



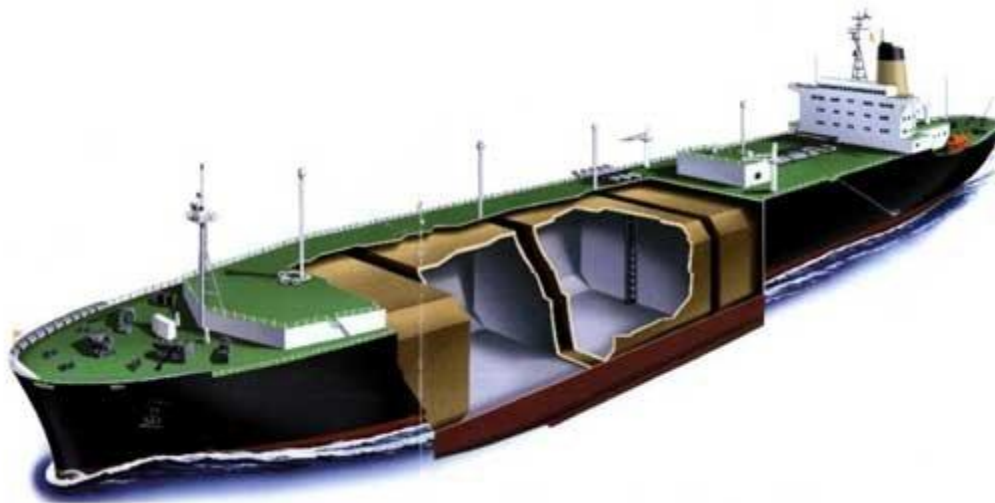
LNG TANKER 160.000m³

NÚMERO 17-05

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CUADERNO 4

CÁLCULOS DE ARQUITECTURA NAVAL





GRADO EN INGENIERÍA NAVAL Y OCEÁNICA

TRABAJO FIN DE GRADO

CURSO 2.017-2018

PROYECTO NÚMERO 17/05

TIPO DE BUQUE: LNG carrier.

CLASIFICACIÓN, COTA Y REGLAMENTOS DE APLICACIÓN: Bureau Veritas, SOLAS, MARPOL, CIG.

CARACTERÍSTICAS DE LA CARGA: LNG con una capacidad de 160.000 m³.

VELOCIDAD Y AUTONOMÍA: 19.5 knots a velocidad de servicio, al 85% MCR + 15% MM y 5000 millas de autonomía.

SISTEMAS Y EQUIPOS DE CARGA / DESCARGA: bombas de carga y de vapor habituales en buques de este tipo.

PROPULSIÓN: dual-fuel diesel-electric (DFDE)

TRIPULACIÓN Y PASAJE: capacidad para 40 tripulantes en camarotes dobles e individuales.

OTROS EQUIPOS E INSTALACIONES: los habituales en este tipo de buques.

Ferrol, 18 Setiembre 2017

ALUMNA: D^a Carmen Seoane Fernández

ÍNDICE

1. INTRODUCCIÓN.....	4
2. DEFINICIÓN DE ZONA ESTANCA.....	4
3. PUNTOS DE INUNDACIÓN PROGRESIVA.....	5
4. DISPOSICIÓN DEL COMPARTIMENTADO.....	6
5. JUSTIFICACIÓN TANQUES Y CAPACIDADES.....	12
5.1. CAPACIDADES TANQUES DE FUEL OIL.....	13
5.2. CAPACIDADES TANQUES DE DIESEL.....	15
5.3. CAPACIDADES TANQUES DE ACEITE.....	15
5.4. CAPACIDADES TANQUES DE AGUA DULCE.....	16
5.5. CAPACIDADES TANQUES DE AGUAS GRISES Y NEGRAS.....	16
5.6. CAPACIDADES TANQUES DE LODOS.....	17
5.7. COMPROBACIÓN CAPACIDAD TANQUES.....	17
5.8. CAPACIDADES TANQUES DE LASTRE.....	18
5.9. CAPACIDADES TANQUES DE CARGA.....	19
6. CURVA DE KN.....	20
7. CURVAS HIDROSTÁTICAS.....	22
ANEXO I. Calibración tanques.....	26
ANEXO II. Fichas motores generadores.....	58
ANEXO III. COMPARTIMENTADO.....	61

1. INTRODUCCIÓN.

En este cuaderno se define la disposición de las zonas del buque así como la distribución de tanques para comprobar los aspectos relacionados con la estabilidad. Se recuerdan características principales del buque:

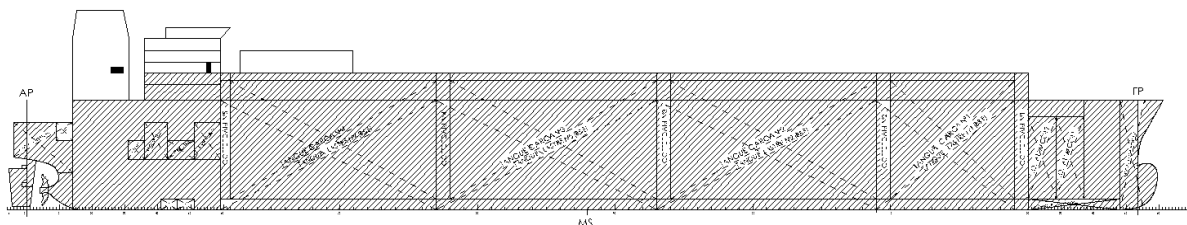
Lpp (m)	271,3
B (m)	45,4
D (m)	26,4
T (m)	12,3
Δ (t)	119484,5
LBD (m ³)	324.682,40
Cb	0,767
Cm	0,992
Cp	0,774
V (kn)	19,5

Tabla 1 Características principales

2. DEFINICIÓN DE ZONA ESTANCA.

Se define zona estanca como aquella zona que no dispone de aberturas o si las tuviera estarán protegidas con cierres estancos a la intemperie.

La zona estanca de el buque proyecto abarcará desde la línea base hasta la cubierta de francobordo, a 26,4 metros. Será zona estanca la parte superior de los tanques que sobresale de la cubierta de francobordo.

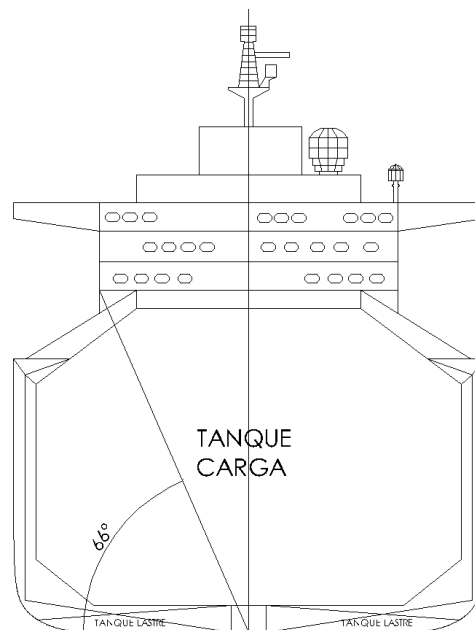


3. PUNTOS DE INUNDACIÓN PROGRESIVA.

Los puntos de inundación progresiva son aberturas no estancas a la intemperie que se sitúan por encima de la cubierta de francobordo. Son puntos que provocarán una inundación progresiva si están sumergidos. Podrá soportar sin filtrar agua una situación de inmersión transitoria como un golpe de mar pero no una situación de inmersión permanente. Limitarán el ángulo de inundación.

En este buque se considerará como puntos de inundación progresiva los accesos en la superestructura a la zona de habilitación así como la ventilación de la cámara de máquinas. Se considerará que están situados a:

PUNTOS INUNDACIÓN PROGRESIVA	Xg(m)	Yg(m)	Kg(m)
ACCESO HABILITACIÓN(B)	44,8	-14,4	33,0
ACCESO HABILITACIÓN(E)	44,8	14,4	33,0
VENTILACIÓN C.M. (B)	22,0	-13,0	35
VENTILACIÓN C.M. (E)	22,0	13,0	35



4. DISPOSICIÓN DEL COMPARTIMENTADO.

Para calcular los elementos del compartimentado, habrá que regirse por el Código Internacional de Gaseros, por la SSCC y por SOLAS. Este buque está catalogado como un buque 2G ya que está destinado al transporte de gas natural.

CLARA DE CUADERNAS

Para definir el espacio entre cuadernas y bulárcamas se tendrá en cuenta el Barcelona Knutsen ya que la sociedad de clasificación no hace referencia al espaciado de las mismas. Se adjunta la ficha de dicho buque en el anexo.

Zona de popa y cámara de máquinas: 800 mm

Zona de tanques: 3360 mm

Zona de proa: 800 mm

Cada dos claras, habrá una bulárcama.

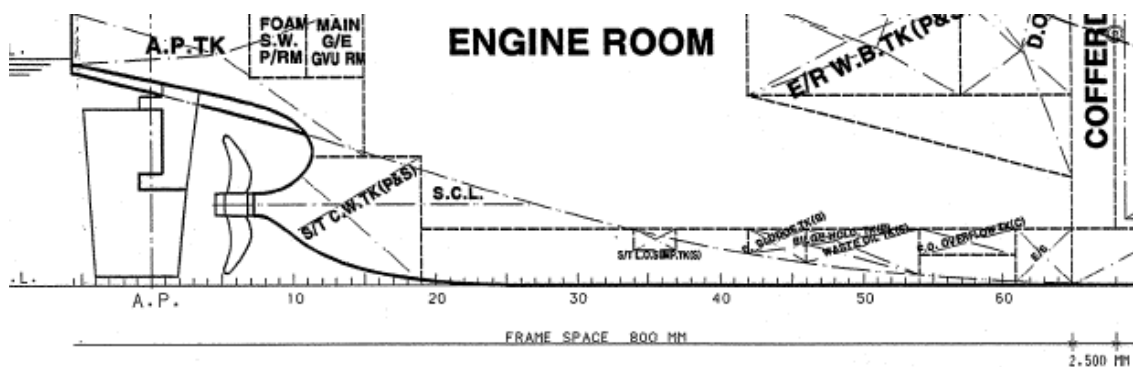


Ilustración 1 Espacio entre cuadernas en popa y cámara de máquinas

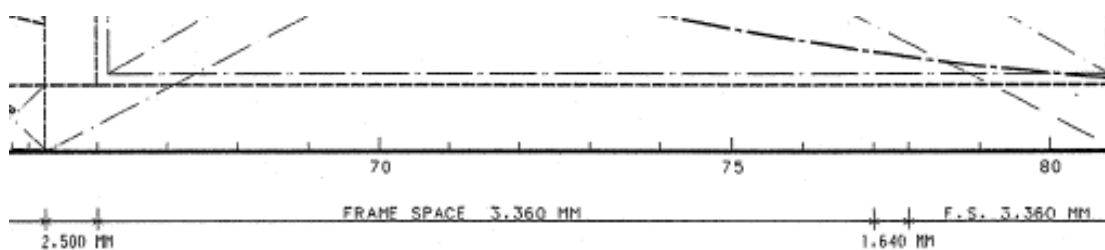


Ilustración 2 Espacio entre cuadernas en zona de tanques

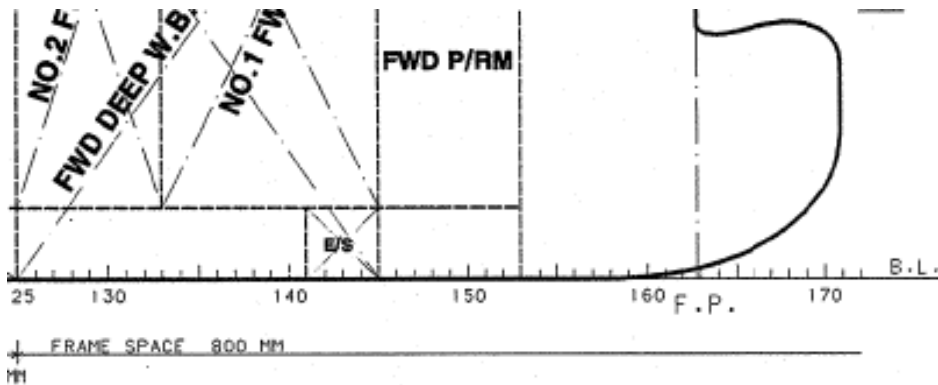


Ilustración 3 Espacio entre cuadernas en zona de proa

DOBLE CASCO

El código CIG: “Buques de tipos 2G/2PG y 3G: desde la línea de trazado de la chapa del forro del fondo, en el eje longitudinal, una distancia no menor que la extensión vertical de la avería especificada en 2.5.1.2.3; en ningún punto será de menos de 760 mm desde la chapa del forro. “

Tomando de referencia el buque Barcelona Knutsen se considerará un doble casco de 2,2 metros que se utilizará como tanques de lastre.

DOBLE FONDO

La sociedad de clasificación Bureau Veritas exige una altura mínima del doble fondo de 0,7 m: “La altura del doble fondo debe ser suficiente para asegurar el acceso a todas las partes y, en el camino de la viga central, debe ser no menos de 0,7m.

Tomando de referencia el buque Barcelona Knutsen se considerará un doble fondo de 2,6 metros. En la línea de crujía se instalará a lo largo de la eslora el pipe duct. Este conducto tendrá la altura del doble fondo y tendrá una manga de 3,4 metros y se utilizará para el paso de cables y tuberías necesarias así como para el acceso de la tripulación.

Para hacernos una idea de este valor tomando de referencia $h = \frac{B}{20} = 2,27 \text{ m}$ para buques de pasaje o de carga que no sean buques tanque (SOLAS).

PIQUE DE POPA

El reglamento no exige un valor, suele tomarse como referencia el 4% de la eslora para buques de grandes dimensiones. También se tendrá en cuenta la disposición del buque base. Estos datos son tomados desde la perpendicular de popa hacia proa:

$$4\%L_{pp} = 10,85 \text{ m}$$

Barcelona Knutsen 11,1 m.

Para este proyecto tomaremos por tanto un valor de 11,2 m coincidiendo así con la cuaderna 14.



PIQUE DE PROA

Para calcular el mamparo de colisión utilizaremos lo exigido por el SOLAS en el capítulo II:

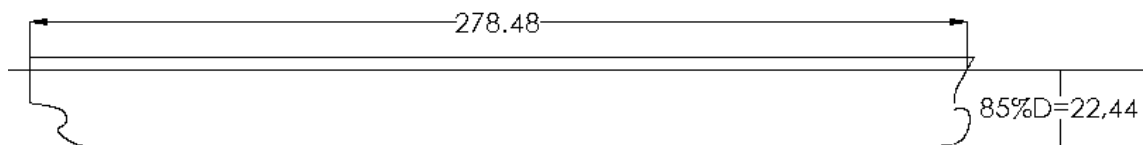
“Se instalará un mamparo de colisión que será estanco hasta la cubierta de cierre. Este mamparo estará situado a una distancia de la perpendicular de proa no inferior al 5% de L o a 10 m, si esta segunda magnitud es menor, y, salvo cuando la Administración permita otra cosa, dicha distancia no será superior al 8% de L. Cuando cualquier parte del buque que quede debajo de la flotación se prolongue por delante de la perpendicular de proa, como por ejemplo ocurre con una proa de bulbo, las distancias estipuladas en el párrafo 2 se medirán desde un punto situado:

- *A mitad de dicha prolongación.*
- *A una distancia igual al 1,5% de la parte de la eslora del buque que quede por delante de la perpendicular de proa.*
- *A una distancia de 3 m por delante de la perpendicular de proa.*

Tomándose de esas medidas la menor. “

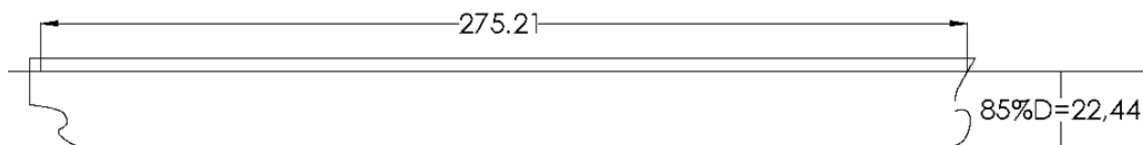
Para este cálculo se debe definir la eslora que se utilizará. Se tomará el valor máximo de:

96 % de la eslora total desde el extremo de la roda hasta el extremo del codaste en una flotación al 85 % del puntal mínimo de trazado:



$$96\% \text{ de } 278,48 = 267,34 \text{ m}$$

Eslora desde el extremo de la roda hasta el eje de la mecha del timón en la misma flotación:



$$L = 275,21 \text{ m}$$

Se escogerá el valor máximo, por tanto la eslora para los cálculos del mamparo de colisión será $L = 275,21 \text{ m}$.

Se recuerda que “Este mamparo estará situado a una distancia de la perpendicular de proa no inferior al 5% de L o a 10 m, si esta segunda magnitud es menor”. A partir de la eslora calculada se obtiene que:

$$5\% \text{ de } L = 13,76 \text{ m}$$

En este proyecto por tanto se escogerá 10 metros. Ahora se debe tener en cuenta el bulbo en proa para restar ese valor. Se considerará el menor de:

Mitad de dicha prolongación. 2,40 m

Distancia igual al 1,5% de la parte de la eslora del buque que quede por delante de la perpendicular de proa. 4,16 m

Distancia de 3 m por delante de la perpendicular de proa.

Se escogerá 2,40 m por ser el valor mínimo. Al valor calculado antes de 10 metros se tiene que restar este valor mínimo, por tanto, se obtiene:

$$10 - 2,40 = 7,60 \text{ metros}$$

Si a la eslora calculada se le resta este valor se obtiene la distancia mínima donde debe colocarse el mamparo de colisión.

$$DISTANCIA \text{ MÍN} = 267,60 \text{ m}$$

Según el reglamento no puede exceder del 8% de la eslora. A este valor se le restará el valor de 2,40 metros antes calculado.

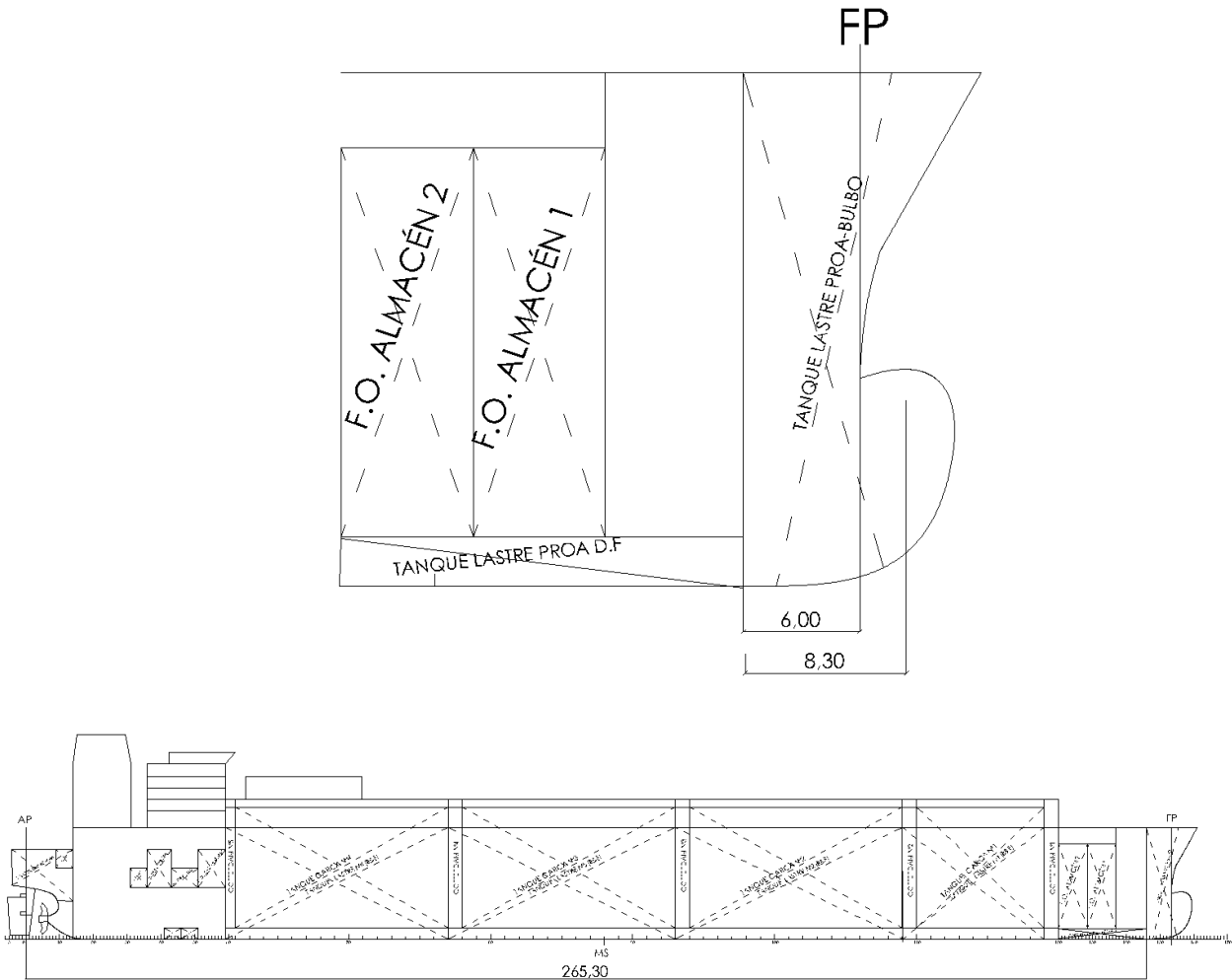
$$22,02 - 2,40 = 19,62 \text{ m}$$

Restando al valor de la eslora,

$$DISTANCIA \text{ MÁX} = 255,59 \text{ m}$$

Por tanto, el mamparo de colisión estará situado entre esos dos valores. En este proyecto se situará haciéndolo coincidir con una cuaderna:

$$PIQUE \text{ PROA} = \text{CUADERNA } 146 = 265,30 \text{ m}$$



LONGITUD CÁMARA DE MÁQUINAS

Para definir este valor, debemos basarnos en el buque base Barcelona Knutsen. La longitud en este buque es de 47,4 metros. La cámara de máquinas incluye espacios para bombas, tanques auxiliares y equipos del buque.

En este proyecto la longitud de la cámara de máquinas será 47,2 metros coincidiendo con la CUADERNA 59.

COFFERDAMS

Los espacios de bodega estarán separados de los espacios de máquinas y de calderas, de alojamiento y de servicio, puestos de control, cajas de cadenas, tanques de agua potable y de agua destinada a usos domésticos, y pañoles. Cada tanque de carga irá separado mediante un cofferdam, se menciona en este punto que estos cofferdams irán vacíos y no se utilizarán como tanques de lastre.

Se situarán cofferdams cerrando la cámara de máquinas y situados entre los tanques. Las medidas se han obtenido a partir del buque base. Se muestra una tabla para visualizar su posición:

COFFERDAM	LONGITUD (m)	POSICIÓN (m)	Nº CUADERNA
Nº5	2,40	47,20-49,60	59-62
Nº4	3,36	100,00-103,35	77-78
Nº3	3,36	153,75 -157,10	93-94
Nº2	3,36	207,65-210,90	109-110
Nº1	3,36	241,15-244,50	119-120

Se muestra un plano de la disposición del compartimentado en el anexo.

5. JUSTIFICACIÓN TANQUES Y CAPACIDADES.

En este apartado se calcularán los volúmenes mínimos de los consumos para la autonomía que requiere el buque.

La RPA obliga a tener de autonomía de 5.000 millas a una velocidad de servicio de 19,5 Kn, por tanto, el tiempo de navegación será de 11 días aproximadamente.

5.1. CAPACIDADES TANQUES DE FUEL OIL.

Este buque llevará instalados cuatro motores dual-fuel como motores generadores para la planta eléctrica. Se debe tener en cuenta la condición de funcionamiento de estos motores. Simultáneamente funcionarán tres motores.

El dimensionamiento de los tanques de combustible lo realizaremos teniendo en cuenta la situación de mayor consumo, es decir, cuando uno de los motores de menor potencia esté parado (16V50DF). De forma normal el buque navegará con uno de los motores 16V50DF y dos motores 18V50DF. La información para estos cálculos se obtiene de la ficha técnica de los motores.

CÁLCULO DEL CONSUMO MOTORES

$$C_{FO} = C_e * PS * t_{nav} * 10^{-6}$$

Siendo, C_e el consumo específico de los motores 18V50DF será de 198 g/kwh y PS la potencia del motor en kw (17.650 kW y dos de 15.600 kW) considerando un 85% de margen. El tiempo de navegación se considerará de 11 días (264 horas), por tanto se obtiene:

$$C_{FO} = 198 * (3 * 17.650) * 0.85 * 264 * 10^{-6}$$

$$C_{FO} = 2227 t$$

El consumo utilizado es el valor más alto (100%fuel), el motor operará de forma normal añadiendo el gas del biol-off y por tanto, el consumo de fuel será algo menor. Se ha optado por este valor para tener un margen de capacidad en el tanque.

Tomando la densidad del fuel como 0,9 t/m³ se obtiene el volumen necesario:

$$Vol_{FO} = 2474 m^3$$

CÁLCULO DEL TANQUE ALMACÉN

El buque llevará dos tanques almacén en proa que tendrán una capacidad total igual al volumen de combustible necesario menos dos días de consumo. Así se asegura la disponibilidad del combustible que será el que más se consuma.

El volumen necesario para dos días de consumo se calculará de la misma forma pero considerando dos días de navegación.

$$C_{FO} = C_e * PS * t_{nav} * 10^{-6} = 284 t \rightarrow V_{2d} = 405 m^3$$

Tomaremos una permeabilidad de 0,98:

$$Vol_{TAFO} = \frac{2474 - 405}{0,98} = 2112 m^3$$

Cada tanque, por tanto deberá tener una capacidad mínima de 1056 m³.

CÁLCULO DEL TANQUE DE SEDIMENTACIÓN

El tanque de sedimentación debe suministrar al tanque de uso diario el fuel, por tanto, se considerará que este tanque tenga capacidad para almacenar el fuel necesario para dos días de navegación. Se tomará una permeabilidad de 0,98.

$$Vol_{TSFO} = 414 m^3$$

Se instalarán dos tanques de sedimentación a cada banda de la cámara de máquinas con una capacidad mínima de 207 m³ cada uno.

CÁLCULO DEL TANQUE DE USO DIARIO

Se instalarán dos tanques de uso diario a cada banda de la cámara de máquinas que tendrán la capacidad para albergar el consumo de un día de navegación cada uno.

Tomando una permeabilidad de 0,98 cada tanque tendrá:

$$Vol_{UDFO} = 203 m^3$$

5.2. CAPACIDADES TANQUES DE DIESEL.

El diesel se utilizará en el momento de arranque del buque y en zonas de puerto o zonas protegidas. Se estimará una capacidad para los tanques que corresponda a tres días de navegación. Se tomará una densidad de 0,9 t/m³, un consumo de 198 g/kwh y 0,97 de permeabilidad.

$$C_{DO} = C_e * PS * t_{nav} * 10^{-6} = 607 \text{ t}$$

$$Vol_{TDO} = 696 \text{ m}^3$$

Se instalarán dos tanques de diesel a cada banda de la cámara de máquinas con una capacidad cada uno de 348 m³.

5.3. CAPACIDADES TANQUES DE ACEITE.

Para este cálculo se tendrá en cuenta el consumo de aceite obtenido del catálogo de los motores 18V50DF para una autonomía de 11 días (264 h). A continuación se muestra el cálculo.

$$C_{AC} = C_e * PS * t_{nav} * 10^{-6} = 5,8 \text{ t}$$

El consumo de aceite total será por tanto $C_{AC} = 5,8 \text{ t}$

El volumen teniendo en cuenta la densidad 0,9 t/m³ resulta

$$Vol_{AC} = 6,5 \text{ m}^3$$

A este volumen hay que añadirle el volumen que define necesario el catálogo de los motores. Siendo este volumen de 15 m³ para los motores 18V50DF.

El volumen total necesario y teniendo en cuenta una permeabilidad de 0,97 será:

$$Vol_{AC} = 70 \text{ m}^3$$

Se instalarán dos tanques de aceite, uno a cada banda del buque. Cada tanque tendrá una capacidad de 35 m³.

5.4. CAPACIDADES TANQUES DE AGUA DULCE.

Para estimar la cantidad de agua dulce necesaria se tendrá en cuenta la norma UNE EN ISO 15748 que considera 175 litros por persona y día. El buque tiene capacidad para 40 tripulantes y 11 días de autonomía, por tanto y teniendo en cuenta un permeabilidad de 0,97 se obtiene:

$$Vol_{AD} = 79.382 \text{ l} \approx 80 \text{ m}^3$$

Se instalarán un tanque a cada banda del buque a popa del pique de popa. Cada tanque con una capacidad de 40 m³.

5.5. CAPACIDADES TANQUES DE AGUAS GRISES Y NEGRAS.

A partir de la norma UNE EN ISO 15749 de desagües en embarcaciones se considerará que cada tripulante generará 180 l/día de aguas sucias. Por tanto la capacidad necesaria total teniendo en cuenta los 40 tripulantes y una permeabilidad de 0,97:

$$Vol_{TAGN} = 81.650 \text{ l} \approx 82 \text{ m}^3$$

Se colocará UN tanque en la cámara de máquinas.

5.6. CAPACIDADES TANQUES DE LODOS.

El tanque de lodos lo dimensionaremos de acuerdo con el convenio MARPOL. En el Anexo I, Regla 17 se define a modo de orientación la capacidad adecuada del tanque de lodos en buques que no lleven agua de lastre en los tanques de fuel oil.

$$Vol_{LOD} = K * C * D$$

Siendo $k=0,01$ para buques que utilicen fuel oil pesado para la máquina principal, C el consumo diario de fuel 203 m³ y D la duración máxima entre puertos en los que se pueda descargar este tipo de lodos, tomaremos este valor como el dato de la autonomía (11 días).

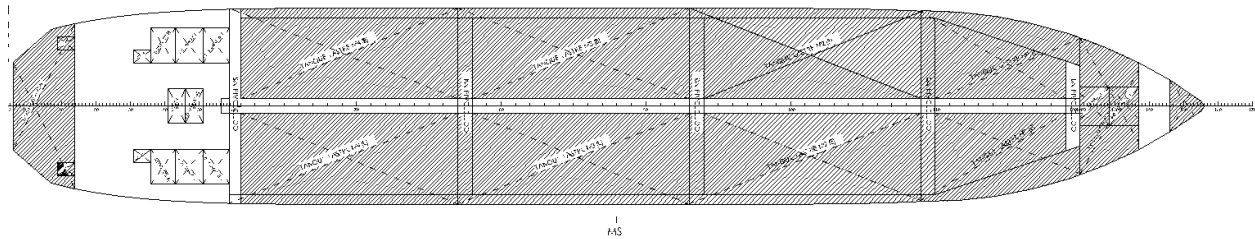
$$Vol_{LOD} = 23 \text{ m}^3$$

5.7. COMPROBACIÓN CAPACIDAD TANQUES.

TANQUES	m3 mínimo	m3 reales
F.O. ALMACÉN (2)	1.056	1.187,30
F.O. ALMACÉN (1)	1.056	1.187,30
F.O.SEDIMENTACIÓN (E)	414	444,5
F.O.SEDIMENTACIÓN (B)	414	444,5
F.O. USO DIARIO (E)	203	219
F.O. USO DIARIO (B)	203	219
D.O (E)	348	377,5
D.O (B)	348	377,5
ACEITE (E)	35	51,8
ACEITE (B)	35	51,8
AGUA DULCE (E)	40	48
AGUA DULCE (B)	40	48
AGUAS SUCIAS	41	79,8
LODOS	23	79,8

5.8. CAPACIDADES TANQUES DE LASTRE.

A continuación se muestra las capacidades totales de cada tanque de lastre obtenidos a partir del Maxsurf y su ubicación en el buque.



TANQUE LASTRE PROA-BULBO	3200,305
TANQUE LASTRE PROA DF	584,789
TANQUE LASTRE POPA	1743,618
TANQUE LASTRE DC Nº1 (E)	3216,820
TANQUE LASTRE DC Nº1 (B)	3216,820
TANQUE LASTRE DC Nº2 (B)	4034,831
TANQUE LASTRE DC Nº2 (E)	4034,831
TANQUE LASTRE DC Nº3 (B)	4686,973
TANQUE LASTRE DC Nº3 (E)	4686,973
TANQUE LASTRE DC Nº4 (B)	3246,993
TANQUE LASTRE DC Nº4 (E)	3246,993
TANQUE LASTRE COFFERDAM Nº2	4151,561
TANQUE LASTRE COFFERDAM Nº3	4298,209
TANQUE LASTRE COFFERDAM Nº4	4243,858
TOTAL	48593,575

La Capacidad de lastre del buque será de 48.594 m³. El buque proyecto cumplirá que la suma del peso en rosca (39.863 t), el peso de lastre y contando 10% de consumos será lo suficiente para sumergir la hélice en su totalidad. Se obtendrá a partir de las curvas de KN (calculadas en el punto 6).

5.9. CAPACIDADES TANQUES DE CARGA.

Se muestra la capacidad de los tanques de carga obtenidos a partir del Maxsurf y se detalla los requerimientos del proyecto.

TANQUE GAS Nº 1	29685,60
TANQUE GAS Nº 2	47291,96
TANQUE GAS Nº 3	47112,03
TANQUE GAS Nº 4	44838,93
TOTAL (m3)	168928,51
PESO (t)	76017,83

Del reporte de Maxsurf se obtiene una capacidad total de 168.929 m³. La capacidad requerida son 160.000 m³, teniendo en cuenta una permeabilidad del 0,97:

$$V(m^3) = \frac{160.000}{0,97} = 164.949$$

Se debe tener en cuenta el capítulo 15 del Código Internacional de Gaseros (CIG) que pone límite al llenado del tanque. Este límite de llenado no excederá del 98%, por tanto:

$$V_{REQUERIDO} = \frac{164.949}{0.98} = 168.314,7 \text{ m}^3$$

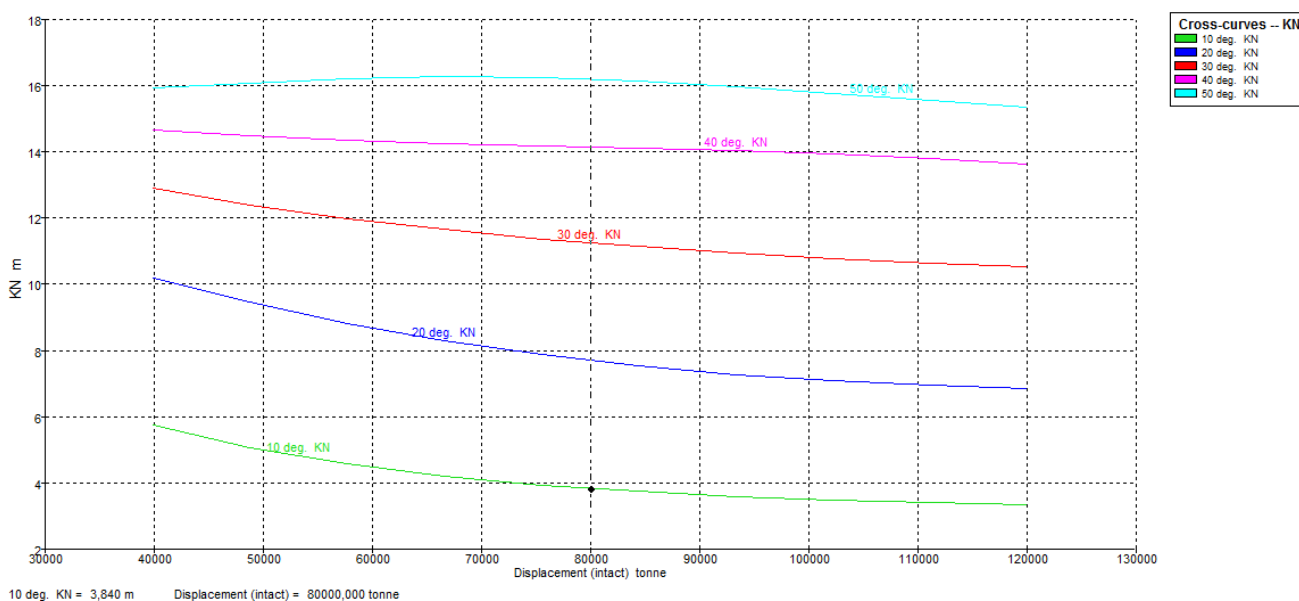
Como puede comprobarse, se cumple lo especificado en la RPA del proyecto. Si tomamos la densidad del gas licuado como 0,45 t/m³, se obtendría un peso de 76.524 t.

6. CURVA DE KN.

Se calculará a partir de un desplazamiento inicial que tomaremos como el peso en rosca hasta nuestro desplazamiento final utilizando 10 incrementos de desplazamiento. Los ángulos de escora variarán de 10° a 50°.

Se tomarán valores de -1%Lpp, 1%Lpp y para asiento 0. A continuación se muestran los resultados:

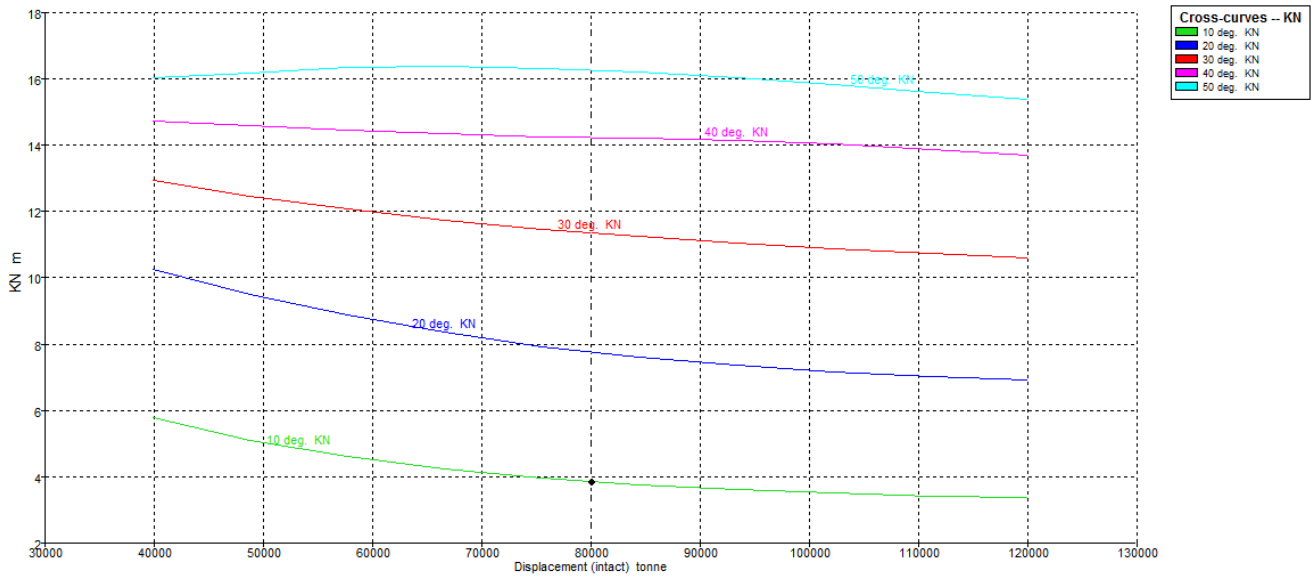
TRIMADO -1%Lpp



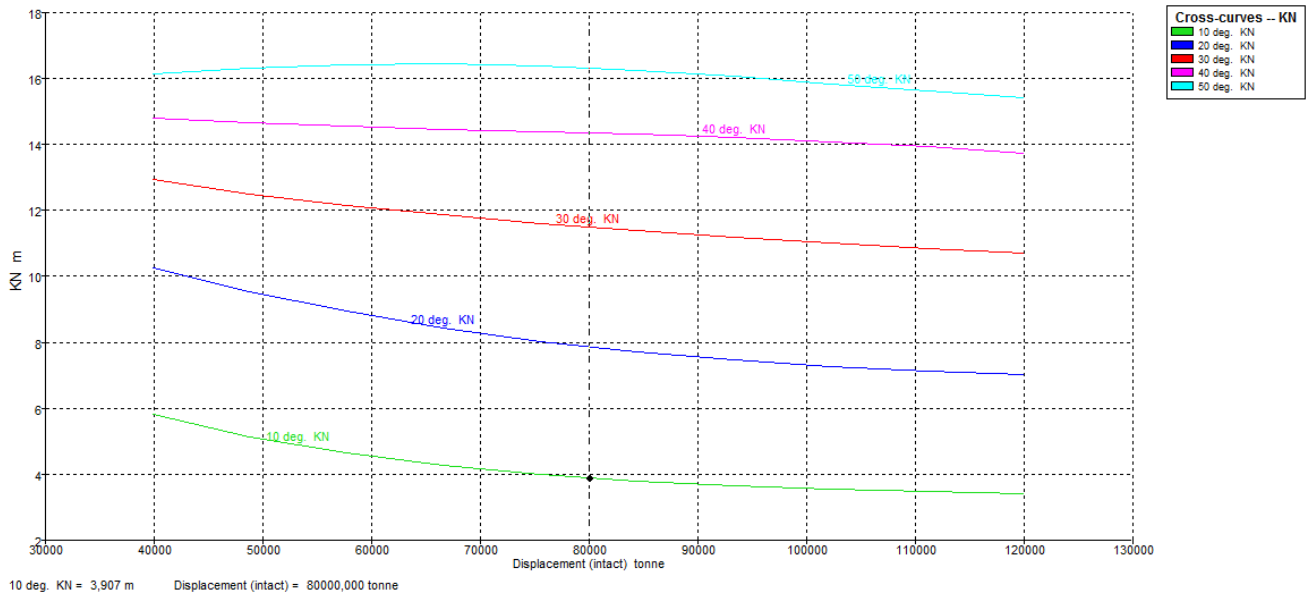
10 deg. KN = 3,840 m Displacement (intact) = 80000,000 tonne

	Displacement (intact) tonne	Draft Amidships m	Trim (+ve by stern) m	LCG m	TCG m	Assu med VCG	KN 10,0 deg. Starb.	KN 20,0 deg. Starb.	KN 30,0 deg. Starb.	KN 40,0 deg. Starb.	KN 50,0 deg. Starb.
1	39863	4,569	-2,700 (fixed)	156,112	0,000	0,000	5,750	10,205	12,901	14,668	15,928
2	48767	5,513	-2,700 (fixed)	154,234	0,000	0,000	5,072	9,454	12,404	14,491	16,085
3	57671	6,446	-2,700 (fixed)	152,840	0,000	0,000	4,579	8,822	11,993	14,354	16,220
4	66575	7,371	-2,700 (fixed)	151,735	0,000	0,000	4,215	8,297	11,655	14,248	16,278
5	75479	8,288	-2,700 (fixed)	150,810	0,000	0,000	3,943	7,874	11,375	14,166	16,243
6	84384	9,199	-2,700 (fixed)	149,998	0,000	0,000	3,739	7,539	11,140	14,104	16,132
7	93288	10,102	-2,700 (fixed)	149,247	0,000	0,000	3,587	7,279	10,941	14,035	15,969
8	102192	10,997	-2,700 (fixed)	148,546	0,000	0,000	3,475	7,085	10,772	13,935	15,771
9	111096	11,882	-2,700 (fixed)	147,880	0,000	0,000	3,395	6,945	10,632	13,796	15,562
10	120000	12,757	-2,700 (fixed)	147,241	0,000	0,000	3,341	6,847	10,520	13,619	15,356

TRIMADO 0%Lpp



	Displacement (intact) tonne	Draft Amidships m	Trim (+ve by stern) m	LCG m	TCG m	Assu med VCG m	KN 10,0 deg. Starb.	KN 20,0 deg. Starb.	KN 30,0 deg. Starb.	KN 40,0 deg. Starb.	KN 50,0 deg. Starb.
1	39863	4,669	0,000 (fixed)	146,637	0,000	0,000	5,791	10,257	12,946	14,748	16,038
2	48767	5,607	0,000 (fixed)	146,325	0,000	0,000	5,105	9,509	12,458	14,579	16,193
3	57671	6,534	0,000 (fixed)	146,037	0,000	0,000	4,609	8,881	12,066	14,448	16,335
4	66575	7,452	0,000 (fixed)	145,748	0,000	0,000	4,244	8,358	11,747	14,344	16,386
5	75479	8,362	0,000 (fixed)	145,436	0,000	0,000	3,971	7,935	11,479	14,262	16,330
6	84384	9,263	0,000 (fixed)	145,086	0,000	0,000	3,767	7,605	11,249	14,199	16,203
7	93288	10,156	0,000 (fixed)	144,699	0,000	0,000	3,614	7,354	11,049	14,139	16,028
8	102192	11,039	0,000 (fixed)	144,275	0,000	0,000	3,502	7,166	10,876	14,030	15,821
9	111096	11,914	0,000 (fixed)	143,820	0,000	0,000	3,423	7,027	10,728	13,875	15,605
10	120000	12,775	0,000 (fixed)	143,323	0,000	0,000	3,373	6,927	10,605	13,685	15,395

TRIMADO +1%Lpp

	Displacement (intact) tonne	Draft Amidships m	Trim (+ve by stern) m	LCG m	TCG m	Assumed VCG m	KN 10,0 deg. Starb.	KN 20,0 deg. Starb.	KN 30,0 deg. Starb.	KN 40,0 deg. Starb.	KN 50,0 deg. Starb.
1	39863	4,758	2,700 (fixed)	137,090	0,000	0,000	5,822	10,263	12,950	14,810	16,156
2	48767	5,693	2,700 (fixed)	138,333	0,000	0,000	5,140	9,545	12,504	14,663	16,311
3	57671	6,615	2,700 (fixed)	139,130	0,000	0,000	4,647	8,940	12,153	14,545	16,423
4	66575	7,526	2,700 (fixed)	139,619	0,000	0,000	4,283	8,432	11,858	14,451	16,444
5	75479	8,426	2,700 (fixed)	139,888	0,000	0,000	4,010	8,023	11,604	14,374	16,373
6	84384	9,316	2,700 (fixed)	139,990	0,000	0,000	3,806	7,708	11,379	14,307	16,237
7	93288	10,197	2,700 (fixed)	139,960	0,000	0,000	3,654	7,467	11,179	14,220	16,057
8	102192	11,067	2,700 (fixed)	139,810	0,000	0,000	3,545	7,281	10,999	14,094	15,849
9	111096	11,924	2,700 (fixed)	139,536	0,000	0,000	3,471	7,136	10,842	13,927	15,633
10	120000	12,768	2,700 (fixed)	139,151	0,000	0,000	3,427	7,023	10,708	13,727	15,422

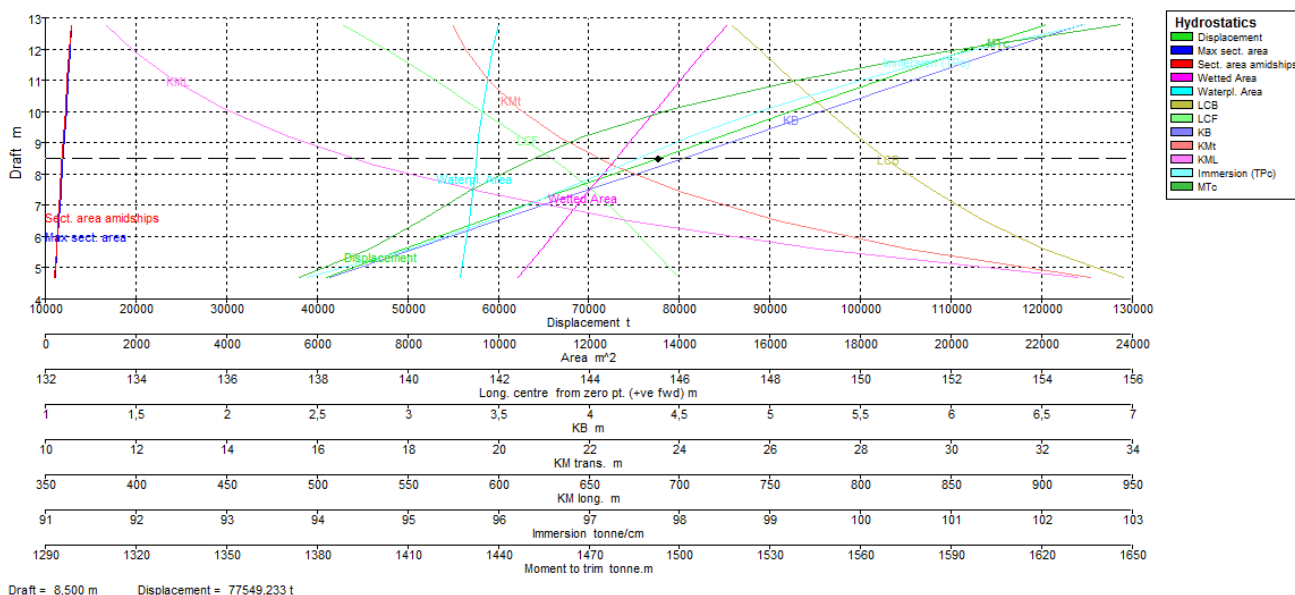
7. CURVAS HIDROSTÁTICAS.

Estas curvas definen el comportamiento de la carena para diferentes calados. Se calcularán para diferentes calados haciendo coincidir los valores con los utilizados en el cálculo de las curvas KN.

Estos cálculos hidrostáticos se realizarán para asiento -1%Lpp, +1%Lpp y para asiento 0.

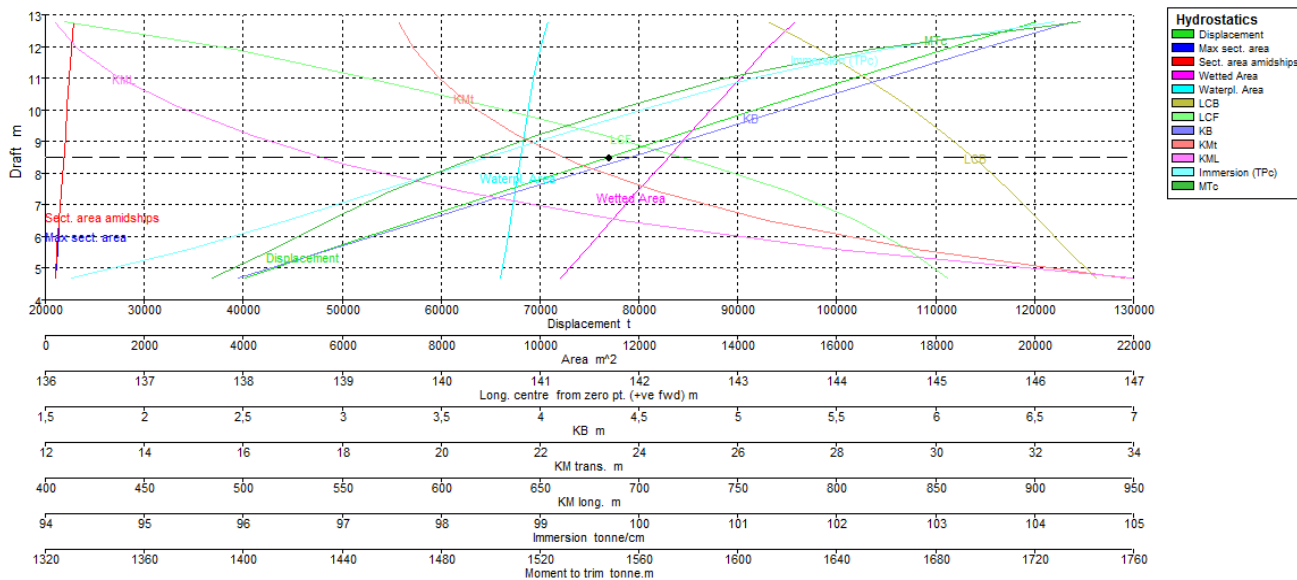
A continuación se muestran los resultados:

TRIMADO -1% Lpp



	Draft Amidships m	4,700	5,600	6,500	7,400	8,300	9,200	10,100	11,000	11,900	12,800
1	Displacement t	41089	49595	58191	66860	75594	84393	93264	102222	111277	120443
2	Heel deg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
3	Draft at FP m	6,050	6,950	7,850	8,750	9,650	10,550	11,450	12,350	13,250	14,150
4	Draft at AP m	3,350	4,250	5,150	6,050	6,950	7,850	8,750	9,650	10,550	11,450
5	Draft at LCF m	4,803	5,697	6,591	7,484	8,377	9,268	10,159	11,049	11,939	12,829
6	Trim (+ve by stern) m	-2,700	-2,700	-2,700	-2,700	-2,700	-2,700	-2,700	-2,700	-2,700	-2,700
7	WL Length m	269,941	270,753	270,816	269,166	268,201	267,443	263,695	264,174	265,176	267,701
8	Beam max extents on	45,268	45,329	45,356	45,371	45,381	45,388	45,393	45,397	45,400	45,401
9	Wetted Area m²	10437,5	10951,3	11461,4	11970,5	12479,5	12992,2	13508,3	14023,8	14547,8	15055,4
10	Waterpl. Area m²	9160,12	9270,60	9356,18	9429,11	9499,50	9571,76	9656,90	9757,03	9869,15	9998,63
11	Prismatic coeff. (Cp)	0,673	0,684	0,695	0,708	0,718	0,727	0,743	0,748	0,750	0,748
12	Block coeff. (Cb)	0,547	0,572	0,593	0,614	0,632	0,646	0,667	0,676	0,683	0,686
13	Max Sect. area coeff. (C)	0,944	0,952	0,957	0,961	0,966	0,969	0,972	0,974	0,975	0,977
14	Waterpl. area coeff. (C)	0,750	0,755	0,762	0,772	0,780	0,789	0,807	0,814	0,820	0,823
15	LCB from zero pt. (+ve)	155,788	154,058	152,734	151,664	150,755	149,949	149,196	148,486	147,805	147,143
16	LCF from zero pt. (+ve)	145,998	145,383	144,786	144,138	143,390	142,494	141,547	140,603	139,606	138,545
17	KB m	2,573	3,032	3,492	3,952	4,411	4,871	5,332	5,794	6,257	6,723
18	KG m	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300
19	BMT m	30,496	26,013	22,681	20,118	18,093	16,457	15,112	13,992	13,054	12,266
20	BML m	917,220	773,773	668,383	588,571	527,326	479,467	443,006	415,173	393,250	376,540
21	GMT m	20,569	16,563	13,704	11,611	10,054	8,886	8,010	7,359	6,890	6,575
22	GML m	907,294	764,322	659,406	580,064	519,287	471,896	435,903	408,539	387,087	370,849
23	KMT m	33,067	29,044	26,172	24,069	22,503	21,328	20,443	19,785	19,310	18,989
24	KML m	919,748	776,767	671,842	592,494	531,711	484,314	448,315	420,946	399,488	383,245
25	Immersion (TPc) tonne/	93,891	95,024	95,901	96,648	97,370	98,111	98,983	100,010	101,159	102,486
26	MTc tonne.m	1374,10	1397,21	1414,35	1429,52	1446,92	1467,91	1498,48	1539,31	1587,68	1646,37
27	RM at 1deg = GMT.Disp.	14749,9	14335,8	13917,3	13548,6	13264,7	13088,4	13037,1	13127,9	13381,5	13820,8
28	Max deck inclination de	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702
29	Trim angle (+ve by ster	-0,5702	-0,5702	-0,5702	-0,5702	-0,5702	-0,5702	-0,5702	-0,5702	-0,5702	-0,5702

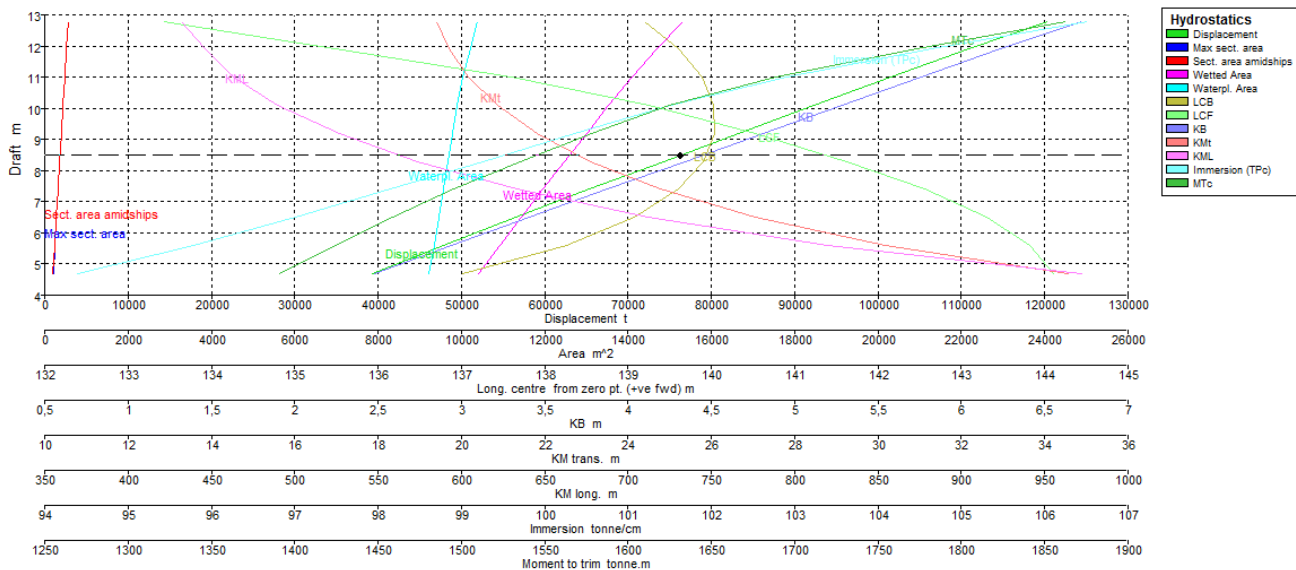
TRIMADO 0



Draft = 8,500 m Displacement = 76843,588 t

	Draft Amidships m	4,700	5,600	6,500	7,400	8,300	9,200	10,100	11,000	11,900	12,800
1	Displacement t	40160	48702	57341	66065	74869	83756	92729	101792	110956	120256
2	Heel deg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
3	Draft at FP m	4,700	5,600	6,500	7,400	8,300	9,200	10,100	11,000	11,900	12,800
4	Draft at AP m	4,700	5,600	6,500	7,400	8,300	9,200	10,100	11,000	11,900	12,800
5	Draft at LCF m	4,700	5,600	6,500	7,400	8,300	9,200	10,100	11,000	11,900	12,800
6	Trim (+ve by stern) m	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
7	WL Length m	270,219	269,840	268,656	268,324	268,374	268,538	268,755	269,059	269,353	275,604
8	Beam max extents on	45,235	45,316	45,350	45,367	45,378	45,386	45,392	45,396	45,399	45,401
9	Wetted Area m ²	10422,1	10935,5	11446,0	11956,1	12469,9	12992,0	13521,7	14062,6	14577,8	15153,6
10	Waterpl. Area m ²	9196,14	9312,42	9409,01	9497,50	9585,29	9675,16	9768,99	9868,90	9997,33	10166,9
11	Prismatic coeff. (Cp)	0,719	0,726	0,735	0,741	0,746	0,750	0,754	0,757	0,761	0,748
12	Block coeff. (Cb)	0,682	0,694	0,706	0,716	0,723	0,729	0,734	0,739	0,744	0,733
13	Max Sect. area coeff. (C)	0,949	0,956	0,961	0,966	0,969	0,972	0,974	0,976	0,978	0,980
14	Waterpl. area coeff. (C)	0,752	0,762	0,772	0,780	0,787	0,794	0,801	0,808	0,818	0,813
15	LCB from zero pt. (+ve)	146,626	146,327	146,048	145,765	145,459	145,112	144,724	144,295	143,827	143,308
16	LCF from zero pt. (+ve)	145,116	144,717	144,204	143,529	142,672	141,657	140,511	139,243	137,912	136,181
17	KB m	2,476	2,945	3,413	3,880	4,347	4,814	5,282	5,751	6,221	6,695
18	KG m	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300
19	BMt m	31,349	26,654	23,186	20,526	18,429	16,737	15,349	14,200	13,242	12,447
20	BML m	947,097	796,091	687,784	607,559	546,757	499,463	461,924	431,716	410,493	397,913
21	GMt m	21,526	17,299	14,299	12,107	10,476	9,251	8,331	7,650	7,164	6,843
22	GML m	937,274	786,736	678,897	599,139	538,804	491,977	454,906	425,167	404,414	392,308
23	KMt m	33,826	29,599	26,599	24,407	22,776	21,551	20,631	19,950	19,464	19,143
24	KML m	949,574	799,036	691,197	611,439	551,104	504,277	467,206	437,467	416,714	404,608
25	Immersion (TPc) tonne/	94,261	95,452	96,442	97,349	98,249	99,170	100,132	101,156	102,473	104,211
26	MTC tonne.m	1387,43	1412,30	1434,90	1458,97	1486,89	1518,84	1554,85	1595,22	1653,96	1738,93
27	RM at 1deg = GMT.Disp.	15087,0	14703,4	14309,3	13958,7	13688,0	13522,2	13482,7	13590,8	13872,3	14360,9
28	Max deck inclination de	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
29	Trim angle (+ve by ster	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

TRIMADO +1%Lpp



Draft = 8,500 m Displacement = 76223,046 t

	Draft Amidships m	4,700	5,600	6,500	7,400	8,300	9,200	10,100	11,000	11,900	12,800
1	Displacement t	39318	47879	56556	65339	74226	83213	92300	101499	110840	120344
2	Heel deg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
3	Draft at FP m	3,350	4,250	5,150	6,050	6,950	7,850	8,750	9,650	10,550	11,450
4	Draft at AP m	6,050	6,950	7,850	8,750	9,650	10,550	11,450	12,350	13,250	14,150
5	Draft at LCF m	4,616	5,519	6,424	7,331	8,241	9,152	10,064	10,981	11,902	12,822
6	Trim (+ve by stern) m	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
7	WL Length m	268,220	267,783	267,862	268,260	268,788	269,675	271,918	276,731	279,697	275,903
8	Beam max extents on	45,196	45,299	45,343	45,363	45,375	45,384	45,390	45,395	45,398	45,401
9	Wetted Area m²	10404,0	10920,0	11433,1	11950,9	12475,9	13008,9	13524,5	14089,4	14693,6	15305,2
10	Waterpl. Area m²	9208,80	9344,87	9463,77	9575,40	9683,63	9791,62	9903,18	10039,4	10208,6	10390,7
11	Prismatic coeff. (Cp)	0,702	0,716	0,725	0,732	0,738	0,741	0,741	0,734	0,732	0,748
12	Block coeff. (Cb)	0,535	0,565	0,589	0,608	0,624	0,637	0,645	0,645	0,649	0,669
13	Max Sect. area coeff. (0,922	0,931	0,936	0,941	0,946	0,952	0,955	0,958	0,961	0,963
14	Waterpl. area coeff. (C	0,760	0,770	0,779	0,787	0,794	0,800	0,802	0,799	0,804	0,830
15	LCB from zero pt. (+ve	137,018	138,262	139,082	139,604	139,904	140,033	140,021	139,883	139,608	139,201
16	LCF from zero pt. (+ve	144,101	143,821	143,307	142,561	141,625	140,522	139,251	137,605	135,489	133,426
17	KB m	2,478	2,941	3,406	3,872	4,341	4,811	5,283	5,758	6,237	6,721
18	KG m	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300	12,300
19	BMt m	32,081	27,232	23,656	20,916	18,755	17,016	15,594	14,423	13,460	12,679
20	BML m	969,452	816,473	708,567	629,389	569,056	521,878	484,499	457,776	440,025	425,510
21	GMt m	22,273	17,899	14,797	12,528	10,839	9,571	8,621	7,923	7,436	7,135
22	GML m	959,643	807,141	699,707	621,001	561,139	514,433	477,526	451,277	434,001	419,967
23	KMt m	34,557	30,171	27,061	24,787	23,095	21,826	20,876	20,180	19,696	19,399
24	KML m	971,881	819,374	711,938	633,230	573,368	526,663	489,759	463,512	446,240	432,210
25	Immersion (TPc) tonne/	94,390	95,785	97,004	98,148	99,257	100,364	101,508	102,905	104,638	106,506
26	MTC tonne.m	1390,75	1424,43	1458,61	1495,61	1535,24	1577,85	1624,60	1688,31	1773,12	1862,89
27	RM at 1deg = GMt.Disp.	15283,1	14956,5	14604,6	14286,0	14041,1	13899,1	13886,8	14035,2	14384,8	14985,3
28	Max deck inclination de	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702
29	Trim angle (+ve by ster	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702	0,5702

ANEXO I. Calibración tanques.

Tank Calibrations - LNG

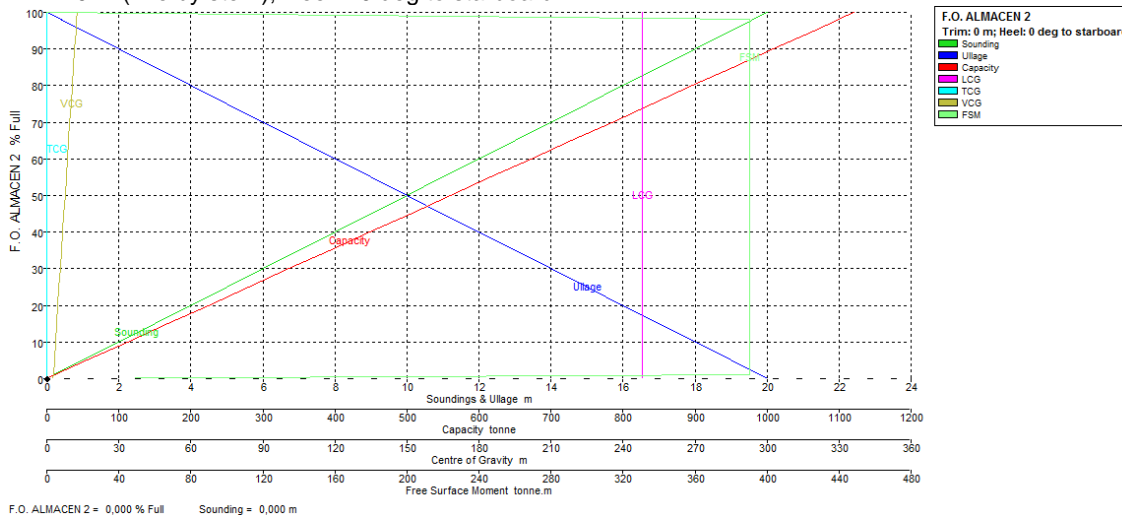
Stability 20.00.02.31, build: 31

Tank Calibrations - F.O. ALMACEN 2

Fluid Type = Fuel Oil Specific gravity = 0,9443

Permeability = 97 %

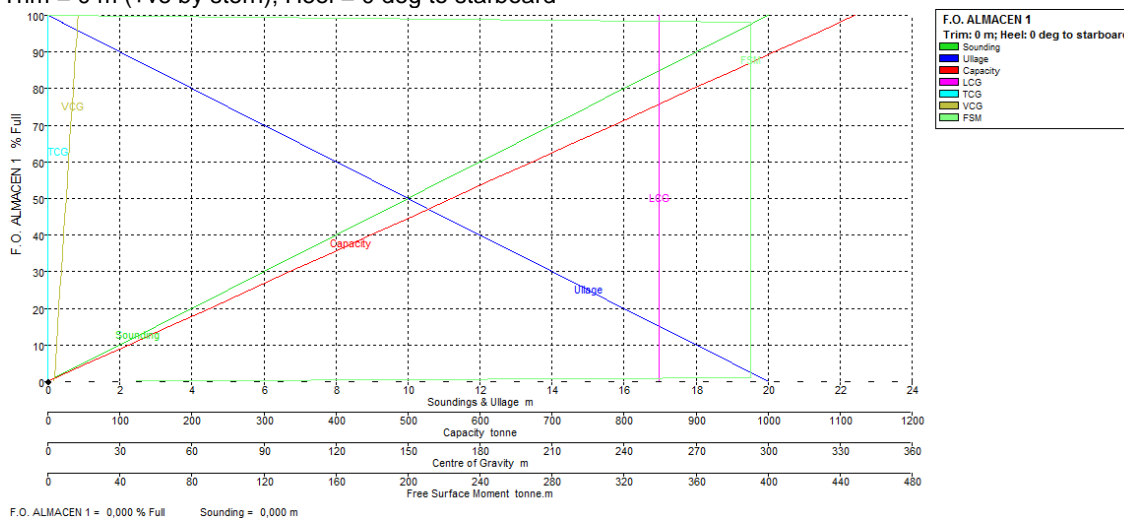
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
F.O. ALMACEN 2	20,000	0,000	100,000	1187,280	1121,148	247,900	0,000	12,600	0,000
	19,600	0,400	98,000	1163,534	1098,725	247,900	0,000	12,400	390,090
	19,580	0,420	97,900	1162,347	1097,604	247,900	0,000	12,390	390,090
	19,000	1,000	95,000	1127,916	1065,091	247,900	0,000	12,100	390,090
	18,000	2,000	90,000	1068,552	1009,034	247,900	0,000	11,600	390,090
	17,000	3,000	85,000	1009,188	952,976	247,900	0,000	11,100	390,090
	16,000	4,000	80,000	949,824	896,919	247,900	0,000	10,600	390,090
	15,000	5,000	75,000	890,460	840,861	247,900	0,000	10,100	390,090
	14,000	6,000	70,000	831,096	784,804	247,900	0,000	9,600	390,090
	13,000	7,000	65,000	771,732	728,746	247,900	0,000	9,100	390,090
	12,000	8,000	60,000	712,368	672,689	247,900	0,000	8,600	390,090
	11,000	9,000	55,000	653,004	616,632	247,900	0,000	8,100	390,090
	10,000	10,000	50,000	593,640	560,574	247,900	0,000	7,600	390,090
	9,000	11,000	45,000	534,276	504,517	247,900	0,000	7,100	390,090
	8,000	12,000	40,000	474,912	448,459	247,900	0,000	6,600	390,090
	7,000	13,000	35,000	415,548	392,402	247,900	0,000	6,100	390,090
	6,000	14,000	30,000	356,184	336,345	247,900	0,000	5,600	390,090
	5,000	15,000	25,000	296,820	280,287	247,900	0,000	5,100	390,090
	4,000	16,000	20,000	237,456	224,230	247,900	0,000	4,600	390,090
	3,000	17,000	15,000	178,092	168,172	247,900	0,000	4,100	390,090
	2,000	18,000	10,000	118,728	112,115	247,900	0,000	3,600	390,090
	1,000	19,000	5,000	59,364	56,057	247,900	0,000	3,100	390,090
	0,200	19,800	1,000	11,873	11,211	247,900	0,000	2,700	390,090
	0,000	20,000	0,000	0,000	0,000	247,900	0,000	2,600	0,000

Tank Calibrations - F.O. ALMACEN 1

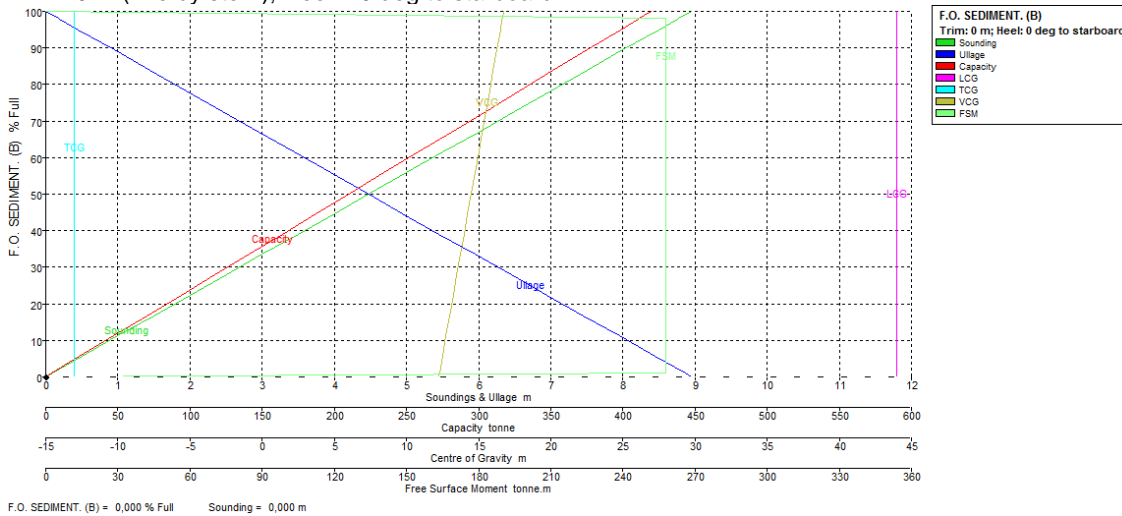
Fluid Type = Fuel Oil Specific gravity = 0,9443
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
F.O. ALMACEN 1	20,000	0,000	100,000	1187,280	1121,149	254,700	0,000	12,600	0,000
	19,600	0,400	98,000	1163,535	1098,726	254,700	0,000	12,400	390,090
	19,580	0,420	97,900	1162,347	1097,605	254,700	0,000	12,390	390,090
	19,000	1,000	95,000	1127,916	1065,091	254,700	0,000	12,100	390,090
	18,000	2,000	90,000	1068,552	1009,034	254,700	0,000	11,600	390,090
	17,000	3,000	85,000	1009,188	952,976	254,700	0,000	11,100	390,090
	16,000	4,000	80,000	949,824	896,919	254,700	0,000	10,600	390,090
	15,000	5,000	75,000	890,460	840,862	254,700	0,000	10,100	390,090
	14,000	6,000	70,000	831,096	784,804	254,700	0,000	9,600	390,090
	13,000	7,000	65,000	771,732	728,747	254,700	0,000	9,100	390,090
	12,000	8,000	60,000	712,368	672,689	254,700	0,000	8,600	390,090
	11,000	9,000	55,000	653,004	616,632	254,700	0,000	8,100	390,090
	10,000	10,000	50,000	593,640	560,574	254,700	0,000	7,600	390,090
	9,000	11,000	45,000	534,276	504,517	254,700	0,000	7,100	390,090
	8,000	12,000	40,000	474,912	448,459	254,700	0,000	6,600	390,090
	7,000	13,000	35,000	415,548	392,402	254,700	0,000	6,100	390,090
	6,000	14,000	30,000	356,184	336,345	254,700	0,000	5,600	390,090
	5,000	15,000	25,000	296,820	280,287	254,700	0,000	5,100	390,090
	4,000	16,000	20,000	237,456	224,230	254,700	0,000	4,600	390,090
	3,000	17,000	15,000	178,092	168,172	254,700	0,000	4,100	390,090
	2,000	18,000	10,000	118,728	112,115	254,700	0,000	3,600	390,090
	1,000	19,000	5,000	59,364	56,057	254,700	0,000	3,100	390,090
	0,200	19,800	1,000	11,873	11,211	254,700	0,000	2,700	390,090
	0,000	20,000	0,000	0,000	0,000	254,700	0,000	2,600	0,000

Tank Calibrations - F.O. SEDIMENT. (B)

Fluid Type = Fuel Oil Specific gravity = 0,9443
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

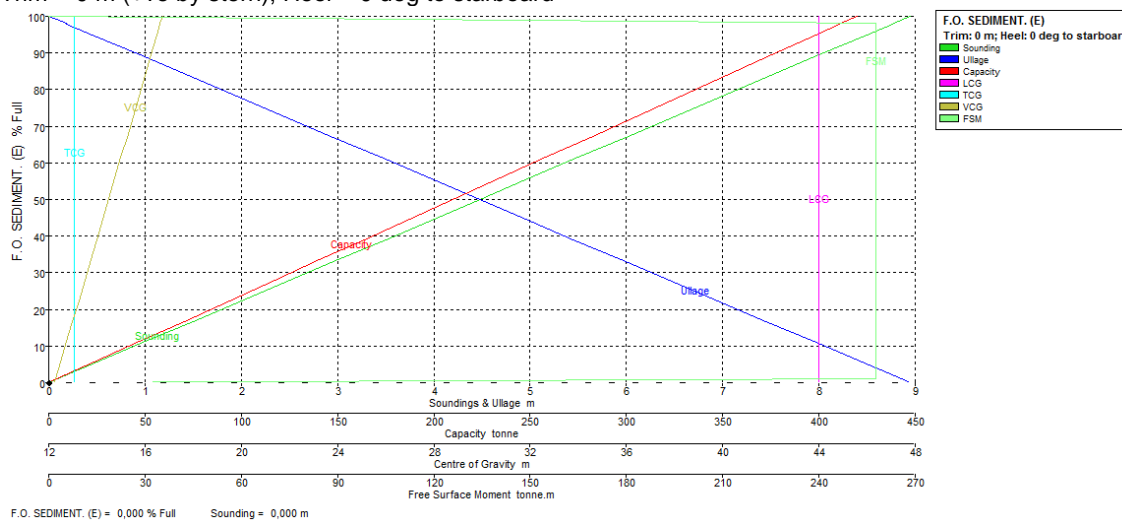


F.O. SEDIMENT. (B) = 0,000 % Full Sounding = 0,000 m

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
F.O. SEDIMENT. (B)	8,950	0,000	100,000	444,492	419,734	44,000	-13,050	16,725	0,000
	8,771	0,179	98,000	435,602	411,339	44,000	-13,050	16,635	257,857
	8,762	0,188	97,900	435,158	410,920	44,000	-13,050	16,631	257,857
	8,500	0,450	94,972	422,144	398,630	44,000	-13,050	16,500	257,857
	8,000	0,950	89,385	397,312	375,181	44,000	-13,050	16,250	257,857
	7,500	1,450	83,799	372,480	351,732	44,000	-13,050	16,000	257,857
	7,000	1,950	78,212	347,648	328,284	44,000	-13,050	15,750	257,857
	6,500	2,450	72,626	322,816	304,835	44,000	-13,050	15,500	257,857
	6,000	2,950	67,039	297,984	281,386	44,000	-13,050	15,250	257,857
	5,500	3,450	61,453	273,152	257,937	44,000	-13,050	15,000	257,857
	5,000	3,950	55,866	248,320	234,488	44,000	-13,050	14,750	257,857
	4,500	4,450	50,279	223,488	211,039	44,000	-13,050	14,500	257,857
	4,000	4,950	44,693	198,656	187,591	44,000	-13,050	14,250	257,857
	3,500	5,450	39,106	173,824	164,142	44,000	-13,050	14,000	257,857
	3,000	5,950	33,520	148,992	140,693	44,000	-13,050	13,750	257,857
	2,500	6,450	27,933	124,160	117,244	44,000	-13,050	13,500	257,857
	2,000	6,950	22,346	99,328	93,795	44,000	-13,050	13,250	257,857
	1,500	7,450	16,760	74,496	70,346	44,000	-13,050	13,000	257,857
	1,000	7,950	11,173	49,664	46,898	44,000	-13,050	12,750	257,857
	0,500	8,450	5,587	24,832	23,449	44,000	-13,050	12,500	257,857
	0,089	8,860	1,000	4,445	4,197	44,000	-13,050	12,295	257,857
	0,000	8,950	0,000	0,000	0,000	44,000	-13,050	12,250	0,000

Tank Calibrations - F.O. SEDIMENT. (E)

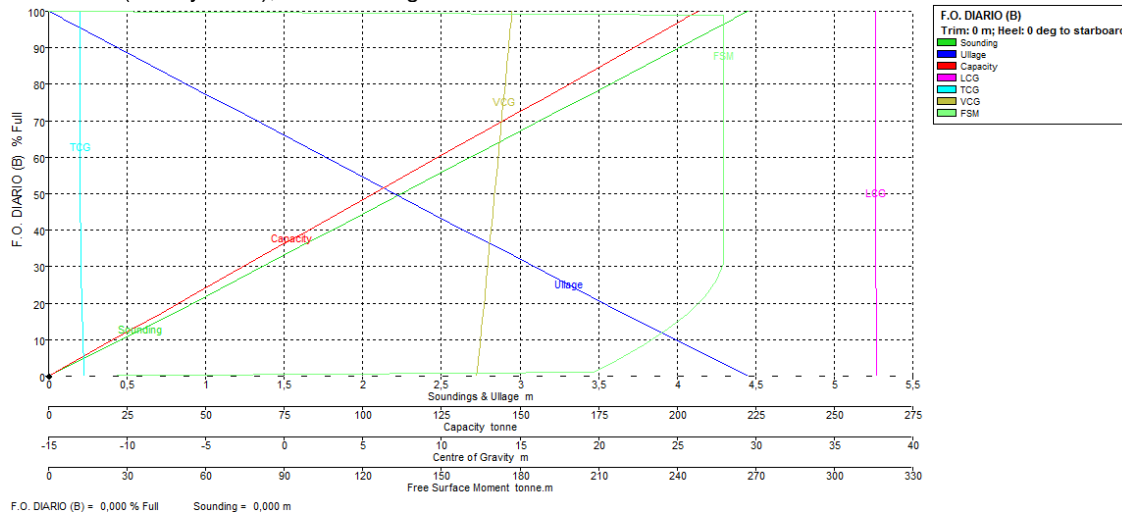
Fluid Type = Fuel Oil Specific gravity = 0,9443
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
F.O. SEDIMENT. (E)	8,950	0,000	100,000	444,492	419,734	44,000	13,050	16,725	0,000
	8,771	0,179	98,000	435,602	411,339	44,000	13,050	16,635	257,857
	8,762	0,188	97,900	435,158	410,920	44,000	13,050	16,631	257,857
	8,500	0,450	94,972	422,144	398,630	44,000	13,050	16,500	257,857
	8,000	0,950	89,385	397,312	375,181	44,000	13,050	16,250	257,857
	7,500	1,450	83,799	372,480	351,732	44,000	13,050	16,000	257,857
	7,000	1,950	78,212	347,648	328,284	44,000	13,050	15,750	257,857
	6,500	2,450	72,626	322,816	304,835	44,000	13,050	15,500	257,857
	6,000	2,950	67,039	297,984	281,386	44,000	13,050	15,250	257,857
	5,500	3,450	61,453	273,152	257,937	44,000	13,050	15,000	257,857
	5,000	3,950	55,866	248,320	234,488	44,000	13,050	14,750	257,857
	4,500	4,450	50,279	223,488	211,039	44,000	13,050	14,500	257,857
	4,000	4,950	44,693	198,656	187,591	44,000	13,050	14,250	257,857
	3,500	5,450	39,106	173,824	164,142	44,000	13,050	14,000	257,857
	3,000	5,950	33,520	148,992	140,693	44,000	13,050	13,750	257,857
	2,500	6,450	27,933	124,160	117,244	44,000	13,050	13,500	257,857
	2,000	6,950	22,346	99,328	93,795	44,000	13,050	13,250	257,857
	1,500	7,450	16,760	74,496	70,346	44,000	13,050	13,000	257,857
	1,000	7,950	11,173	49,664	46,898	44,000	13,050	12,750	257,857
	0,500	8,450	5,587	24,832	23,449	44,000	13,050	12,500	257,857
	0,089	8,860	1,000	4,445	4,197	44,000	13,050	12,295	257,857
	0,000	8,950	0,000	0,000	0,000	44,000	13,050	12,250	0,000

Tank Calibrations - F.O. DIARIO (B)

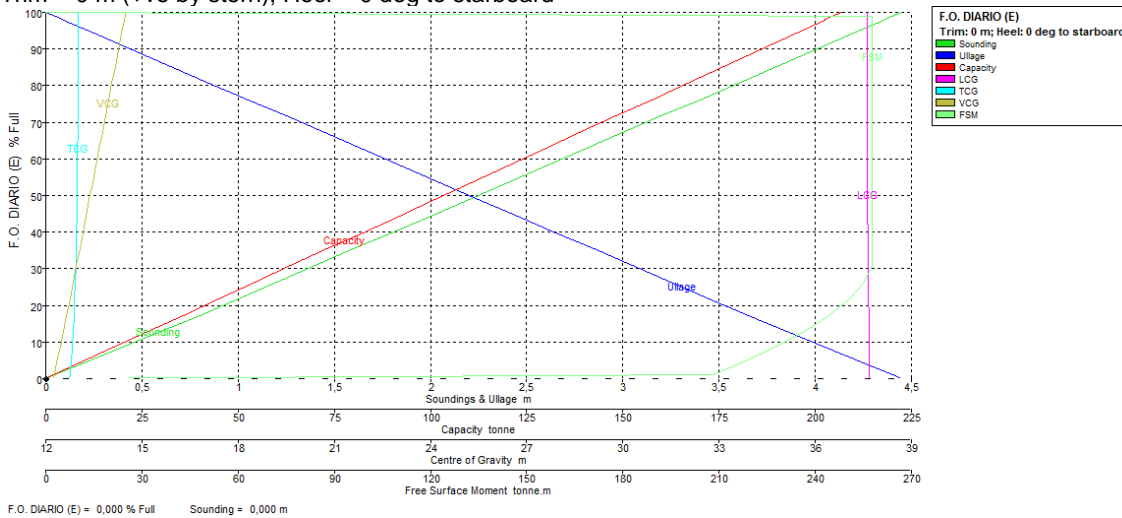
Fluid Type = Fuel Oil Specific gravity = 0,9443
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
F.O. DIARIO (B)	4,450	0,000	100,000	218,953	206,757	37,615	-13,016	14,492	0,000
	4,400	0,050	98,866	216,469	204,412	37,615	-13,015	14,467	257,857
	4,362	0,088	98,000	214,574	202,622	37,615	-13,015	14,448	257,857
	4,357	0,093	97,900	214,355	202,415	37,615	-13,015	14,446	257,857
	4,200	0,250	94,329	206,537	195,032	37,616	-13,014	14,367	257,857
	4,000	0,450	89,793	196,604	185,653	37,617	-13,012	14,267	257,857
	3,800	0,650	85,256	186,671	176,273	37,618	-13,010	14,167	257,857
	3,600	0,850	80,720	176,738	166,894	37,619	-13,007	14,066	257,857
	3,400	1,050	76,183	166,805	157,514	37,620	-13,005	13,966	257,857
	3,200	1,250	71,647	156,872	148,135	37,621	-13,002	13,866	257,857
	3,000	1,450	67,110	146,940	138,755	37,623	-12,999	13,766	257,857
	2,800	1,650	62,574	137,007	129,376	37,624	-12,995	13,665	257,857
	2,600	1,850	58,037	127,074	119,996	37,626	-12,991	13,565	257,857
	2,400	2,050	53,501	117,141	110,616	37,628	-12,986	13,464	257,857
	2,200	2,250	48,964	107,208	101,237	37,631	-12,980	13,364	257,857
	2,000	2,450	44,428	97,276	91,857	37,634	-12,973	13,263	257,857
	1,800	2,650	39,891	87,343	82,478	37,638	-12,964	13,162	257,857
	1,600	2,850	35,355	77,410	73,098	37,643	-12,953	13,061	257,857
	1,400	3,050	30,818	67,478	63,719	37,649	-12,938	12,960	257,634
	1,200	3,250	26,289	57,561	54,355	37,657	-12,920	12,858	255,186
	1,000	3,450	21,782	47,693	45,036	37,665	-12,899	12,756	250,699
	0,800	3,650	17,311	37,902	35,791	37,673	-12,874	12,654	244,370
	0,600	3,850	12,887	28,216	26,644	37,681	-12,846	12,553	236,468
	0,400	4,050	8,521	18,657	17,618	37,688	-12,816	12,451	227,260
	0,200	4,250	4,222	9,245	8,730	37,693	-12,783	12,350	216,867
	0,048	4,402	1,000	2,190	2,068	37,696	-12,756	12,274	208,219
	0,000	4,450	0,000	0,000	0,000	37,697	-12,748	12,250	0,000

Tank Calibrations - F.O. DIARIO (E)

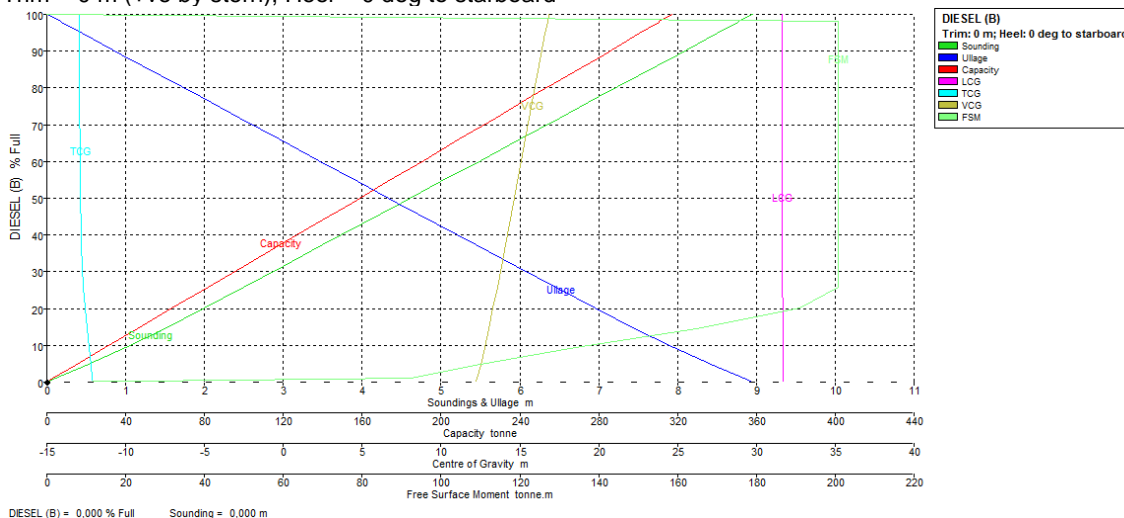
Fluid Type = Fuel Oil Specific gravity = 0,9443
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
F.O. DIARIO (E)	4,450	0,000	100,000	218,953	206,757	37,615	13,016	14,492	0,000
	4,400	0,050	98,866	216,469	204,412	37,615	13,015	14,467	257,857
	4,362	0,088	98,000	214,574	202,622	37,615	13,015	14,448	257,857
	4,357	0,093	97,900	214,355	202,415	37,615	13,015	14,446	257,857
	4,200	0,250	94,329	206,537	195,032	37,616	13,014	14,367	257,857
	4,000	0,450	89,793	196,604	185,653	37,617	13,012	14,267	257,857
	3,800	0,650	85,256	186,671	176,273	37,618	13,010	14,167	257,857
	3,600	0,850	80,720	176,738	166,894	37,619	13,007	14,066	257,857
	3,400	1,050	76,183	166,805	157,514	37,620	13,005	13,966	257,857
	3,200	1,250	71,647	156,872	148,135	37,621	13,002	13,866	257,857
	3,000	1,450	67,110	146,940	138,755	37,623	12,999	13,766	257,857
	2,800	1,650	62,574	137,007	129,376	37,624	12,995	13,665	257,857
	2,600	1,850	58,037	127,074	119,996	37,626	12,991	13,565	257,857
	2,400	2,050	53,501	117,141	110,616	37,628	12,986	13,464	257,857
	2,200	2,250	48,964	107,208	101,237	37,631	12,980	13,364	257,857
	2,000	2,450	44,428	97,276	91,857	37,634	12,973	13,263	257,857
	1,800	2,650	39,891	87,343	82,478	37,638	12,964	13,162	257,857
	1,600	2,850	35,355	77,410	73,098	37,643	12,953	13,061	257,857
	1,400	3,050	30,818	67,478	63,719	37,649	12,938	12,960	257,634
	1,200	3,250	26,289	57,561	54,355	37,657	12,920	12,858	255,186
	1,000	3,450	21,782	47,693	45,036	37,665	12,899	12,756	250,699
	0,800	3,650	17,311	37,902	35,791	37,673	12,874	12,654	244,370
	0,600	3,850	12,887	28,216	26,644	37,681	12,846	12,553	236,468
	0,400	4,050	8,521	18,657	17,618	37,688	12,816	12,451	227,260
	0,200	4,250	4,222	9,245	8,730	37,693	12,783	12,350	216,867
	0,048	4,402	1,000	2,190	2,068	37,696	12,756	12,274	208,219
	0,000	4,450	0,000	0,000	0,000	37,697	12,748	12,250	0,000

Tank Calibrations - DIESEL (B)

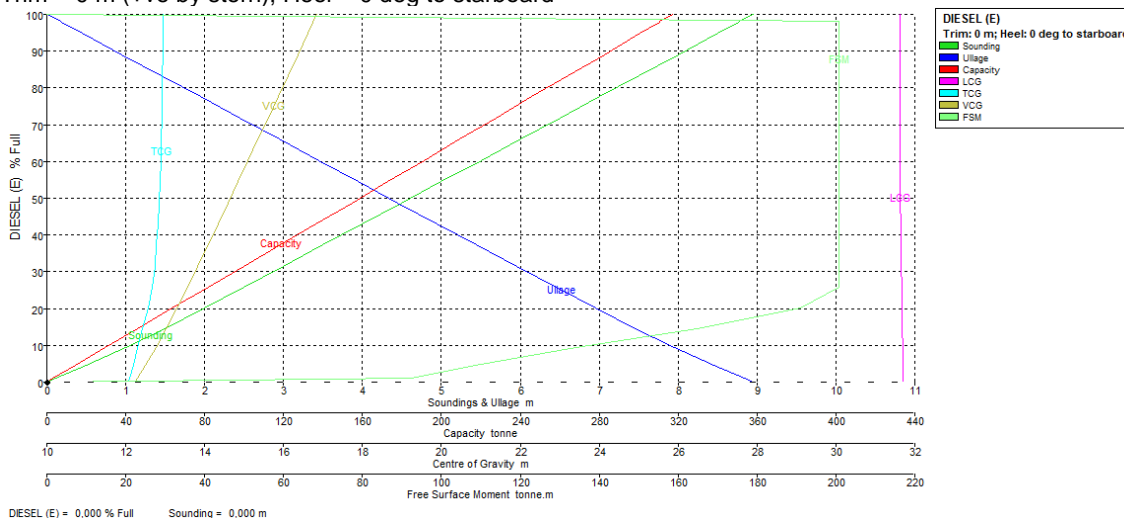
Fluid Type = Diesel Specific gravity = 0,84
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
DIESEL (B)	8,950	0,000	100,000	377,527	317,123	31,616	-12,951	16,839	0,000
	8,776	0,174	98,000	369,977	310,780	31,617	-12,949	16,752	200,704
	8,768	0,182	97,900	369,599	310,463	31,617	-12,949	16,747	200,704
	8,500	0,450	94,820	357,972	300,697	31,617	-12,945	16,613	200,704
	8,000	0,950	89,065	336,244	282,445	31,618	-12,939	16,362	200,704
	7,500	1,450	83,310	314,516	264,194	31,620	-12,931	16,110	200,704
	7,000	1,950	77,554	292,788	245,942	31,621	-12,922	15,859	200,704
	6,500	2,450	71,799	271,060	227,691	31,623	-12,912	15,607	200,704
	6,000	2,950	66,044	249,332	209,439	31,625	-12,900	15,355	200,704
	5,500	3,450	60,288	227,604	191,188	31,627	-12,886	15,102	200,704
	5,000	3,950	54,533	205,876	172,936	31,630	-12,868	14,849	200,704
	4,500	4,450	48,778	184,148	154,685	31,634	-12,847	14,595	200,704
	4,000	4,950	43,022	162,420	136,433	31,638	-12,820	14,341	200,704
	3,500	5,450	37,267	140,692	118,182	31,644	-12,784	14,084	200,704
	3,000	5,950	31,512	118,965	99,930	31,652	-12,735	13,826	200,704
	2,500	6,450	25,756	97,237	81,679	31,664	-12,665	13,563	200,704
	2,000	6,950	20,033	75,631	63,530	31,678	-12,561	13,296	191,062
	1,500	7,450	14,509	54,777	46,012	31,687	-12,434	13,027	164,707
	1,000	7,950	9,326	35,207	29,574	31,693	-12,307	12,762	133,976
	0,500	8,450	4,495	16,971	14,255	31,699	-12,188	12,503	108,700
	0,114	8,836	1,000	3,775	3,171	31,704	-12,100	12,307	92,288
	0,000	8,950	0,000	0,000	0,000	31,706	-12,074	12,250	0,000

Tank Calibrations - DIESEL (E)

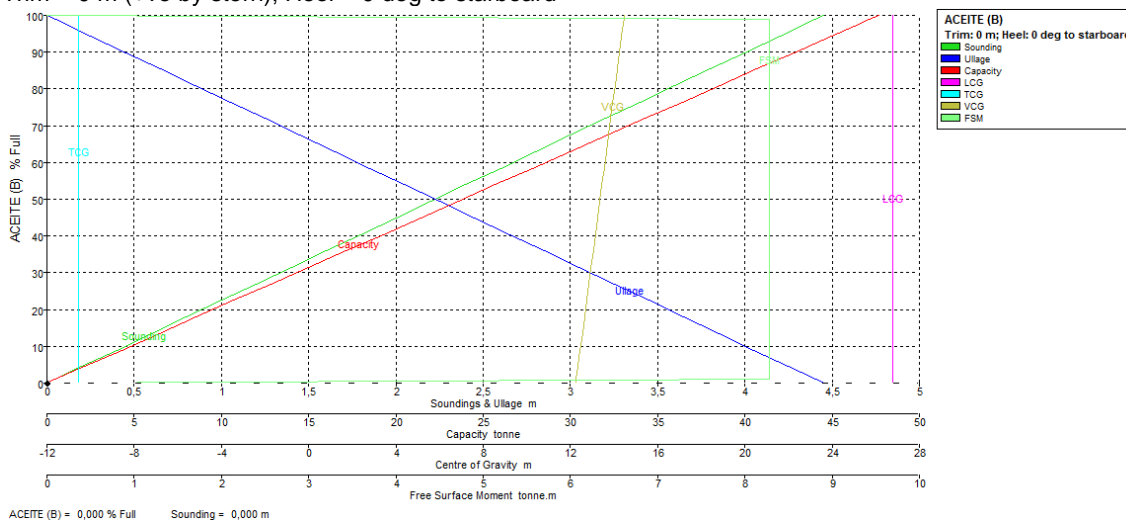
Fluid Type = Diesel Specific gravity = 0,84
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
DIESEL (E)	8,950	0,000	100,000	377,527	317,123	31,616	12,951	16,839	0,000
	8,776	0,174	98,000	369,977	310,780	31,617	12,949	16,752	200,704
	8,768	0,182	97,900	369,599	310,463	31,617	12,949	16,747	200,704
	8,500	0,450	94,820	357,972	300,697	31,617	12,945	16,613	200,704
	8,000	0,950	89,065	336,244	282,445	31,618	12,939	16,362	200,704
	7,500	1,450	83,310	314,516	264,194	31,620	12,931	16,110	200,704
	7,000	1,950	77,554	292,788	245,942	31,621	12,922	15,859	200,704
	6,500	2,450	71,799	271,060	227,691	31,623	12,912	15,607	200,704
	6,000	2,950	66,044	249,332	209,439	31,625	12,900	15,355	200,704
	5,500	3,450	60,288	227,604	191,188	31,627	12,886	15,102	200,704
	5,000	3,950	54,533	205,876	172,936	31,630	12,868	14,849	200,704
	4,500	4,450	48,778	184,148	154,685	31,634	12,847	14,595	200,704
	4,000	4,950	43,022	162,420	136,433	31,638	12,820	14,341	200,704
	3,500	5,450	37,267	140,692	118,182	31,644	12,784	14,084	200,704
	3,000	5,950	31,512	118,965	99,930	31,652	12,735	13,826	200,704
	2,500	6,450	25,756	97,237	81,679	31,664	12,665	13,563	200,704
	2,000	6,950	20,033	75,631	63,530	31,678	12,561	13,296	191,062
	1,500	7,450	14,509	54,777	46,012	31,687	12,434	13,027	164,707
	1,000	7,950	9,326	35,207	29,574	31,693	12,307	12,762	133,976
	0,500	8,450	4,495	16,971	14,255	31,699	12,188	12,503	108,700
	0,114	8,836	1,000	3,775	3,171	31,704	12,100	12,307	92,288
	0,000	8,950	0,000	0,000	0,000	31,706	12,074	12,250	0,000

Tank Calibrations - ACEITE (B)

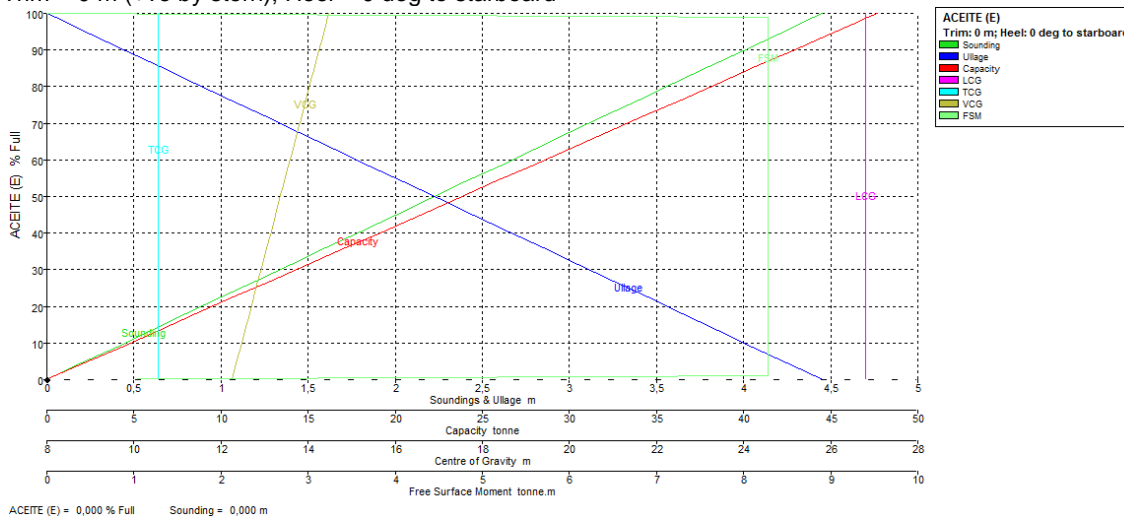
Fluid Type = Lube Oil Specific gravity = 0,92
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
ACEITE (B)	4,450	0,000	100,000	51,798	47,654	26,800	-10,550	14,475	0,000
	4,400	0,050	98,876	51,216	47,119	26,800	-10,550	14,450	8,280
	4,361	0,089	98,000	50,762	46,701	26,800	-10,550	14,430	8,280
	4,357	0,093	97,900	50,710	46,653	26,800	-10,550	14,428	8,280
	4,200	0,250	94,382	48,888	44,977	26,800	-10,550	14,350	8,280
	4,000	0,450	89,888	46,560	42,835	26,800	-10,550	14,250	8,280
	3,800	0,650	85,393	44,232	40,693	26,800	-10,550	14,150	8,280
	3,600	0,850	80,899	41,904	38,552	26,800	-10,550	14,050	8,280
	3,400	1,050	76,404	39,576	36,410	26,800	-10,550	13,950	8,280
	3,200	1,250	71,910	37,248	34,268	26,800	-10,550	13,850	8,280
	3,000	1,450	67,416	34,920	32,126	26,800	-10,550	13,750	8,280
	2,800	1,650	62,921	32,592	29,985	26,800	-10,550	13,650	8,280
	2,600	1,850	58,427	30,264	27,843	26,800	-10,550	13,550	8,280
	2,400	2,050	53,933	27,936	25,701	26,800	-10,550	13,450	8,280
	2,200	2,250	49,438	25,608	23,559	26,800	-10,550	13,350	8,280
	2,000	2,450	44,944	23,280	21,418	26,800	-10,550	13,250	8,280
	1,800	2,650	40,449	20,952	19,276	26,800	-10,550	13,150	8,280
	1,600	2,850	35,955	18,624	17,134	26,800	-10,550	13,050	8,280
	1,400	3,050	31,461	16,296	14,992	26,800	-10,550	12,950	8,280
	1,200	3,250	26,966	13,968	12,851	26,800	-10,550	12,850	8,280
	1,000	3,450	22,472	11,640	10,709	26,800	-10,550	12,750	8,280
	0,800	3,650	17,978	9,312	8,567	26,800	-10,550	12,650	8,280
	0,600	3,850	13,483	6,984	6,425	26,800	-10,550	12,550	8,280
	0,400	4,050	8,989	4,656	4,284	26,800	-10,550	12,450	8,280
	0,200	4,250	4,494	2,328	2,142	26,800	-10,550	12,350	8,280
	0,044	4,405	1,000	0,518	0,477	26,800	-10,550	12,272	8,280
	0,000	4,450	0,000	0,000	0,000	26,800	-10,550	12,250	0,000

Tank Calibrations - ACEITE (E)

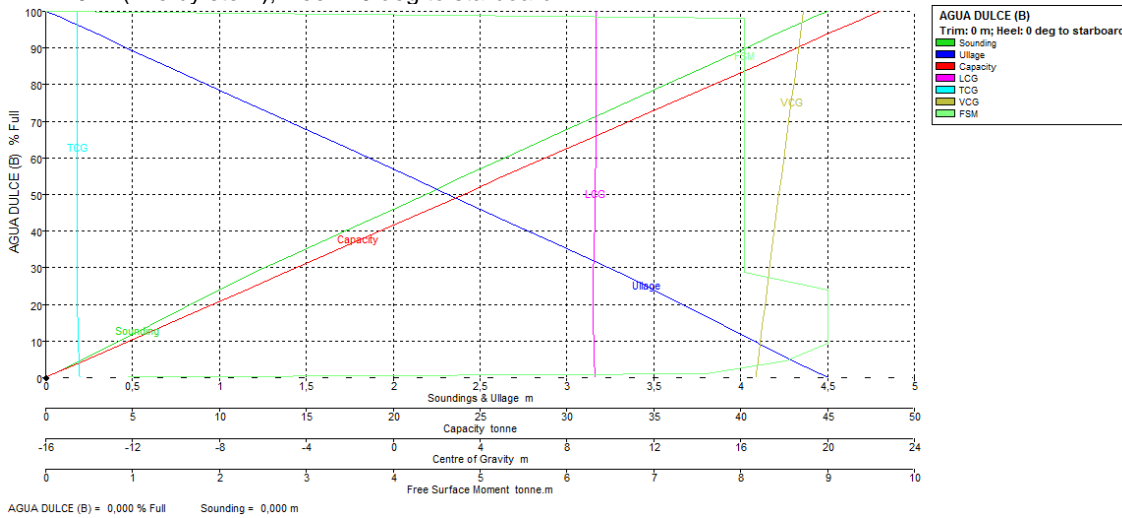
Fluid Type = Lube Oil Specific gravity = 0,92
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
ACEITE (E)	4,450	0,000	100,000	51,798	47,654	26,800	10,550	14,475	0,000
	4,400	0,050	98,876	51,216	47,119	26,800	10,550	14,450	8,280
	4,361	0,089	98,000	50,762	46,701	26,800	10,550	14,430	8,280
	4,357	0,093	97,900	50,710	46,653	26,800	10,550	14,428	8,280
	4,200	0,250	94,382	48,888	44,977	26,800	10,550	14,350	8,280
	4,000	0,450	89,888	46,560	42,835	26,800	10,550	14,250	8,280
	3,800	0,650	85,393	44,232	40,693	26,800	10,550	14,150	8,280
	3,600	0,850	80,899	41,904	38,552	26,800	10,550	14,050	8,280
	3,400	1,050	76,404	39,576	36,410	26,800	10,550	13,950	8,280
	3,200	1,250	71,910	37,248	34,268	26,800	10,550	13,850	8,280
	3,000	1,450	67,416	34,920	32,126	26,800	10,550	13,750	8,280
	2,800	1,650	62,921	32,592	29,985	26,800	10,550	13,650	8,280
	2,600	1,850	58,427	30,264	27,843	26,800	10,550	13,550	8,280
	2,400	2,050	53,933	27,936	25,701	26,800	10,550	13,450	8,280
	2,200	2,250	49,438	25,608	23,559	26,800	10,550	13,350	8,280
	2,000	2,450	44,944	23,280	21,418	26,800	10,550	13,250	8,280
	1,800	2,650	40,449	20,952	19,276	26,800	10,550	13,150	8,280
	1,600	2,850	35,955	18,624	17,134	26,800	10,550	13,050	8,280
	1,400	3,050	31,461	16,296	14,992	26,800	10,550	12,950	8,280
	1,200	3,250	26,966	13,968	12,851	26,800	10,550	12,850	8,280
	1,000	3,450	22,472	11,640	10,709	26,800	10,550	12,750	8,280
	0,800	3,650	17,978	9,312	8,567	26,800	10,550	12,650	8,280
	0,600	3,850	13,483	6,984	6,425	26,800	10,550	12,550	8,280
	0,400	4,050	8,989	4,656	4,284	26,800	10,550	12,450	8,280
	0,200	4,250	4,494	2,328	2,142	26,800	10,550	12,350	8,280
	0,044	4,405	1,000	0,518	0,477	26,800	10,550	12,272	8,280
	0,000	4,450	0,000	0,000	0,000	26,800	10,550	12,250	0,000

Tank Calibrations - AGUA DULCE (B)

Fluid Type = Fresh Water Specific gravity = 1
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

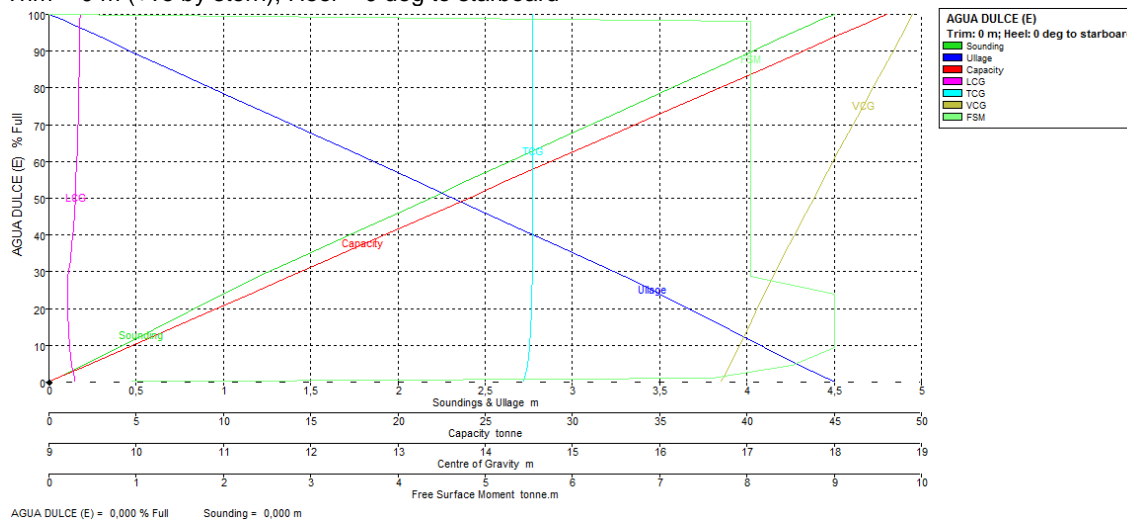


AGUA DULCE (B) = 0,000 % Full Sounding = 0,000 m

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
AGUA DULCE (B)	4,500	0,000	100,000	47,999	47,999	9,360	-14,546	18,901	0,000
	4,400	0,100	98,045	47,060	47,060	9,356	-14,546	18,856	8,040
	4,398	0,102	98,000	47,039	47,039	9,356	-14,546	18,855	8,040
	4,393	0,107	97,900	46,991	46,991	9,356	-14,546	18,853	8,040
	4,200	0,300	93,712	44,981	44,981	9,353	-14,546	18,757	8,040
	4,000	0,500	89,380	42,901	42,901	9,350	-14,546	18,658	8,040
	3,800	0,700	85,047	40,821	40,821	9,347	-14,546	18,559	8,040
	3,600	0,900	80,715	38,742	38,742	9,343	-14,546	18,460	8,040
	3,400	1,100	76,382	36,662	36,662	9,340	-14,545	18,362	8,040
	3,200	1,300	72,050	34,583	34,583	9,335	-14,545	18,263	8,040
	3,000	1,500	67,717	32,503	32,503	9,330	-14,545	18,165	8,040
	2,800	1,700	63,384	30,424	30,424	9,325	-14,544	18,067	8,040
	2,600	1,900	59,052	28,344	28,344	9,318	-14,544	17,969	8,040
	2,400	2,100	54,719	26,264	26,264	9,311	-14,544	17,871	8,040
	2,200	2,300	50,387	24,185	24,185	9,302	-14,543	17,774	8,040
	2,000	2,500	46,054	22,105	22,105	9,292	-14,542	17,678	8,040
	1,800	2,700	41,722	20,026	20,026	9,279	-14,542	17,582	8,040
	1,600	2,900	37,389	17,946	17,946	9,264	-14,541	17,487	8,040
	1,400	3,100	33,057	15,867	15,867	9,244	-14,539	17,394	8,040
	1,200	3,300	28,724	13,787	13,787	9,219	-14,538	17,302	8,040
	1,000	3,500	23,983	11,512	11,512	9,215	-14,535	17,204	9,000
	0,800	3,700	19,133	9,184	9,184	9,218	-14,532	17,104	9,000
	0,600	3,900	14,283	6,856	6,856	9,225	-14,525	17,004	9,000
	0,400	4,100	9,433	4,528	4,528	9,237	-14,513	16,903	9,000
	0,200	4,300	4,616	2,216	2,216	9,264	-14,484	16,801	8,518
	0,045	4,455	1,000	0,480	0,480	9,291	-14,449	16,722	7,599
	0,000	4,500	0,000	0,000	0,000	9,299	-14,436	16,700	0,000

Tank Calibrations - AGUA DULCE (E)

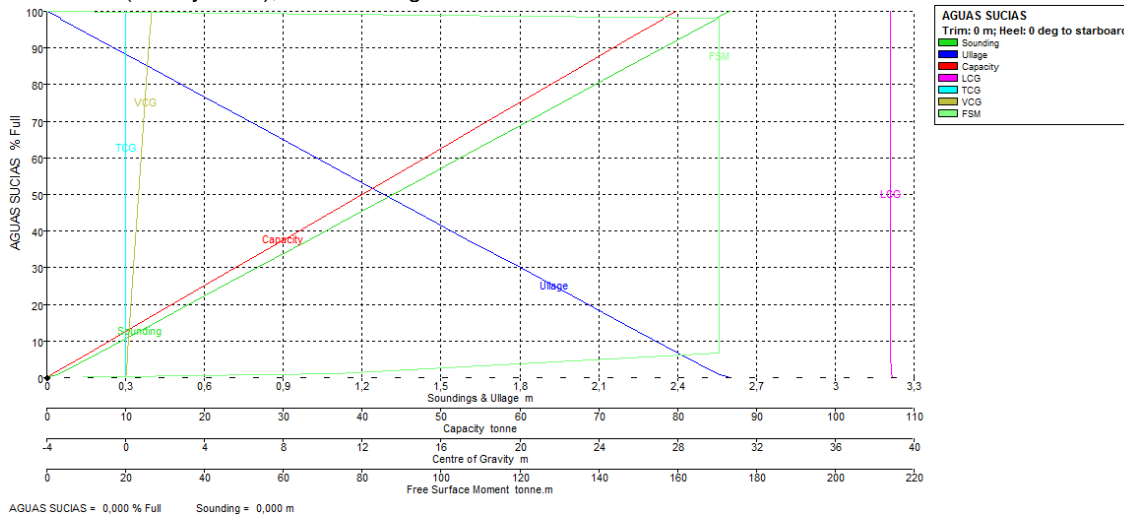
Fluid Type = Fresh Water Specific gravity = 1
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
AGUA DULCE (E)	4,500	0,000	100,000	47,999	47,999	9,360	14,546	18,901	0,000
	4,400	0,100	98,045	47,060	47,060	9,356	14,546	18,856	8,040
	4,398	0,102	98,000	47,039	47,039	9,356	14,546	18,855	8,040
	4,393	0,107	97,900	46,991	46,991	9,356	14,546	18,853	8,040
	4,200	0,300	93,712	44,981	44,981	9,353	14,546	18,757	8,040
	4,000	0,500	89,380	42,901	42,901	9,350	14,546	18,658	8,040
	3,800	0,700	85,047	40,821	40,821	9,347	14,546	18,559	8,040
	3,600	0,900	80,715	38,742	38,742	9,343	14,546	18,460	8,040
	3,400	1,100	76,382	36,662	36,662	9,340	14,545	18,362	8,040
	3,200	1,300	72,050	34,583	34,583	9,335	14,545	18,263	8,040
	3,000	1,500	67,717	32,503	32,503	9,330	14,545	18,165	8,040
	2,800	1,700	63,384	30,424	30,424	9,325	14,544	18,067	8,040
	2,600	1,900	59,052	28,344	28,344	9,318	14,544	17,969	8,040
	2,400	2,100	54,719	26,264	26,264	9,311	14,544	17,871	8,040
	2,200	2,300	50,387	24,185	24,185	9,302	14,543	17,774	8,040
	2,000	2,500	46,054	22,105	22,105	9,292	14,542	17,678	8,040
	1,800	2,700	41,722	20,026	20,026	9,279	14,542	17,582	8,040
	1,600	2,900	37,389	17,946	17,946	9,264	14,541	17,487	8,040
	1,400	3,100	33,057	15,867	15,867	9,244	14,539	17,394	8,040
	1,200	3,300	28,724	13,787	13,787	9,219	14,538	17,302	8,040
	1,000	3,500	23,983	11,512	11,512	9,215	14,535	17,204	9,000
	0,800	3,700	19,133	9,184	9,184	9,218	14,532	17,104	9,000
	0,600	3,900	14,283	6,856	6,856	9,225	14,525	17,004	9,000
	0,400	4,100	9,433	4,528	4,528	9,237	14,513	16,903	9,000
	0,200	4,300	4,616	2,216	2,216	9,264	14,484	16,801	8,518
	0,045	4,455	1,000	0,480	0,480	9,291	14,449	16,722	7,599
	0,000	4,500	0,000	0,000	0,000	9,299	14,436	16,700	0,000

Tank Calibrations - AGUAS SUCIAS

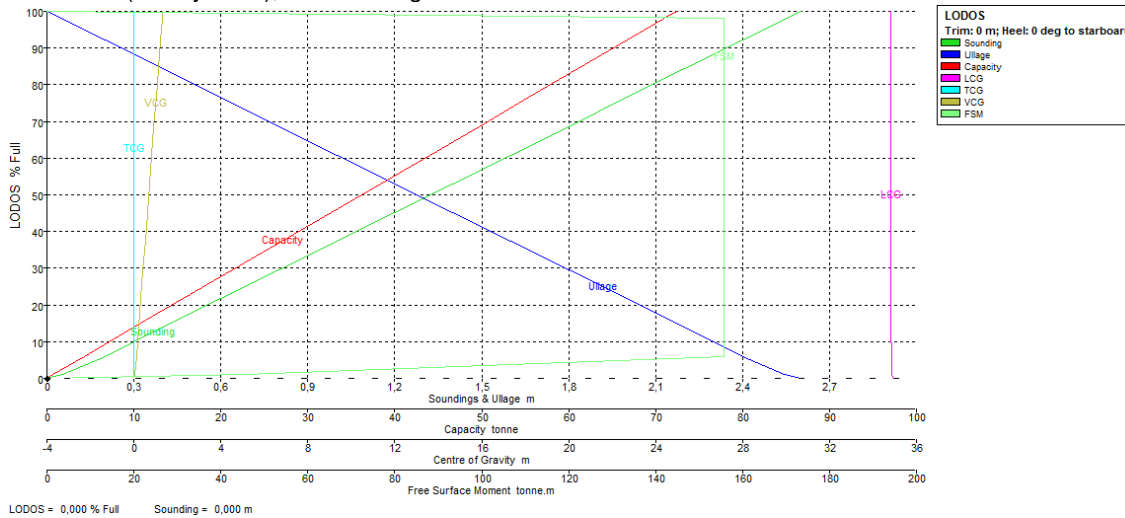
Fluid Type = Specific gravity = 1
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
AGUAS SUCIAS	2,600	0,000	100,000	79,804	79,804	38,802	0,000	1,314	0,000
	2,600	0,000	100,000	79,804	79,804	38,802	0,000	1,314	0,000
	2,549	0,051	98,000	78,208	78,208	38,802	0,000	1,289	170,667
	2,546	0,054	97,900	78,128	78,128	38,802	0,000	1,287	170,667
	2,400	0,200	92,221	73,596	73,596	38,802	0,000	1,214	170,667
	2,200	0,400	84,442	67,388	67,388	38,802	0,000	1,114	170,667
	2,000	0,600	76,663	61,180	61,180	38,802	0,000	1,014	170,667
	1,800	0,800	68,884	54,972	54,972	38,802	0,000	0,914	170,667
	1,600	1,000	61,105	48,764	48,764	38,803	0,000	0,814	170,667
	1,400	1,200	53,326	42,556	42,556	38,803	0,000	0,714	170,667
	1,200	1,400	45,547	36,348	36,348	38,804	0,000	0,614	170,667
	1,000	1,600	37,767	30,140	30,140	38,804	0,000	0,514	170,667
	0,800	1,800	29,988	23,932	23,932	38,806	0,000	0,414	170,667
	0,600	2,000	22,209	17,724	17,724	38,808	0,000	0,314	170,667
	0,400	2,200	14,430	11,516	11,516	38,812	0,000	0,213	170,667
	0,200	2,400	6,651	5,308	5,308	38,825	0,000	0,112	170,667
	0,048	2,552	1,000	0,798	0,798	38,863	0,000	0,028	73,508
	0,000	2,600	0,000	0,000	0,000	38,931	0,000	0,000	0,000

Tank Calibrations - LODOS

Fluid Type = Slops Specific gravity = 0,913
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



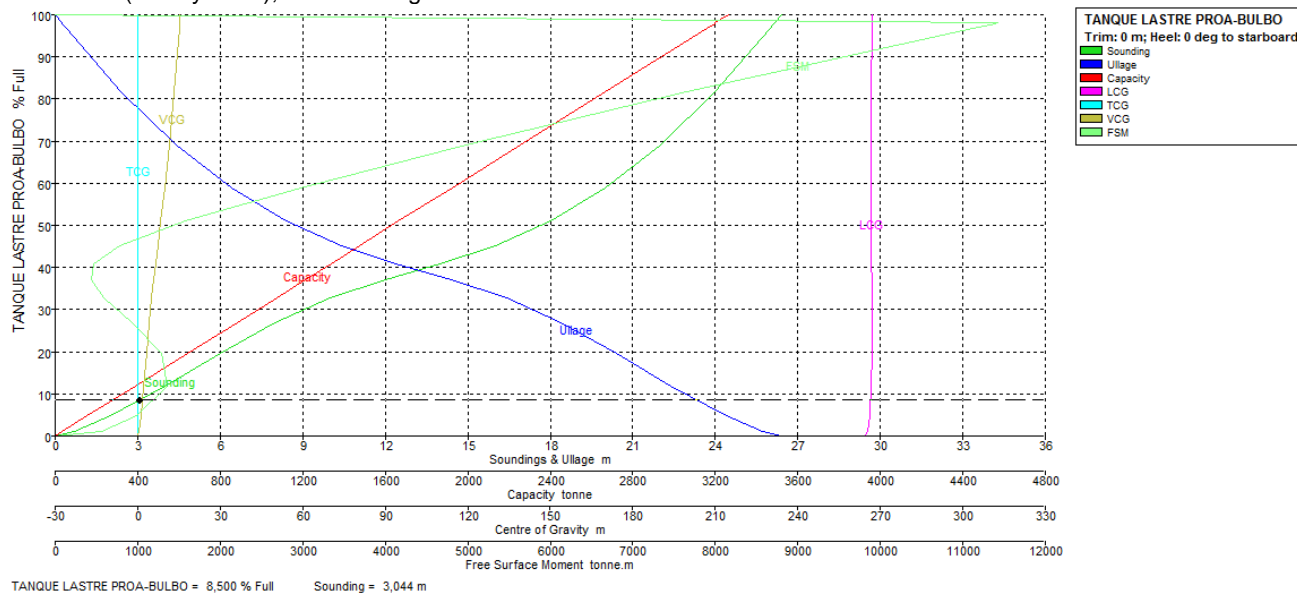
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
LODOS	2,600	0,000	100,000	79,280	72,383	34,803	0,000	1,322	0,000
	2,600	0,000	100,000	79,280	72,383	34,803	0,000	1,322	0,000
	2,549	0,051	98,000	77,694	70,935	34,803	0,000	1,297	155,819
	2,546	0,054	97,900	77,615	70,863	34,803	0,000	1,296	155,819
	2,400	0,200	92,170	73,072	66,715	34,803	0,000	1,222	155,819
	2,200	0,400	84,339	66,864	61,047	34,803	0,000	1,122	155,819
	2,000	0,600	76,509	60,656	55,379	34,804	0,000	1,022	155,819
	1,800	0,800	68,678	54,448	49,711	34,804	0,000	0,922	155,819
	1,600	1,000	60,848	48,240	44,043	34,805	0,000	0,822	155,819
	1,400	1,200	53,017	42,032	38,375	34,805	0,000	0,722	155,819
	1,200	1,400	45,187	35,824	32,707	34,806	0,000	0,622	155,819
	1,000	1,600	37,356	29,616	27,039	34,807	0,000	0,522	155,819
	0,800	1,800	29,526	23,408	21,372	34,809	0,000	0,421	155,819
	0,600	2,000	21,695	17,200	15,704	34,813	0,000	0,321	155,819
	0,400	2,200	13,865	10,992	10,036	34,820	0,000	0,220	155,819
	0,200	2,400	6,034	4,784	4,368	34,846	0,000	0,116	155,696
	0,055	2,545	1,000	0,793	0,724	34,869	0,000	0,033	45,630
	0,000	2,600	0,000	0,000	0,000	34,937	0,000	0,000	0,000

Tank Calibrations - TANQUE LASTRE PROA-BULBO

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 97 %

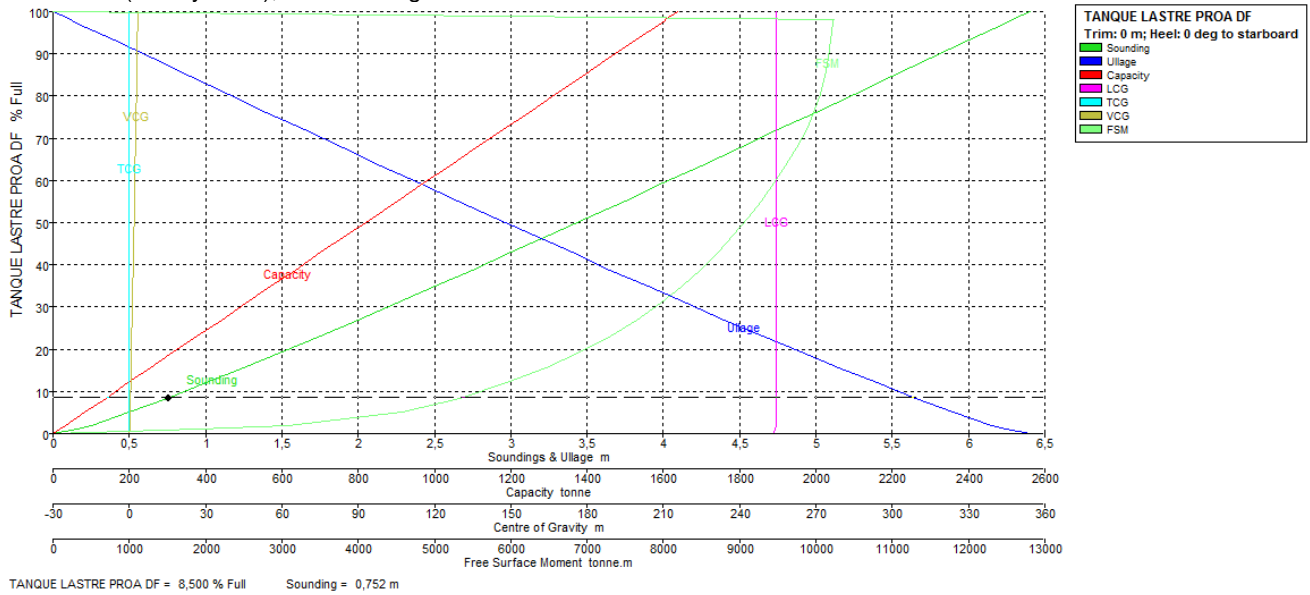
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE PROA-BULBO	26,400	0,000	100,000	3185,968	3265,617	266,882	0,000	15,451	0,000
	26,158	0,242	98,000	3122,248	3200,305	266,865	0,000	15,230	11425,200
	26,146	0,254	97,900	3119,062	3197,039	266,864	0,000	15,219	11401,154
	26,000	0,400	96,711	3081,187	3158,217	266,853	0,000	15,086	11116,079
	24,000	2,400	81,668	2601,917	2666,965	266,717	0,000	13,268	7659,427
	22,000	4,400	69,108	2201,773	2256,818	266,624	0,000	11,492	4978,253
	20,000	6,400	58,906	1876,722	1923,640	266,585	0,000	9,838	2982,519
	18,000	8,400	50,951	1623,278	1663,860	266,603	0,000	8,400	1576,096
	16,000	10,400	45,178	1439,372	1475,356	266,695	0,000	7,294	783,968
	14,000	12,400	40,953	1304,745	1337,364	266,826	0,000	6,495	465,086
	12,000	14,400	37,153	1183,675	1213,267	266,974	0,000	5,830	440,279
	10,000	16,400	32,905	1048,357	1074,566	267,128	0,000	5,168	584,787
	8,000	18,400	26,970	859,261	880,743	267,151	0,000	4,336	926,142
	6,000	20,400	19,684	627,129	642,807	267,041	0,000	3,358	1291,340
	4,000	22,400	11,928	380,036	389,537	266,792	0,000	2,289	1355,580
	2,000	24,400	4,759	151,629	155,420	266,287	0,000	1,176	994,017
	0,683	25,717	1,000	31,860	32,656	265,427	0,000	0,426	565,768
	0,000	26,400	0,000	0,000	0,000	264,666	0,000	0,000	0,000

Tank Calibrations - TANQUE LASTRE PROA DF

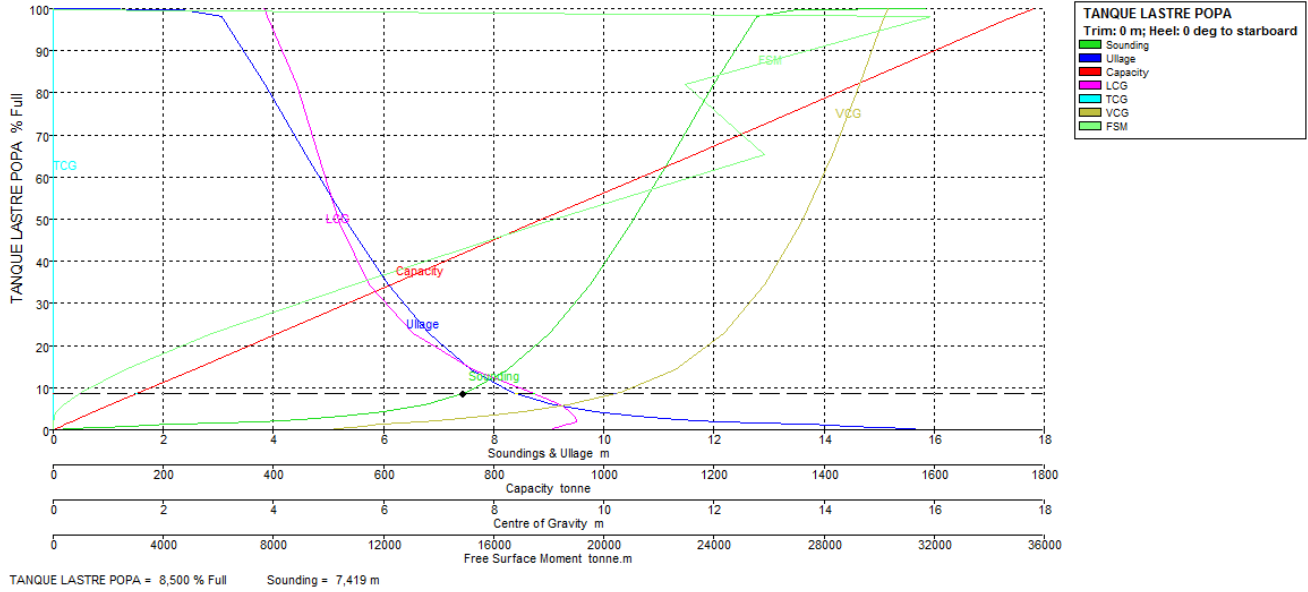
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE PROA DF	6,400	0,000	100,000	1598,238	1638,194	254,459	0,000	3,383	0,000
	6,283	0,117	98,000	1566,274	1605,431	254,460	0,000	3,323	10229,335
	6,277	0,123	97,900	1564,675	1603,792	254,460	0,000	3,320	10228,742
	6,250	0,150	97,443	1557,378	1596,313	254,460	0,000	3,306	10225,998
	6,000	0,400	93,183	1489,291	1526,523	254,462	0,000	3,177	10196,330
	5,750	0,650	88,925	1421,236	1456,767	254,464	0,000	3,048	10158,915
	5,500	0,900	84,671	1353,240	1387,071	254,465	0,000	2,919	10112,146
	5,250	1,150	80,422	1285,333	1317,466	254,467	0,000	2,789	10052,161
	5,000	1,400	76,181	1217,551	1247,990	254,468	0,000	2,659	9974,758
	4,750	1,650	71,950	1149,940	1178,688	254,469	0,000	2,528	9877,096
	4,500	1,900	67,734	1082,551	1109,615	254,469	0,000	2,398	9751,196
	4,250	2,150	63,535	1015,442	1040,828	254,469	0,000	2,267	9603,509
	4,000	2,400	59,356	948,647	972,363	254,469	0,000	2,136	9448,905
	3,750	2,650	55,198	882,197	904,252	254,468	0,000	2,005	9285,293
	3,500	2,900	51,064	816,127	836,530	254,466	0,000	1,874	9110,365
	3,250	3,150	46,957	750,480	769,242	254,464	0,000	1,743	8920,618
	3,000	3,400	42,879	685,307	702,440	254,461	0,000	1,612	8714,464
	2,750	3,650	38,835	620,668	636,185	254,458	0,000	1,480	8488,682
	2,500	3,900	34,828	556,633	570,549	254,454	0,000	1,348	8239,254
	2,250	4,150	30,864	493,287	505,619	254,450	0,000	1,216	7962,504
	2,000	4,400	26,950	430,731	441,499	254,445	0,000	1,084	7653,626
	1,750	4,650	23,093	369,087	378,314	254,439	0,000	0,952	7306,348
	1,500	4,900	19,303	308,509	316,222	254,433	0,000	0,820	6911,990
	1,250	5,150	15,591	249,187	255,417	254,425	0,000	0,688	6461,112
	1,000	5,400	11,973	191,355	196,139	254,416	0,000	0,555	5940,911
	0,750	5,650	8,466	135,301	138,683	254,396	0,000	0,423	5336,300
	0,500	5,900	5,099	81,501	83,539	254,343	0,000	0,288	4577,864
	0,250	6,150	1,993	31,860	32,657	254,179	0,000	0,149	3068,249
	0,156	6,244	1,000	15,982	16,382	254,060	0,000	0,094	1905,783
	0,000	6,400	0,000	0,000	0,000	253,424	0,000	0,000	0,000

Tank Calibrations - TANQUE LASTRE POPA

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



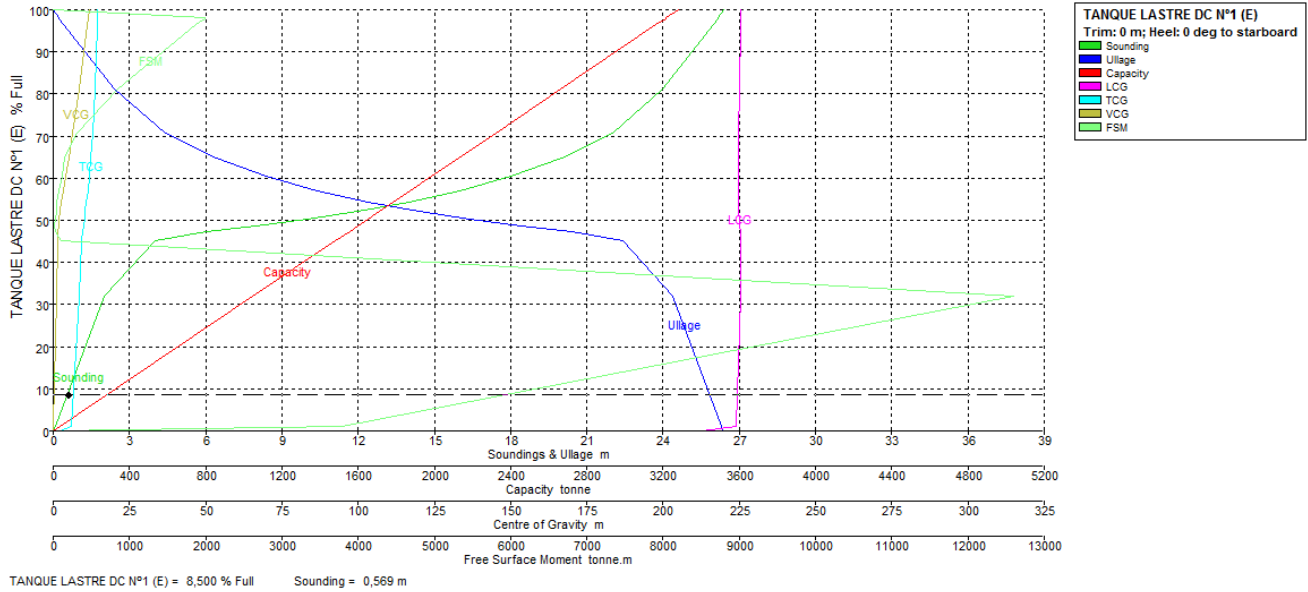
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE POPA	15,840	0,000	100,000	1735,806	1779,201	3,826	0,000	15,159	0,000
	15,750	0,090	99,998	1735,764	1779,158	3,826	0,000	15,159	6,020
	15,000	0,840	99,970	1735,279	1778,661	3,829	0,000	15,158	0,000
	14,250	1,590	99,859	1733,365	1776,699	3,839	0,000	15,153	0,000
	13,500	2,340	99,859	1733,365	1776,699	3,839	0,000	15,153	0,000
	12,775	3,065	98,000	1701,090	1743,618	3,894	0,000	15,102	31858,455
	12,770	3,069	97,900	1699,355	1741,838	3,897	0,000	15,099	31808,864
	12,750	3,090	97,449	1691,530	1733,819	3,910	0,000	15,087	31585,475
	12,000	3,840	81,968	1422,812	1458,383	4,431	0,000	14,653	22949,549
	11,250	4,590	65,427	1135,679	1164,071	4,819	0,000	14,160	25820,522
	10,500	5,340	48,791	846,922	868,095	5,197	0,000	13,572	17703,064
	9,750	6,090	34,504	598,917	613,890	5,745	0,000	12,925	10887,916
	9,000	6,840	22,912	397,707	407,650	6,544	0,000	12,183	5742,347
	8,250	7,590	14,313	248,444	254,655	7,634	0,000	11,303	2577,296
	7,500	8,340	8,824	153,170	157,000	8,686	0,000	10,304	1020,415
	6,750	9,090	5,828	101,169	103,698	9,206	0,000	9,348	375,459
	6,000	9,840	4,174	72,461	74,273	9,387	0,000	8,531	138,459
	5,250	10,590	3,126	54,268	55,624	9,459	0,000	7,821	53,810
	4,500	11,340	2,404	41,734	42,777	9,506	0,000	7,197	23,208
	3,750	12,090	1,904	33,043	33,869	9,510	0,000	6,684	11,705
	3,000	12,840	1,548	26,876	27,548	9,455	0,000	6,292	7,156
	2,250	13,590	1,260	21,877	22,424	9,351	0,000	5,987	5,649
	1,630	14,210	1,000	17,358	17,792	9,257	0,000	5,741	6,232
	1,500	14,340	0,939	16,302	16,710	9,237	0,000	5,688	6,446
	0,750	15,090	0,528	9,171	9,400	9,129	0,000	5,361	8,633
	0,000	15,840	0,000	0,000	0,000	9,046	0,000	5,000	0,000

Tank Calibrations - TANQUE LASTRE DC Nº1 (E)

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 97 %

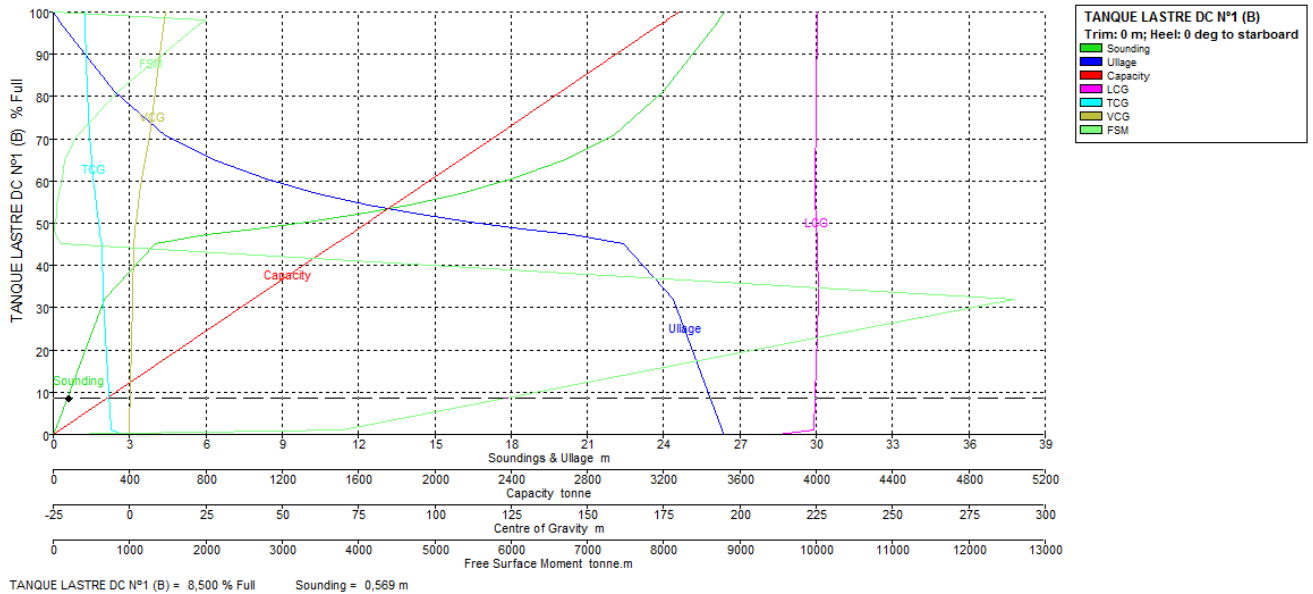
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC Nº1 (E)	26,400	0,000	100,000	3202,410	3282,470	225,475	14,614	11,735	0,000
	26,182	0,218	98,000	3138,362	3216,821	225,441	14,544	11,438	1996,052
	26,171	0,229	97,900	3135,159	3213,538	225,440	14,541	11,423	1988,336
	26,000	0,400	96,375	3086,328	3163,487	225,413	14,485	11,191	1871,963
	24,000	2,400	81,159	2599,056	2664,033	225,099	13,751	8,592	851,041
	22,000	4,400	70,807	2267,521	2324,209	224,816	12,977	6,474	319,277
	20,000	6,400	64,859	2077,045	2128,971	224,634	12,368	5,134	155,277
	18,000	8,400	60,445	1935,688	1984,080	224,554	11,836	4,119	113,671
	16,000	10,400	57,035	1826,495	1872,157	224,586	11,366	3,346	72,910
	14,000	12,400	54,344	1740,304	1783,812	224,689	10,951	2,767	50,867
	12,000	14,400	52,147	1669,968	1711,717	224,828	10,578	2,335	38,042
	10,000	16,400	50,288	1610,425	1650,686	224,979	10,237	2,013	29,593
	8,000	18,400	48,712	1559,945	1598,944	225,137	9,927	1,786	21,910
	6,000	20,400	47,418	1518,507	1556,470	225,297	9,658	1,644	27,530
	4,000	22,400	45,143	1445,662	1481,803	225,527	9,200	1,480	110,498
	2,000	24,400	31,906	1021,751	1047,294	225,598	8,562	1,068	12599,850
	0,111	26,289	1,000	32,024	32,825	224,052	5,970	0,062	3790,617
	0,000	26,400	0,000	0,000	0,000	212,854	2,109	0,000	0,000

Tank Calibrations - TANQUE LASTRE DC Nº1 (B)

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



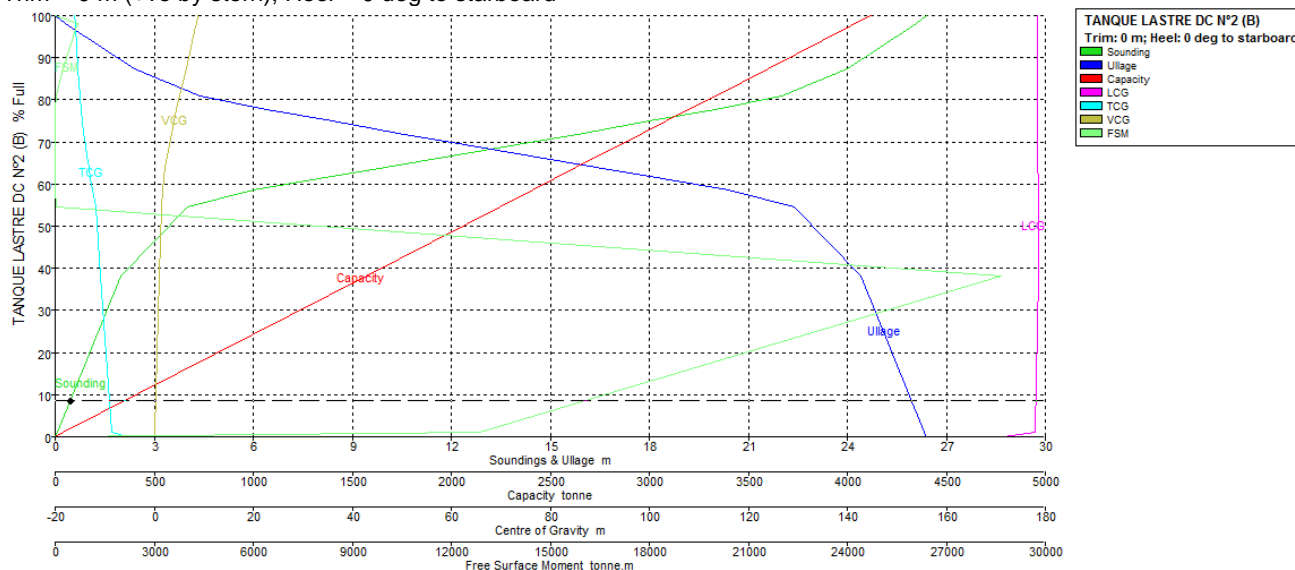
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC Nº1 (B)	26,400	0,000	100,000	3202,410	3282,470	225,475	-14,614	11,735	0,000
	26,182	0,218	98,000	3138,362	3216,821	225,441	-14,544	11,438	1996,052
	26,171	0,229	97,900	3135,159	3213,538	225,440	-14,541	11,423	1988,336
	26,000	0,400	96,375	3086,328	3163,487	225,413	-14,485	11,191	1871,963
	24,000	2,400	81,159	2599,056	2664,033	225,099	-13,751	8,592	851,041
	22,000	4,400	70,807	2267,521	2324,209	224,816	-12,977	6,474	319,277
	20,000	6,400	64,859	2077,045	2128,971	224,634	-12,368	5,134	155,277
	18,000	8,400	60,445	1935,688	1984,080	224,554	-11,836	4,119	113,671
	16,000	10,400	57,035	1826,495	1872,157	224,586	-11,366	3,346	72,910
	14,000	12,400	54,344	1740,304	1783,812	224,689	-10,951	2,767	50,867
	12,000	14,400	52,147	1669,968	1711,717	224,828	-10,578	2,335	38,042
	10,000	16,400	50,288	1610,425	1650,686	224,979	-10,237	2,013	29,593
	8,000	18,400	48,712	1559,945	1598,944	225,137	-9,927	1,786	21,910
	6,000	20,400	47,418	1518,507	1556,470	225,297	-9,658	1,644	27,530
	4,000	22,400	45,143	1445,662	1481,803	225,527	-9,200	1,480	110,498
	2,000	24,400	31,906	1021,751	1047,294	225,598	-8,562	1,068	12599,849
	0,111	26,289	1,000	32,024	32,825	224,052	-5,970	0,062	3790,617
	0,000	26,400	0,000	0,000	0,000	212,854	-2,109	0,000	0,000

Tank Calibrations - TANQUE LASTRE DC N°2 (B)

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 97 %

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

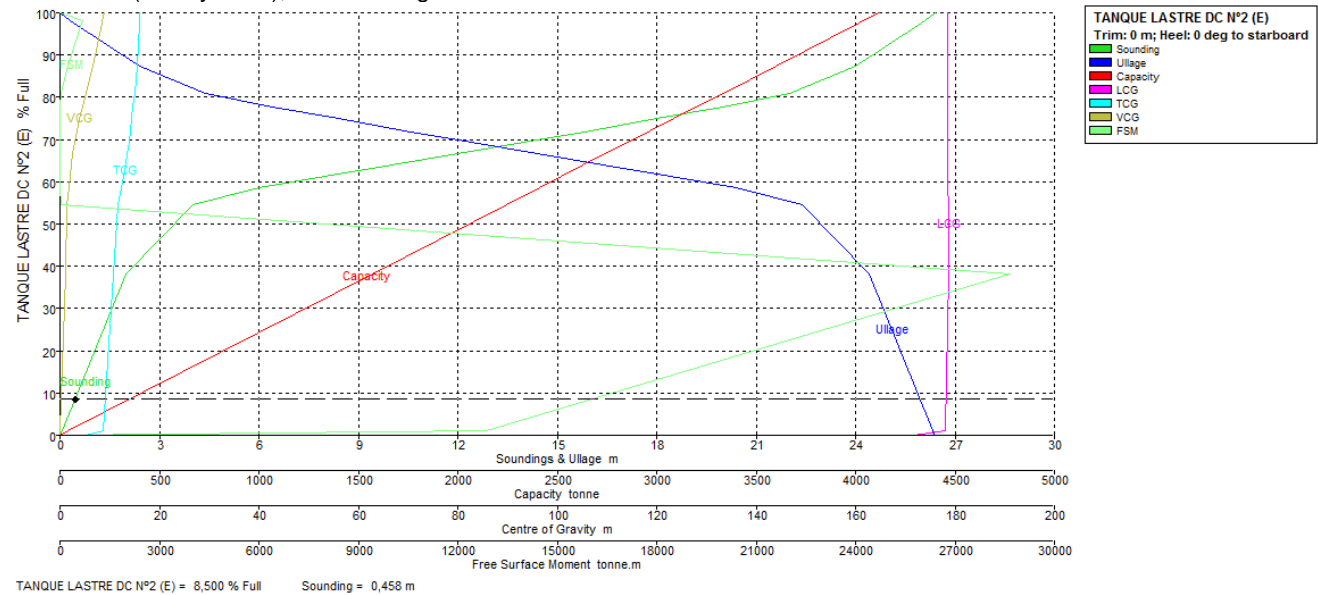


TANQUE LASTRE DC N°2 (B) = 8,500 % Full Sounding = 0,458 m

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC N°2 (B)	26,400	0,000	100,000	4016,756	4117,174	178,512	-16,070	8,869	0,000
	26,075	0,325	98,000	3936,420	4034,831	178,502	-15,994	8,514	690,383
	26,058	0,342	97,900	3932,404	4030,714	178,502	-15,990	8,496	685,214
	26,000	0,400	97,554	3918,486	4016,448	178,500	-15,976	8,434	667,405
	24,000	2,400	87,483	3513,965	3601,814	178,446	-15,482	6,520	225,577
	22,000	4,400	81,015	3254,189	3335,544	178,412	-15,033	5,197	40,595
	20,000	6,400	77,706	3121,275	3199,307	178,403	-14,743	4,520	9,313
	18,000	8,400	74,879	3007,708	3082,900	178,404	-14,470	3,973	9,055
	16,000	10,400	72,087	2895,541	2967,929	178,412	-14,179	3,469	8,843
	14,000	12,400	69,327	2784,682	2854,299	178,428	-13,869	3,009	8,652
	12,000	14,400	66,599	2675,121	2741,999	178,451	-13,538	2,600	8,467
	10,000	16,400	63,905	2566,920	2631,093	178,482	-13,184	2,246	8,261
	8,000	18,400	61,252	2460,343	2521,852	178,523	-12,804	1,953	7,982
	6,000	20,400	58,568	2352,519	2411,332	178,576	-12,387	1,723	13,903
	4,000	22,400	54,488	2188,634	2243,350	178,646	-11,708	1,483	50,424
	2,000	24,400	38,219	1535,151	1573,529	178,714	-10,835	1,040	28675,589
	0,069	26,331	1,000	40,167	41,171	177,971	-8,665	0,036	12870,482
	0,000	26,400	0,000	0,000	0,000	171,620	-5,311	0,000	0,000

Tank Calibrations - TANQUE LASTRE DC Nº2 (E)

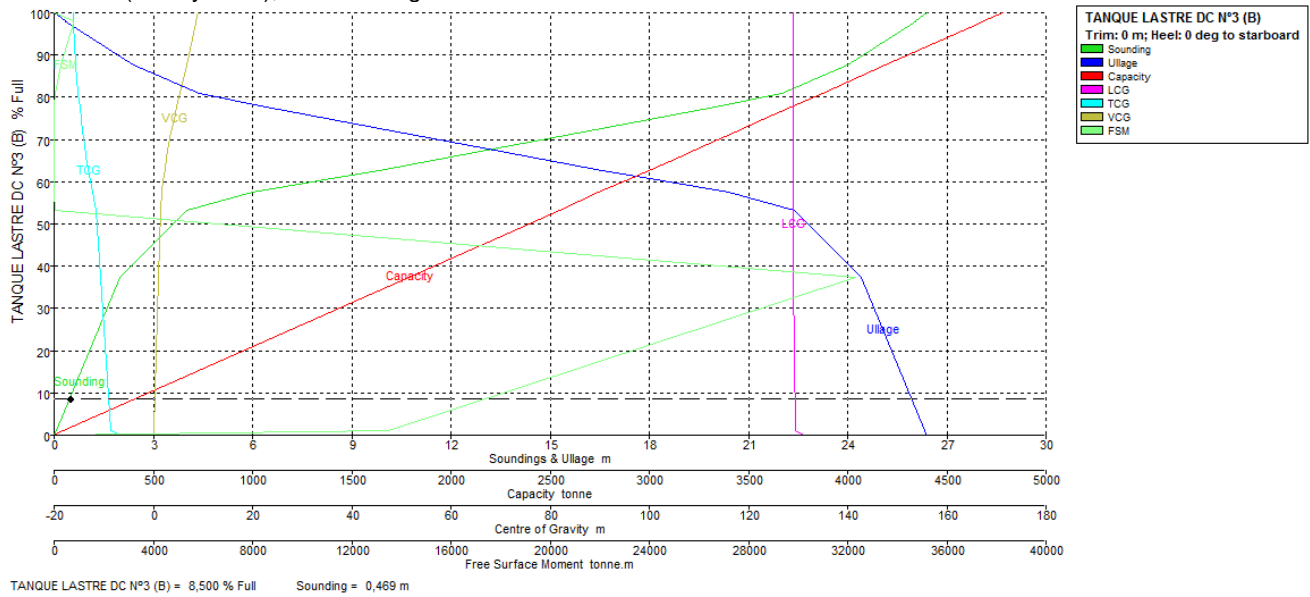
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC Nº2 (E)	26,400	0,000	100,000	4016,756	4117,174	178,512	16,070	8,869	0,000
	26,075	0,325	98,000	3936,420	4034,831	178,502	15,994	8,514	690,383
	26,058	0,342	97,900	3932,404	4030,714	178,502	15,990	8,496	685,214
	26,000	0,400	97,554	3918,486	4016,448	178,500	15,976	8,434	667,405
	24,000	2,400	87,483	3513,965	3601,814	178,446	15,482	6,520	225,577
	22,000	4,400	81,015	3254,189	3335,544	178,412	15,033	5,197	40,595
	20,000	6,400	77,706	3121,275	3199,307	178,403	14,743	4,520	9,313
	18,000	8,400	74,879	3007,708	3082,900	178,404	14,470	3,973	9,055
	16,000	10,400	72,087	2895,541	2967,929	178,412	14,179	3,469	8,843
	14,000	12,400	69,327	2784,682	2854,299	178,428	13,869	3,009	8,652
	12,000	14,400	66,599	2675,121	2741,999	178,451	13,538	2,600	8,467
	10,000	16,400	63,905	2566,920	2631,093	178,482	13,184	2,246	8,261
	8,000	18,400	61,252	2460,343	2521,852	178,523	12,804	1,953	7,982
	6,000	20,400	58,568	2352,519	2411,332	178,576	12,387	1,723	13,903
	4,000	22,400	54,488	2188,634	2243,350	178,646	11,708	1,483	50,424
	2,000	24,400	38,219	1535,151	1573,529	178,714	10,835	1,040	28675,589
	0,069	26,331	1,000	40,167	41,171	177,971	8,665	0,036	12870,482
	0,000	26,400	0,000	0,000	0,000	171,620	5,311	0,000	0,000

Tank Calibrations - TANQUE LASTRE DC N°3 (B)

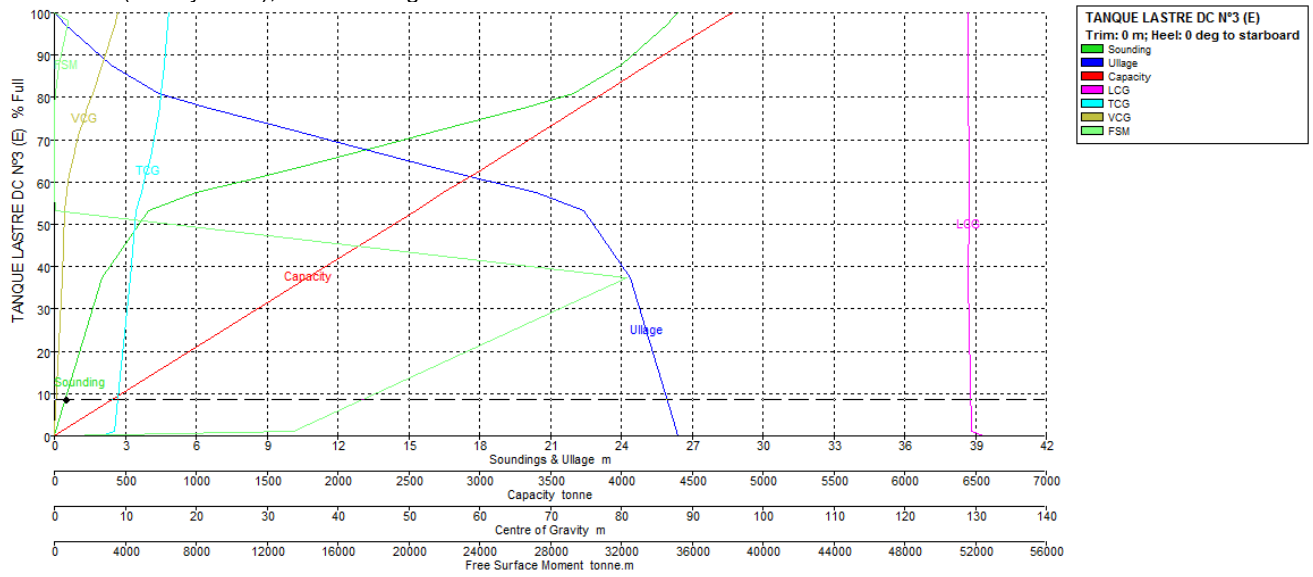
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC N°3 (B)	26,400	0,000	100,000	4665,976	4782,626	128,921	-16,124	9,006	0,000
	26,073	0,327	98,000	4572,657	4686,973	128,927	-16,049	8,655	798,635
	26,056	0,344	97,900	4567,991	4682,190	128,927	-16,045	8,637	792,682
	26,000	0,400	97,565	4552,346	4666,155	128,929	-16,032	8,577	772,831
	24,000	2,400	87,520	4083,670	4185,762	128,966	-15,545	6,686	264,418
	22,000	4,400	81,029	3780,789	3875,308	128,996	-15,099	5,371	49,029
	20,000	6,400	77,647	3622,977	3713,552	129,013	-14,804	4,687	11,865
	18,000	8,400	74,709	3485,890	3573,037	129,029	-14,521	4,124	11,865
	16,000	10,400	71,771	3348,837	3432,558	129,046	-14,214	3,597	11,841
	14,000	12,400	68,838	3211,982	3292,282	129,064	-13,883	3,111	11,754
	12,000	14,400	65,918	3075,698	3152,590	129,082	-13,523	2,673	11,536
	10,000	16,400	63,025	2940,737	3014,255	129,096	-13,135	2,291	11,077
	8,000	18,400	60,193	2808,569	2878,783	129,103	-12,718	1,975	10,193
	6,000	20,400	57,393	2677,922	2744,870	129,091	-12,269	1,730	16,148
	4,000	22,400	53,335	2488,607	2550,823	129,045	-11,571	1,486	53,578
	2,000	24,400	37,363	1743,354	1786,938	128,996	-10,684	1,045	32316,537
	0,071	26,329	1,000	46,660	47,827	129,488	-8,505	0,037	13504,571
	0,000	26,400	0,000	0,000	0,000	131,175	-6,563	0,000	0,000

Tank Calibrations - TANQUE LASTRE DC N°3 (E)

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



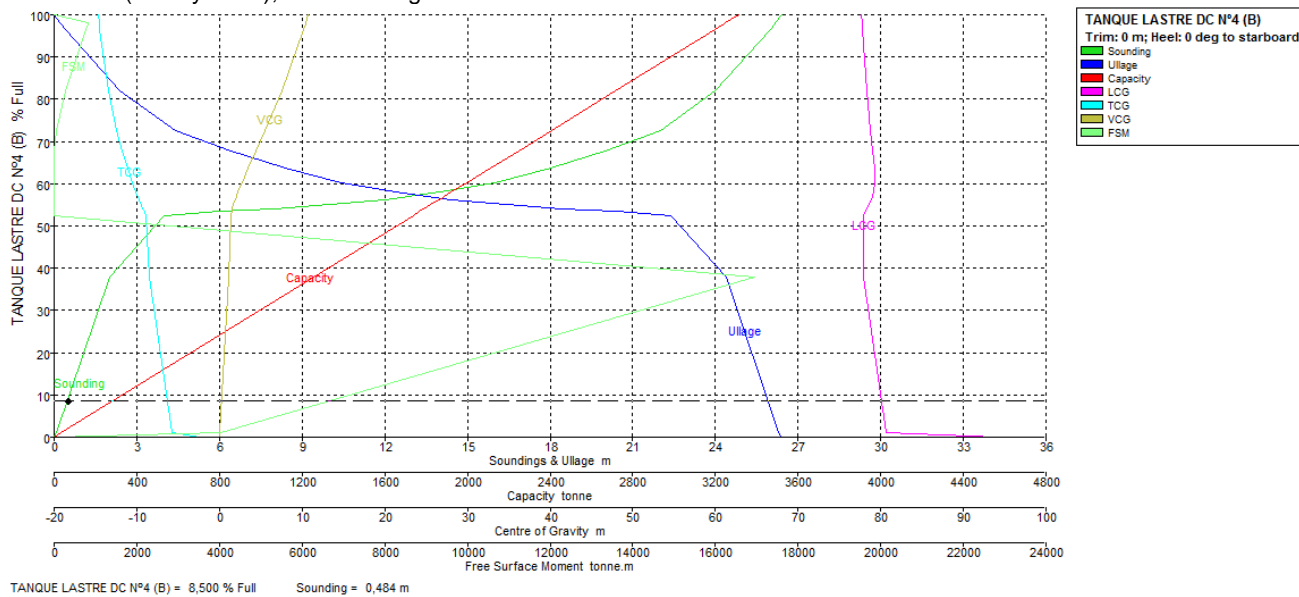
Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC N°3 (E)	26,400	0,000	100,000	4665,976	4782,626	128,921	16,124	9,006	0,000
	26,073	0,327	98,000	4572,657	4686,973	128,927	16,049	8,655	798,635
	26,056	0,344	97,900	4567,991	4682,190	128,927	16,045	8,637	792,682
	26,000	0,400	97,565	4552,346	4666,155	128,929	16,032	8,577	772,831
	24,000	2,400	87,520	4083,670	4185,762	128,966	15,545	6,686	264,418
	22,000	4,400	81,029	3780,789	3875,308	128,996	15,099	5,371	49,029
	20,000	6,400	77,647	3622,977	3713,552	129,013	14,804	4,687	11,865
	18,000	8,400	74,709	3485,890	3573,037	129,029	14,521	4,124	11,865
	16,000	10,400	71,771	3348,837	3432,558	129,046	14,214	3,597	11,841
	14,000	12,400	68,838	3211,982	3292,282	129,064	13,883	3,111	11,754
	12,000	14,400	65,918	3075,698	3152,590	129,082	13,523	2,673	11,536
	10,000	16,400	63,025	2940,737	3014,255	129,096	13,135	2,291	11,077
	8,000	18,400	60,193	2808,569	2878,783	129,103	12,718	1,975	10,193
	6,000	20,400	57,393	2677,922	2744,870	129,091	12,269	1,730	16,148
	4,000	22,400	53,335	2488,607	2550,823	129,045	11,571	1,486	53,578
	2,000	24,400	37,363	1743,354	1786,938	128,996	10,684	1,045	32316,537
	0,071	26,329	1,000	46,660	47,827	129,488	8,505	0,037	13504,571
	0,000	26,400	0,000	0,000	0,000	131,175	6,563	0,000	0,000

Tank Calibrations - TANQUE LASTRE DC N°4 (B)

Fluid Type = Water Ballast Specific gravity = 1,025

Permeability = 97 %

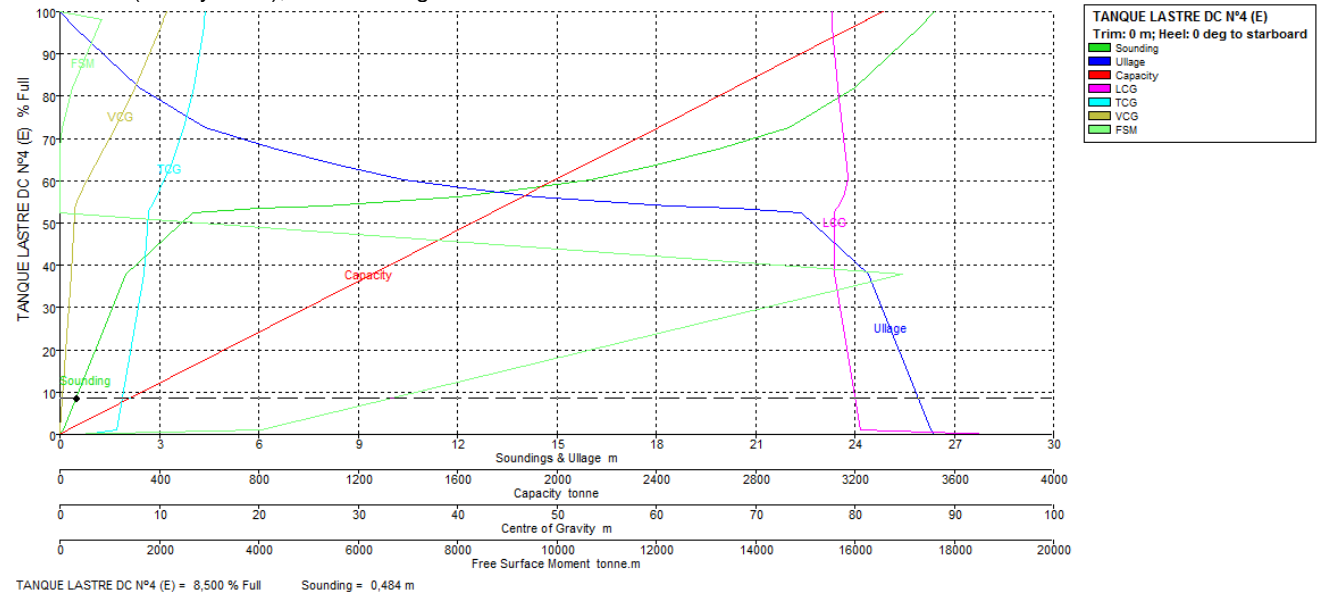
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC N°4 (B)	26,400	0,000	100,000	3232,447	3313,258	77,660	-14,672	10,739	0,000
	26,176	0,224	98,000	3167,798	3246,993	77,719	-14,568	10,421	834,867
	26,164	0,236	97,900	3164,566	3243,680	77,722	-14,563	10,405	830,665
	26,000	0,400	96,481	3118,701	3196,669	77,766	-14,485	10,175	771,816
	24,000	2,400	81,983	2650,060	2716,311	78,292	-13,461	7,542	262,299
	22,000	4,400	72,646	2348,255	2406,961	78,734	-12,479	5,544	47,843
	20,000	6,400	67,829	2192,547	2247,360	78,996	-11,812	4,440	11,254
	18,000	8,400	63,679	2058,379	2109,838	79,243	-11,149	3,491	11,104
	16,000	10,400	60,222	1946,655	1995,322	79,327	-10,531	2,711	6,119
	14,000	12,400	57,974	1873,987	1920,837	79,127	-10,092	2,232	3,985
	12,000	14,400	56,314	1820,321	1865,829	78,862	-9,746	1,914	2,828
	10,000	16,400	55,021	1778,522	1822,986	78,596	-9,463	1,699	1,927
	8,000	18,400	54,042	1746,885	1790,557	78,356	-9,241	1,566	1,094
	6,000	20,400	53,367	1725,072	1768,198	78,165	-9,084	1,497	1,023
	4,000	22,400	52,488	1696,654	1739,070	77,906	-8,884	1,439	2,433
	2,000	24,400	37,943	1226,487	1257,149	77,945	-8,451	1,092	16957,223
	0,098	26,302	1,000	32,324	33,133	80,600	-5,751	0,055	4044,769
	0,000	26,400	0,000	0,000	0,000	94,132	-2,472	0,000	0,000

Tank Calibrations - TANQUE LASTRE DC N°4 (E)

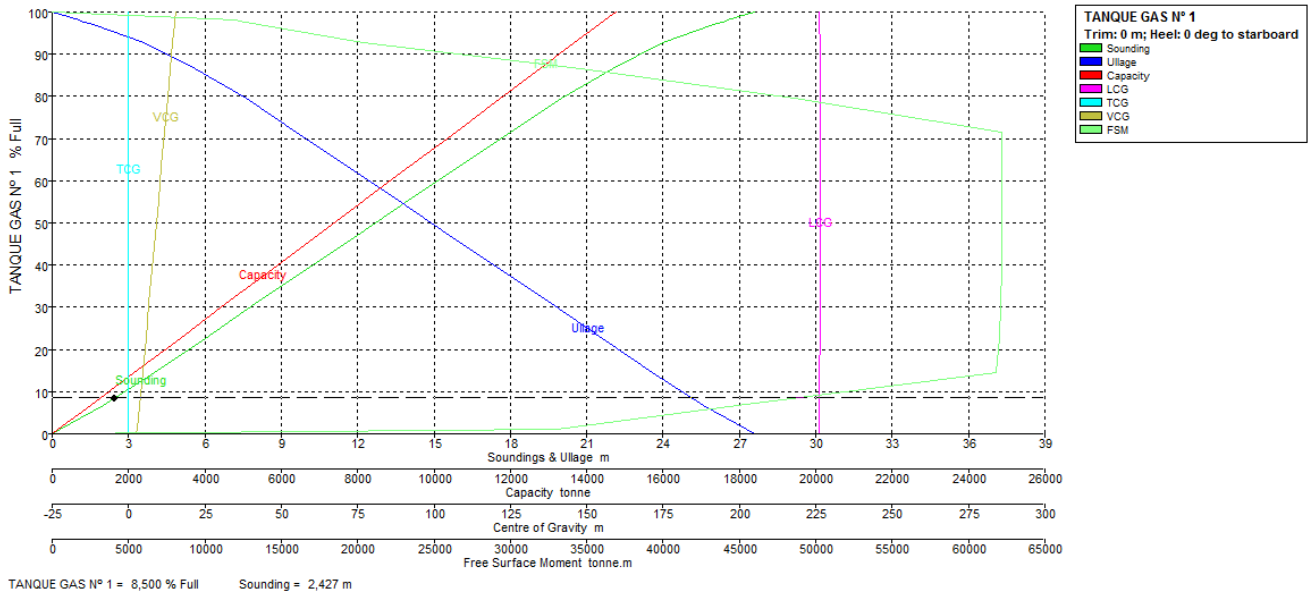
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE LASTRE DC N°4 (E)	26,400	0,000	100,000	3232,447	3313,258	77,660	14,672	10,739	0,000
	26,176	0,224	98,000	3167,798	3246,993	77,719	14,568	10,421	834,867
	26,164	0,236	97,900	3164,566	3243,680	77,722	14,563	10,405	830,665
	26,000	0,400	96,481	3118,701	3196,669	77,766	14,485	10,175	771,816
	24,000	2,400	81,983	2650,060	2716,311	78,292	13,461	7,542	262,299
	22,000	4,400	72,646	2348,255	2406,961	78,734	12,479	5,544	47,843
	20,000	6,400	67,829	2192,547	2247,360	78,996	11,812	4,440	11,254
	18,000	8,400	63,679	2058,379	2109,838	79,243	11,149	3,491	11,104
	16,000	10,400	60,222	1946,655	1995,322	79,327	10,531	2,711	6,119
	14,000	12,400	57,974	1873,987	1920,837	79,127	10,092	2,232	3,985
	12,000	14,400	56,314	1820,321	1865,829	78,862	9,746	1,914	2,828
	10,000	16,400	55,021	1778,522	1822,986	78,596	9,463	1,699	1,927
	8,000	18,400	54,042	1746,885	1790,557	78,356	9,241	1,566	1,094
	6,000	20,400	53,367	1725,072	1768,198	78,165	9,084	1,497	1,023
	4,000	22,400	52,488	1696,654	1739,070	77,906	8,884	1,439	2,433
	2,000	24,400	37,943	1226,487	1257,149	77,945	8,451	1,092	16957,223
	0,098	26,302	1,000	32,324	33,133	80,600	5,751	0,055	4044,769
	0,000	26,400	0,000	0,000	0,000	94,132	2,472	0,000	0,000

Tank Calibrations - TANQUE GAS Nº 1

Fluid Type = Specific gravity = 0,45
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

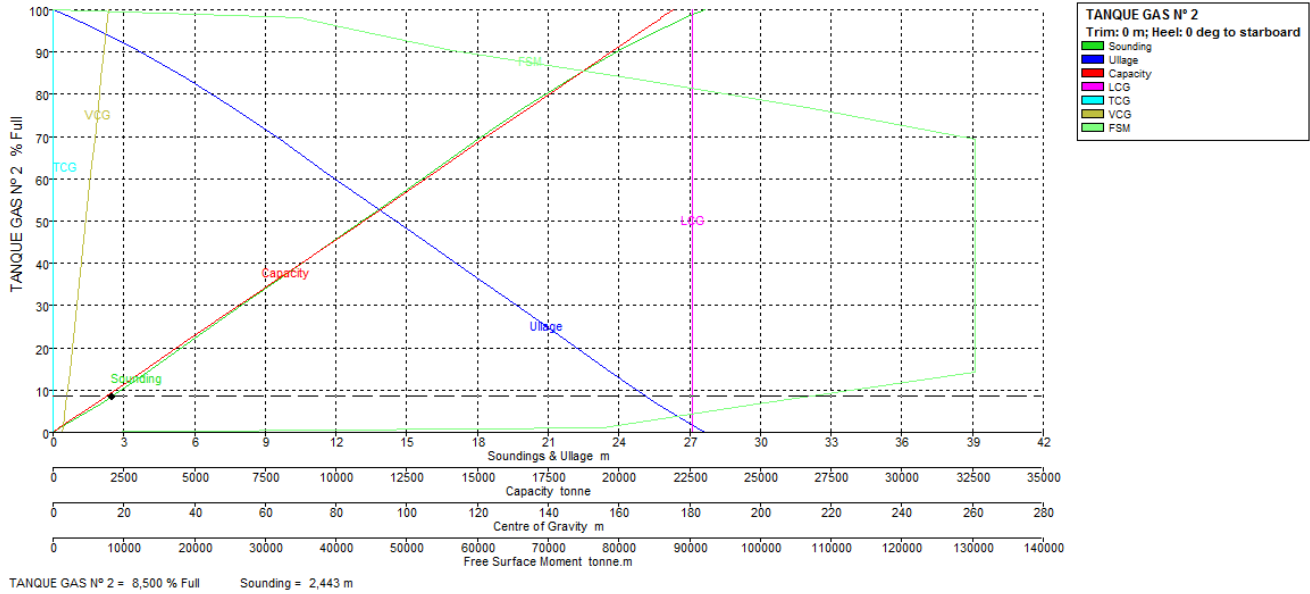


TANQUE GAS Nº 1 = 8,500 % Full Sounding = 2,427 m

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE GAS Nº 1	27,600	0,000	100,000	32803,032	14761,364	225,950	0,000	15,453	0,000
	26,521	1,079	98,000	32146,972	14466,137	226,041	0,000	15,164	12024,388
	26,470	1,130	97,900	32114,166	14451,374	226,046	0,000	15,149	12166,281
	26,000	1,600	96,970	31809,156	14314,120	226,089	0,000	15,018	13511,759
	24,000	3,600	92,632	30386,023	13673,710	226,295	0,000	14,430	20375,473
	22,000	5,600	86,511	28378,390	12770,275	226,341	0,000	13,643	34600,598
	20,000	7,600	79,443	26059,721	11726,874	226,356	0,000	12,758	48567,116
	18,000	9,600	71,562	23474,509	10563,529	226,357	0,000	11,786	62172,459
	16,000	11,600	63,416	20802,263	9361,018	226,351	0,000	10,783	62172,466
	14,000	13,600	55,269	18130,016	8158,507	226,345	0,000	9,778	62172,466
	12,000	15,600	47,123	15457,770	6955,996	226,335	0,000	8,771	62172,466
	10,000	17,600	38,977	12785,543	5753,494	226,322	0,000	7,762	62162,809
	8,000	19,600	30,832	10113,945	4551,275	226,304	0,000	6,748	62127,936
	6,000	21,600	22,692	7443,812	3349,715	226,276	0,000	5,725	62032,848
	4,000	23,600	14,562	4776,887	2149,599	226,230	0,000	4,678	61817,636
	2,000	25,600	6,853	2247,974	1011,588	226,143	0,000	3,621	44879,954
	0,308	27,292	1,000	328,030	147,614	226,053	0,000	2,755	33073,530
	0,000	27,600	0,000	0,000	0,000	226,035	0,000	2,600	0,000

Tank Calibrations - TANQUE GAS Nº 2

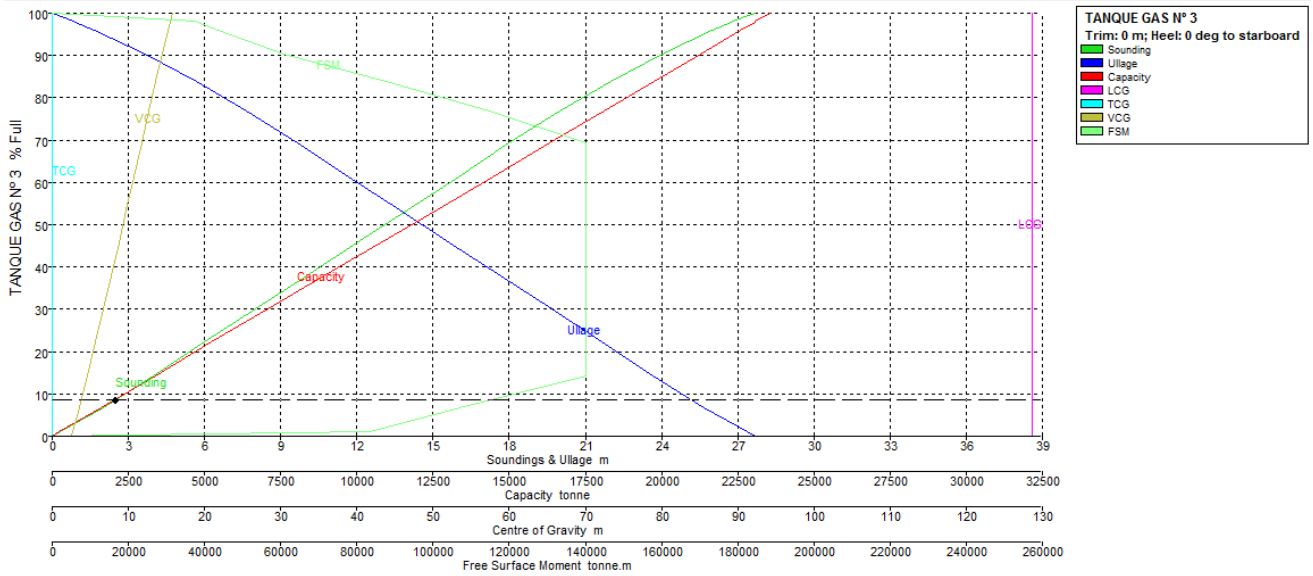
Fluid Type = Specific gravity = 0,45
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE GAS Nº 2	27,630	0,000	100,000	48705,909	21917,659	180,649	0,000	15,822	0,000
	26,793	0,838	98,000	47731,796	21479,308	180,649	0,000	15,537	35265,768
	26,753	0,877	97,900	47683,090	21457,390	180,649	0,000	15,522	35519,985
	26,000	1,630	95,940	46728,520	21027,833	180,649	0,000	15,248	40623,182
	24,000	3,630	90,311	43986,802	19794,060	180,649	0,000	14,479	56492,346
	22,000	5,630	83,934	40880,672	18396,302	180,649	0,000	13,635	81407,915
	20,000	7,630	76,910	37459,797	16856,908	180,650	0,000	12,727	106677,530
	18,000	9,630	69,267	33737,028	15181,662	180,650	0,000	11,749	130295,640
	16,000	11,630	61,421	29915,680	13462,056	180,650	0,000	10,746	130295,640
	14,000	13,630	53,575	26094,333	11742,450	180,650	0,000	9,742	130295,640
	12,000	15,630	45,730	22272,986	10022,843	180,650	0,000	8,737	130295,640
	10,000	17,630	37,884	18451,638	8303,237	180,650	0,000	7,730	130295,640
	8,000	19,630	30,038	14630,291	6583,631	180,650	0,000	6,719	130295,640
	6,000	21,630	22,192	10808,943	4864,024	180,650	0,000	5,701	130295,640
	4,000	23,630	14,347	6987,596	3144,418	180,650	0,000	4,663	130295,640
	2,000	25,630	6,837	3330,023	1498,510	180,650	0,000	3,616	99580,339
	0,305	27,325	1,000	487,057	219,176	180,650	0,000	2,753	77682,908
	0,000	27,630	0,000	0,000	0,000	180,650	0,000	2,600	0,000

Tank Calibrations - TANQUE GAS Nº 3

Fluid Type = Specific gravity = 0,45
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

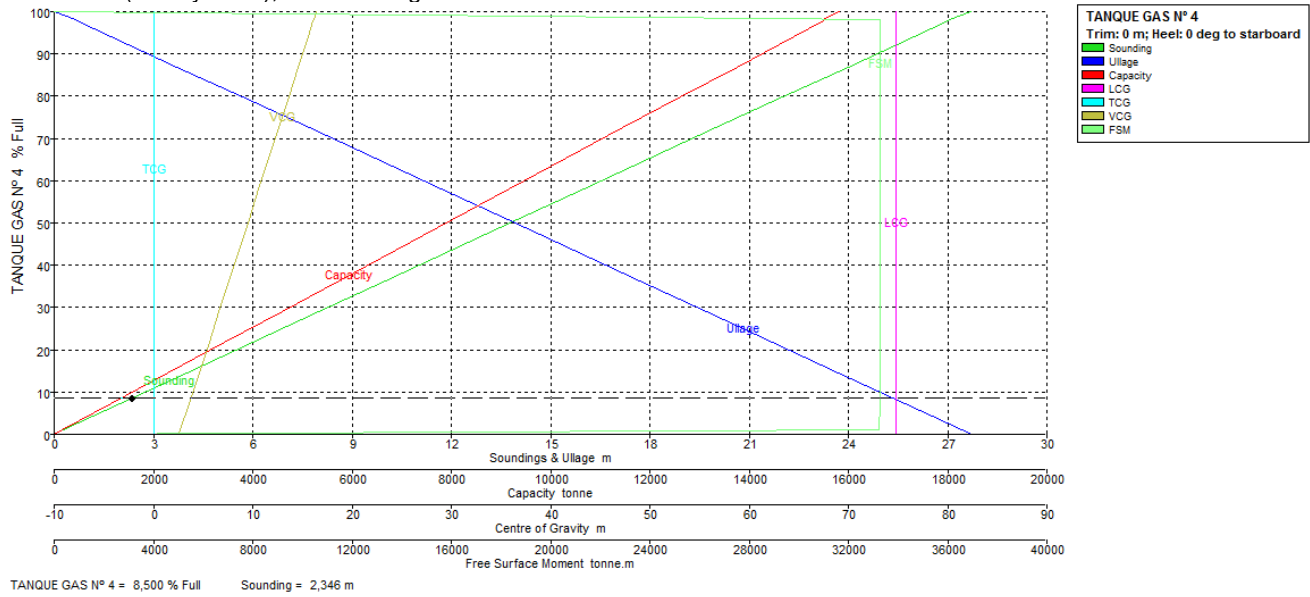


TANQUE GAS Nº 3 = 8,500 % Full Sounding = 2,443 m

Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE GAS Nº 3	27,665	0,000	100,000	52346,549	23555,946	128,599	0,000	15,823	0,000
	26,793	0,872	98,000	51299,616	23084,827	128,600	0,000	15,537	37897,474
	26,754	0,911	97,900	51247,272	23061,272	128,600	0,000	15,523	38170,644
	26,000	1,665	95,939	50220,978	22599,440	128,600	0,000	15,248	43656,689
	24,000	3,665	90,311	47274,632	21273,584	128,600	0,000	14,480	60708,417
	22,000	5,665	83,929	43934,195	19770,387	128,600	0,000	13,636	87650,794
	20,000	7,665	76,904	40256,393	18115,376	128,600	0,000	12,727	114731,215
	18,000	9,665	69,260	36255,348	16314,906	128,600	0,000	11,749	140026,342
	16,000	11,665	61,415	32148,756	14466,940	128,600	0,000	10,746	140026,342
	14,000	13,665	53,570	28042,163	12618,973	128,600	0,000	9,742	140026,342
	12,000	15,665	45,725	23935,570	10771,006	128,600	0,000	8,737	140026,342
	10,000	17,665	37,880	19828,977	8923,039	128,600	0,000	7,730	140026,342
	8,000	19,665	30,035	15722,384	7075,073	128,600	0,000	6,719	140026,342
	6,000	21,665	22,190	11615,791	5227,106	128,600	0,000	5,701	140026,342
	4,000	23,665	14,345	7509,198	3379,139	128,600	0,000	4,663	140026,342
	2,000	25,665	6,836	3578,602	1610,371	128,600	0,000	3,616	107017,680
	0,305	27,360	1,000	523,460	235,557	128,600	0,000	2,753	83485,530
	0,000	27,665	0,000	0,000	0,000	128,600	0,000	2,600	0,000

Tank Calibrations - TANQUE GAS Nº 4

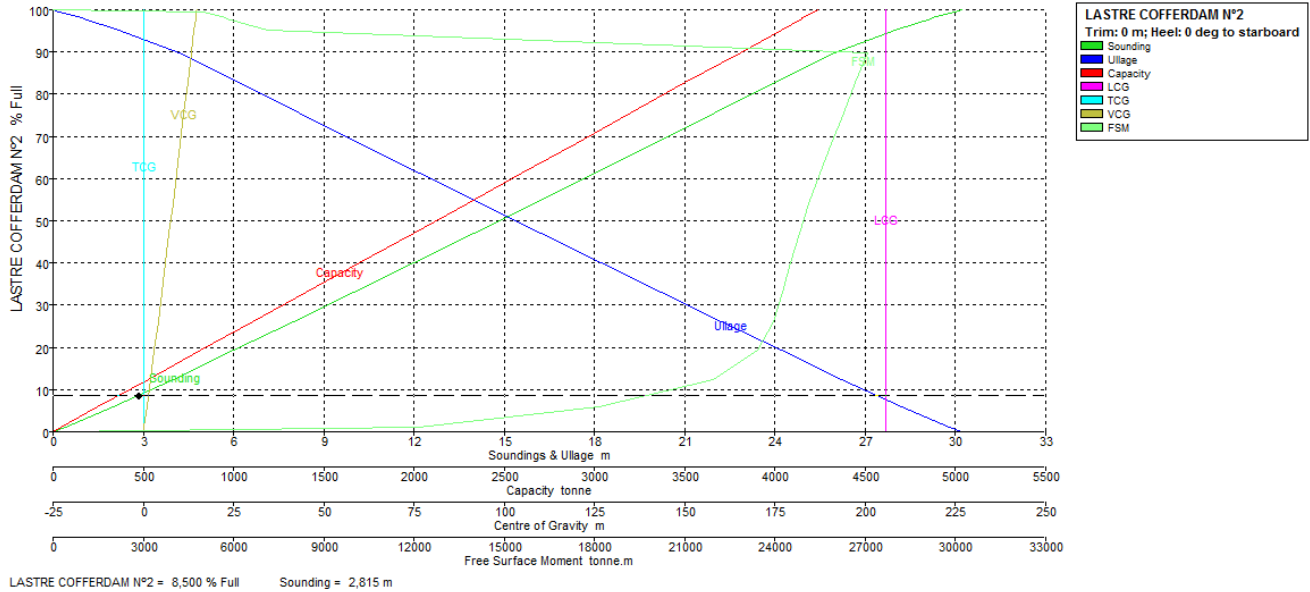
Fluid Type = Specific gravity = 0,45
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
TANQUE GAS Nº 4	27,700	0,000	100,000	35152,520	15818,634	74,750	0,000	16,401	0,000
	27,049	0,651	98,000	34449,466	15502,259	74,751	0,000	16,125	33284,217
	27,022	0,678	97,900	34414,316	15486,442	74,751	0,000	16,111	33284,217
	26,000	1,700	94,198	33113,015	14900,856	74,751	0,000	15,600	33284,217
	24,000	3,700	86,952	30565,821	13754,619	74,751	0,000	14,600	33284,217
	22,000	5,700	79,706	28018,626	12608,381	74,751	0,000	13,600	33284,217
	20,000	7,700	72,460	25471,431	11462,144	74,751	0,000	12,600	33284,217
	18,000	9,700	65,214	22924,237	10315,906	74,751	0,000	11,600	33284,217
	16,000	11,700	57,968	20377,042	9169,669	74,751	0,000	10,600	33284,217
	14,000	13,700	50,721	17829,847	8023,431	74,751	0,000	9,600	33284,217
	12,000	15,700	43,475	15282,653	6877,193	74,751	0,000	8,600	33284,217
	10,000	17,700	36,229	12735,458	5730,956	74,751	0,000	7,600	33284,217
	8,000	19,700	28,983	10188,263	4584,718	74,751	0,000	6,600	33284,217
	6,000	21,700	21,737	7641,068	3438,481	74,752	0,000	5,600	33284,217
	4,000	23,700	14,491	5093,874	2292,243	74,753	0,000	4,600	33284,217
	2,000	25,700	7,245	2546,679	1146,006	74,755	0,000	3,600	33284,217
	0,276	27,424	1,000	351,525	158,186	74,780	0,000	2,738	33235,534
	0,000	27,700	0,000	0,000	0,000	74,798	0,000	2,600	0,000

Tank Calibrations - LASTRE COFFERDAM Nº2

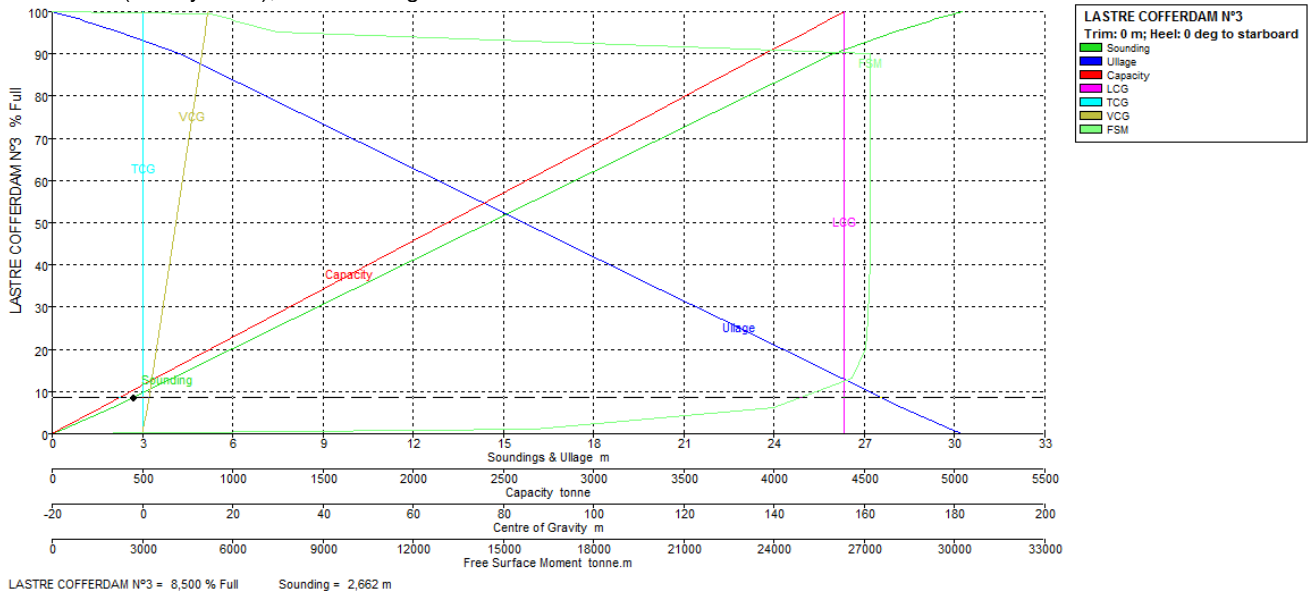
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
LASTRE COFFERDAM Nº2	30,200	0,000	100,000	4132,962	4236,286	205,797	0,000	14,786	0,000
	30,000	0,200	99,591	4116,076	4218,978	205,797	0,000	14,723	4969,089
	29,244	0,956	98,000	4050,303	4151,560	205,797	0,000	14,481	5729,483
	29,198	1,002	97,900	4046,170	4147,324	205,797	0,000	14,466	5778,458
	28,000	2,200	95,215	3935,190	4033,570	205,797	0,000	14,068	7144,225
	26,000	4,200	89,884	3714,888	3807,760	205,798	0,000	13,306	27066,314
	24,000	6,200	82,666	3416,575	3501,989	205,797	0,000	12,284	26665,899
	22,000	8,200	75,484	3119,746	3197,739	205,797	0,000	11,265	26268,190
	20,000	10,200	68,339	2824,407	2895,017	205,797	0,000	10,247	25872,469
	18,000	12,200	61,229	2530,569	2593,833	205,797	0,000	9,230	25477,674
	16,000	14,200	54,154	2238,178	2294,132	205,797	0,000	8,215	25123,337
	14,000	16,200	47,111	1947,097	1995,775	205,796	0,000	7,201	24800,145
	12,000	18,200	40,098	1657,216	1698,647	205,796	0,000	6,186	24508,615
	10,000	20,200	33,110	1368,434	1402,645	205,796	0,000	5,170	24237,798
	8,000	22,200	26,150	1080,753	1107,771	205,796	0,000	4,151	23939,535
	6,000	24,200	19,226	794,591	814,456	205,795	0,000	3,124	23419,523
	4,000	26,200	12,390	512,077	524,879	205,795	0,000	2,087	21958,843
	2,000	28,200	5,822	240,622	246,637	205,795	0,000	1,046	18151,353
	0,406	29,794	1,000	41,329	42,363	205,792	0,000	0,216	12156,948
	0,000	30,200	0,000	0,000	0,000	205,772	0,000	0,000	0,000

Tank Calibrations - LASTRE COFFERDAM N°3

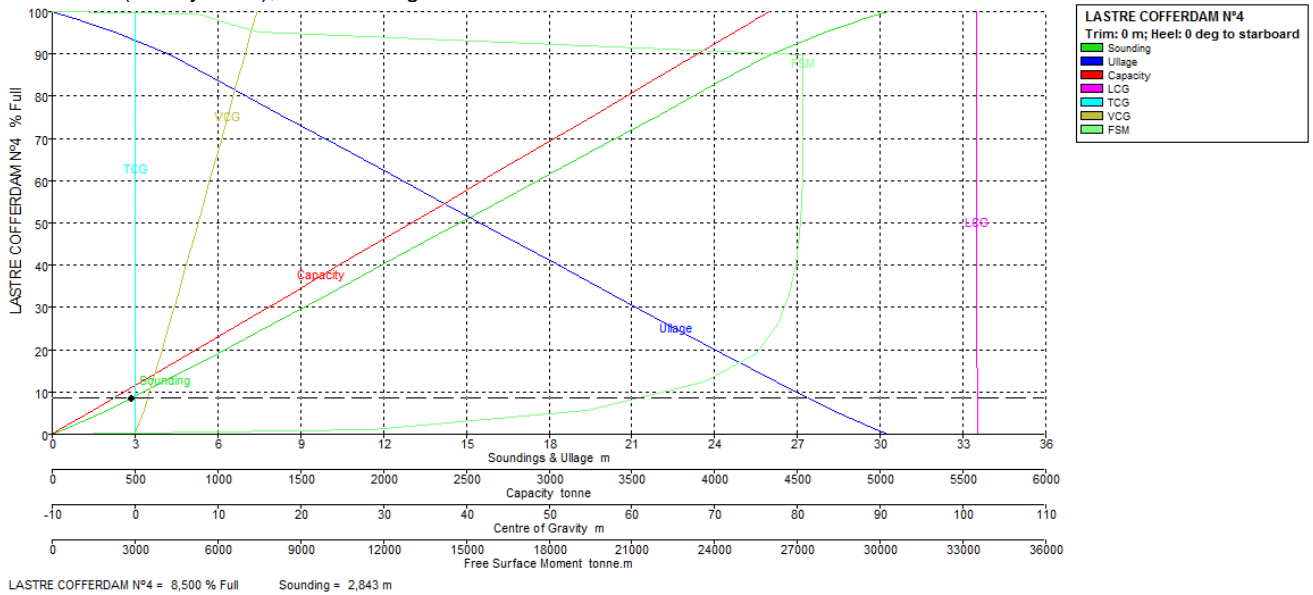
Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
LASTRE COFFERDAM N°3	30,233	0,000	100,000	4278,946	4385,919	155,500	0,000	14,601	0,000
	30,000	0,233	99,536	4259,081	4365,558	155,500	0,000	14,528	5229,340
	29,257	0,976	98,000	4193,367	4298,201	155,500	0,000	14,292	5993,613
	29,210	1,023	97,900	4189,088	4293,815	155,500	0,000	14,276	6044,571
	28,000	2,233	95,242	4075,372	4177,256	155,500	0,000	13,877	7450,284
	26,000	4,233	90,044	3852,919	3949,242	155,500	0,000	13,123	27183,562
	24,000	6,233	83,045	3553,434	3642,270	155,500	0,000	12,123	27183,561
	22,000	8,233	76,046	3253,949	3335,297	155,500	0,000	11,121	27183,559
	20,000	10,233	69,047	2954,464	3028,325	155,500	0,000	10,120	27183,555
	18,000	12,233	62,047	2654,979	2721,353	155,500	0,000	9,118	27183,549
	16,000	14,233	55,048	2355,494	2414,381	155,500	0,000	8,116	27183,306
	14,000	16,233	48,050	2056,013	2107,413	155,500	0,000	7,114	27181,131
	12,000	18,233	41,051	1756,548	1800,461	155,500	0,000	6,110	27174,094
	10,000	20,233	34,053	1457,124	1493,552	155,500	0,000	5,105	27157,415
	8,000	22,233	27,058	1157,792	1186,737	155,500	0,000	4,098	27121,978
	6,000	24,233	20,067	858,660	880,127	155,500	0,000	3,087	27036,688
	4,000	26,233	13,094	560,288	574,295	155,500	0,000	2,068	26605,431
	2,000	28,233	6,229	266,531	273,194	155,500	0,000	1,035	23972,347
	0,360	29,873	1,000	42,789	43,859	155,501	0,000	0,185	16021,111
	0,000	30,233	0,000	0,000	0,000	155,499	0,000	0,000	0,000

Tank Calibrations - LASTRE COFFERDAM Nº4

Fluid Type = Water Ballast Specific gravity = 1,025
 Permeability = 97 %
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m ³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
LASTRE COFFERDAM Nº4	30,267	0,000	100,000	4224,839	4330,459	101,701	0,000	14,767	0,000
	30,000	0,267	99,459	4201,966	4307,015	101,701	0,000	14,684	5261,214
	29,304	0,964	98,000	4140,342	4243,850	101,701	0,000	14,461	5971,718
	29,257	1,010	97,900	4136,117	4239,520	101,701	0,000	14,446	6021,516
	28,000	2,267	95,104	4018,004	4118,454	101,701	0,000	14,029	7468,198
	26,000	4,267	89,837	3795,488	3890,375	101,701	0,000	13,273	27183,562
	24,000	6,267	82,749	3496,003	3583,403	101,701	0,000	12,269	27183,562
	22,000	8,267	75,660	3196,518	3276,431	101,701	0,000	11,263	27183,562
	20,000	10,267	68,571	2897,033	2969,459	101,701	0,000	10,257	27183,562
	18,000	12,267	61,483	2597,548	2662,487	101,701	0,000	9,249	27183,562
	16,000	14,267	54,396	2298,133	2355,587	101,701	0,000	8,239	27140,081
	14,000	16,267	47,314	1998,935	2048,908	101,701	0,000	7,227	27064,798
	12,000	18,267	40,241	1700,101	1742,604	101,702	0,000	6,212	26936,618
	10,000	20,267	33,182	1401,901	1436,948	101,702	0,000	5,194	26713,055
	8,000	22,267	26,151	1104,831	1132,452	101,702	0,000	4,170	26306,989
	6,000	24,267	19,171	809,947	830,196	101,703	0,000	3,139	25492,884
	4,000	26,267	12,306	519,910	532,908	101,703	0,000	2,099	23627,154
	2,000	28,267	5,725	241,892	247,940	101,704	0,000	1,050	19378,385
	0,411	29,856	1,000	42,248	43,304	101,706	0,000	0,215	11545,438
	0,000	30,267	0,000	0,000	0,000	101,760	0,000	0,000	0,000

ANEXO II. Fichas motores generadores.

3.7 Wärtsilä 18V50DF

Wärtsilä 18V50DF		DE		DE	
		Gas mode	Diesel mode	Gas mode	Diesel mode
Cylinder output	kW	950		975	
Engine speed	rpm	500		514	
Engine output	kW	17100		17550	
Mean effective pressure	MPa	2.0		2.0	
IMO compliance		Tier 3	Tier 2	Tier 3	Tier 2
Combustion air system (Note 1)					
Flow at 100% load	kg/s	27.5	33.8	27.5	33.7
Temperature at turbocharger intake, max.	°C	45		45	
Temperature after air cooler, nom. (TE 601)	°C	45	50	45	50
Exhaust gas system					
Flow at 100% load	kg/s	27.0	32.4	28.8	34.2
Flow at 75% load	kg/s	21.6	27.0	21.6	27.0
Flow at 50% load	kg/s	16.2	18.0	16.2	19.8
Temperature after turbocharger at 100% load (TE 517)	°C	375	345	378	347
Temperature after turbocharger at 75% load (TE 517)	°C	424	332	428	330
Temperature after turbocharger at 50% load (TE 517)	°C	430	377	433	373
Backpressure, max.	kPa	4		4	
Calculated exhaust diameter for 35 m/s	mm	1339	1432	1386	1474
Heat balance at 100% load (Note 2)					
Jacket water, HT-circuit	kW	1962	2898	2808	3024
Charge air, HT-circuit	kW	2700	3636	2034	3906
Charge air, LT-circuit	kW	1350	1836	1386	1890
Lubricating oil, LT-circuit	kW	1386	2178	1422	2250
Radiation	kW	468	504	486	540
Fuel consumption (Note 3)					
Total energy consumption at 100% load	kJ/kWh	7410	-	7440	-
Total energy consumption at 75% load	kJ/kWh	7740	-	7780	-
Total energy consumption at 50% load	kJ/kWh	8410	-	8440	-
Fuel gas consumption at 100% load	kJ/kWh	7365	-	7397	-
Fuel gas consumption at 75% load	kJ/kWh	7677	-	7710	-
Fuel gas consumption at 50% load	kJ/kWh	8300	-	8336	-
Fuel oil consumption at 100% load	g/kWh	1.0	187	1.0	189
Fuel oil consumption at 75% load	g/kWh	1.5	187	1.5	188
Fuel oil consumption 50% load	g/kWh	2.4	198	2.4	198
Fuel gas system (Note 4)					
Gas pressure at engine inlet, min (PT901)	kPa (a)	472	-	472	-
Gas pressure to Gas Valve unit, min	kPa (a)	592	-	592	-
Gas temperature before Gas Valve Unit	°C	0...60	-	0...60	-

Wärtsilä 18V50DF		DE		DE	
		Gas mode	Diesel mode	Gas mode	Diesel mode
Cylinder output	kW	950		975	
Engine speed	rpm	500		514	
Fuel oil system					
Pressure before injection pumps (PT 101)	kPa	800±50		800±50	
Fuel oil flow to engine, approx	m ³ /h	18.0		18.6	
HFO viscosity before the engine	cSt	-	16...24	-	16...24
Max. HFO temperature before engine (TE 101)	°C	-	140	-	140
MDF viscosity, min.	cSt	2.0		2.0	
Max. MDF temperature before engine (TE 101)	°C	45		45	
Leak fuel quantity (HFO), clean fuel at 100% load	kg/h	-	13.6	-	13.6
Leak fuel quantity (MDF), clean fuel at 100% load	kg/h	36.1	68.0	36.1	68.0
Pilot fuel (MDF) viscosity before the engine	cSt	2...11		2...11	
Pilot fuel pressure at engine inlet (PT 112)	kPa	400...800		400...800	
Pilot fuel outlet pressure, max	kPa	150		150	
Pilot fuel return flow at 100% load	kg/h	325		325	
Lubricating oil system (Note 5)					
Pressure before bearings, nom. (PT 201)	kPa	400		400	
Pressure after pump, max.	kPa	800		800	
Suction ability, including pipe loss, max.	kPa	40		40	
Priming pressure, nom. (PT 201)	kPa	80		80	
Temperature before bearings, nom. (TE 201)	°C	63		63	
Temperature after engine, approx.	°C	78		78	
Pump capacity (main), engine driven	m ³ /h	335		345	
Pump capacity (main), electrically driven	m ³ /h	335		335	
Oil flow through engine	m ³ /h	260		260	
Priming pump capacity (50/60Hz)	m ³ /h	100.0 / 100.0		100.0 / 100.0	
Oil volume in separate system oil tank	m ³	25		25	
Oil consumption at 100% load, approx.	g/kWh	0.5		0.5	
Crankcase ventilation flow rate at full load	l/min	4200		4200	
Crankcase volume	m ³	44.3		44.3	
Crankcase ventilation backpressure, max.	Pa	500		500	
Oil volume in turning device	l	68.0...70.0		68.0...70.0	
Oil volume in speed governor	l	6.2		6.2	
HT cooling water system					
Pressure at engine, after pump, nom. (PT 401)	kPa	250 + static		250 + static	
Pressure at engine, after pump, max. (PT 401)	kPa	480		480	
Temperature before cylinders, approx. (TE 401)	°C	74		74	
Temperature after charge air cooler, nom.	°C	96		96	
Capacity of engine driven pump, nom.	m ³ /h	400		400	
Pressure drop over engine, total	kPa	50		50	
Pressure drop in external system, max.	kPa	150		150	

Wärtsilä 18V50DF		DE		DE	
		Gas mode	Diesel mode	Gas mode	Diesel mode
Cylinder output	kW	950		975	
Engine speed	rpm	500		514	
Pressure from expansion tank	kPa	70...150		70...150	
Water volume in engine	m ³	2.6		2.6	
LT cooling water system					
Pressure at engine, after pump, nom. (PT 471)	kPa	250+ static		250+ static	
Pressure at engine, after pump, max. (PT 471)	kPa	440		440	
Temperature before engine, max. (TE 471)	°C	55		55	
Temperature before engine, min. (TE 471)	°C	36		36	
Capacity of engine driven pump, nom.	m ³ /h	400		400	
Pressure drop over charge air cooler	kPa	30		30	
Pressure drop in external system, max.	kPa	200		200	
Pressure from expansion tank	kPa	70...150		70...150	
Starting air system (Note 6)					
Pressure, nom. (PT 301)	kPa	3000		3000	
Pressure at engine during start, min. (20 °C)	kPa	1000		1000	
Pressure, max. (PT 301)	kPa	3000		3000	
Low pressure limit in starting air vessel	kPa	1800		1800	
Consumption per start at 20 °C (successful start)	Nm ³	9.0		9.0	
Consumption per start at 20 °C (with slowturn)	Nm ³	10.8		10.8	

Notes:

Note 1 At Gas LHV 49620kJ/kg

Note 2 At 100% output and nominal speed. The figures are valid for ambient conditions according to ISO 15550, except for LT-water temperature, which is 35°C in gas operation and 45°C in back-up fuel operation. And with engine driven water, lube oil and pilot fuel pumps.

Note 3 According to ISO 15550, lower calorific value 42700 kJ/kg, with engine driven pumps (two cooling water + one lubricating oil pumps). Tolerance 5%. Gas Lower heating value >28 MJ/m³N and Methane Number High (>80). The fuel consumption BSEC and SFOC are guaranteed at 100% load and the values at other loads are given for indication only.

Note 4 Fuel gas pressure given at LHV ≥ 36MJ/m³N. Required fuel gas pressure depends on fuel gas LHV and need to be increased for lower LHV's. Pressure drop in external fuel gas system to be considered. See chapter Fuel system for further information.

Note 5 Lubricating oil treatment losses and oil changes are not included in oil consumption. The lubricating oil volume of the governor is depending of the governor type.

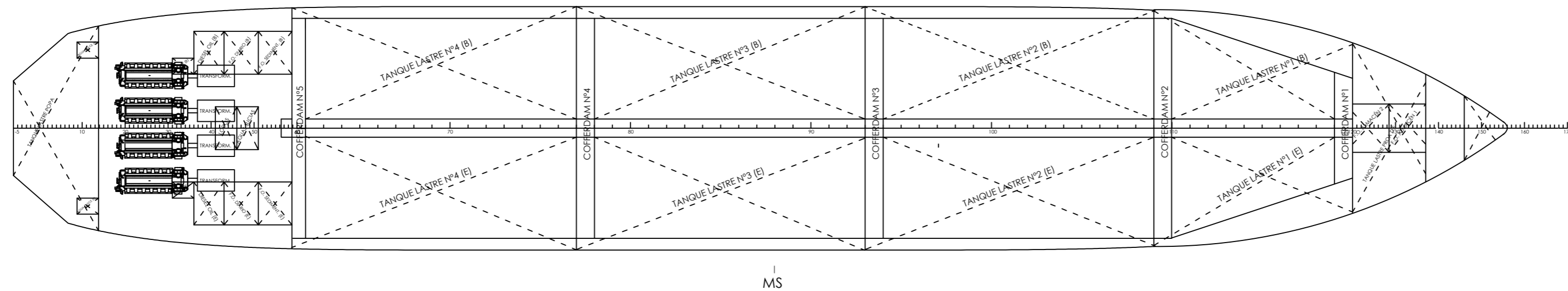
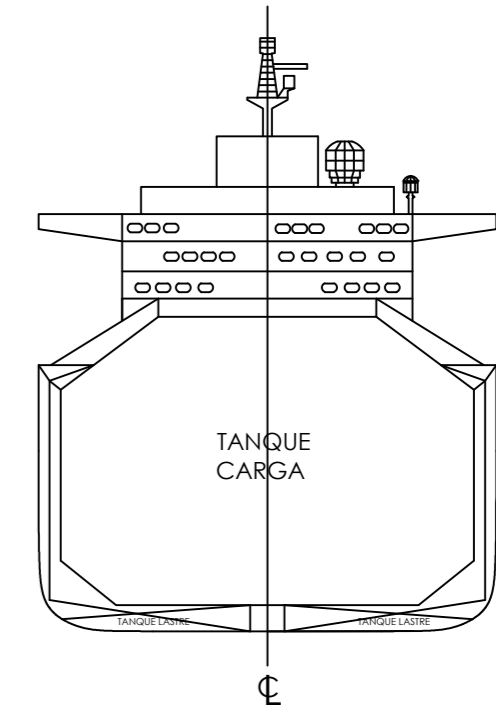
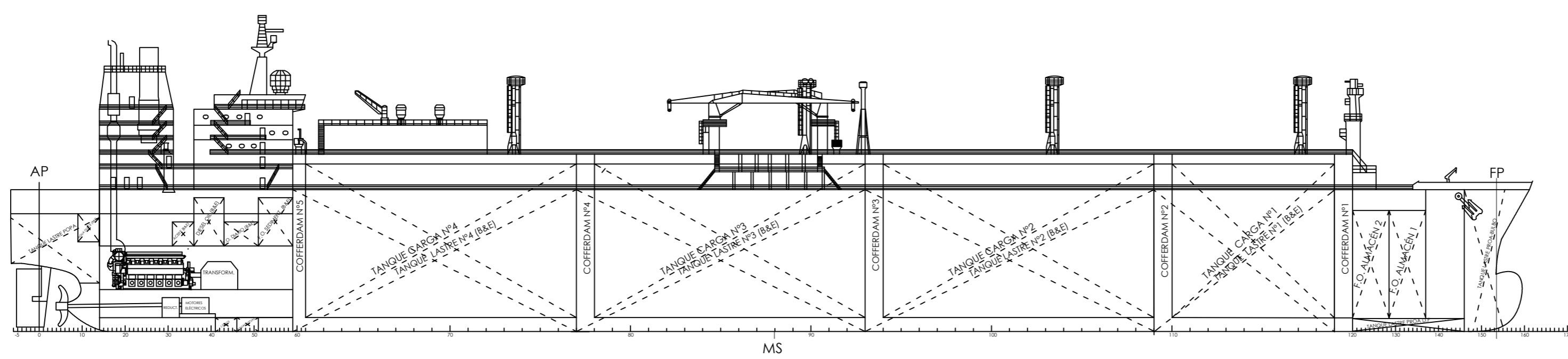
Note 6 At manual starting the consumption may be 2...3 times lower.

ME = Engine driving propeller, variable speed

DE = Diesel-Electric engine driving generator

Subject to revision without notice.

ANEXO III. COMPARTIMENTADO



ESCUELA POLITÉCNICA SUPERIOR	PROYECTO 17/05
PLANO DISPOSICIÓN GENERAL 160.000 m³	
AUTORA: CARMEN SEOANE FERNÁNDEZ TUTOR: VICENTE DÍAZ CASÁS	ESCALA 1:750