21,333
97741	7,8	-5,000 (fixed)	190,405	15	2,592	5,204	7,802	10,183	12,163	13,835	15,304	16,652	19,079	20,939	21,365
103213	8,2	-5,000 (fixed)	189,777	15	2,509	5,038	7,576	9,961	11,985	13,704	15,226	16,626	19,156	20,996	21,382
108705	8,6	-5,000 (fixed)	189,183	15	2,434	4,891	7,371	9,752	11,817	13,584	15,158	16,605	19,227	21,032	21,386
114217	9,001	-5,000 (fixed)	188,617	15	2,369	4,761	7,186	9,556	11,659	13,473	15,099	16,589	19,288	21,05	21,377
119749	9,401	-5,000 (fixed)	188,076	15	2,311	4,645	7,019	9,372	11,51	13,371	15,046	16,577	19,339	21,053	21,358
125302	9,801	-5,000 (fixed)	187,558	15	2,259	4,543	6,869	9,202	11,37	13,279	14,999	16,57	19,381	21,044	21,33
130877	10,201	-5,000 (fixed)	187,06	15	2,214	4,451	6,734	9,045	11,238	13,195	14,957	16,566	19,413	21,025	21,293
136474	10,601	-5,000 (fixed)	186,581	15	2,173	4,37	6,614	8,901	11,115	13,118	14,92	16,565	19,434	20,996	21,25
142095	11,001	-5,000 (fixed)	186,118	15	2,138	4,299	6,507	8,771	11	13,047	14,886	16,568	19,446	20,96	21,199
147741	11,401	-5,000 (fixed)	185,672	15	2,106	4,235	6,412	8,654	10,894	12,981	14,856	16,568	19,448	20,917	21,143
153415	11,8	-5,000 (fixed)	185,242	15	2,078	4,179	6,329	8,549	10,798	12,919	14,829	16,576	19,44	20,868	21,084
159118	12,2	-5,000 (fixed)	184,827	15	2,054	4,13	6,255	8,455	10,709	12,861	14,806	16,585	19,423	20,814	21,02
164855	12,6	-5,000 (fixed)	184,428	15	2,033	4,088	6,191	8,373	10,629	12,807	14,785	16,595	19,399	20,754	20,954
170628	13	-5,000 (fixed)	184,044	15	2,014	4,051	6,135	8,301	10,557	12,757	14,766	16,603	19,367	20,691	20,885
176440	13,4	-5,000 (fixed)	183,676	15	1,998	4,019	6,088	8,241	10,492	12,71	14,751	16,607	19,328	20,623	20,815
182293	13,8	-5,000 (fixed)	183,323	15	1,985	3,992	6,048	8,189	10,435	12,666	14,731	16,608	19,283	20,552	20,743
188190	14,2	-5,000 (fixed)	182,983	15	1,974	3,97	6,014	8,146	10,384	12,626	14,719	16,604	19,234	20,478	20,669

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
194135	14,6	-5,000 (fixed)	182,656	15	1,965	3,952	5,988	8,112	10,339	12,589	14,709	16,596	19,179	20,401	20,594
200129	15	-5,000 (fixed)	182,34	15	1,958	3,938	5,969	8,085	10,301	12,555	14,7	16,583	19,12	20,325	20,518
206175	15,4	-5,000 (fixed)	182,034	15	1,952	3,927	5,954	8,065	10,268	12,525	14,69	16,564	19,056	20,243	20,44
212277	15,8	-5,000 (fixed)	181,737	15	1,949	3,921	5,945	8,05	10,241	12,498	14,677	16,539	18,989	20,16	20,362
218438	16,2	-5,000 (fixed)	181,444	15	1,947	3,919	5,94	8,04	10,22	12,468	14,662	16,507	18,917	20,075	20,282
224661	16,6	-5,000 (fixed)	181,156	15	1,948	3,919	5,941	8,034	10,203	12,448	14,643	16,467	18,842	19,988	20,201
230954	17	-5,000 (fixed)	180,868	15	1,949	3,923	5,945	8,032	10,192	12,431	14,62	16,421	18,764	19,9	20,12
237319	17,4	-5,000 (fixed)	180,576	15	1,953	3,929	5,954	8,034	10,185	12,419	14,592	16,368	18,682	19,81	20,038
243757	17,8	-5,000 (fixed)	180,28	15	1,957	3,938	5,964	8,04	10,183	12,409	14,56	16,308	18,598	19,72	19,957
250271	18,2	-5,000 (fixed)	179,979	15	1,963	3,949	5,977	8,048	10,185	12,401	14,522	16,242	18,509	19,629	19,875
256864	18,6	-5,000 (fixed)	179,672	15	1,971	3,963	5,992	8,06	10,185	12,393	14,478	16,17	18,415	19,536	19,794
263538	19	-5,000 (fixed)	179,359	15	1,979	3,979	6,009	8,074	10,193	12,384	14,428	16,091	18,318	19,441	19,713
270295	19,4	-5,000 (fixed)	179,039	15	1,988	3,996	6,027	8,091	10,206	12,373	14,372	16,006	18,218	19,346	19,633
277132	19,8	-5,000 (fixed)	178,713	15	1,999	4,014	6,047	8,111	10,221	12,361	14,311	15,916	18,113	19,249	19,553
284047	20,2	-5,000 (fixed)	178,384	15	2,01	4,033	6,068	8,132	10,24	12,346	14,244	15,821	18,004	19,15	19,473
291037	20,6	-5,000 (fixed)	178,053	15	2,021	4,051	6,09	8,156	10,261	12,327	14,174	15,72	17,892	19,049	19,394
298101	21	-5,000 (fixed)	177,728	15	2,033	4,07	6,114	8,176	10,28	12,305	14,098	15,617	17,777	18,946	19,315
305230	21,4	-5,000 (fixed)	177,407	15	2,045	4,089	6,138	8,203	10,298	12,277	14,018	15,508	17,658	18,842	19,236
312423	21,8	-5,000 (fixed)	177,092	15	2,056	4,108	6,163	8,231	10,312	12,245	13,935	15,395	17,535	18,736	19,156
319676	22,2	-5,000 (fixed)	176,786	15	2,067	4,127	6,188	8,261	10,323	12,206	13,85	15,278	17,409	18,628	19,076
326986	22,6	-5,000 (fixed)	176,49	15	2,077	4,146	6,215	8,292	10,329	12,163	13,761	15,16	17,281	18,518	18,995
334350	23	-5,000 (fixed)	176,204	15	2,088	4,165	6,239	8,323	10,33	12,113	13,672	15,039	17,149	18,407	18,914

Tabla 20. KN con asiento -5 [m]

3.9 KN con asiento -7 [m]

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
60515	5,000	-7,000 (fixed)	203,832	15,000	3,591	7,035	9,865	11,974	13,606	14,918	15,999	16,909	18,389	19,713	20,548
65754	5,400	-7,000 (fixed)	202,185	15,000	3,380	6,673	9,503	11,660	13,344	14,710	15,849	16,819	18,452	19,959	20,754
71030	5,800	-7,000 (fixed)	200,725	15,000	3,197	6,347	9,161	11,364	13,098	14,518	15,711	16,742	18,523	20,171	20,920
76338	6,200	-7,000 (fixed)	199,416	15,000	3,039	6,055	8,840	11,085	12,868	14,338	15,587	16,677	18,601	20,350	21,050
81676	6,600	-7,000 (fixed)	198,232	15,000	2,901	5,796	8,539	10,821	12,651	14,171	15,473	16,622	18,685	20,497	21,149
87038	7,000	-7,000 (fixed)	197,158	15,000	2,781	5,566	8,258	10,571	12,448	14,016	15,370	16,577	18,774	20,618	21,222
92425	7,400	-7,000 (fixed)	196,170	15,000	2,675	5,362	7,998	10,334	12,256	13,871	15,277	16,542	18,865	20,716	21,274
97833	7,800	-7,000 (fixed)	195,254	15,000	2,582	5,180	7,759	10,109	12,075	13,737	15,192	16,514	18,953	20,792	21,307
103262	8,200	-7,000 (fixed)	194,401	15,000	2,500	5,019	7,540	9,897	11,904	13,612	15,117	16,495	19,033	20,849	21,323
108711	8,601	-7,000 (fixed)	193,600	15,000	2,427	4,875	7,341	9,697	11,743	13,497	15,050	16,482	19,104	20,889	21,326
114181	9,001	-7,000 (fixed)	192,850	15,000	2,363	4,748	7,160	9,509	11,591	13,390	14,992	16,475	19,163	20,914	21,317
119672	9,401	-7,000 (fixed)	192,143	15,000	2,306	4,634	6,998	9,332	11,448	13,291	14,942	16,471	19,216	20,925	21,297
125186	9,801	-7,000 (fixed)	191,474	15,000	2,255	4,534	6,851	9,168	11,312	13,199	14,900	16,471	19,259	20,924	21,267
130722	10,201	-7,000 (fixed)	190,839	15,000	2,211	4,444	6,720	9,016	11,185	13,115	14,863	16,475	19,292	20,913	21,229
136282	10,600	-7,000 (fixed)	190,238	15,000	2,171	4,365	6,602	8,877	11,065	13,039	14,831	16,483	19,318	20,892	21,185
141870	11,000	-7,000 (fixed)	189,666	15,000	2,136	4,294	6,497	8,750	10,953	12,969	14,803	16,494	19,334	20,864	21,135
147486	11,400	-7,000 (fixed)	189,122	15,000	2,105	4,232	6,404	8,634	10,849	12,906	14,778	16,508	19,342	20,828	21,081
153134	11,800	-7,000 (fixed)	188,607	15,000	2,077	4,176	6,322	8,531	10,753	12,848	14,757	16,522	19,342	20,787	21,024
158816	12,200	-7,000 (fixed)	188,120	15,000	2,053	4,128	6,249	8,438	10,665	12,795	14,740	16,536	19,334	20,741	20,964
164534	12,600	-7,000 (fixed)	187,658	15,000	2,032	4,085	6,185	8,356	10,586	12,746	14,725	16,543	19,318	20,689	20,901
170291	13,000	-7,000 (fixed)	187,221	15,000	2,014	4,049	6,130	8,284	10,514	12,700	14,713	16,550	19,294	20,633	20,837
176090	13,400	-7,000 (fixed)	186,808	15,000	1,998	4,017	6,082	8,222	10,450	12,659	14,704	16,554	19,263	20,572	20,770
181930	13,800	-7,000 (fixed)	186,416	15,000	1,984	3,990	6,041	8,168	10,394	12,620	14,697	16,554	19,226	20,507	20,702
187815	14,200	-7,000 (fixed)	186,044	15,000	1,973	3,967	6,006	8,124	10,346	12,585	14,692	16,549	19,182	20,443	20,633

Displacement <i>t</i>	Draft Amidships <i>m</i>	Trim (+ve by stern) <i>m</i>	LCG <i>m</i>	Assumed VCG <i>m</i>	KN 5,0 deg <i>m</i>	KN 10,0 deg <i>m</i>	KN 15,0 deg <i>m</i>	KN 20,0 deg <i>m</i>	KN 25,0 deg <i>m</i>	KN 30,0 deg <i>m</i>	KN 35,0 deg <i>m</i>	KN 40,0 deg <i>m</i>	KN 50,0 deg <i>m</i>	KN 60,0 deg <i>m</i>	KN 70,0 deg <i>m</i>
193746	14,600	-7,000 (fixed)	185,690	15,000	1,964	3,948	5,979	8,088	10,305	12,553	14,686	16,541	19,132	20,371	20,562
199725	15,000	-7,000 (fixed)	185,354	15,000	1,956	3,934	5,956	8,059	10,269	12,524	14,673	16,527	19,078	20,297	20,490
205756	15,400	-7,000 (fixed)	185,032	15,000	1,951	3,923	5,940	8,038	10,240	12,498	14,663	16,509	19,019	20,220	20,417
211838	15,800	-7,000 (fixed)	184,723	15,000	1,947	3,915	5,929	8,022	10,216	12,476	14,649	16,485	18,956	20,140	20,342
217976	16,200	-7,000 (fixed)	184,427	15,000	1,945	3,910	5,923	8,013	10,197	12,458	14,632	16,456	18,890	20,059	20,267
224168	16,600	-7,000 (fixed)	184,138	15,000	1,944	3,909	5,922	8,009	10,184	12,443	14,611	16,420	18,819	19,975	20,191
230419	17,000	-7,000 (fixed)	183,855	15,000	1,945	3,911	5,924	8,009	10,175	12,432	14,587	16,379	18,747	19,891	20,114
236732	17,400	-7,000 (fixed)	183,577	15,000	1,947	3,917	5,931	8,013	10,171	12,417	14,559	16,332	18,668	19,805	20,036
243113	17,800	-7,000 (fixed)	183,300	15,000	1,951	3,924	5,941	8,020	10,172	12,407	14,526	16,277	18,585	19,717	19,958
249566	18,200	-7,000 (fixed)	183,020	15,000	1,956	3,934	5,955	8,031	10,177	12,397	14,489	16,215	18,499	19,628	19,880
256090	18,600	-7,000 (fixed)	182,739	15,000	1,963	3,946	5,971	8,045	10,185	12,386	14,448	16,148	18,409	19,538	19,801
262690	19,000	-7,000 (fixed)	182,453	15,000	1,970	3,960	5,990	8,061	10,198	12,374	14,401	16,074	18,316	19,446	19,723
269366	19,400	-7,000 (fixed)	182,162	15,000	1,979	3,977	6,010	8,080	10,214	12,361	14,350	15,994	18,217	19,352	19,644
276125	19,800	-7,000 (fixed)	181,866	15,000	1,988	3,995	6,032	8,102	10,228	12,346	14,294	15,909	18,116	19,257	19,566
282964	20,200	-7,000 (fixed)	181,566	15,000	1,999	4,015	6,055	8,126	10,246	12,329	14,231	15,820	18,011	19,160	19,487
289888	20,600	-7,000 (fixed)	181,258	15,000	2,010	4,035	6,079	8,151	10,263	12,310	14,165	15,724	17,901	19,062	19,409
296889	21,000	-7,000 (fixed)	180,948	15,000	2,022	4,056	6,104	8,179	10,279	12,287	14,094	15,622	17,788	18,961	19,331
303968	21,400	-7,000 (fixed)	180,635	15,000	2,034	4,078	6,130	8,209	10,293	12,261	14,018	15,516	17,672	18,858	19,252
311120	21,800	-7,000 (fixed)	180,324	15,000	2,047	4,099	6,157	8,241	10,304	12,231	13,939	15,407	17,552	18,754	19,173
318340	22,200	-7,000 (fixed)	180,015	15,000	2,060	4,120	6,186	8,269	10,312	12,196	13,859	15,293	17,428	18,647	19,093
325625	22,600	-7,000 (fixed)	179,712	15,000	2,072	4,142	6,214	8,300	10,315	12,156	13,772	15,177	17,301	18,539	19,013
332969	23,000	-7,000 (fixed)	179,416	15,000	2,084	4,163	6,244	8,328	10,314	12,110	13,683	15,058	17,172	18,428	18,932

Tabla 21. KN con asiento -7[m]

4. ZONA ESTANCA Y PUNTOS DE INUNDACIÓN PROGRESIVA

Es necesario a continuación definir la zona estanca y los puntos de inundación del buque proyecto de cara a realizar estudios de estabilidad y de cumplimiento de criterios.

4.1 Definición de la zona estanca

La zona estanca por definición es aquella zona cerrada, en la que no existen aperturas o en caso de tenerlas estas serán estancas, donde no puede entrar agua en condiciones normales de operación.

Se muestra en la siguiente ilustración la zona estanca contemplada en el buque proyecto.

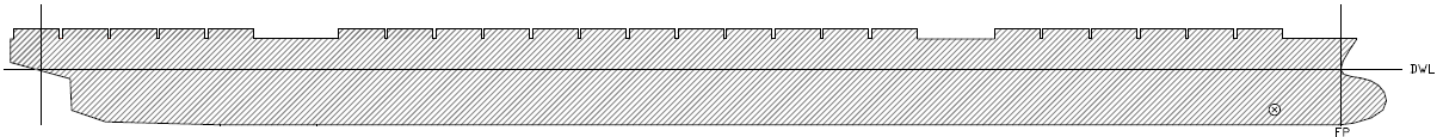


Ilustración 2. Definición zona estanca

4.2 Puntos de inundación progresiva

Por definición son aquellos puntos que ofrecen una vía de entrada de agua directa al interior de la zona estanca.

En el caso del buque proyecto se establecen dos puntos de inundación progresiva correspondiente a las dos superestructuras con las que cuenta.

En la superestructura de habilitación y puente, situada en proa, se establece el punto de inundación en la segunda cubierta de la superestructura.

En la superestructura de las chimeneas se establece el respiradero de la cámara de máquinas.

Con las siguientes coordenadas:

	X [m]	Y [m]	Z [m]
Cámara de máquinas	72,0	14,5	47,7
Habilitación	247,0	15,4	40,1

Tabla 22. Puntos de inundación progresiva

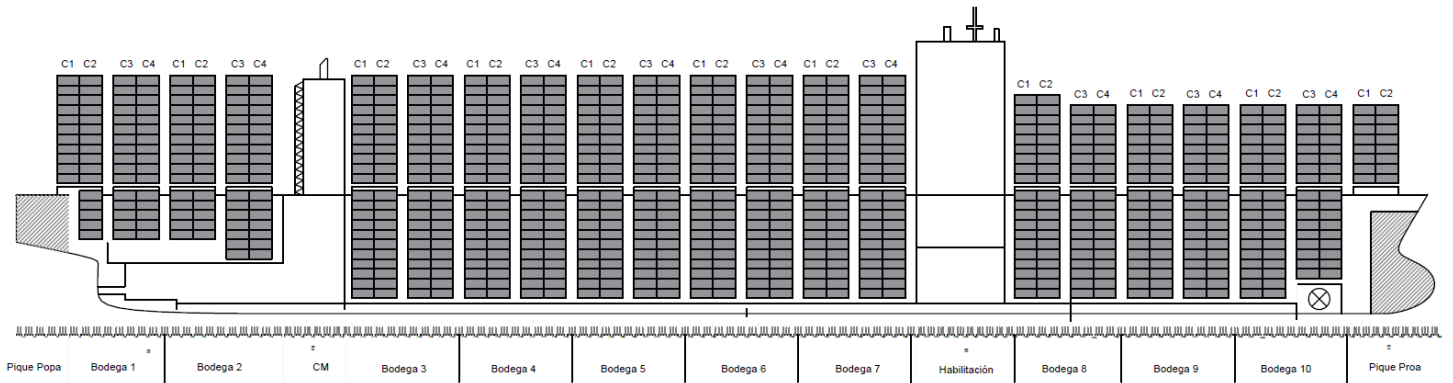
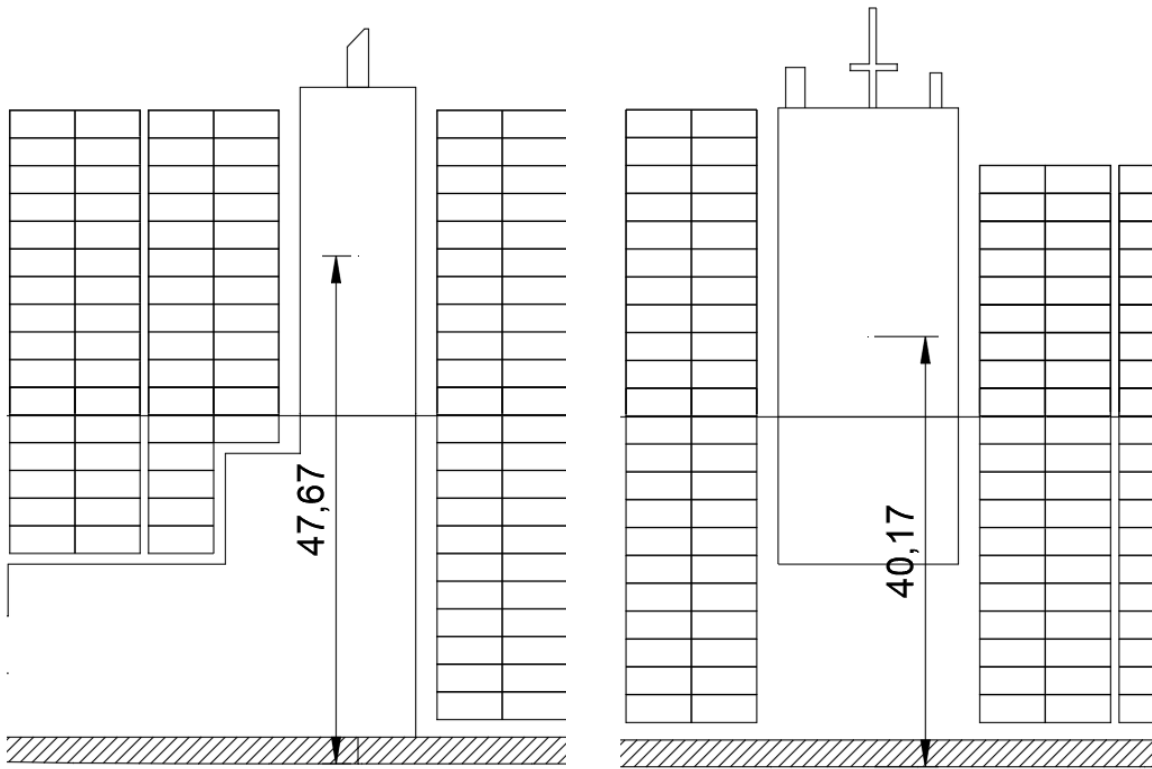


Ilustración 3. Detalle puntos de inundación

5. COMPARTIMENTADO

Se procede a continuación a realizar la subdivisión del buque, para ello se partirá del compartimentado de los buques consultados en la base de datos de buques referencia.

El objetivo del compartimentado es lograr un espaciado óptimo para el transporte de la carga descrita en el RPA, 16000 TEU's.

Dentro del buque se distinguirán 5 zonas principales a la hora de realizar el compartimentado general, con una separación de cuadernas determinada para cada zona:

- Pique de popa: 0,750 [m]
- Bodegas: 0,750 [m]
- Cámara maquinas: 0,650 [m]
- Habitación: 0,650 [m]
- Pique proa: 0,650 [m]

5.1 Mamparos principales

El primer paso consistirá en realizar los cálculos pertinentes para la ubicación del mamparo de colisión, para de esta forma, poder continuar con el compartimentado del resto del buque.

5.1.1 Mamparo de colisión

El mamparo de colisión se situará conforme a las reglas aportadas por el reglamento DNV-GL.

A partir de la norma DNVGL-RU-SHIP-Pt3Ch2-S4.1, "*Extent and position of collision bulkhead*", para buques con $L_{LL} \geq 200[m]$ se aplican las siguientes fórmulas:

$$x_{c-min} = 10 - x_f = 7,0 [m]$$

$$x_{c-max} = 0,08 \cdot L_{LL} - x_f = 27,15 [m]$$

Donde:

- L_{LL} , es el 96% de la eslora con un calado de $0,85 \cdot D_{sc}$, $L_{LL} = 376,92 [m]$
- $x_f = \min(0,5 \cdot x_{be}; 0,015 \cdot L_{LL}; 3,0)$, luego, $x_f = \min(5,7; 5,65; 3,0)$, $x_f = 3,0 [m]$
- x_{be} , la eslora del bulbo, del cuaderno 3, $x_{be} = 11,4 [m]$

Por tanto la posición del mamparo de colisión ha de estar dentro del intervalo (7,0 ; 27,15) [m] medidos desde la perpendicular de proa considerando un calado $T = 0,85 \cdot D_{SC}$.

En el caso del buque proyecto se decide situarla a 12,86 [m], desde la referencia anteriormente nombrada.

En coordenadas tomadas desde la perpendicular de popa en el calado de escantillonado, la posición longitudinal del mamparo se sitúa en 342,51 [m], coincidiendo con la cuaderna C-456.

Esta ubicación del pique de popa se corresponde con la ubicación promedia consultada en la base de datos de los buques.

En la siguiente imagen se observa el detalle de la ubicación del pique de proa.

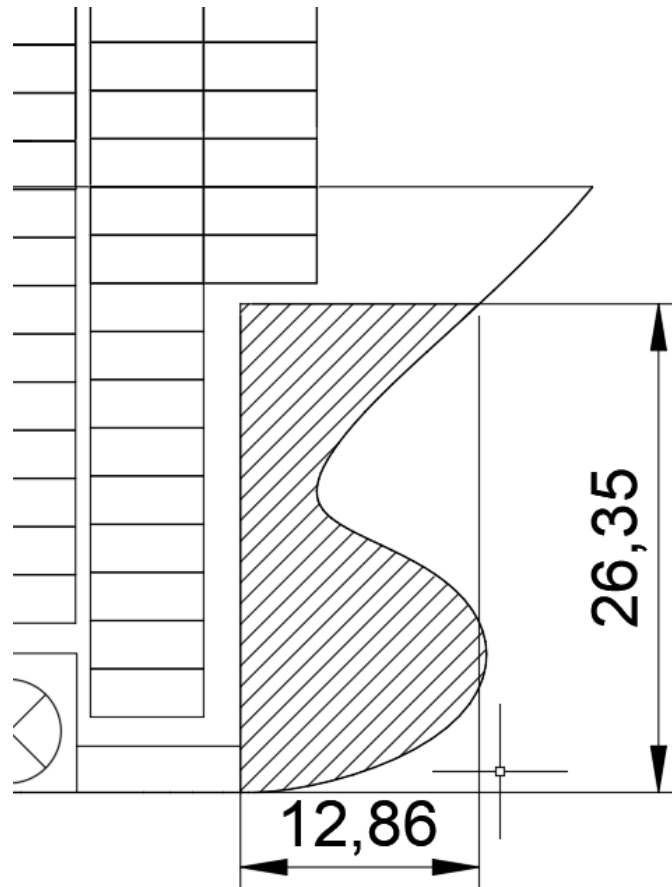


Ilustración 4. Detalle pique de proa

5.1.2 Mamparos de la cámara de máquinas

La ubicación de estos mamparos se ha obtenido a partir de la distribución del buque referencia CMA CGM Argentina.

Estos mamparos estarán situados en la siguiente posición longitudinal, medidos desde la perpendicular de popa:

- Mamparo de proa: 76,25 [m], cuaderna C105.
- Mamparo de popa: 60,00 [m], cuaderna C80.

5.1.3 Mamparos de la hélice de proa

La ubicación de la hélice de proa se realizó en el cuaderno 3, a partir del catálogo del fabricante, se establecen las distancias que hay que dejar a proa y a popa del equipo.

Resultando de esta manera la siguiente ubicación de los mamparos medidos desde la perpendicular de popa:

- Mamparo de proa: 341,2 [m], cuaderna C454.
- Mamparo de popa: 329,20 [m], cuaderna C438.

5.1.4 Mamparos del pique de popa

El mamparo del pique de popa se establece de igual manera a partir del buque de referencia CMA CGM Argentina.

Se decide establecerlo a una distancia de 3 [m] a proa de la perpendicular de popa, correspondiente a la cuaderna C4.

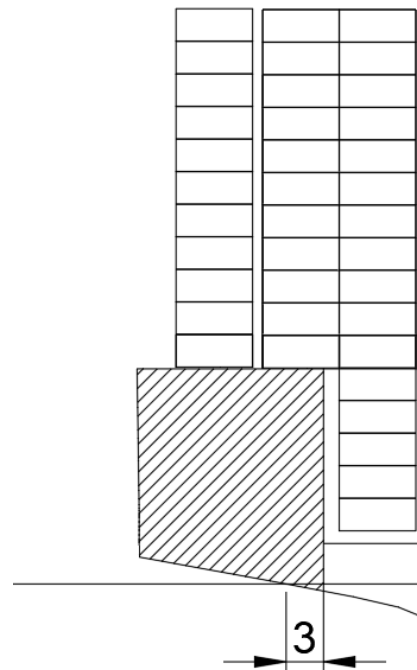


Ilustración 5. Detalle pique de popa

5.2 Compartimentado

El siguiente paso será definir el compartimentado definitivo del buque proyecto, para ello se realizará una división del compartimentado en vertical y longitudinal, para finalmente hacer énfasis en determinados espacios particulares.

5.2.1 Compartimentado longitudinal

Como se comentó anteriormente, el compartimentado longitudinal estará compuesto de 5 tipos de zonas bien definidas, pique de proa, bodegas, habitación, cámara de máquinas y pique de popa.

Con la separación de cuadernas mostrado anteriormente se obtienen la relación de cuadernas que se encuentra en el Anexo 3.

Se muestra a continuación un resumen del compartimentado longitudinal obtenido:

Zona	Cuadernas	Eslora [m]
Pique de popa	C-14 – C4	13,5
Bodega 1	C4 - C37	25,5
Bodega 2	C37 - C80	31,5
CM	C80- C106	18,2
Bodega 3	C106 - C146	30
Bodega 4	C146 - C186	30
Bodega 5	C186 - C226	30
Bodega 6	C226 - C266	30
Bodega 7	C266 – C306	30
Habitación	C306 - C346	27,5
Bodega 8	C346 - C386	30
Bodega 9	C386 - C426	30
Bodega 10	C426 - C466	30
Pique de proa	C466 - C504	24,7

Tabla 23. Compartimentado longitudinal

Se observa una diferencia en la eslora de las bodegas 1, 2 y el resto debido a que en la bodega 1 solo existe una columna de contenedores bajo cubierta.

Se adjunta en el anexo un esquema de la disposición general del buque donde se observan la relación entre compartimentos y cuadernas.

5.2.2 Compartimentado vertical

Los buques portacontenedores son buques simples en lo que a compartimentado se refiere. Las bodegas son continuas sin cubiertas intermedias al estar los contenedores estibados sobre guías.

En primer lugar, se calculará la altura mínima del doble fondo a partir de las normas de la sociedad de clasificación, DNVGL-RU-SHIP Pt.3 Ch.2 S3.

La altura de fondo debe ser la mayor entre $h_{DB} = 1000 \cdot \frac{B}{20}$ y 760 [mm], no siendo necesario que su altura se tome como más de 2000 [mm].

Así mismo será necesario que la altura sea suficiente para permitir el acceso a todas las partes del doble fondo.

$$h_{DB} = 1000 \cdot \frac{53}{20} = 2650 [mm]$$

Luego según el reglamento $h_{DB \text{ mínimo}} = 2000 [mm]$.

En el caso del buque, acorde con la base de datos de buques consultados, se decide establecer un doble fondo de 2,8 [m].

La altura de las brazolas se establece en 2,2 [m] y el espesor del doble casco se tomará como el doble fondo, 2,8 [m] (para la cuaderna maestra). Este espesor del doble casco variará según la sección, con un mínimo de 2[m].

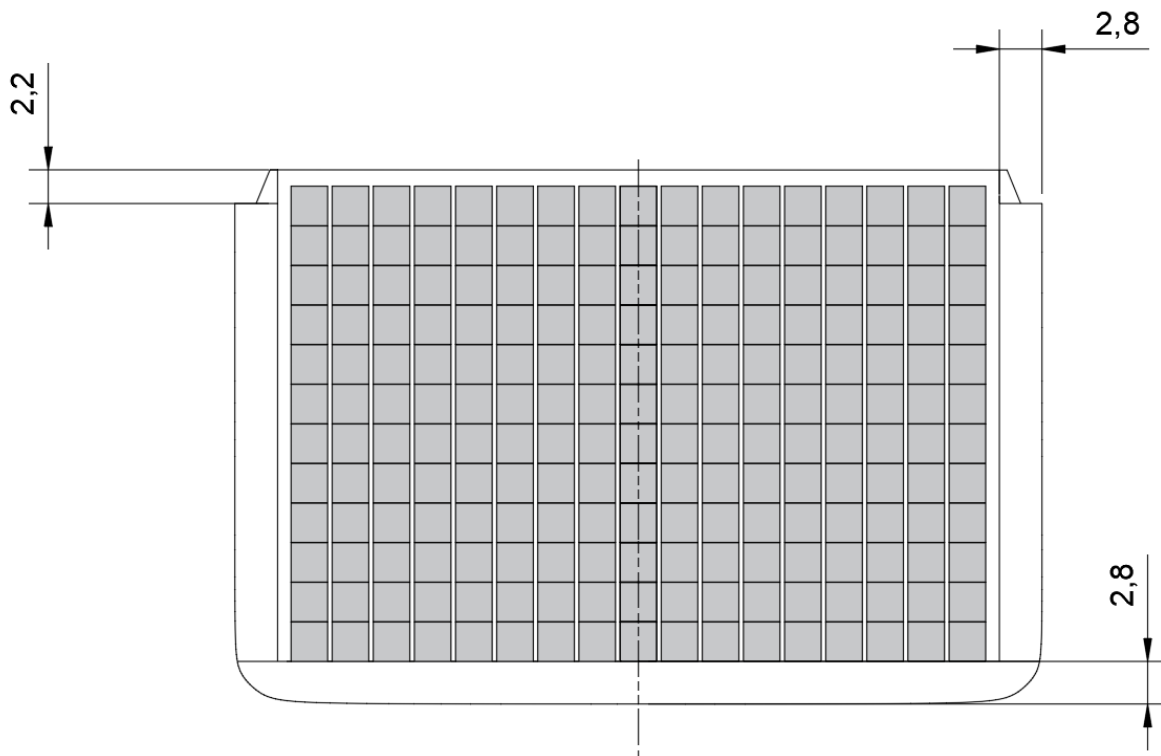


Ilustración 6. Compartimentado vertical

5.2.3 Otros espacios

Se añade a continuación la disposición del pique de proa, al ser un espacio que no se destina al transporte de contenedores.

Este espacio se empleará para almacenar la cabuyería del amarre, caja de cadenas y tanque de lastre.

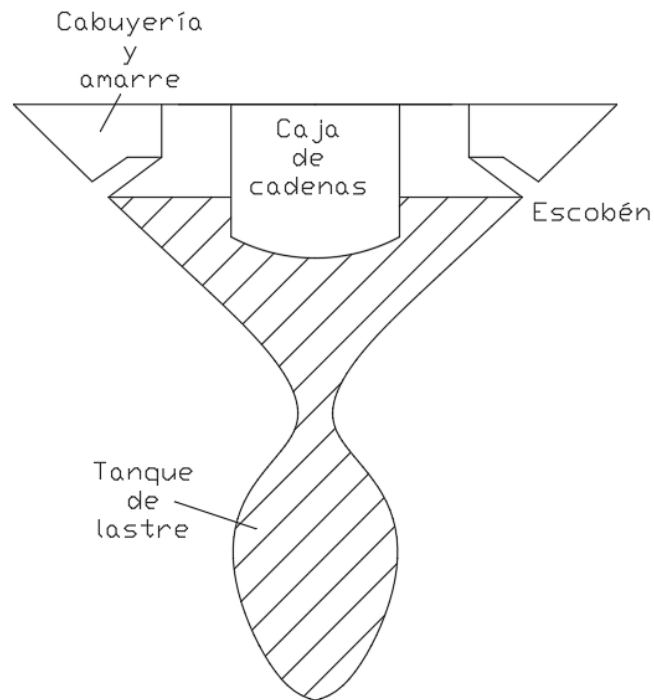


Ilustración 7. Detalle pique de proa

Así mismo, el espacio destinado a cámara de máquinas tendrá un compartimentado marcado por la geometría de los sistemas.

En base al catálogo del motor, seleccionado de manera preliminar en los Cuadernos 1 y 2, se toman las alturas mínimas del motor y de la cubierta de mantenimiento.

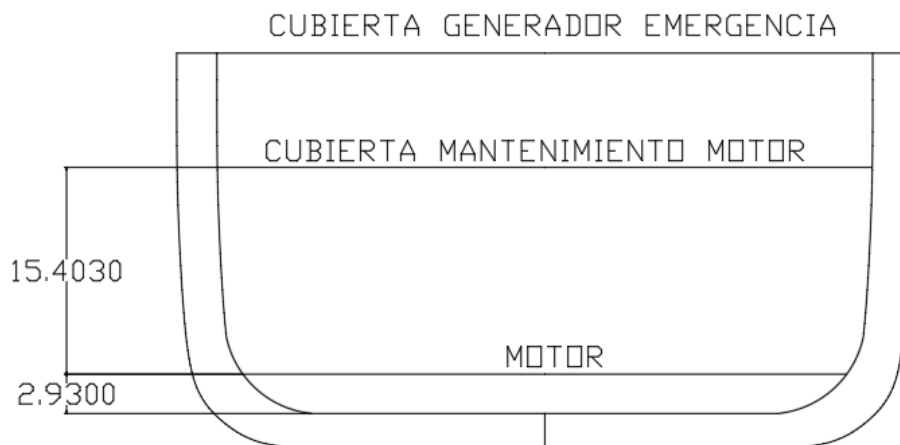


Ilustración 8. Detalle cámara de máquinas

6. TANQUES Y CAPACIDADES

Se calculan a continuación las capacidades requeridas de los tanques a partir de los consumos estimados y el reglamento proporcionado por la sociedad de clasificación, DNV-GL.

6.1 Combustible

A partir de la autonomía solicitada en el RPA, 20000 [millas], se calcularán los distintos consumos con el fin de especificar las capacidades mínimas de los tanques a diseñar e instalar en el buque proyecto.

6.1.1 Combustible

El combustible se calculará a partir de los consumos del motor principal y de los generadores

A partir del catálogo del motor se obtiene un consumo de 166 [g/kWh], con una potencia de 73560 [KW].

$$C_{MP} = \frac{\text{autonomía} \cdot \text{consumo} \cdot \text{potencia}}{\text{velocidad}}$$

$$C_{MP} = \frac{20000 \cdot 166 \cdot 73560}{22 \cdot 10^6} = 11100[t]$$

A partir del catálogo de la planta eléctrica seleccionada, 3 unidades de 3840 [kW] se obtiene un consumo de 179 [g/kWh] por cada una de ellas.

$$C_G = \frac{20000 \cdot 179 \cdot 3840 \cdot 3}{22 \cdot 10^6} = 1740[t]$$

El consumo total de combustible, aplicando un margen del 10% para contingencia, resulta:

$$C_C = 14125 [t]$$

El buque está proyectado para navegar por zonas ECA, por lo que el combustible se dividirá en dos tanques, uno para combustible más pesado, y otro para combustible con bajo contenido en azufre.

Cabe destacar que este tanque en caso de ser requerido posteriormente podría ser sustituido por un tanque LNG, para una propulsión dual, al ser la planta propulsora adecuada para este tipo de combustible.

Considerando un 25% de la ruta por zonas ECA, se obtienen las siguientes capacidades:

	Capacidad [t]
Combustible convencional	10725
Zonas ECA	3400
Total	14125

Tabla 24. Capacidades requeridas combustible

Así mismo, cumpliendo con MARPOL 12^a enmienda del 2006, los tanques no tendrán un volumen superior a 2500 [m³] y en el doble casco no albergarán más de 600 [m³].

6.1.2 Tanques de combustible de uso diario

Los tanques de combustible de uso diario han de tener una capacidad suficiente para almacenar 24h de consumo de combustible:

$$C_{diario} = 24 \cdot (179 \cdot 3 \cdot 3840 + 166 \cdot 73560) \cdot 10^{-6} = 343[t]$$

6.1.3 Tanques de sedimentación

Los tanques de sedimentación se diseñarán con una capacidad de combustible para 36h, con un margen del 10%.

$$C_{sedimentación} = 36 \cdot (179 \cdot 3840 \cdot 3 + 166 \cdot 73560) \cdot 10^{-6} \cdot (1,1) = 565[t]$$

Resultando finalmente los siguientes tanques de combustible:

		Capacidad [t]
Combustible convencional	Tanque 1	2500
	Tanque 2	2500
	Tanque 3	2500
	Tanque 4	2500
	Uso diario	343
	Sedimentación	565
	TOTAL	10908
Zonas ECA	Tanque 1	2500
	Uso diario	343
	Sedimentación	565
	TOTAL	3408

Tabla 25. Tanques de combustible

6.2 Aceite

Del fabricante del motor se obtiene que se requiere $0,9 \text{ [g/kW} \cdot \text{cilindro]}$, así mismo, se establece un consumo para el generador auxiliar de $0,5 \text{ [g/kW} \cdot \text{cil]}$, se añaden 3 [t] de margen para el resto de los equipos:

$$C_{\text{Aceite total}} = 0,9 \cdot 73560 \cdot 12 \cdot 10^{-3} + 0,5 \cdot 3 \cdot 3000 \cdot 6 \cdot 10^{-3} = 821 \text{ [t]}$$

Se instalará de igual manera un tanque de aceite usado que permita almacenar todo el aceite del circuito.

$$C_{\text{aceiteusado}} = 821 \text{ [t]}$$

6.3 Agua dulce

Se entiende como agua dulce potable la orientada al consumo de la tripulación.

A partir de la norma UNE-EN ISO 15748-2 se obtiene la tabla A.1 donde se representa la cantidad de agua potable por persona y día según el tipo de buque.

El buque proyecto se clasifica como buque carguero de alta mar. Como se estudiará posteriormente en el Cuaderno 12, Equipos y servicios, se empleará un sistema de aseos de vacío, por lo que se empleará un consumo por tripulante de 175 [l/persona·día]

Tabla A.1
Valores guía para el consumo de agua potable en litros por persona/cama y día

Tipo de buque		Grupo de personas embarcado	Consumo de agua cuando esté equipado con	
			sistema de aseos de gravedad	sistema de aseos de vacío
Buque de alta mar	Carguero	Tripulante/cama	220 l	175 l
	Buque de pasaje	Pasajero/cama	270 l	225 l
	Crucero de lujo	Pasajero/cama	–	275 l
	Trasbordador con cabinas	Pasajero/cama	205 l ^a	160 l ^a
		Pasajero sin cama	100 l	55 l
	Trasbordador sin cabinas	Pasajero sin cama	150 l	105 l
		Tripulante sin cama	100 l	55 l
Embarcación de navegación interior	Carguero	Tripulante/cama	mínimo 150 l	
	Buque de pasaje con cabinas	Pasajero/tripulante/cama	220 l	175 l
	Buque de pasaje sin cabinas	Tripulante/pasajero	100 l	
Buques especiales	Buque de investigación	por cama	220 l	175 l
	Buque auxiliar de las fuerzas armadas y mayores	Tripulante/cama	160 l	110 l
	Buque de las fuerzas armadas menor que un auxiliar	Tripulante/cama	100 l	55 l
Pesquero		Tripulante/cama	mínimo 150 l	
Plataforma “offshore”		Tripulante/cama	350 l	

^a Sin lavandería a bordo.

Tabla 26. A1. Valores guía para el consumo de agua potable

$$C_{AP} = \frac{20000[\text{millas}]}{22[\text{nudos}]} \cdot \frac{1[\text{día}]}{24[\text{horas}]} \cdot 175 \left[\frac{\text{litros}}{\text{tripulante} \cdot \text{día}} \right] \cdot 30[\text{tripulantes}] = 199[\text{m}^3]$$

$$C_{AP} = 199[t]$$

6.4 Tanque de Lodos

Aplicando la normativa del MARPOL, Anexo I, Capítulo 3, Parte A, RG 12, se obtiene la siguiente fórmula.

$$V_1 = K_1 \cdot C \cdot D$$

Donde:

- K_1 : 0,005 para buques en los que se use diésel o fuel pesado que no haya de ser purificado
- C : Consumo de fuel diario en toneladas
- D : Periodo máximo de travesía entre puertos en los que se puedan descargar fangos a tierra.

Para el caso del buque proyecto, al utilizarse dos combustibles durante el trayecto:

$$V_{Lodos} = 0.005 \cdot 343 \cdot \frac{20000}{22 \cdot 24} = 65[m^3]$$

6.5 Tanque de aguas grises y negras

A partir de la Tabla 2, Cantidad mínima de agua de desecho, obtenida de la norma UNE-EN ISO 15749-1 se calcula el volumen de aguas grises y negras del buque,

Considerando un sistema de vacío se obtienen los siguientes datos para “buques de alta mar exceptuando los de pasaje”.

$$C_{aguas\ negras} = 25[l/persona \cdot día]$$

$$C_{aguas\ grises\ y\ negras} = 135[l/persona \cdot día]$$

Obteniendo los siguientes volúmenes:

$$V_{aguas\ grises\ y\ negras} = (135 + 25) \cdot 30 \cdot \frac{20000}{22 \cdot 24} = 182[m^3]$$

6.6 Tanques de lastre

Se parte de la idea de que la capacidad mínima de lastre tiene que ser suficiente para que, en condiciones de navegación sin carga, la hélice del buque se encuentre completamente sumergida.

Para que se sumerja la hélice ha de existir un calado mínimo en popa, que será el diámetro de la hélice (10m) al que se le suma un margen de seguridad.

En este caso, se estima un margen de seguridad de un 15%.

$$Tpp_{min} = 9,1 \cdot 1,15 = 10,5[m]$$

Así mismo, se estima un trimado máximo, para que el buque pueda navegar, en este caso se estima un trimado del 1% de la eslora entre perpendiculares.

$$t = 0,01 \cdot 356,7 = 3,57 [m]$$

Se obtiene un calado medio de 6,93 [m], que entrando en *Maxsurf Stability* se obtienen los siguientes datos:

Displacement	86021	t
Draft at LCF	6,961	m
Trim (+ve by stern)	3,5	m
Sect. area amidships	360,143	m^2
Wetted Area	16134,964	m^2
Waterpl. Area	13431,337	m^2
Block coeff. (Cb)	0,545	-
LCB from zero pt. (+ve fwd)	167,802	m
LCF from zero pt. (+ve fwd)	174,892	m
KB	3,706	m
BMt	29,316	m
BML	1031,103	m
KMt	33,021	m
KML	1034,759	m
Immersion (TPc)	137,671	t/cm
MTc	2462,748	$t \cdot m$

Tabla 27. Hidrostáticas calado mínimo

A partir del peso en rosca obtenido en el Cuaderno 2, y considerando que el resto del buque está completamente vacío al ser esta la peor situación se obtiene un lastre requerido:

$$C_{Lastre} = 86021 - 56623 = 29398[t]$$

6.7 Resumen de capacidades de tanques

Mostrando a continuación los tanques obtenidos tras realizar el compartimentado del buque, con la herramienta *Maxsurf Stability*, comparados con la capacidad mínima obtenida.

	Calculado [t]	Obtenido [t]
Lastre	29398	52973
Combustible	10000	11006
Sedimentación	565	671
Uso diario	343	330
ECA	2500	2735
Sedimentación ECA	565	671
Uso diario ECA	343	382
Aceite	821	832
Aceite sucio	821	825
Lodos	65	349
Agua Dulce	205	245
Aguas negras	188	193

Tabla 28. Tanques obtenidos

En el Anexo 5 se encuentra la relación completa de tanques con capacidades y la ubicación del centro de gravedad de cada uno de ellos.

Se adjunta igualmente en la siguiente página el plano de tanques resultante.

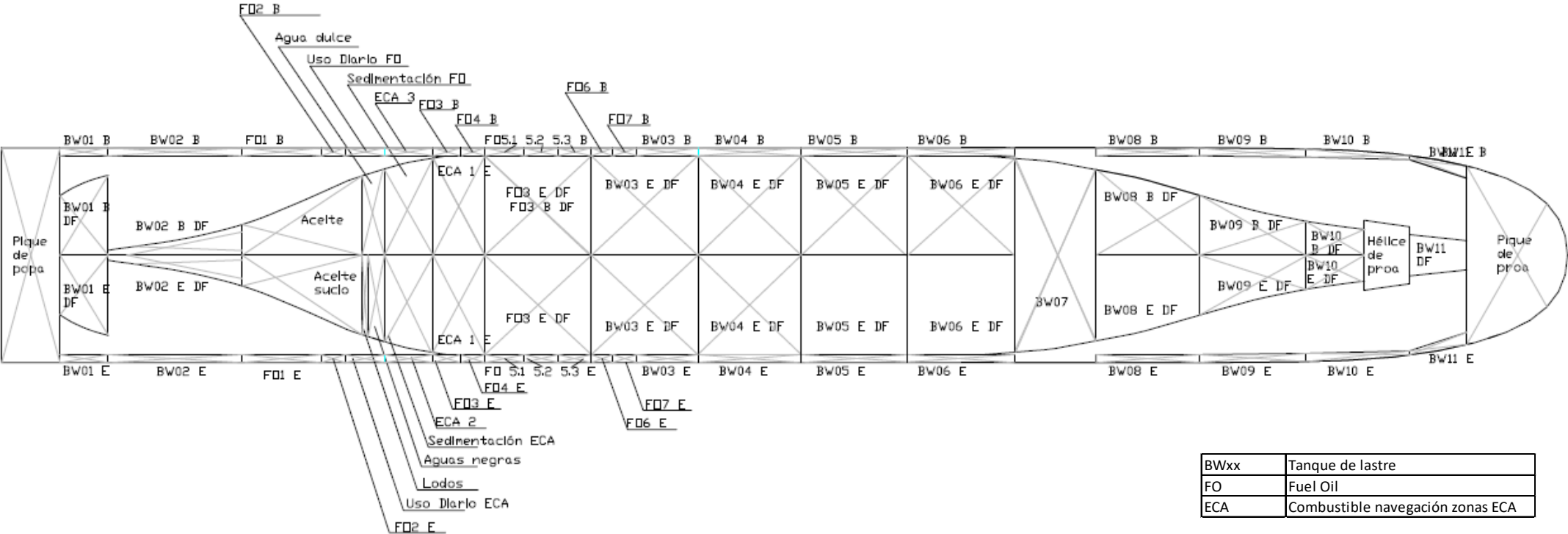


Ilustración 9. Plano de tanques

7. COMPROBACIÓN DE CARGA ÚTIL

Finalmente se realiza el esquema de carga máxima del buque, adjunto en el Anexo 6. El buque proyecto contaba con un RPA de 16000 TEU's de capacidad de carga, tras la realización del esquema de carga, se ha comprobado que el buque proyecto es capaz de transportar un total de 16754 TEU's.

Si bien es cierto que se excede la especificación del RPA, se considera un resultado válido al existir la posibilidad de cargar el buque con 16000 TEU's.

Se muestra a continuación un esquema de la distribución de la carga.

		Bajo Bodega	Sobre Cubierta	Total
B1	C1	0	220	220
	C2	98	220	318
	C3	98	220	318
	C4	124	220	344
B2	C1	126	220	346
	C2	126	220	346
	C3	132	220	352
	C4	134	220	354
B3	C1	222	220	442
	C2	222	220	442
	C3	238	220	458
	C4	238	220	458
B4	C1	240	220	460
	C2	240	220	460
	C3	240	220	460
	C4	240	220	460
B5	C1	240	220	460
	C2	240	220	460
	C3	240	220	460
	C4	240	220	460
B6	C1	240	220	460
	C2	240	220	460
	C3	230	220	450
	C4	230	220	450
B7	C1	224	220	444
	C2	224	220	444
	C3	222	220	442
	C4	222	220	442

B8	C1	220	180	400
	C2	220	180	400
	C3	216	160	376
	C4	216	160	376
B9	C1	196	160	356
	C2	196	160	356
	C3	148	160	308
	C4	148	160	308
B10	C1	134	160	294
	C2	134	160	294
	C3	112	160	272
	C4	112	160	272
B11	C1	0	160	160
	C2	0	160	160

TEU's Bodega	TEU's Cubierta
7562	8440
Totales	16002

Tabla 29. Distribución de contenedores

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- [8] VAN DOKKMUN, Klaas. *Ship Knowledge. Ship Design, construction and operation*. 5ª ed. Enkhuizen: Dokmar.

ANEXO 1. CMA CGM ARGENTINA



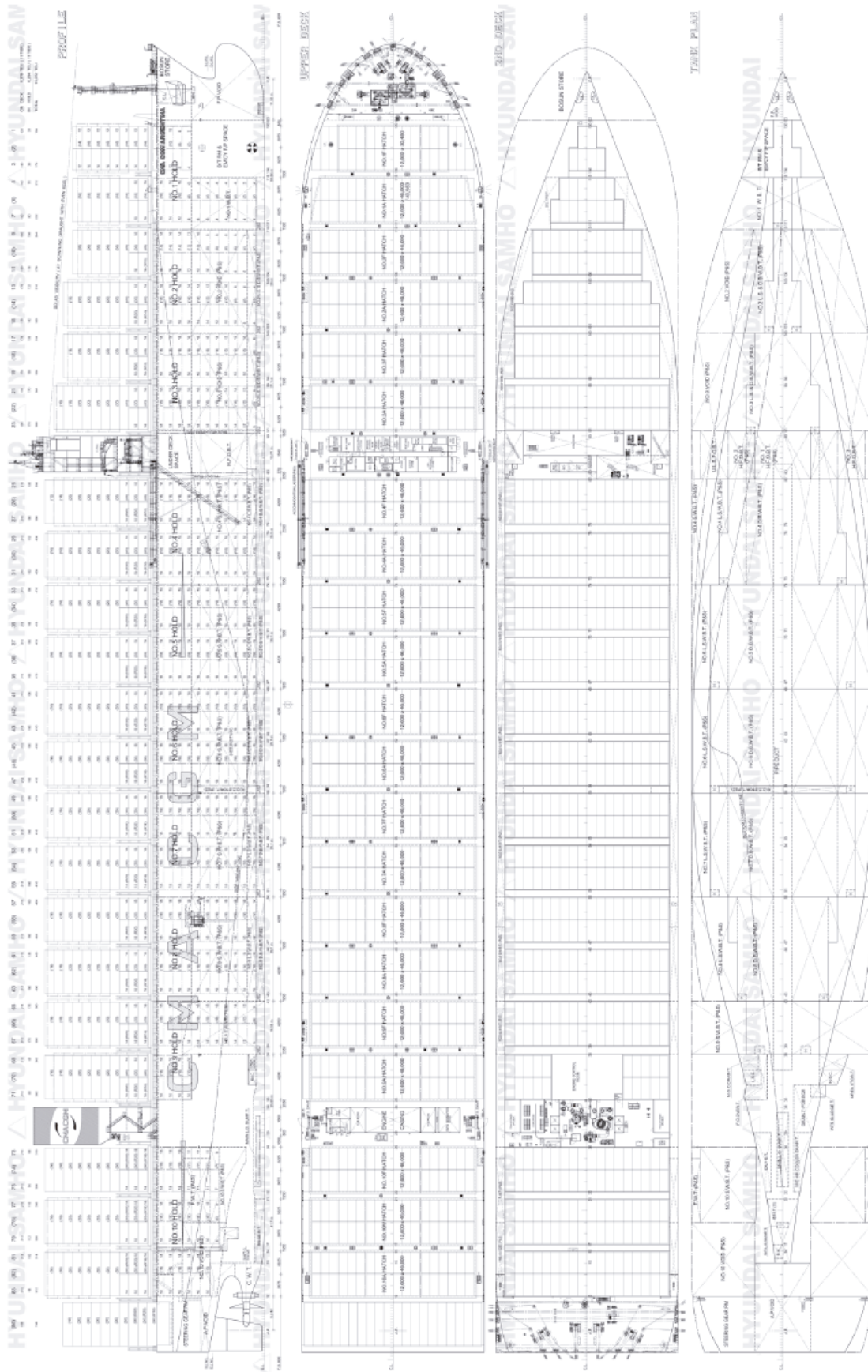
CMA CGM ARGENTINA: Container ship

Shipbuilder: Hyundai Samho Heavy Industries Co., Ltd.
 Vessel's name: CMA CGM Argentina
 Hull No: S985
 Owner/Operator: Eastern Pacific Shipping / CMA CGM
 Country: Singapore
 Designer: Hyundai Samho Heavy Industries
 Country: Republic of Korea
 Model test establishment used: Hyundai Maritime Research Institute
 Flag: Malta
 IMO Number: 9839909
 Total number of sister ships already completed (excluding ship presented): 3 off
 Total number of sister ships still on order: 2 off

TECHNICAL PARTICULARS

Length oa: 365.98m
 Length bp: 350m
 Breadth moulded: 51m
 Depth moulded
 to main deck: 29.85m
 to upper deck: 29.85m
 Width of double skin
 side: 2.5m
 bottom: 2.3m
 Draught
 scantling: 16m
 design: 14.5m
 Gross: 149,314gt
 Displacement: 199,983t (at Scant.)
 Lightweight: 42,907t
 Deadweight
 Design: 133,607t
 scantling: 157,076t
 Block co-efficient: 0.6818 (At Scant.)
 Speed, service: 22knots at design draught at NCR with 15% S.M.
 Bunkers (m³)
 Heavy oil: 8,087.5
 Diesel oil: 1,442.6
 Water ballast (m³): 41,810.4
 Daily fuel consumption (tonnes/day)
 Main engine only: 163.6g/kWh + 5% at NCR
 Classification society and notations: LR, +100A1 containership(SDA,FDA,FDASPR,WDA2,CM,ACS(B)),*IWS,LI,BoxMax(V,W,L),-LMC,UMS,BWTS,withdescriptivenotesShipRight(BWMP(T),IHM,SCM),GSA,GR(A)
 % high-tensile steel used in construction:68.84 %
 Main engine(s)
 Design: Hyundai-Man B&W
 Model:11G90ME-C10.5-EGRTC
 Manufacturer: HHI-EMD
 Number: 1 off
 Type of fuel : HFO/MDO
 Output of each engine: . 46,360kW x 75.7rpm (two stroke, crosshead, turbocharged)
 Propeller(s)
 Material: Ni-Al-Bronze
 Designer/Manufacturer: HHI-EMD
 Number: 1 off
 Fixed/Controllable pitch: Fixed
 Diameter: 10m
 Diesel-driven alternators
 Number: 5 sets
 Engine make/type: 8H32/40, 7H32/40
 Type of fuel : HFO
 Output/speed of each set: Abt. 4,000kW @720rpm, Abt. 3,500kW @ 720rpm
 Alternator make/type: HHI-EES/Marine Design IP54 Enclosure Brushless

Output/speed of each set: Abt. 3,840kW @720rpm, Abt. 3,360kW @ 720rpm
 Exhaust-gas scrubbing equipment
 Manufacturer: Wärtsilä Moss AS
 Type: ..Open-loop EGC system Q-50x5SMW
 On main engines?: Yes
 On auxiliary engines?: Yes
 Boilers
 Number: 1 off
 Type: ..Automatic, forced draught, heavy fuel oil burning, marine boiler
 Make: Kangrim
 Output, each boiler: 5,000kg/h x 1set
 Other cranes
 Number: 1 off
 Make: Oriental Precision & Engineering Co., Ltd.
 Type: Electric motor driven system
 Tasks: Monorail crane
 Performance: 12.5t x 7.0m/min
 Other cranes
 Number: 2 set
 Make: Dongnam Marine Crane Co., Ltd.
 Type: Electric Motor Driven System
 Tasks: Provision Crane
 Performance: 3.0t x 10.0m/min
 Mooring equipment
 Number: 12 sets
 Make: TTS Marine GMBH
 Type: Electric
 Hatch covers
 Design: Non-tight, Pontoon non-sequential operation type
 Manufacturer: SMS-SME
 Type: Upper Deck
 Containers
 Lengths: 40ft container of 40'(L) x 8'(W) x 9'6"(H) ISO container
 Heights: 40ft container of 40'(L) x 8'(W) x 9'6"(H) ISO container
 Cell guides: 40ft container of 40'(L) x 8'(W) x 9'6"(H) ISO container
 Total TEU capacity: 15,072TEU
 On deck: 8,778TEU
 In holds: 6,294TEU
 Homogeneously loaded to 14t: Yes
 Reefer plugs: 1,500 FEU reefer container socket on deck/hatch covers
 Tiers/rows (maximum)
 On deck: 11 Tiers/22 rows
 In holds: 11 Tiers/21 rows
 Ballast control system
 Make: Emerson Process
 Type: Hyd. operated and remotely controlled
 Water ballast Treatment System
 Make: Hyundai Heavy Industries
 Capacity: Filter + electrolysis unit (2,000m³/h)
 Complement
 Officers: 11 persons
 Crew: 20 persons
 Bow thruster(s)
 Make: KTE Co., Ltd.
 Number: 1 off
 Output (each): 3,000kW
 Bridge control system
 Make: HHI-EES
 Fire detection system
 Make: Autronica
 Type: Analogue addressable optical smoke detector
 Fire extinguishing systems
 Cargo holds: High pressure CO₂, sea water
 Make/Type: FAÏN Co., Ltd.
 Engine room: Water mist
 Make/Type: NK Co., Ltd.
 Radars
 Number: 2 sets
 Make: JRC
 Model(s) : S-Band (JMR-9282-S), X-Band (JMR-922S-6X)
 Waste disposal plant
 Incinerator
 Make: Hyundai Marine Machinery Co., Ltd.
 Model: MAXI 1500SL WS
 Sewage plant
 Make: Jonghap Machinery
 Model: Biological type
 Contract date: 28 September 2017
 Launch/float-out date: 22 March 2019
 Delivery date: 1 July 2019



ANEXO 2. CATÁLOGO KAWASAKI

<p>TECHNICAL SPECIFICATIONS and DRAWINGS</p> <hr/> <p>OF</p> <p>KAWASAKI SIDE THRUSTER</p> <hr/> <p>KT-255B5</p> <hr/> <p>FOR</p> <hr/> <p>9,400 TEU CONTAINER VESSEL</p> <hr/> <p>JIANGNAN SHIPYARD (GROUP) CO., LTD. S.No. H2552 / H2553</p> <p>SHANGHAI JIANGNAN-CHANGXING SHIPBUILDING CO., LTD. S.No. H3001 / H3002 / H3003 / H3004</p>																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="font-size: small;">DELIVERY</td> <td style="font-size: small;">ORDER NO.</td> </tr> <tr> <td style="font-size: small;">YARD</td> <td style="font-size: small;">31KC767/768, 31KC752M/7778</td> </tr> <tr> <td style="font-size: small;">営業</td> <td rowspan="5" style="vertical-align: top;"> <p>NOTES</p> <p>For Approval, For Working</p> </td> </tr> <tr> <td style="font-size: small;">KPME 工機</td> </tr> <tr> <td style="font-size: small;">KPME 工務</td> </tr> <tr> <td style="font-size: small;">検査</td> </tr> <tr> <td style="font-size: small;">生産管理</td> </tr> <tr> <td style="font-size: small;">控計</td> <td style="font-size: small;">1</td> </tr> <tr> <td style="font-size: small;">ISSUE</td> <td></td> </tr> </table>	DELIVERY	ORDER NO.	YARD	31KC767/768, 31KC752M/7778	営業	<p>NOTES</p> <p>For Approval, For Working</p>	KPME 工機	KPME 工務	検査	生産管理	控計	1	ISSUE		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 10px;"> <p>KAWASAKI HEAVY INDUSTRIES, LTD. GAS TURBINE & MACHINERY COMPANY MACHINERY DIVISION MARINE PROPULSION SYSTEM DEPT PROPULSION MACHINERY ENG'NG SECT.</p> </td> </tr> <tr> <td style="font-size: small;">APPROVED</td> <td style="text-align: center;"></td> </tr> <tr> <td style="font-size: small;">CHECKED</td> <td style="text-align: center;"></td> </tr> <tr> <td style="font-size: small;">DRAWN</td> <td style="text-align: center;"></td> </tr> <tr> <td style="font-size: small;">DATE</td> <td style="text-align: center;">Aug. 21, 2013</td> </tr> <tr> <td style="font-size: small;">DRAWING NO.</td> <td style="text-align: center;">95001-07497R3</td> </tr> </table>	 <p>KAWASAKI HEAVY INDUSTRIES, LTD. GAS TURBINE & MACHINERY COMPANY MACHINERY DIVISION MARINE PROPULSION SYSTEM DEPT PROPULSION MACHINERY ENG'NG SECT.</p>	APPROVED		CHECKED		DRAWN		DATE	Aug. 21, 2013	DRAWING NO.	95001-07497R3
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控計	1																									
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 <p>KAWASAKI HEAVY INDUSTRIES, LTD. GAS TURBINE & MACHINERY COMPANY MACHINERY DIVISION MARINE PROPULSION SYSTEM DEPT PROPULSION MACHINERY ENG'NG SECT.</p>																										
APPROVED																										
CHECKED																										
DRAWN																										
DATE	Aug. 21, 2013																									
DRAWING NO.	95001-07497R3																									

(32 SHEETS COVER INC)



95001-07497

1

I GENERAL

01 Contractor	
02 Ship Owner	MSC
03 Shipyard and Ship No.	Jiangnan Shipyard (Group) Corporation, Ltd. H2552 / H2553 Shanghai Jiangnan-Changxing Shipbuilding Co., Ltd. H3001 / H3002 / H3003 / H3004
04 Kind of ship	9,400 TEU CONTAINER VESSEL
05 Hull dimensions	
Lpp x B x D x d	x x x m
06 Classification	GL
07 Location of thruster(s)	Bow x 1



II PARTICULARS

01 Thruster unit	
01) Model	KT-255B5
02) Number of units	1 unit / vessel
03) Type of propeller	4 bladed, Skewed type, Controllable Pitch type
04) Propeller diameter	2,850 mm
05) Thrust (per unit)	Approx. 427 kN (Approx. 43.6 metric tons)
06) Input shaft speed	880 min ⁻¹
07) Input power (per unit)	3,000 kW
08) Direction of input shaft rotation	Clockwise view from prime mover
09) Position of propeller blade	Starboard side
10) Anti-corrosive anodes	Aluminum, bolting type, lifetime 5 years
11) Lubrication method	Oil bath
12) Lubrication oil	Gear oil equivalent to ISO VG100

SIDE THRUSTER



95001-07497

2

02 Prime mover and control device

02-1 Main motor (Drive motor)

01) Type	Vertical type, squirrel cage, induction motor
02) Number	1 unit / thruster
03) Output	3,000 kW x 900 min ⁻¹ (synchronous speed)
04) Voltage x Frequency	AC3 ϕ 6,600V x 60Hz
05) Rating	60 minutes
06) Insulation	F class, F rise
07) Protection	IP 44
08) Space heater	Element type
09) Temperature sensor	PT 100 Ω x 3 phase PTC Thermistor x 3 for alarm, x 3 for trip (Total6)

02-2 Motor control device

01) Type	Self-standing type
02) Number	1 unit / thruster
03) Voltage x Frequency	AC3 ϕ 6,600V x 60Hz (Power source) AC1 ϕ 220V x 60Hz (Control source)
04) Protection	IP44
05) Starting method	Auto transformer starting, 65% Tap
06) Start interlock	The prime mover start function interlocks with the following conditions.
a) Gravity tank oil level	Normal close, open at low level
b) Control oil pressure	Normal close, open at low pressure
c) Blade angle	Close at pitch neutral zone (AB : +3 / -3 degrees)
d) Fan run x 2	Close at No.1 and No.2 fan running *1
e) Hydraulic pump run	Close at hydraulic pump running
f) Generators run	Close at generators running *1
g) Door for starter	Close at door close
h) Suction & Drain line valve open	Close at valve full open
07) Door open interlock	The starter door open function interlocks with the following conditions.
a) ACB open	Close at ACB open (Interface with switch board) *1
*1: Potential free signal should be supplied by shipyard.	
08) Accessories	Earthing device

Note: Please prepare some protection by shipyard for safety of operators from internal arc, for instance to install the starter into an independent compartment.

Note: Emergency stop button and ammeter for bow thruster are provided in ECR, bridge wings, bridge console, and starter in bow thruster room.

SIDE THRUSTER

KAWASAKI HEAVY INDUSTRIES, LTD.

Page 3

2. OPERATION**2.1 Interlock for prime mover**

- | | |
|----------------------------|--------------------------------------|
| (1) Gravity tank oil level | : Normal (checking by float switch) |
| (2) Control oil pressure | : Normal (checking by press. switch) |
| (3) Blade angle | : Neutral (AB = 0 degree) |
| Allowable range | : ± 3 degree |

2.2 Rated draft

The draft should be kept shown in "fig.- 1" at running.

Fore draft : $df \geq \boxed{6.4}$ m

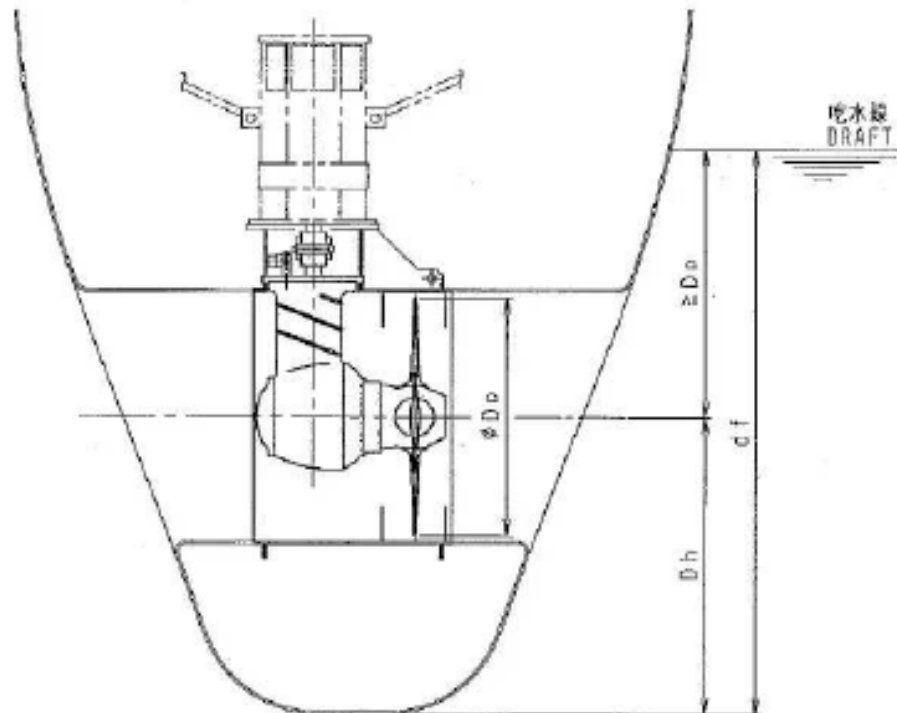


fig.- 1

2.3 Oil temperature of the thruster

The kinematic coefficient of viscosity for thruster should be kept the range of $40 \sim 500 \text{ mm}^2/\text{s}$ { cSt } at running.

The corresponding temperature to the fore mentioned viscosity is at about $10 \sim 60$ degrees C for the gear oil ISO VG 100.

ANEXO 3. RELACIÓN DE CUADERNAS

	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslora del espacio [m]
Pique de popa	C-14	-10,5	20	-15
	C-13	-9,75		
	C-12	-9		
	C-11	-8,25		
	C-10	-7,5		
	C-9	-6,75		
	C-8	-6		
	C-7	-5,25		
	C-6	-4,5		
	C-5	-3,75		
	C-4	-3		
	C-3	-2,25		
	C-2	-1,5		
	C-1	-0,75		
	C0	0		
	C1	0,75		
	C2	1,5		
C3	2,25			
C4	3			
Bodega 1	C5	3,75	33	25,5
	C6	4,5		
	C7	5,25		
	C8	6		
	C9	6,75		
	C10	7,5		
	C11	8,25		
	C12	9		
	C13	9,75		
	C14	10,5		
	C15	11,25		
	C16	12		
	C17	12,75		
	C18	13,5		
	C19	14,25		
	C20	15		
	C21	15,75		
	C22	16,5		
	C23	17,25		
	C24	18		
	C25	18,75		
	C26	19,5		
	C27	20,25		
	C28	21		
C29	21,75			
C30	22,5			
C31	23,25			
C32	24			
C33	24,75			
C34	25,5			
C35	26,25			
C36	27			
C37	27,75			

	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslora del espacio [m]
Bodega 2	C37	27,75	43	31,5
	C39	28,5		
	C40	29,25		
	C39	28,5		
	C40	29,25		
	C41	30		
	C42	30,75		
	C43	31,5		
	C44	32,25		
	C45	33		
	C46	33,75		
	C47	34,5		
	C48	35,25		
	C49	36		
	C50	36,75		
	C51	37,5		
	C52	38,25		
	C53	39		
	C54	39,75		
	C55	40,5		
	C56	41,25		
	C57	42		
	C58	42,75		
	C59	43,5		
	C60	44,25		
	C61	45		
	C62	45,75		
	C63	46,5		
	C64	47,25		
	C65	48		
	C66	48,75		
	C67	49,5		
	C68	50,25		
	C69	51		
C70	51,75			
C71	52,5			
C72	53,25			
C73	54			
C74	54,75			
C75	55,5			
C76	56,25			
C77	57			
C78	57,75			
C79	58,5			
C80	59,25			

	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslora del espacio [m]
Cámara de máquinas	C80	59,25	26	18,2
	C81	59,9		
	C82	60,55		
	C83	61,2		
	C84	61,85		
	C85	62,5		
	C86	63,15		
	C87	63,8		
	C88	64,45		
	C89	65,1		
	C90	65,75		
	C91	66,4		
	C92	67,05		
	C93	67,7		
	C94	68,35		
	C95	69		
	C96	69,65		
	C97	70,3		
	C98	70,95		
	C99	71,6		
C100	72,25			
C101	72,9			
C102	73,55			
C103	74,2			
C104	74,85			
C105	75,5			
C106	76,15			
Bodega 3	C106	76,15	40	30
	C107	76,9		
	C108	77,65		
	C109	78,4		
	C110	79,15		
	C111	79,9		
	C112	80,65		
	C113	81,4		
	C114	82,15		
	C115	82,9		
	C116	83,65		
	C117	84,4		
	C118	85,15		
	C119	85,9		
	C120	86,65		
	C121	87,4		
	C122	88,15		
	C123	88,9		
	C124	89,65		
	C125	90,4		
	C126	91,15		
	C127	91,9		
	C128	92,65		
	C129	93,4		
	C130	94,15		
	C131	94,9		
	C132	95,65		
	C133	96,4		
	C134	97,15		
	C135	97,9		
C136	98,65			
C137	99,4			
C138	100,15			
C139	100,9			
C140	101,65			
C141	102,4			
C142	103,15			
C143	103,9			
C144	104,65			
C145	105,4			
C146	106,15			

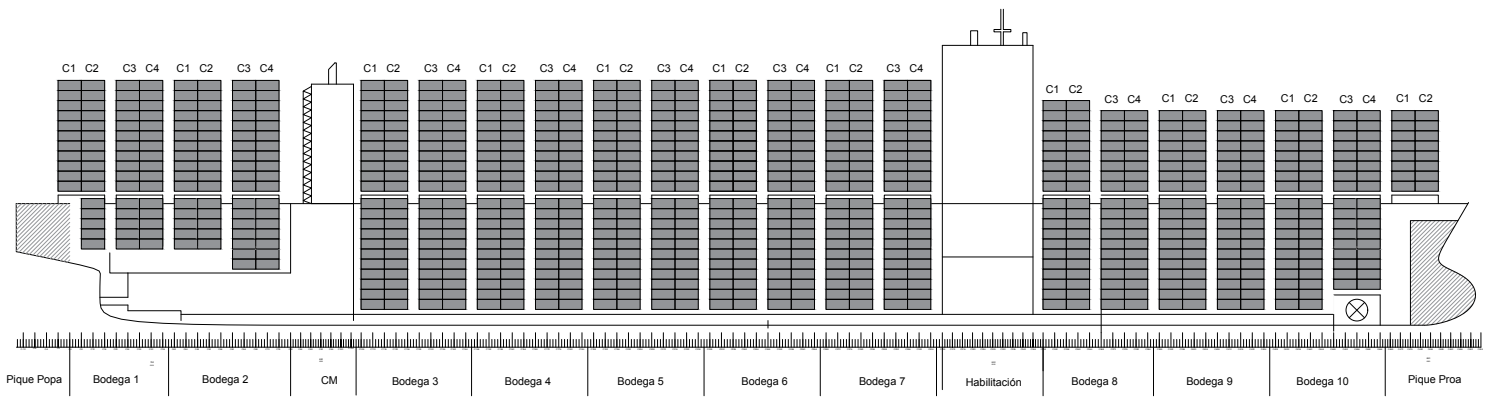
	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslora del espacio [m]
Bodega 4	C146	106,15	40	30
	C147	106,9		
	C148	107,65		
	C149	108,4		
	C150	109,15		
	C151	109,9		
	C152	110,65		
	C153	111,4		
	C154	112,15		
	C155	112,9		
	C156	113,65		
	C157	114,4		
	C158	115,15		
	C159	115,9		
	C160	116,65		
	C161	117,4		
	C162	118,15		
	C163	118,9		
	C164	119,65		
	C165	120,4		
	C166	121,15		
	C167	121,9		
	C168	122,65		
	C169	123,4		
	C170	124,15		
	C171	124,9		
	C172	125,65		
	C173	126,4		
	C174	127,15		
	C175	127,9		
C176	128,65			
C177	129,4			
C178	130,15			
C179	130,9			
C180	131,65			
C181	132,4			
C182	133,15			
C183	133,9			
C184	134,65			
C185	135,4			
C186	136,15			
Bodega 5	C186	136,15	40	30
	C187	136,9		
	C188	137,65		
	C189	138,4		
	C190	139,15		
	C191	139,9		
	C192	140,65		
	C193	141,4		
	C194	142,15		
	C195	142,9		
	C196	143,65		
	C197	144,4		
	C198	145,15		
	C199	145,9		
	C200	146,65		
	C201	147,4		
	C202	148,15		
	C203	148,9		
	C204	149,65		
	C205	150,4		
	C206	151,15		
	C207	151,9		
	C208	152,65		
	C209	153,4		
	C210	154,15		
	C211	154,9		
C212	155,65			
C213	156,4			
C214	157,15			
C215	157,9			
C216	158,65			
C217	159,4			
C218	160,15			
C219	160,9			
C220	161,65			
C221	162,4			
C222	163,15			
C223	163,9			
C224	164,65			
C225	165,4			
C226	166,15			

	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslora del espacio [m]
Bodega 6	C226	166,15	40	30
	C227	166,9		
	C228	167,65		
	C229	168,4		
	C230	169,15		
	C231	169,9		
	C232	170,65		
	C233	171,4		
	C234	172,15		
	C235	172,9		
	C236	173,65		
	C237	174,4		
	C238	175,15		
	C239	175,9		
	C240	176,65		
	C241	177,4		
	C242	178,15		
	C243	178,9		
	C244	179,65		
	C245	180,4		
	C246	181,15		
	C247	181,9		
	C248	182,65		
	C249	183,4		
	C250	184,15		
	C251	184,9		
	C252	185,65		
	C253	186,4		
	C254	187,15		
	C255	187,9		
C256	188,65			
C257	189,4			
C258	190,15			
C259	190,9			
C260	191,65			
C261	192,4			
C262	193,15			
C263	193,9			
C264	194,65			
C265	195,4			
C266	196,15			
Bodega 7	C266	196,15	40	30
	C267	196,9		
	C268	197,65		
	C269	198,4		
	C270	199,15		
	C271	199,9		
	C272	200,65		
	C273	201,4		
	C274	202,15		
	C275	202,9		
	C276	203,65		
	C277	204,4		
	C278	205,15		
	C279	205,9		
	C280	206,65		
	C281	207,4		
	C282	208,15		
	C283	208,9		
	C284	209,65		
	C285	210,4		
	C286	211,15		
	C287	211,9		
	C288	212,65		
	C289	213,4		
	C290	214,15		
	C291	214,9		
	C292	215,65		
	C293	216,4		
	C294	217,15		
	C295	217,9		
C296	218,65			
C297	219,4			
C298	220,15			
C299	220,9			
C300	221,65			
C301	222,4			
C302	223,15			
C303	223,9			
C304	224,65			
C305	225,4			
C306	226,15			

	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslera del espacio [m]
Habilitación	C306	226,15	40	27,5
	C307	226,8		
	C308	227,45		
	C309	228,1		
	C310	228,75		
	C311	229,4		
	C312	230,05		
	C313	230,7		
	C314	231,35		
	C315	232		
	C316	232,65		
	C317	233,3		
	C318	233,95		
	C319	234,6		
	C320	235,25		
	C321	235,9		
	C322	236,55		
	C323	237,2		
	C324	237,85		
	C325	238,5		
	C326	239,15		
	C327	239,8		
	C328	240,45		
	C329	241,1		
	C330	241,75		
	C331	242,4		
	C332	243,05		
	C333	243,7		
	C334	244,35		
	C335	245		
	C336	245,65		
	C337	246,3		
C338	246,95			
C339	247,6			
C340	248,25			
C341	248,9			
C342	249,55			
C343	250,2			
C344	250,85			
C345	251,5			
C346	252,15			
Bodega 8	C346	252,15	40	30
	C347	252,9		
	C348	253,65		
	C349	254,4		
	C350	255,15		
	C351	255,9		
	C352	256,65		
	C353	257,4		
	C354	258,15		
	C355	258,9		
	C356	259,65		
	C357	260,4		
	C358	261,15		
	C359	261,9		
	C360	262,65		
	C361	263,4		
	C362	264,15		
	C363	264,9		
	C364	265,65		
	C365	266,4		
	C366	267,15		
	C367	267,9		
	C368	268,65		
	C369	269,4		
	C370	270,15		
	C371	270,9		
	C372	271,65		
	C373	272,4		
	C374	273,15		
	C375	273,9		
C376	274,65			
C377	275,4			
C378	276,15			
C379	276,9			
C380	277,65			
C381	278,4			
C382	279,15			
C383	279,9			
C384	280,65			
C385	281,4			
C386	282,15			

	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslora del espacio [m]
Bodega 9	C386	282,15	40	30
	C387	282,9		
	C388	283,65		
	C389	284,4		
	C390	285,15		
	C391	285,9		
	C392	286,65		
	C393	287,4		
	C394	288,15		
	C395	288,9		
	C396	289,65		
	C397	290,4		
	C398	291,15		
	C399	291,9		
	C400	292,65		
	C401	293,4		
	C402	294,15		
	C403	294,9		
	C404	295,65		
	C405	296,4		
	C406	297,15		
	C407	297,9		
	C408	298,65		
	C409	299,4		
	C410	300,15		
	C411	300,9		
C412	301,65			
C413	302,4			
C414	303,15			
C415	303,9			
C416	304,65			
C417	305,4			
C418	306,15			
C419	306,9			
C420	307,65			
C421	308,4			
C422	309,15			
C423	309,9			
C424	310,65			
C425	311,4			
C426	312,15			
Bodega 10	C426	312,15	40	30
	C427	312,9		
	C428	313,65		
	C429	314,4		
	C430	315,15		
	C431	315,9		
	C432	316,65		
	C433	317,4		
	C434	318,15		
	C435	318,9		
	C436	319,65		
	C437	320,4		
	C438	321,15		
	C439	321,9		
	C440	322,65		
	C441	323,4		
	C442	324,15		
	C443	324,9		
	C444	325,65		
	C445	326,4		
	C446	327,15		
	C447	327,9		
	C448	328,65		
	C449	329,4		
	C450	330,15		
	C451	330,9		
	C452	331,65		
	C453	332,4		
	C454	333,15		
	C455	333,9		
	C456	334,65		
	C457	335,4		
	C458	336,15		
	C459	336,9		
	C460	337,65		
	C461	338,4		
	C462	339,15		
	C463	339,9		
C464	340,65			
C465	341,4			
C466	342,15			

	Cuaderna	Posición desde perpendicular de popa [m]	Diferencia de cuadernas	Eslora del espacio [m]
Pique de proa	C466	342,15	38	24,7
	C467	342,8		
	C468	343,45		
	C469	344,1		
	C470	344,75		
	C471	345,4		
	C472	346,05		
	C473	346,7		
	C474	347,35		
	C475	348		
	C476	348,65		
	C477	349,3		
	C478	349,95		
	C479	350,6		
	C480	351,25		
	C481	351,9		
	C482	352,55		
	C483	353,2		
	C484	353,85		
	C485	354,5		
	C486	355,15		
	C487	355,8		
	C488	356,45		
	C489	357,1		
	C490	357,75		
	C491	358,4		
	C492	359,05		
	C493	359,7		
	C494	360,35		
	C495	361		
	C496	361,65		
	C497	362,3		
	C498	362,95		
	C499	363,6		
	C500	364,25		
	C501	364,9		
	C502	365,55		
	C503	366,2		
C504	366,85			



ANEXO 4. CATÁLOGO DEL MOTOR WÄRTSILÄ X92



At Wärtsilä, we are passionate about optimising lifecycle value by offering precisely what each of our customers need. We can deliver on this promise because we provide the only true total offering of marine products, integrated solutions and services in the industry – worldwide. We help our customers find the shorter route to robust growth and bigger profits through operational efficiency, environmental excellence, fuel flexibility and services. Even though this brochure is just a beginning to learn why Wärtsilä nowadays powers one in every three ships worldwide, it still demonstrates how we are able to customise our comprehensive offering in order to give customers a crucial competitive edge. What can we do for you?

WÄRTSILÄ X92 CASE STUDY

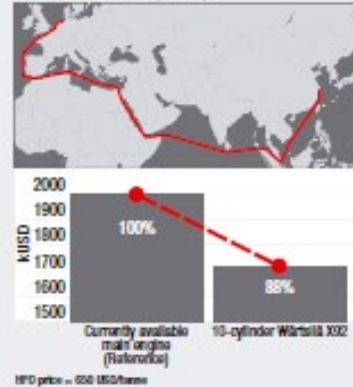
13,200TEU Container vessel: Asia – Europe (Shanghai, Ningbo, Singapore, Rotterdam, Bremerhaven) comparison

Sailing profile

- Distance: 10,726 nm/leg
- HFO price = 660 USD/tonne



FUEL COSTS/LEG (kUSD)

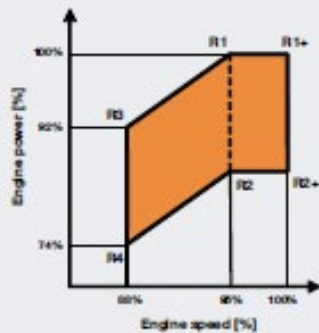


The Wärtsilä X92 is the marine two-stroke diesel engine designed to provide propulsion power for modern large and ultra large container vessels following the latest trends in container vessel propulsion. The combination of the large bore, long stroke, and low shaft speeds together with the advanced proven common-rail technology results in an engine with particularly high efficiency and environmental performance.

The Wärtsilä X92, which has a cylinder bore of 920 mm, provides a power output of 24,420 to 73,560 kW and is available in 6–12 cylinder configurations.

The key benefits of the Wärtsilä X92 include:

- Extra low fuel consumption over the whole operating range together with low cylinder oil consumption
- Flexibility of optimum rpm selection to enable increased propeller diameter
- Stable operation down to 12% nominal engine speed for slow steaming
- Reduced CO₂, SO_x and NO_x emissions, offering shipyards excellent possibilities for improved EEDI



Wärtsilä X92 rating field



TYPICAL APPLICATION AREAS

- ■ ■ The Wärtsilä X92 has been designed as a main engine for large and ultra large container vessels of 8000TEU and beyond. The Wärtsilä X92 engine offers flexibility for changing market conditions, providing minimum daily fuel consumption. When comparing the Wärtsilä X92 to previous generation main engine options, a gain of approximately 10% and beyond in daily fuel consumption can be achieved. This can be attributed mainly to the low shaft speeds of the engine allowing larger propeller diameters to be installed on the vessel.

OPERATIONAL FEATURES

The engine offers high efficiency due to the large bore, high stroke-to-bore ratio and Wärtsilä's well proven electronically-controlled common-rail technology which plays a key role in enabling ship owners to reduce fuel costs, mainly through the flexibility of the fuel injection and exhaust valve operations. A unique feature of Wärtsilä low-speed electronically controlled engines is the possibility to control each fuel injector separately. This flexibility results in lower fuel consumption across the entire operating range, especially at low and part loads. In addition, different engine tunings are available in order to meet specific customer requirements according to their particular needs Standard, Delta, Delta Bypass and Low Load. Other advantages of this technology include stable low running speeds (down to 12% of nominal speed), smokeless operation, and improved control of exhaust emissions. As far as cylinder lubrication is concerned, an oil feed rate of 0.6 g/kWh can be achieved. The engines are equipped as standard with intelligent combustion control (ICC) system enabling further fuel savings and balanced working of each cylinder.

ENVIRONMENTAL COMPLIANCE

The engine is fully compliant with IMO Tier II requirements. It can also be equipped with a SCR catalyst to meet IMO Tier III NO_x emission levels, and a scrubber to reduce SO_x emissions to 0.1% – even with high sulphur fuels. The introduction of the EEDI index also puts an emphasis on CO₂ emissions and total vessel efficiency. The Wärtsilä X92 internal engine efficiency, and the possibility to apply various Power Take Off (PTO) arrangements for onboard electricity production, make it easy for shipyards to meet these new requirements. Thanks to Wärtsilä's common-rail fuel injection technology, the engine has no visible smoke at any load.

TOTAL COST OF OWNERSHIP

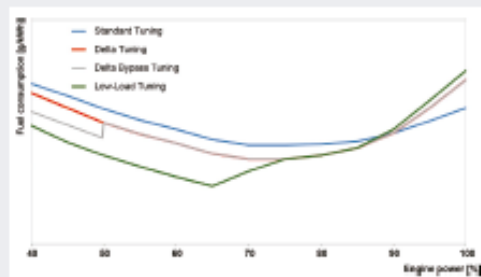
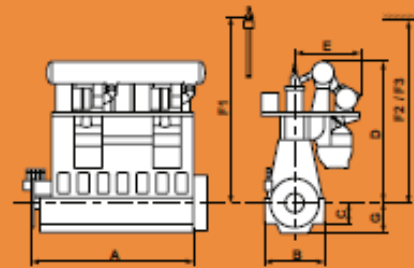
Minimum total cost of ownership can be achieved by a low engine cost and low operational costs during the lifetime of the engine. The Wärtsilä X92 is designed for exceptional reliability and for long periods of maintenance-free operation. It also allows extended Time Between Overhaul (TBO) of the critical components, to as much as 5 years. The service-friendly design will reduce downtime, maintain vessel operation and cut operating costs. Together with Condition Based Maintenance (CBM) and service agreements, the overhaul interval can be even further extended, thus minimizing maintenance costs and maximizing the revenue-earning

Wärtsilä X92		IMO Tier II
Cylinder bore	920 mm	
Piston stroke	3468 mm	
Speed	70-80 rpm	
Mean effective pressure at R1/R1+	21.0/20.0 bar	
Stroke / bore	3.77	

Rated power, principal dimensions and weights						
Cyl.	Output in kW at				Length A mm	Weight tonnes
	76/60 rpm		70 rpm			
	R1 / R1+	R2 / R2+	R3	R4		
6	36 780	26 520	33 900	24 420	11 630	1 120
7	42 910	30 940	39 550	28 490	13 210	1 260
8	49 040	35 360	45 200	32 560	16 350	1 460
9	55 170	39 780	50 850	36 630	17 850	1 630
10	61 300	44 200	56 500	40 700	19 520	1 790
11	67 430	48 620	62 150	44 770	21 280	1 960
12	73 560	53 040	67 800	48 840	22 670	2 140

Dimensions mm	B	C	D	E
	5550	1900	12 950	6050
	F1	F2	F3	G
	15 420	15 450	14 240	2930

Brake specific fuel consumption (BSFC) in g/kWh					
Full load					
Rating point	R1/R1+	R2/R2+	R3	R4	
BMEP bar	21.0/20.0	15.1/14.4	21.0	15.1	
BSFC	Standard Tuning	166/165	159	166	
				159	
Part load, % of R1/R1+					
	65	70	85	70	65
Tuning variant	Standard	Standard	Delta	Delta	Low Load
BSFC	162.4/161.4	162.0/161.0	161.7/160.7	160.5/159.5	157.2/156.4



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TYPICAL APPLICATION AREAS

- ■ The Wärtsilä X92 has been designed as a main engine for large and ultra large container vessels of 8000TEU and beyond. The Wärtsilä X92 engine offers flexibility for changing market conditions, providing minimum daily fuel consumption. When comparing the Wärtsilä X92 to previous generation main engine options, a gain of approximately 10% and beyond in daily fuel consumption can be achieved. This can be attributed mainly to the low shaft speeds of the engine allowing larger propeller diameters to be installed on the vessel.

OPERATIONAL FEATURES

The engine offers high efficiency due to the large bore, high stroke-to-bore ratio and Wärtsilä's well proven electronically-controlled common-rail technology which plays a key role in enabling ship owners to reduce fuel costs, mainly through the flexibility of the fuel injection and exhaust valve operations. A unique feature of Wärtsilä low-speed electronically controlled engines is the possibility to control each fuel injector separately. This flexibility results in lower fuel consumption across the entire operating range, especially at low and part loads. In addition, different engine tunings are available in order to meet specific customer requirements according to their particular needs Standard, Delta, Delta Bypass and Low Load). Other advantages of this technology include stable low running speeds (down to 12% of nominal speed), smokeless operation, and improved control of exhaust emissions. As far as cylinder lubrication is concerned, an oil feed rate of 0.6 g/kWh can be achieved. The engines are equipped as standard with intelligent combustion control (ICC) system enabling further fuel savings and balanced working of each cylinder.

ENVIRONMENTAL COMPLIANCE

The engine is fully compliant with IMO Tier II requirements. It can also be equipped with a SCR catalyst to meet IMO Tier III NO_x emission levels, and a scrubber to reduce SO_x emissions to 0.1% – even with high sulphur fuels. The introduction of the EEDI index also puts an emphasis on CO₂ emissions and total vessel efficiency. The Wärtsilä X92 internal engine efficiency, and the possibility to apply various Power Take Off (PTO) arrangements for onboard electricity production, make it easy for shipyards to meet these new requirements. Thanks to Wärtsilä's common-rail fuel injection technology, the engine has no visible smoke at any load.

TOTAL COST OF OWNERSHIP

Minimum total cost of ownership can be achieved by a low engine cost and low operational costs during the lifetime of the engine. The Wärtsilä X92 is designed for exceptional reliability and for long periods of maintenance-free operation. It also allows extended Time Between Overhaul (TBO) of the critical components, to as much as 5 years. The service-friendly design will reduce downtime, maintain vessel operation and cut operating costs. Together with Condition Based Maintenance (CBM) and service agreements, the overhaul interval can be even further extended, thus minimizing maintenance costs and maximizing the revenue-earning

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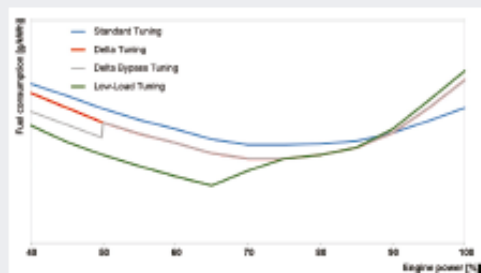
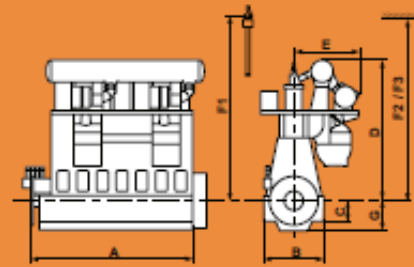
Wärtsilä X92	IMO Tier II
Cylinder bore	920 mm
Piston stroke	2468 mm
Speed	70-80 rpm
Mean effective pressure at R1/R1+	21.0/20.0 bar
Stroke / bore	2.7

Rated power, principal dimensions and weights						
Cyl.	Output in kW at				Length A m	Weight tonnes
	76/60 rpm		70 rpm			
	R1 / R1+	R2 / R2+	R3	R4		
6	36 780	26 520	33 900	24 420	11 630	1 120
7	42 910	30 340	39 550	26 490	13 210	1 260
8	49 040	35 360	45 200	32 560	16 350	1 460
9	55 170	39 780	50 850	36 630	17 850	1 630
10	61 300	44 200	56 500	40 700	19 520	1 790
11	67 430	48 620	62 150	44 770	21 280	1 960
12	73 560	53 040	67 800	48 840	22 870	2 140

Dimensions mm	B	C	D	E
	5550	1900	12 950	6050
	F1	F2	F3	G
	15 420	15 450	14 240	2030

Brake specific fuel consumption (BSFC) in g/kWh					
Full load					
Rating point		R1/R1+	R2/R2+	R3	R4
BMEP, bar		21.0/20.0	15.1/14.4	21.0	15.1
BSFC	Standard Tuning	166/165	159	166	159

Part load, % of R1/R1+	65	70	65	70	65
	Tuning variant	Standard	Standard	Delta	Delta
BSFC	162.4/161.4	162.0/161.0	161.7/160.7	160.5/159.5	157.2/156.4



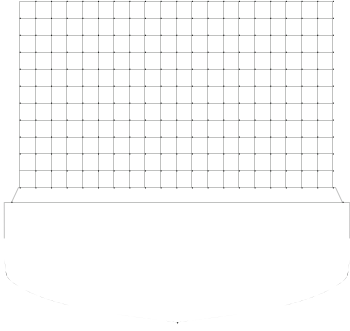
ANEXO 5. TANQUES OBTENIDOS

	Capacidad [t]	LCG [m]	TCG [m]	VCG [m]
Aceite	831,644	64,538	-5,917	1,626
Aceite usado	816,241	64,311	5,873	1,627
Agua dulce	244,75	79,403	-8,785	1,552
Lodos	66,948	77,155	8,382	1,566
Aguas negras	193,204	79,957	8,884	1,548
UD FO	382,062	77,181	-25,397	22,659
UD ECA	382,062	77,181	25,397	22,659
sedimentación FO	670,897	88,134	-10,211	1,499
sedimentación ECA	670,897	88,134	10,211	1,499
ECA 1	1638,264	100,431	0	1,458
ECA 2	548,135	88,117	25,397	20,954
ECA 3	548,135	88,117	-25,397	20,954
FO 1 B	593,903	56,94	-25,416	24,978
FO 1 E	593,903	56,94	25,416	24,978
FO 2 B	206,165	69,312	-25,403	23,722
FO 2 E	206,165	69,312	25,403	23,722
FO 3 B	348,608	97,374	-25,411	19,503
FO 3 E	348,608	97,374	25,411	19,503
FO 4 B	329,812	103,719	-25,433	18,771
FO 4 E	329,812	103,719	25,433	18,771
FO 5 B DF	1822,119	119,932	-12,435	1,438
FO 5.1 B	559,804	111,613	-25,462	18,288
FO 5.2 B	485,524	120,583	-25,482	18,025
FO 5.3 B	490,97	128,831	-25,492	17,907
FO 5 E DF	1822,118	119,932	12,435	1,438
FO 5.1 E	548,135	88,117	25,397	20,954
FO 5.2 E	485,524	120,583	25,482	18,025
FO 5.3 E	490,97	128,831	25,492	17,907
FO 6 B	313,5	135,575	-25,495	17,872
FO 6 E	313,5	135,575	25,495	17,872
FO 7 B	358,579	141,2	-25,496	17,864
FO 7 E	358,579	141,2	25,496	17,864
BW01 B DF	431,792	9,323	-5,806	14,937
BW01 E DF	431,792	9,323	5,806	14,937
BW01 B	279,219	7,93	-25,451	26,82
BW01 E	279,219	7,93	25,451	26,82
BW02 B DF	224,681	35,728	-1,917	1,772
BW02 E DF	224,681	35,728	1,917	1,772
BW02 B	833,599	30,743	-25,438	26,385

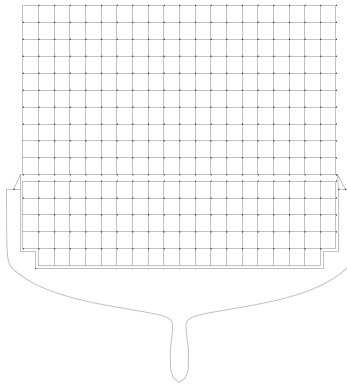
	Capacidad [t]	LCG [m]	TCG [m]	VCG [m]
BW02 E	833,599	30,743	25,438	26,385
BW03 B DF	1855,351	146,078	-12,651	1,433
BW03 E DF	1855,351	146,078	12,651	1,433
BW03 B	896,635	151,696	-25,496	17,857
BW03 E	896,635	151,696	25,496	17,857
BW04 B DF	1796,405	171,938	-12,612	1,435
BW04 E DF	1796,405	171,938	12,612	1,435
BW04 B	1501,817	171,901	-25,481	17,936
BW04 E	1501,817	171,901	25,481	17,936
BW05 B DF	1808,497	197,745	-12,353	1,442
BW05 E DF	1808,497	197,745	12,353	1,442
BW05 B	1408,861	197,472	-25,401	18,47
BW05 E	1408,861	197,472	25,401	18,47
BW06 DF B	1700,565	223,833	-11,68	1,46
BW06 DF E	1700,565	223,833	11,68	1,46
BW06 B	1039,099	222,722	-25,253	20,58
BW06 E	1039,099	222,722	25,253	20,58
BW07 DF	2296,149	246,985	0	1,494
BW08 B DF	1083,711	269,149	-8,01	1,545
BW08 E DF	1083,711	269,149	8,01	1,545
BW08 B	254,074	268,539	-25,182	29,747
BW08 E	254,074	268,539	25,182	29,747
BW09 B DF	634,27	294,596	-4,737	1,594
BW09 E DF	634,27	294,596	4,737	1,594
BW09 B	135,673	294,787	-25,043	31,833
BW09 E	135,673	294,787	25,043	31,833
BW10 B DF	218,167	315,965	-2,92	1,613
BW10 E DF	218,167	315,965	2,92	1,613
BW10 B	61,079	319,01	-24,584	33,303
BW10 E	61,079	319,01	24,584	33,303
BW11 DF	243,137	341,216	0	1,641
BW11 B	38,827	343,551	-21,492	34,326
BW11 E	38,827	343,551	21,492	34,326
Pique popa	10992,204	-5,012	0	25,273
Pique proa	7036,964	356,364	0	26,516

ANEXO 6. ESQUEMA DE CARGA

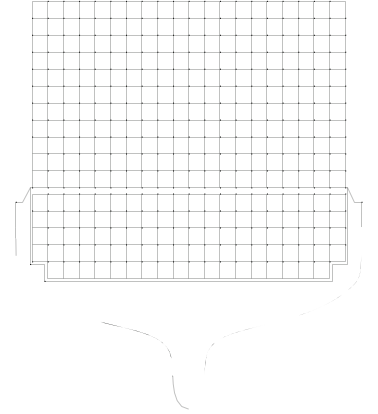
Bodega 1 Columna 1
220 TELs



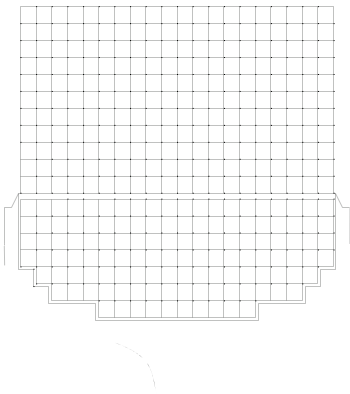
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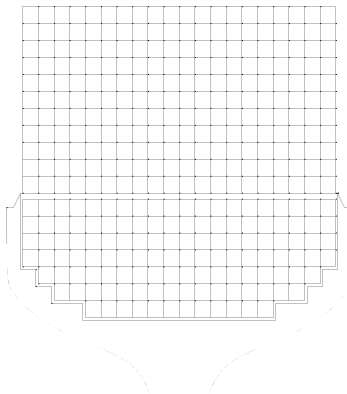
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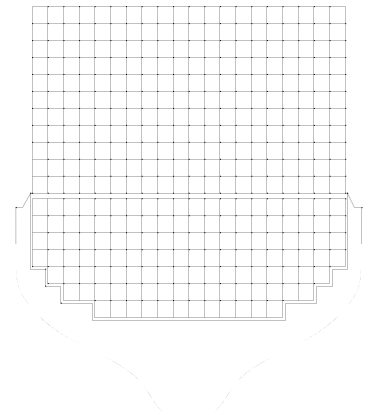
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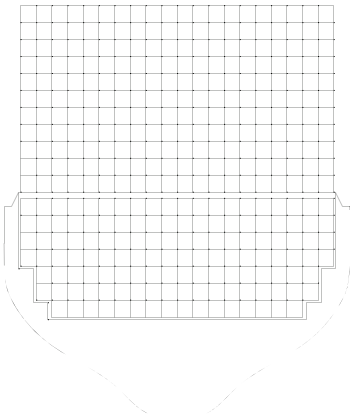
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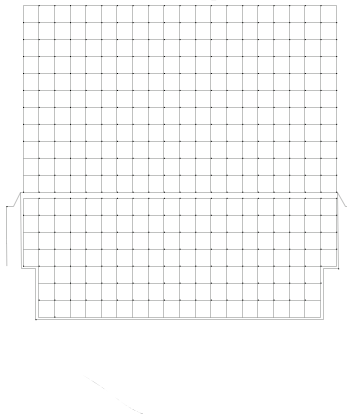
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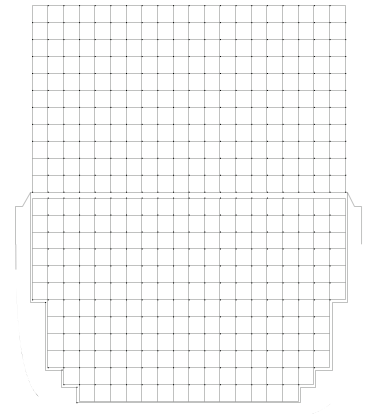
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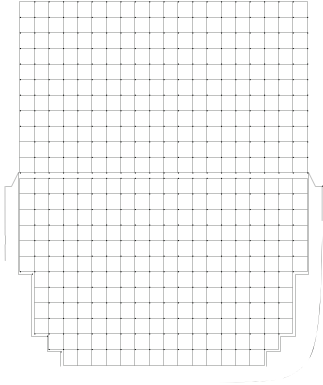
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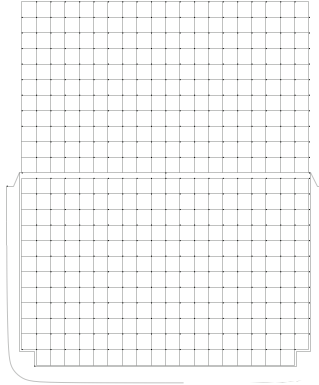
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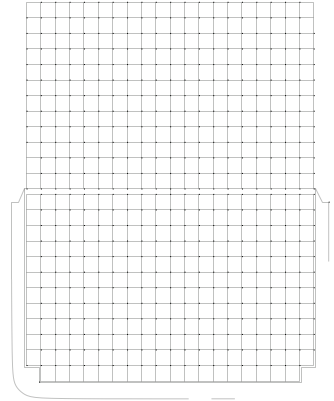
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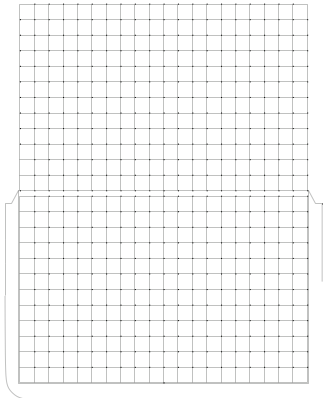
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458 TEUs



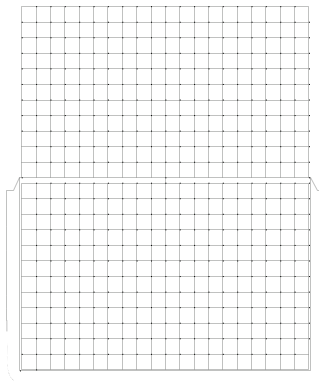
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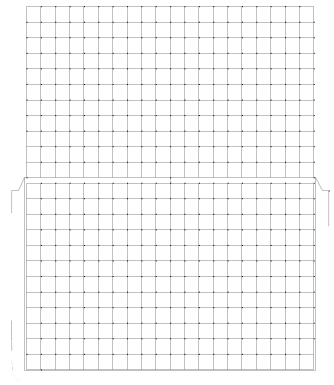
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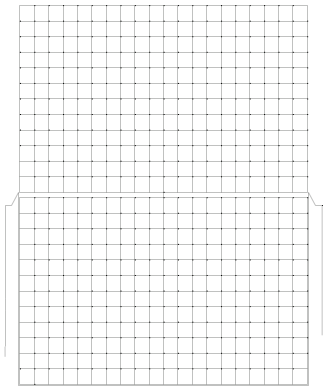
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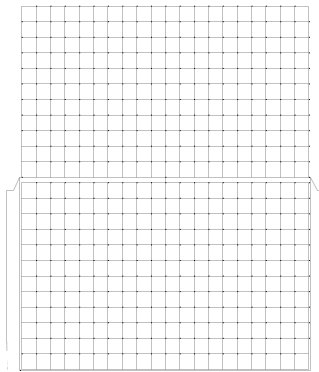
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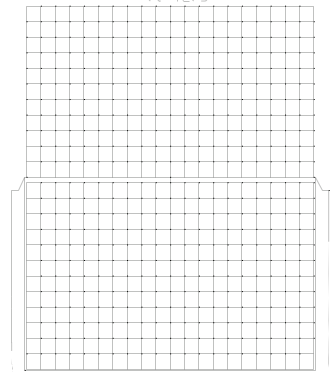
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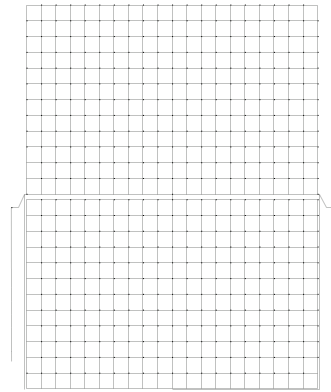
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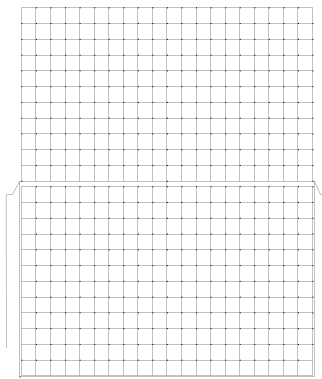
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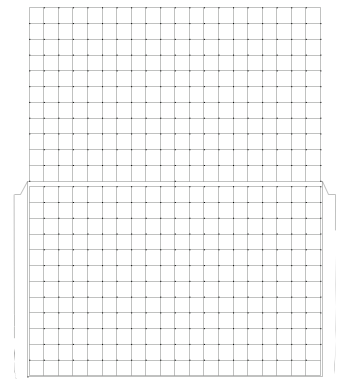
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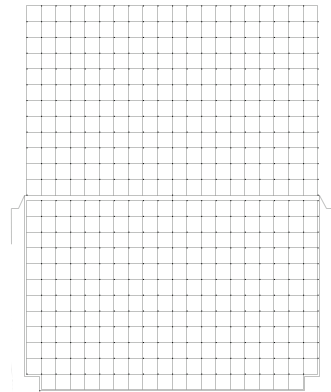
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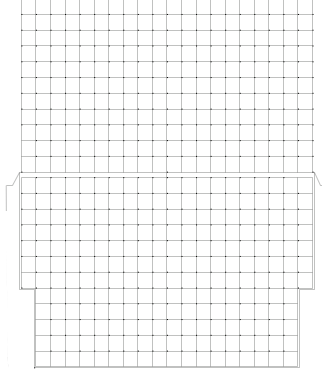
Bodega 6 Columna 1
460 TEUs



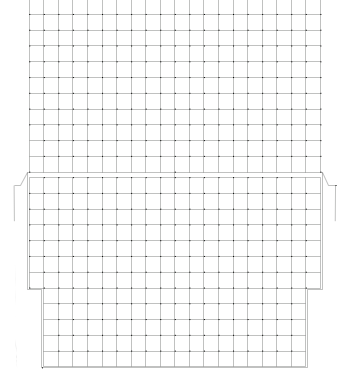
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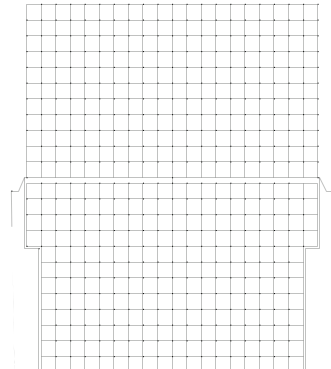
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450 TEUs



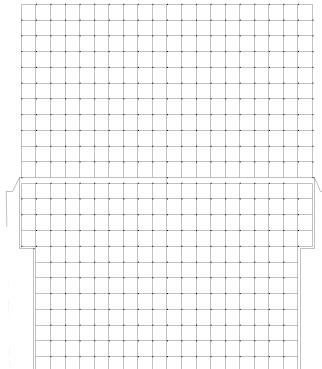
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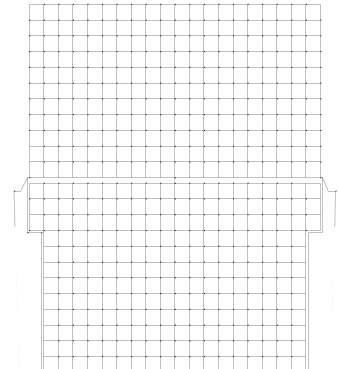
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444 TEUs



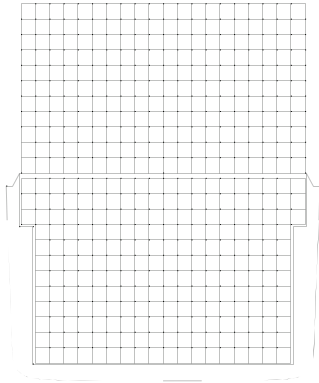
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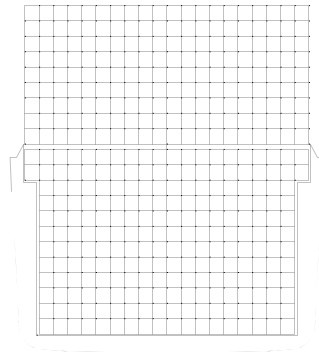
Bodega 7 Columna 3
442 TEUs



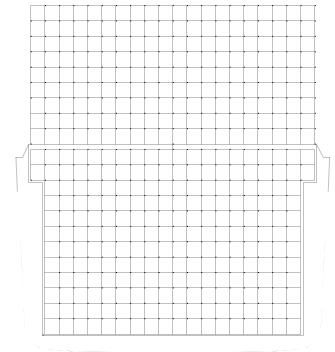
Boulogne 7 Columna 4
442 TELIS



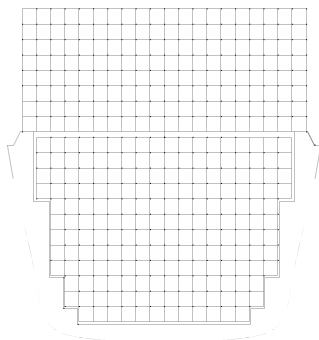
Boulogne 8 Columna 1
400 TELIS



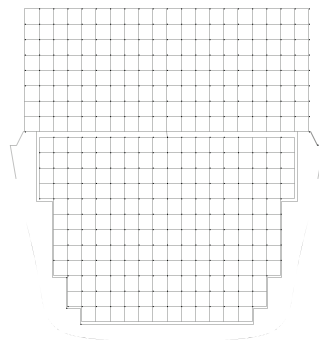
Boulogne 8 Columna 2
400 TELIS



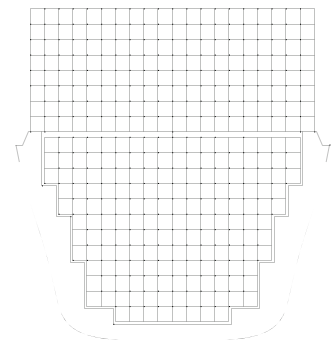
Boulogne 9 Columna 3
376 TELIS



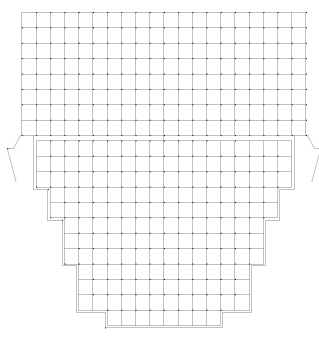
Boulogne 9 Columna 3
376 TELIS



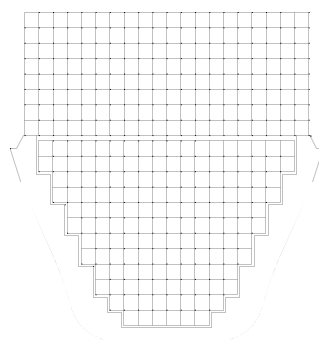
Boulogne 9 Columna 1
356 TELIS



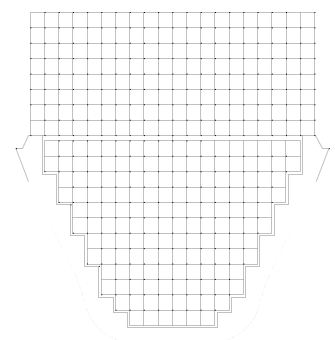
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356 TELIS



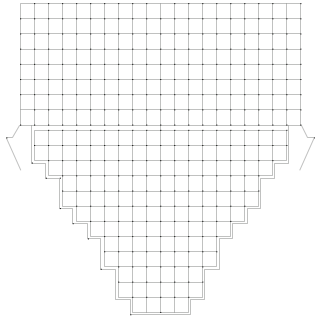
Boulogne 9 Columna 3
308 TELIS



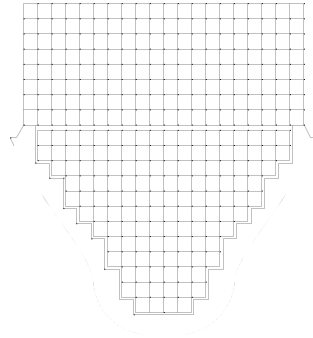
Boulogne 9 Columna 4
308 TELIS



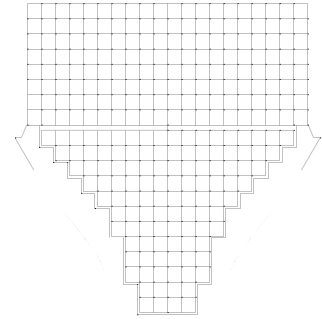
Rowena 10 Column 1
204 TEUs



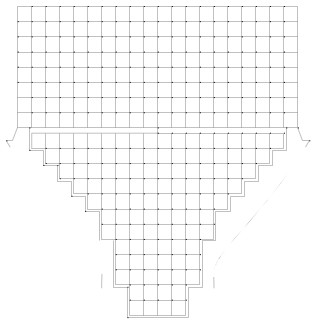
Rowena 10 Column 2
204 TEUs



Rowena 10 Column 3
272 TEUs



Rowena 10 Column 4
272 TEUs



Rowena 11 Column 1
160 TEUs

