



UNIVERSIDADE DA CORUÑA



Escola Politécnica Superior

**TRABAJO FIN DE GRADO  
CURSO 2017/2018**

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*PETROLERO SUEZMAX 148.000 TPM*

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**Grado en Ingeniería Naval y Oceánica**

**Cuaderno 4**

**CÁLCULOS DE ARQUITECTURA NAVAL**



**GRADO EN INGENIERÍA NAVAL Y OCEÁNICA**  
**TRABAJO FIN DE GRADO**

*CURSO 2.016-2017*

**PROYECTO NÚMERO 17-12**

**TIPO DE BUQUE:** Petrolero Suezmax 148000 TPM

**CLASIFICACIÓN, COTA Y REGLAMENTOS DE APLICACIÓN:** DNV, MARPOL, SOLAS, CONVENIO DE LINEAS DE CARGA TIER 3

**CARACTERÍSTICAS DE LA CARGA:** 148000 TPM. Transporte de petróleo CRUDOS Y DERIVADOS.

**VELOCIDAD Y AUTONOMÍA:** 15,8 nudos con 85%MCR+ 15% margen de mar

**SISTEMAS Y EQUIPOS DE CARGA / DESCARGA:** Bombas de carga y descarga en los tanques de carga. Calefacción en tanques de carga.

**PROPULSIÓN:** Motor diésel directamente acoplado.

**TRIPULACIÓN Y PASAJE:** 30 personas

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

Ferrol, 10 Setiembre 2016

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## 1 INTRODUCCIÓN

Para el estudio del buque proyecto, se dividirá el mismo en las siguientes zonas:

- Zona de Proa.
- Zona de Popa.
- Zona de Carga.
- Zona de Máquinas.

Esta disposición debe cumplir con las normas impuestas por la IMO, en este caso el SOLAS, MARPOL y la sociedad de clasificación DNV.

Las dimensiones del buque obtenidas en el cuaderno 3 son:

Lpp (m)	273,5
B (m)	45,3
D (m)	24
T (m)	17,7
Cb	0,866
Cm	0,992
Cp	0,873
Fn	0,157
Pot (Kw)	19350
$\Delta$ (t)	195606
Peso en Rosca (t)	28876
TPM	148.000

### 1.1. Mamparos estancos.

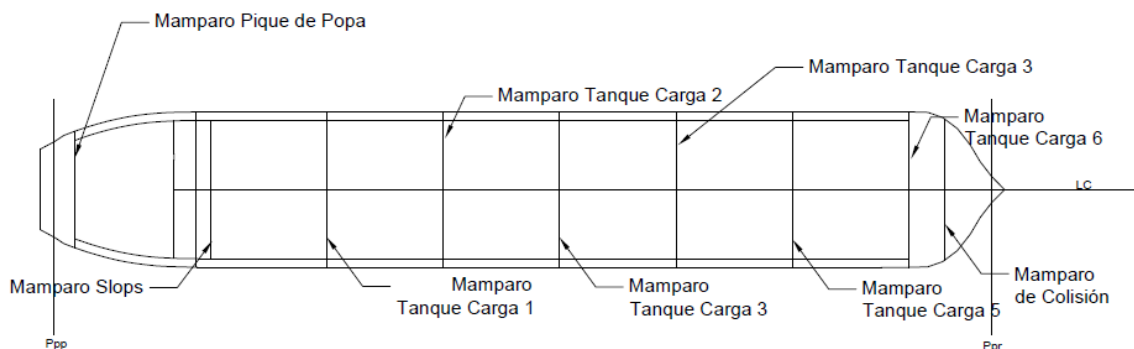
Según DNV en Pt3 Ch1 Sec3 A300, el buque se diseñará con 9 mamparos estancos, que se extienden desde el doble fondo hasta la cubierta de francobordo.

Table A1 Number of transverse bulkheads		
Ship length in m	Engine room	
	Aft	Elsewhere
$85 < L \leq 105$	4	5
$105 < L \leq 125$	5	6
$125 < L \leq 145$	6	7
$145 < L \leq 165$	7	8
$165 < L \leq 190$	8	9
$190 < L \leq 225$	9	10
$L > 225$	specially considered	

Estos mamparos son los siguientes:

- Mamparos Transversales:
  - Mamparo de Pique de Popa.
  - Mamparo de popa de los tanques Slop.
  - Mamparo de los tanques de carga (6 mamparos).
  - Mamparo de Pique de Proa o Mamparo de colisión.
- Además de los mamparos transversales, el buque llevará un mamparo longitudinal situado en crujía, que ayuda a la estabilidad en operaciones de carga y descarga.

El esquema de estos mamparos es el siguiente:



## 1.2. Separación entre cuadernas.

Para la separación entre cuadernas, cumpliendo con las separaciones máximas y mínimas permitidas por el DNV, se diferencian 3 zonas de espaciado de cuadernas que son:

- Zona 1: desde el espejo de popa hasta el mamparo de popa de los tanques slops, el cual está situado a 36 metros desde la Perpendicular de Popa. La separación entre cuadernas es de 750 mm:

- Cuadernas: de la -5 hasta la 53.
- Zona 2: desde el mamparo de popa de los tanques slops hasta el mamparo de colisión, situado a 258,35 metros de la Perpendicular de Popa. La separación entre cuadernas es de 1000 mm.
  - Cuadernas: de la 53 a la 277.
- Zona 3: desde el mamparo de colisión hasta el final del casco. La separación entre cuadernas es de 700 mm.
  - Cuadernas: de la 277 a la 315.

En cuanto a la separación entre bulárcamas se tomará un espacio entre cada una de cinco claras de cuadernas (5000 mm) para la zona de carga (cuadernas 83-277). En la zona de popa la separación entre bulárcamas será de 4 claras de cuaderna que va de la -5 a la cuaderna 53.

## 2 ZONA DE PROA.

Esta zona, que se extiende a proa de la zona de carga y va hasta el final del buque por la parte delantera, se usará para:

- Crear un compartimento de protección de la zona de carga.
- Alojarse un tanque de lastre (pique de proa) que es de gran utilidad para corregir trimados.
- Zona donde se encuentran los equipos de amarre y fondeo.
- Bajo cubierta hay un espacio dispuesto para almacenar herramientas de cubierta.

### 2.1 Mamparo de colisión.

La zona de proa está limitada por un mamparo transversal estanco que va desde el fondo hasta la cubierta principal y de babor a estribor. Este mamparo se llama mamparo de colisión, cuya posición viene regulada por el DNV (pt3 Ch1 Sec3 A400).

En el Anexo I Capítulo 3 Regla 12A del convenio MARPOL define la eslora  $L$  o eslora de reglamento como la eslora mayor entre:

- 96% de la eslora total medida en una flotación cuya distancia a la cara superior de la quilla sea igual al 85% del puntal mínimo de trazado.

$$L(85\%D) = 0,96 \cdot 278,3 = 276,17 \text{ m}$$

- Eslora medida en la flotación anterior desde la cara proel de la roda hasta el eje de la mecha del timón.

$$L(85\%D)_{RODA-MECHA} = 274,43 \text{ m}$$

Por tanto la eslora de reglamento será 276,17 metros.

La distancia a proa de la Perpendicular de Proa desde la que se medirá la ubicación del mamparo de colisión se especifica en DNV Pt3 Ch1 Sec32 A400, teniendo en cuenta que el buque tiene bulbo de proa, la distancia será la menor de las tres siguientes:

- La protuberancia del bulbo es 8,4 metros, y la mitad de esta distancia es 4,2 metros.
- El 1,5% de la eslora antes calculada  $\rightarrow$  4,142 metros.



- 3 metros.

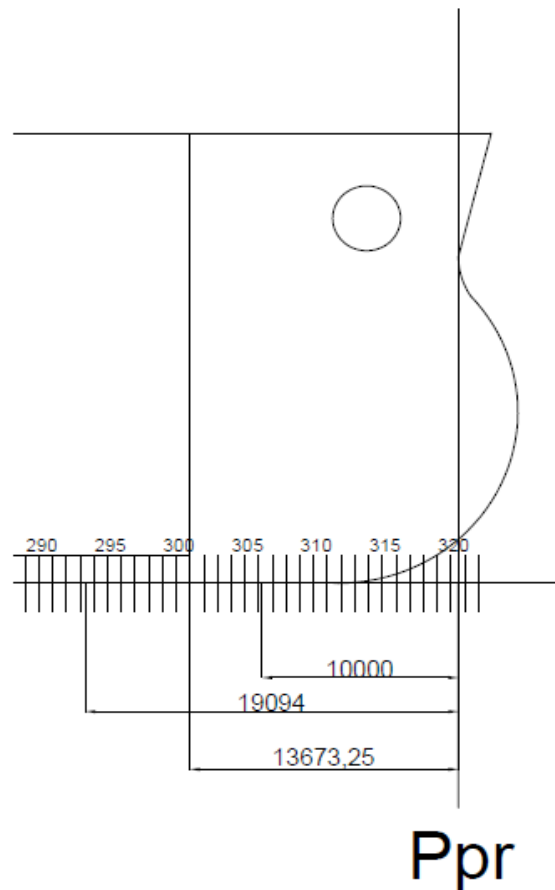
De estos tres valores escojo el menor: 3 metros.

El mamparo deberá estar a una distancia máxima y mínima de estos 3 m a proa de la Perpendicular de Proa y se calcula de la siguiente forma:

- *Distancia mínima:*  $(5\% \cdot L) - 3 = 10,809$  metros a popa de la Ppr ó 10 metros.
- *Distancia máxima:*  $(8\% \cdot L) - 3 = 19,094$  metros a popa de la Ppr.

Por tanto la distancia del pique de proa oscilará entre los 10 metros mínimos y los 19,094 metros máximos.

En definitiva, el mamparo de colisión lo decido situar a 260 metros de la Perpendicular de Popa, en la cuaderna 292 como se ve a continuación en un croquis donde se sitúa dicho mamparo:



### **3 ZONA DE POPA.**

El pique de popa es la zona del mamparo más a popa del buque. Este mamparo encerrará el local del servomotor y tanques de lastre en un compartimento estanco.

El mamparo del pique de popa es obligatorio por la sociedad de clasificación DNV Pt3 Ch1 Sec3 A301, pero su ubicación exacta no se especifica.

Por lo que teniendo en cuenta el espaciado de cuadernas (750 mm) se ha decidido colocarlo a 6 metros de la Perpendicular de Popa.

## 4 ZONA DE CARGA.

La zona de carga, es la zona donde el buque va a alojar la carga que debe transportar.

El volumen útil de esta zona es uno de los parámetros críticos en el diseño de esta clase de buques, puesto que el buque debe ser capaz de transportar el volumen de carga que ha sido impuesto en la especificación.

Los parámetros y dimensiones principales de esta zona tan importante están regulados tanto por el convenio MARPOL como por las normas de la sociedad de clasificación coincidiendo ambas normativas en los aspectos comunes que regulan.

Esta zona se extiende desde el mamparo de proa de la cámara de máquinas hasta el mamparo de colisión y debe estar provista de doble casco y de doble fondo en toda su longitud.

### 1.3. Doble fondo.

La altura de doble fondo se define en el convenio MARPOL Anexo I Ch3 Regla 12A 6, cuya distancia mínima es la mínima de:

- $h_{df} = \frac{B}{15} = \frac{45,3}{15} = 3,02 \text{ m.}$
- $h_{df} = 2 \text{ m.}$

Con lo que la altura mínima de doble fondo será de 2 metros, y finalmente se establece una altura para el doble fondo de 2,5 metros.

### 1.4. Doble casco.

En cuanto a la anchura de doble casco el convenio MARPOL establece un requisito para la anchura en Anexo I Ch3 Regla 12A 8 que es el siguiente:

$$w_{dc} = 0,5 + \frac{DWT}{20000} = 0,5 + \frac{148000}{20000} = 7,9 \text{ m}$$

$$w_{dc} = 2 \text{ m}$$

La anchura mínima para el doble casco será de 2 metros, con lo que la anchura final del doble casco será de 2,5 metros.

Los espacios que quedan entre los tanques de carga y el costado del buque y doble fondo se usarán como tanques de lastre. MARPOL especifica en el Anexo I Ch4 Regla 18 la obligación de que todos los petroleros de crudo con peso muerto superior a 20000 toneladas, entregados después del 1 de Junio de 1982, deberán ir provistos de lastre separado, cuya capacidad mínima será tal que en todas las condiciones de lastre se cumpla que:

- Permita al buque navegar en condiciones de lastre sin necesidad de introducir agua de lastre en los tanques de carga.
- El lastre adicional del punto anterior solo se podrá cargar en tanques de carga lavados según la Regla 35 del Anexo I de MARPOL.
- El calado de trazado de la cuaderna maestra nunca será inferior a:

$$T_m = 2 + (0,02 \cdot L)$$

- Los calados en las Perpendiculares de Popa y de Proa corresponderán a los determinados por el calado en el centro del buque ( $T_m$ ), con un asiento apopante no superior a:

$$0,0155 \cdot L$$

- El calado en popa ha de garantizar siempre la inmersión total de la hélice.

### 1.5. Tanques de carga.

En el Anexo I Ch4 Regla 26 del convenio MARPOL la eslora máxima no será superior a:

$$L_{max} = \left(0,25 \cdot \frac{b_i}{B} + 0,15\right) \cdot L$$

Donde B es la manga del buque y  $b_i$  es la distancia entre el costado del buque y el mamparo longitudinal exterior del tanque de carga, medida perpendicularmente al plano de crujía, que en este caso coincide con la anchura del doble casco de 2,5 m.

$$L_{max} = 45,236 \text{ m}$$

Las eslora de la cántara sin tener en cuenta los dos tanques slops situados a popa de ésta es de 204 metros, los tanques de carga son 6 por tanto cada uno tiene una eslora de 34 metros, con lo que cumple con el criterio anterior.

### 4.1 Tanques Slop.

Según MARPOL en Anexo I Ch4 Regla 29, la capacidad de los tanques de decantación o Slops será del 2% cuando existan tanques de lastre separado o tanques delicados a lastre limpio de conformidad con lo dispuesto a en la Regla 18

del Anexo I, o si se ha instalado un sistema de limpieza de los tanques de carga que utilice el lavado con crudos de conformidad con lo dispuesto en la Regla 33 del presente Anexo, los petroleros de peso muerto igual o superior a 70000 toneladas llevarán por lo menos 2 tanques de decantación.

Estos tanques han de tener la capacidad necesaria (la cual se calcula a continuación) para retener los vertidos generados por el lavado de tanques, residuos de aceite y residuos sucios de lastre.

Dicha capacidad de estos tanques no debe ser menor al 3% de la capacidad de carga, y como mis tanques de lastre van separados se hace excepción y serán del orden del 1,5% de la carga.

Están situados a popa del primer tanque de carga y para su dimensionamiento se necesitan definir los consumibles, tripulación y pertrechos. La RPA especifica que la tripulación es de 30 personas:

- Consumibles: víveres que consume la tripulación en el desarrollo de la vida a bordo, se consideran 4 kg por tripulante, autonomía de 42 días.
- Tripulación: se incluyen tripulantes, respetos, cargos y efectos; se consideran 125 kg por tripulante.
- Pertrechos: según el libro “El proyecto básico del buque mercante” se debe estimar un peso de entre 10-100 toneladas; se considerarán 70 toneladas.
- Respetos: hélice, amarres, estachas, maquinaria de repuesto...Se hace una estimación de 110 toneladas.

		Peso (t)
Consumibles	Víveres	5,04
Pesos fijos	Tripulación	3,75
	Pertrechos	70
	Respetos	110
		<b>188,79</b>

Si el volumen de carga transportada es el siguiente:

$$V_{carga} = \frac{TPM - Consumos - 188,79}{\rho}$$

$$V_{carga} = \frac{148000 - 3869 - 188,79}{\rho} = 167375 t$$

Donde:

- $\rho$  es la densidad de la carga, en este caso petróleo crudo de densidad relativa 0,86.

- Consumos= HFO, MDO, Aceite, agua técnica y dulce, aguas grises y aguas negras, lodos = 3869 t.

El volumen mínimo que deberán tener los tanques Slop será de:

$$V_{\min slop} = 0,015 * V_{carga} = 2511 m^3$$

En este buque hay dos tanques Slop por tanto cada uno transportará como mínimo:

$$V_{\min slop} = 1255 m^3$$

Por tanto las dimensiones finales de los tanques quedan:

<b>TANQUES SLOPS</b>	
Puntal tanque (m)	21,5
Manga Tanque (m)	21,5
Eslora Tanque (m)	10

## 5 ZONA DE MÁQUINAS.

La cámara de máquinas se sitúa a popa como es lo normal en este tipo de buques y así está impuesto en la especificación.

En la zona de cámara de máquinas se sitúan tanques de almacén y uso diario de Fuel-Oil, por tanto hay q aplicar el convenio MARPOL 73/78 para calcular la distancia mínima a la que deben situarse dichos tanques de fondo y del costado de la cámara de máquinas.

La cámara de máquinas tendrá un doble fondo de 2,5 metros excepto la zona de la cama del motor principal que tiene una altura de 2,3 metros. Esta zona también lleva doble casco de 2,5 metros.

El doble fondo y doble casco de la cámara de máquinas se extenderá desde el mamparo del pique de popa hasta el mamparo de popa de los tanques slop.

El doble casco de la cámara de máquinas se empleará para albergar tanques de lastre (como se verá más adelante) y en el doble fondo llevará tanques de:

- Aceite de lubricación del Motor Principal (Estribor).
- Aceite de lubricación de los Motores Auxiliares (Babor).
- Aceite de lubricación para cilindros del Motor Principal (Estribor).
- Aceite de lubricación para cilindros de Motor Auxiliar (Babor).
- Tanque de retorno del aceite de lubricación del Motor Principal (Carter).
- Tanques de sentinas (Babor y Estribor).
- Tanques de lodos.
- Tanques de reboses de HFO.
- Tanque de aguas grises.
- Tanques de agua técnica.

### 5.1 Cámara de máquinas.

Para definir la longitud de la cámara de máquinas se ha de tener en cuenta principalmente la eslora del buque pero también el tipo de motor y el número y tamaño de equipos auxiliares.

El libro “El proyecto básico del buque mercante” proporciona una fórmula para estimar la eslora de la cámara de máquinas para buques con motor de 2 tiempos directamente acoplado a hélice. Para petroleros la expresión es:

$$L_{CM} = 0,28 \cdot L^{0,67} + 0,48 \cdot MCO^{0,35} = 0,28 \cdot 273,5^{0,67} + 0,48 \cdot 19350^{0,35} = 28 \text{ metros}$$

La longitud de la cámara de máquinas será de 29 metros para hacerlo coincidir con las cuadernas. La cámara máquinas va desde la cuaderna 7 a la cuaderna 45.



## 6 CÁLCULOS DEL VOLUMEN Y CONSUMO DE LOS TANQUES.

### 6.1 Tanques de Lastre.

Los tanques de lastre, los cuales se llenan de agua de mar, tienen la función de facilitar la navegación del buque cuando éste no satisface los requerimientos de estabilidad y trimados, bien sea por falta de carga o por haber gastado los consumos.

Estos tanques se dispondrán en zonas del buque de doble fondo y doble casco, siendo estos tanques simétricos encontrándose divididos por crujía con el fin de limitar la superficie libre que se produce como consecuencia de su llenado.

El buque debe de disponer de suficiente lastre para que la hélice permanezca totalmente sumergida, el calado mínimo tiene que ser:

$$T_{min} = D_{hélice} + 10\%D_{hélice} = 8,3 + 0,1 \cdot 8,3 = 9,12 \text{ m}$$

$$P_{rosca} = 28876 \text{ t}$$

Para este calado mínimo, con Maxsurf caculo el valor del desplazamiento mínimo obteniendo el siguiente dato:

$$\Delta_{min} = Cb \cdot \rho \cdot L \cdot B \cdot T = 0,866 \cdot 1,025 \cdot 273,5 \cdot 45,3 \cdot 9,12 = 100408 \text{ t}$$

El peso de agua de lastre será:

$$W_{lastre} = \Delta_{min} - P_{rosca} = 67798 \text{ t}$$

Por tanto el volumen de agua de lastre es:

$$Volumen_{lastre} = \frac{67798}{1,025} = 66144,3 \text{ m}^3$$

### 6.2 Tanques HFO.

#### 6.2.1 Consumo del Motor Principal.

Para el cálculo de los consumos del motor principal se tendrán en cuenta la autonomía del buque que son 16.000 millas y la velocidad del buque que son 15,8 nudos:

$$\text{Días de autonomía} = \frac{11000 \text{ millas}}{15,8 * 24} = 30 \text{ días}$$

Para una potencia de 24289 kW al 85%MCR el consumo específico del motor es de 166,4 g/kWh, con lo que el consumo específico por día será de:

$$\text{Consumo} = 166,4 \cdot 24h \cdot 24289 * 0,85 \cdot 10^{-6} = 85 \frac{t}{\text{día}}$$

La densidad de HFO es de 0,98 t/m<sup>3</sup> con lo que el consumo es de:

$$\text{Consumo}_{\text{día}} = \frac{85 \text{ t/día}}{0,98 \text{ t/m}^3} = 87 \text{ m}^3/\text{día}$$

### 6.2.2 Consumo de Motores Auxiliares.

Según el buque base, el presente buque llevará 4 diésel-generadores auxiliares del modelo Wartsila 6L20, de los cuales 2 funcionan normalmente al 85% para generar la potencia eléctrica necesaria, mientras que el tercero de ellos es de respecto.

Wärtsilä Auxpac		875W6L20 / 60 Hz IMO Tier 2
<b>Fuel system (Note 3)</b>		
Pressure before injection pumps (PT 101)	kPa	700±50
Pressure before injection pumps, unifuel system	kPa	1000±50
HFO viscosity before injection pumps	cSt	16...24
HFO viscosity before injection pumps, unifuel system	cSt	12...24
Max. HFO temperature before engine (TE 101)	°C	140
MDF viscosity, min.	cSt	1.8
Max. MDF temperature before engine (TE 101)	°C	45
Fuel consumption at 100% load	g/kWh	192
Fuel consumption at 85% load	g/kWh	193
Fuel consumption at 75% load	g/kWh	194
Fuel consumption at 50% load	g/kWh	203
Clean leak fuel quantity, MDF at 100% load	kg/h	3.7
Clean leak fuel quantity, HFO at 100% load	kg/h	0.7

Según la especificación de Wartsila el consumo de los motores auxiliares es de 193 g/kWh.

### 6.2.3 Consumo Calderas.

Siguiendo el buque base (Eagle San Antonio), se necesitan 2 calderas para calentar la carga. Las calderas del buque base son:

Boilers  
 Number: ..... 2 x auxiliary boiler  
 Type: ..... Mission OL3500, Mission OC2000/1600  
 Make: ..... Aalborg  
 Output, each boiler: ..... 35tonnes/h x 1.6MPa,  
 2tonnes/h x 0.6MPa for oil fired side,  
 1.6tonnes/h x 0.6MPa for exhaust side

En mi caso Las calderas son de la marca Mitsubishi del tipo MAC-35B y el consumo lo marca la especificación del fabricante:

**Standard Specification** MAC - \*\*B  
 Ex) 40t/h boiler → MAC-40B

Type	MAC	20B	25B	30B	35B	40B	45B	50B	55B	60B	70B	80B	90B	100B	110B	
Max. Evap.	th	20	25	30	35	40	45	50	55	60	70	80	90	100	110	
Design Working Press.	kg/cm <sup>2</sup>	18/16 (1.77/1.57MPa)★														
Mean Temp.	°C	Saturated														
Boiler Efficiency	%	80.5					82.5									
Fuel water/ Air temp.	°C	60/38														
No. of barsel	-	1					2 or 3									
Soot blower	-	1														
FDC	kg/h	1552	1940	2328	2716	3029	3407	3787	4165	4543	5300	6058	6815	7572	8329	
Dry weight	ton	26	28	31	35	44	47	49	54	57	72	73	75	88	114	
Water weight	ton	10	10	11	13	19	20	20	22	29	30	34	34	37	43	

★ Design/Working Press is changeable according to request

MITSUBISHI HEAVY INDUSTRIES LTD.

$$\text{Consumo}_{\text{caldera}} = 2,716 \text{ kg/h}$$

#### 6.2.4 Consumos de Heavy Fuel-Oil.

- 1) El consumo diario de HFO necesario para el Motor Principal se calcula como:

$$V_{HFO} = \frac{P_{\text{funcionamiento}} \cdot C_e \cdot \text{Autonomía}}{\rho_{\text{fuel-oil}}} \cdot 10^{-6} = \frac{24289 \cdot 166,4 \cdot 1013h}{0,98} = 3654 \text{ m}^3$$

$$V_{\text{uso diario HFO}} = \frac{P_{\text{funcionamiento}} \cdot C_e \cdot 24h}{\rho_{\text{fuel-oil}}} \cdot 10^{-6} = 87 \text{ m}^3$$

$$V_{\text{decantación HFO}} = \frac{P_{\text{funcionamiento}} \cdot C_e \cdot 36h}{\rho_{\text{fuel-oil}}} \cdot 10^{-6} = 130 \text{ m}^3$$

- 2) En cuanto al consumo de HFO por el motor auxiliar, uso datos de buque base y un 10% de la potencia del Motor Principal:

$$V_{HFO} = \frac{P_{funcionamiento} \cdot Ce \cdot Autonomía}{\rho_{fuel-oil}} = \frac{24289(10\%) \cdot 193 \cdot 1000h}{0,98} \cdot 10^{-6} = 492 \text{ m}^3$$

$$V_{uso \text{ diario } HFO} = \frac{P_{funcionamiento} \cdot Ce \cdot 24h}{\rho_{fuel-oil}} \cdot 10^{-6} = 12 \text{ m}^3$$

$$V_{decantación \text{ HFO}} = \frac{P_{funcionamiento} \cdot Ce \cdot 36h}{\rho_{fuel-oil}} \cdot 10^{-6} = 18 \text{ m}^3$$

3) Para el consumo de HFO de las calderas empleo su potencia de funcionamiento, el consumo antes indicado por el fabricante (Mitsubishi) y las horas de funcionamiento será de unas horas antes de la llegada a puerto, en mi caso serán 48 horas:

$$V_{HFO} = \frac{P_{funcionamiento} \cdot Ce \cdot h}{\rho_{fuel-oil}} \cdot 10^{-3} = \frac{900 \cdot 2,716 \cdot 48h}{0,98} \cdot 10^{-3} = 120 \text{ m}^3$$

$$V_{uso \text{ diario } HFO} = \frac{900 \cdot 2,716 \cdot 24h}{0,98} \cdot 10^{-3} = 60 \text{ m}^3$$

$$V_{decantación \text{ HFO}} = \frac{900 \cdot 2,716 \cdot 36h}{0,98} \cdot 10^{-3} = 90 \text{ m}^3$$

El volumen total de los tanques de HFO es:

$V_{HFO}$	4266 m <sup>3</sup>
$V_{HFO \text{ USO DIARIO}}$	158 m <sup>3</sup>
$V_{HFO \text{ DECANTACIÓN}}$	237 m <sup>3</sup>

Estos volúmenes se repartirán en:

- 4 Tanques almacén de HFO.
- 2 Tanques de uso diario HFO.
- 1 Tanques de decantación HFO.

### 6.3 Tanques MDO.

El Diésel Oil se utiliza como sistema alternativo de alimentación de combustible, tanto para el Motor Principal como para los auxiliares y calderas. La autonomía debe

ser suficiente para cubrir las necesidades durante tres días (72 HORAS), que es un tiempo suficiente para limpiar el sistema de abastecimiento de HFO.

El MDO necesario para el Motor Principal se divide en dos tanques, uno de uso diario y otro de almacén.

- 1) Para calcular el volumen del tanque de MDO para el Motor Principal:

$$V_{MDO} = \frac{P_{funcionamiento} \cdot Ce \cdot 72h}{\rho_{fuel-oil}} \cdot 10^{-6} = \frac{24289 \cdot 166,4 \cdot 72h}{0,98} = 305,6 \text{ m}^3$$

$$V_{uso \text{ diario } MDO} = \frac{P_{funcionamiento} \cdot Ce \cdot 24h}{\rho_{fuel-oil}} \cdot 10^{-6} = 102 \text{ m}^3$$

- 2) En cuanto a los auxiliares utilizo los datos del buque base y un 10% de la potencia:

$$V_{MDO} = \frac{P_{funcionamiento} \cdot Ce \cdot 72h}{\rho_{fuel-oil}} \cdot 10^{-6} = \frac{24289(10\%) \cdot 193 \cdot 72h}{0,98} = 35,4 \text{ m}^3$$

$$V_{uso \text{ diario } MDO} = \frac{P_{funcionamiento}(10\%) \cdot Ce \cdot 24h}{\rho_{fuel-oil}} \cdot 10^{-6} = 11,8 \text{ m}^3$$

- 3) Para el volumen de MDO de las calderas empleo datos del buque base:

$$V_{MDO} = \frac{P_{funcionamiento} \cdot Ce \cdot 72h}{\rho_{fuel-oil}} \cdot 10^{-3} = \frac{900 \cdot 2,716 \cdot 72h}{0,98} = 179,6 \text{ m}^3$$

$$V_{uso \text{ diario } MDO} = \frac{P_{funcionamiento}(10\%) \cdot Ce \cdot 24h}{\rho_{fuel-oil}} \cdot 10^{-3} = 60 \text{ m}^3$$

Los motores auxiliares y las calderas funcionan las dos de forma continua, por tanto el volumen del diésel en estos casos será el doble.

El volumen de MDO queda:

$V_{MDO}$	$735,7 \text{ m}^3$
$V_{MDO \text{ USO DIARIO}}$	$245,2 \text{ m}^3$

## 6.4 Tanques de Aceite.

Se pueden utilizar distintos tipos de aceite: lubricación de motores, hidráulico y térmico.

Las cantidades a transportar son recomendadas por los suministradores de los equipos.

El aceite que se utiliza para la lubricación de los motores se supone el 5% del peso de combustible:

- 1) Tanque almacén Aceite para Motor Principal:

$$V_{aceite\ MP} = (V_{HFO} + V_{MDO}) \cdot 0,05 = 198\ m^3$$

- 2) Tanque almacén Aceite para Motores Auxiliares:

$$V_{aceite\ MA} = (V_{HFO} + V_{MDO}) \cdot 0,05 = 26,4\ m^3$$

El volumen del tanque de aceite será de:

$$V_{aceite} = 224,4\ m^3$$

### 6.4.1 Tanque almacén aceite de cilindros:

Para calcular el consumo de aceite de cilindros del motor principal usaré la siguiente fórmula apoyándome del buque base para datos del calor específico.

$$V_{aceite\ lubric.\ cilindros} = \frac{P_{funcionamiento}(10\%) \cdot Ce \cdot 1000h}{\rho_{aceite}} \cdot 10^{-6} = 17,2\ m^3$$

El tanque se diseña para un máximo de 5 cambios de aceite, quedando un volumen final de:

$$V_{aceite\ lubric.\ cilindros} = 86\ m^3$$

### 6.4.2 Tanque de aceite de retorno (Carter del Motor Principal).

El motor de este buque es un motor lento cuya lubricación se realiza mediante carter seco, por lo que habrá un tanque debajo del motor al que se devuelva el aceite después de lubricar determinadas partes del motor.

Para el volumen de este tanque realizo una estimación con el tanque del buque base:

$$V_{\text{aceite de retorno}} = 25 \text{ m}^3$$

## 6.5 Tanque de Aguas.

### 6.5.1 Tanque de Agua Dulce.

Para los cálculos de este tanque se tendrá en cuenta:

- $\text{Días de autonomía} = \frac{11000 \text{ millas}}{15,8 \cdot 24} = 30 \text{ días}$
- Número de tripulantes: 30

Agua Potable	Nº Tripulantes	Nº Días	l/tripulante	Consumo (l)
Lavabos	30	30	15	18900
Cocina	30	30	5	6300
Limpieza	30	30	20	25200
				50400

El volumen de los tanques de Agua Dulce será:

$$V_{\text{agua dulce}} = 50,4 \text{ m}^3$$

Como llevamos dos tanques serán 25,2 por tanque.

### 6.5.2 Tanque de Agua sanitaria.

Para realizar el cálculo del peso de agua potable se ha consultado la norma UNE-EN ISO 15748-2 2003, en la que se especifica según el tipo de buque el número de litros de agua potable consumidos por persona y por día.

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

Tipo de buque		Grupo de personas embarcado	Consumo de agua cuando esté equipado con	
			sistema de aseos de gravedad	sistema de aseos de vacío
Buque de alta mar	Carguero	Tripulante/cama	220 l	175 l
	Buque de pasaje	Pasajero/cama	270 l	225 l
	Crucero de lujo	Pasajero/cama	–	275 l
	Trasbordador con cabinas	Pasajero/cama	205 l*	160 l*
		Pasajero sin cama	100 l	55 l
	Trasbordador sin cabinas	Pasajero sin cama	150 l	105 l
Tripulante sin cama		100 l	55 l	

Teniendo en cuenta que el buque proyecto se considera un buque de carga, y que este está equipado con sistema de aseos de vacío, el peso de agua necesario será el siguiente:

$$\text{Días de autonomía} = \frac{11000 \text{ millas}}{15,8 * 24} = 30 \text{ días}$$

$$V_{\text{sanitaria}} = 30 \text{ días} \cdot 175 \frac{\text{litros} \cdot \text{persona}}{\text{día}} \cdot \frac{1 \text{ kg}}{1 \text{ l}} \cdot \frac{1 \text{ t}}{10^3 \text{ kg}} = 7,35 \text{ t}$$

$$V_{\text{sanitaria}} = \frac{7,35 \cdot 30 \text{ pers.}}{1,000 \text{ t/m}^3} = 220,5 \text{ m}^3$$



### 6.5.3 Tanque Aguas grises y Aguas negras.

Para los tanques de aguas grises y negras se estima una autonomía de tanque de 3 días, correspondiente a la estancia en puerto.

Para el cálculo de la capacidad de los tanques de almacén de aguas negras y grises se recurre a la norma UNE-EN ISO 15749-1 2005.

- AGUAS DE DESECHO: aguas no corrientes que han sufrido cambios debido a su uso, como por ejemplo aguas negras (aguas contaminadas), aguas de lluvia, aguas de mar, aguas de condensación que han alcanzado las líneas de achique. Con este tipo de aguas se hace una distinción, entre aguas grises y aguas negras.

Tabla 1  
 Clasificación de las aguas de desecho

Origen		Tipo de aguas de desecho
<b>Achiques sanitarios</b>		
Aseos generales	Bidés, retretes, urinarios	aguas negras
	Desagües <sup>a</sup>	aguas negras o grises
Zonas hospitalarias	Todas las unidades de achique (incluyendo las instalaciones de lavabos y baños, así aguas negras como las descargas de los desagües)	aguas negras
Lavabos y cuartos de baño	Bañeras, duchas, lavabos, lavamanos, desagües <sup>a</sup>	aguas grises o negras
Cocinas, despensas	Fregaderos, lavaderos, desagües, electrodomésticos	aguas grises
Otros espacios	Centrales de aire acondicionado (si hay desagües de agua de condensación sobre cubierta), lavanderías, pasillos, espacios para provisiones refrigeradas, piscinas, jacuzzis	aguas grises

<sup>a</sup> Las aguas de desecho procedentes de desagües inmediatamente adyacentes a retretes o urinarios se clasifican como aguas negras (véase el apartado 3.3).

- AGUAS GRISES: son aguas de desecho que deben evacuarse, con excepción de las aguas negras
- AGUAS NEGRAS: aguas de desechos procedentes de retretes, urinarios y bidés, incluyendo aditivos; de zonas médicas (enfermería, hospital, farmacia, etc.) y de lavabos, bañeras y descargas de agua de estas áreas; de espacios en los que habiten animales vivos y de otros tipos de aguas de desecho, si se mezclan con las aguas contaminadas que se han mencionado.

Tabla 2  
 Cantidad mínima de agua de desecho

Tipo de buque	Cantidad mínima de agua de desecho por persona y día en litros			
	Planta sin vacío		Planta con vacío	
	Aguas negras	Aguas negras y grises	Aguas negras	Aguas negras y grises
Buques de pasaje	70	230	25	185
Buques de alta mar exceptuando los de pasaje	70	180	25	135

Los buques costeros pueden conservar los valores recomendados por las autoridades responsables.

NOTA – Estos valores son los recomendados. Hay que considerar las posibles variaciones debidas a los reglamentos nacionales o a las recomendaciones de las sociedades de clasificación.

1) Tanque de Aguas negras.

$$V_{\text{aguas negras}} = 30 \text{ tripulantes} \cdot 30 \text{ días} \cdot 25 \frac{\text{l}}{\text{trip}} = 31500 \text{ litros}$$

2) Tanque de Aguas negras y grises.

$$V_{\text{aguas negras y grises}} = 30 \text{ tripulantes} \cdot 30 \text{ días} \cdot 135 \frac{\text{l}}{\text{trip}} = 170100 \text{ litros}$$

$V_{\text{aguas negras}}$	31,5 m <sup>3</sup>
$V_{\text{aguas negras y grises}}$	170,1 m <sup>3</sup>

#### 6.5.4 Tanque de Agua Técnica.

El agua técnica se utiliza para reponer las pérdidas producidas en el circuito de vapor. El valor de la producción total de vapor lo desconozco por lo que el volumen de este tanque será una estimación del volumen del tanque del buque base:

$$V_{\text{agua técnica}} = 50 \text{ m}^3$$

Como hay dos tanques el volumen se reparte:

$$V_{\text{agua técnica}} = 25 \text{ m}^3$$

Estos tanques van situados en el doble fondo de la cámara de máquinas.

#### 6.6 Tanque de Reboses HFO.

Este tanque recoge los derrames de los tanques de HFO. El volumen lo calculo con la siguiente fórmula:

$$V_{\text{reboses HFO}} = \frac{\text{Potencia} \cdot Ce \cdot 5h}{\rho_{\text{fuel-oil}}} \cdot 10^{-6} = 16,4 \text{ m}^3$$

#### 6.7 Tanque de Lodos.

Para determinar la capacidad del tanque de fangos se siguen las distintas reglas del Convenio MARPOL, Anexo I Reglas para prevenir la contaminación por

hidrocarburos, en concreto la regla 12 de este anexo (tanques para residuos de hidrocarburo (Fangos)), en la que dice:

*Todos los buques de arqueo igual o superior a 400 estarán provistos de un tanque o tanques con capacidad adecuada, según el tipo de maquinaria y la duración del viaje, para recibir los residuos de hidrocarburos (fangos) que no puedan tratarse de otra forma con arreglo a las disposiciones del presente anexo*

Y en la interpretación de dicha regla, Capacidad de los tanques de fangos se da una fórmula para calcular el volumen de los tanques de fangos respecto a los buques que no llevan agua de lastre en los tanques de combustible líquido:

$$V_1 = k_1 \cdot C \cdot D \text{ (m}^3\text{)}$$

Donde:

- $K_1$  vale 0,01 para los buques en los que se purifique el fueloil pesado destinado a la maquina principal, o 0,005 para los buques en los que se utilice dieseloil o fueloil pesado que no haya de ser purificado antes de su uso
- C=consumo diario de fueloil (toneladas).
- D= duración máxima del viaje entre los puertos en los que puede descarse fangos en tierra (días). A falta de datos precisos se utilizará la cifra de 30 días.

Para el presente buque:

- $K_1 = 0,01$
- $C = \frac{166,4 \text{ g}}{\text{kWh}} \cdot 24 \text{ h} \cdot 24289 \text{ kW} \cdot 10^{-6}$
- $D = \frac{11000 \text{ millas}}{15,8 \cdot 24} = 30 \text{ días}$

$$V_1 = 32 \text{ m}^3$$

Al final del documento se adjunta el plano de tanques en el Anexo I.

## 7 CÁLCULO HIDROSTÁTICAS.

### 1.6. Comprobación del peso muerto.

El Peso en Rosca del buque es de 32610 t, y el programa Maxsurf me da el valor del desplazamiento  $\Delta$  que vale 195606 t:

	Measurement	Value	Units
1	Displacement	195606	t
2	Volume (displaced)	190834,731	m <sup>3</sup>
3	Draft Amidships	17,700	m
4	Immersed depth	17,700	m
5	WL Length	277,195	m
6	Beam max extents o	45,300	m
7	Wetted Area	19990,569	m <sup>2</sup>
8	Max sect. area	796,238	m <sup>2</sup>
9	Waterpl. Area	11598,960	m <sup>2</sup>
10	Prismatic coeff. (Cp)	0,877	
11	Block coeff. (Cb)	0,870	
12	Midship Sect. area c	0,993	
13	Waterpl. area coeff.	0,936	
14	LCB length	141,489	from z
15	LCF length	134,691	from z
16	LCB %	51,733	from z
17	LCF %	49,247	from z
18	KB	9,133	m
19	KG fluid	0,000	m
20	BMt	9,683	m
21	BML	338,277	m
22	GMt corrected	18,816	m
23	GML	347,410	m
24	KMt	18,816	m
25	KML	347,410	m
26	Immersion (TPc)	118,889	tonne/c
27	MTc	2484,658	tonne.
28	RM at 1deg = GMT.Di	64234,668	tonne.

Sabiendo que:

$$TPM = \Delta - PR = 195606 - 32610 = 162996 \text{ t}$$

Con lo que cumple el requerimiento de 148.000 TPM con un margen del 3%

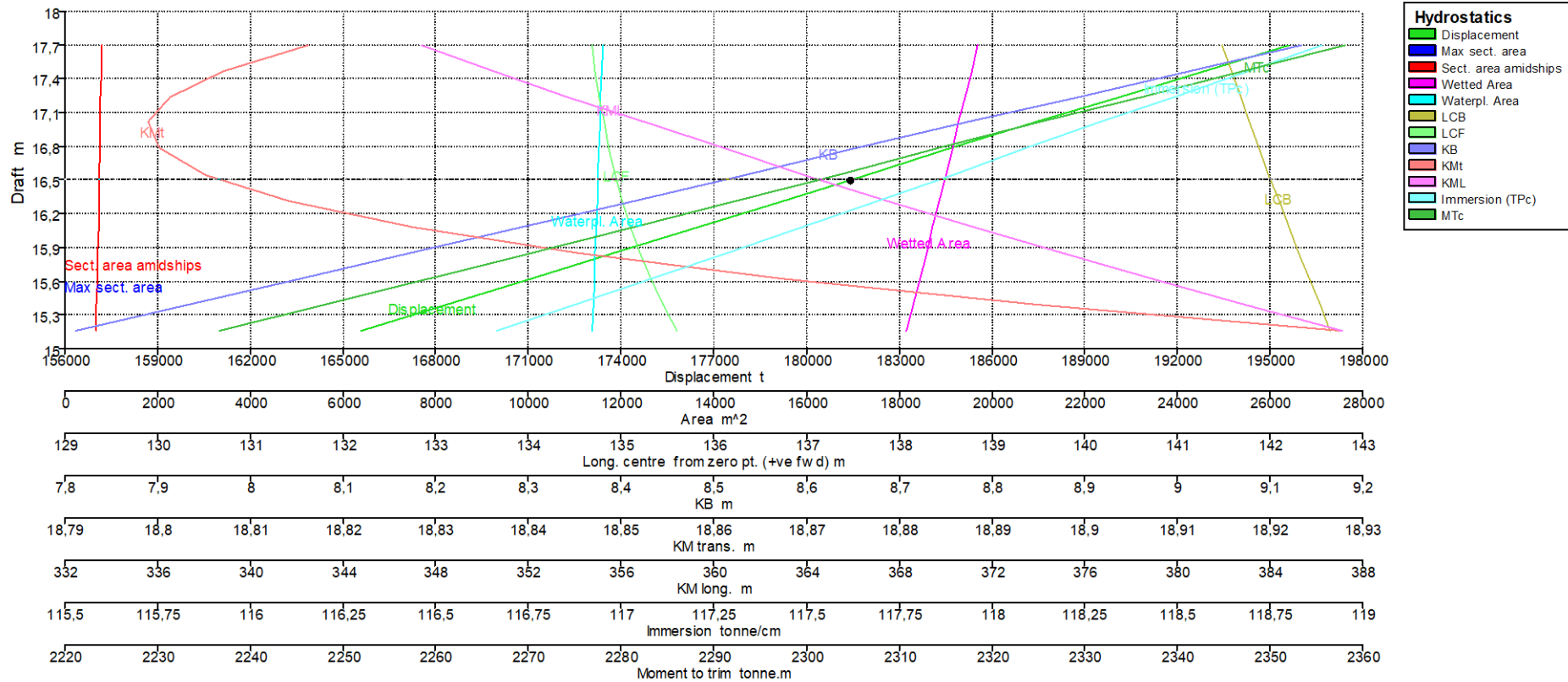
Para el cálculo de las hidrostáticas se emplea el programa Maxsurf Stability, mediante la herramienta "Updgright Hydrostatics" para los siguientes trimados:

- Asiento por Proa:  $t = - 2,735$  m.
- Asiento cero:  $t = 0$ .
- Asiento por Popa:  $t = + 2,735$  m.

1.7. Hidrostáticas para Trimado Cero.

Draft Amidships (m)	17,700	17,471	17,241	17,010	16,780	16,549	16,317	16,085	15,853	15,620	15,387	15,154
Displacement t	195606	192879	190151	187424	184697	181970	179242	176515	173788	171060	168333	165606
Heel deg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Draft at FP m	17,70	17,47	17,24	17,01	16,78	16,55	16,32	16,09	15,85	15,62	15,39	15,15
Draft at AP m	17,70	17,47	17,24	17,01	16,78	16,55	16,32	16,09	15,85	15,62	15,39	15,15
Draft at LCF m	17,70	17,47	17,24	17,01	16,78	16,55	16,32	16,09	15,85	15,62	15,39	15,15
Trim (+ve by stern) m	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
WL Length m	277,20	277,20	277,21	277,22	277,25	277,28	277,32	277,36	277,42	277,47	277,54	277,60
Beam max extents on WL m	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30
Wetted Area m <sup>2</sup>	19697,88	19560,25	19422,39	19284,35	19146,04	19007,52	18868,70	18729,51	18589,98	18449,94	18301,98	18158,92
Waterpl. Area m <sup>2</sup>	11598,96	11579,61	11560,23	11540,81	11521,28	11501,75	11482,10	11462,31	11442,50	11422,35	11402,28	11381,81
Prismatic coeff. (Cp)	0,87	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86
Block coeff. (Cb)	0,86	0,86	0,86	0,86	0,86	0,85	0,85	0,85	0,85	0,85	0,85	0,85
Max Sect. area coeff. (Cm)	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99
Waterpl. area coeff. (Cwp)	0,92	0,92	0,92	0,92	0,92	0,92	0,91	0,91	0,91	0,91	0,91	0,91
LCB from zero pt. (+ve fwd) m	141,49	141,58	141,68	141,78	141,88	141,99	142,09	142,20	142,31	142,42	142,54	142,65
LCF from zero pt. (+ve fwd) m	134,69	134,73	134,77	134,81	134,87	134,94	135,02	135,10	135,21	135,32	135,45	135,60
KB m	9,13	9,01	8,89	8,77	8,65	8,53	8,41	8,29	8,17	8,05	7,93	7,81
KG m	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70
BMt m	9,68	9,79	9,91	10,03	10,15	10,27	10,40	10,53	10,67	10,82	10,96	11,12
BML m	338,28	341,50	344,82	348,24	351,75	355,36	359,08	362,90	366,83	370,86	375,02	379,28
GMt m	1,12	1,11	1,10	1,10	1,10	1,11	1,11	1,13	1,15	1,17	1,20	1,23
GML m	329,71	332,82	336,02	339,31	342,70	346,20	349,79	353,49	357,30	361,21	365,25	369,39
KMt m	18,82	18,81	18,80	18,80	18,80	18,81	18,81	18,83	18,85	18,87	18,90	18,93
KML m	347,41	350,52	353,72	357,01	360,40	363,90	367,49	371,19	375,00	378,91	382,95	387,09

Immersion (TPc) tonne/cm	118,89	118,69	118,49	118,29	118,09	117,89	117,69	117,49	117,29	117,08	116,87	116,66
MTc tonne.m	2358,07	2347,10	2336,16	2325,23	2314,28	2303,37	2292,41	2281,40	2270,39	2259,20	2248,04	2236,67
RM at 1deg = GMt.Disp.sin(1) tonne.m	3810,63	3726,91	3654,84	3594,65	3546,14	3509,84	3485,52	3473,19	3473,57	3485,45	3511,01	3548,05
Max deck inclination deg	0	0	0	0	0	0	0	0	0	0	0	0
Trim angle (+ve by stern) deg	0	0	0	0	0	0	0	0	0	0	0	0



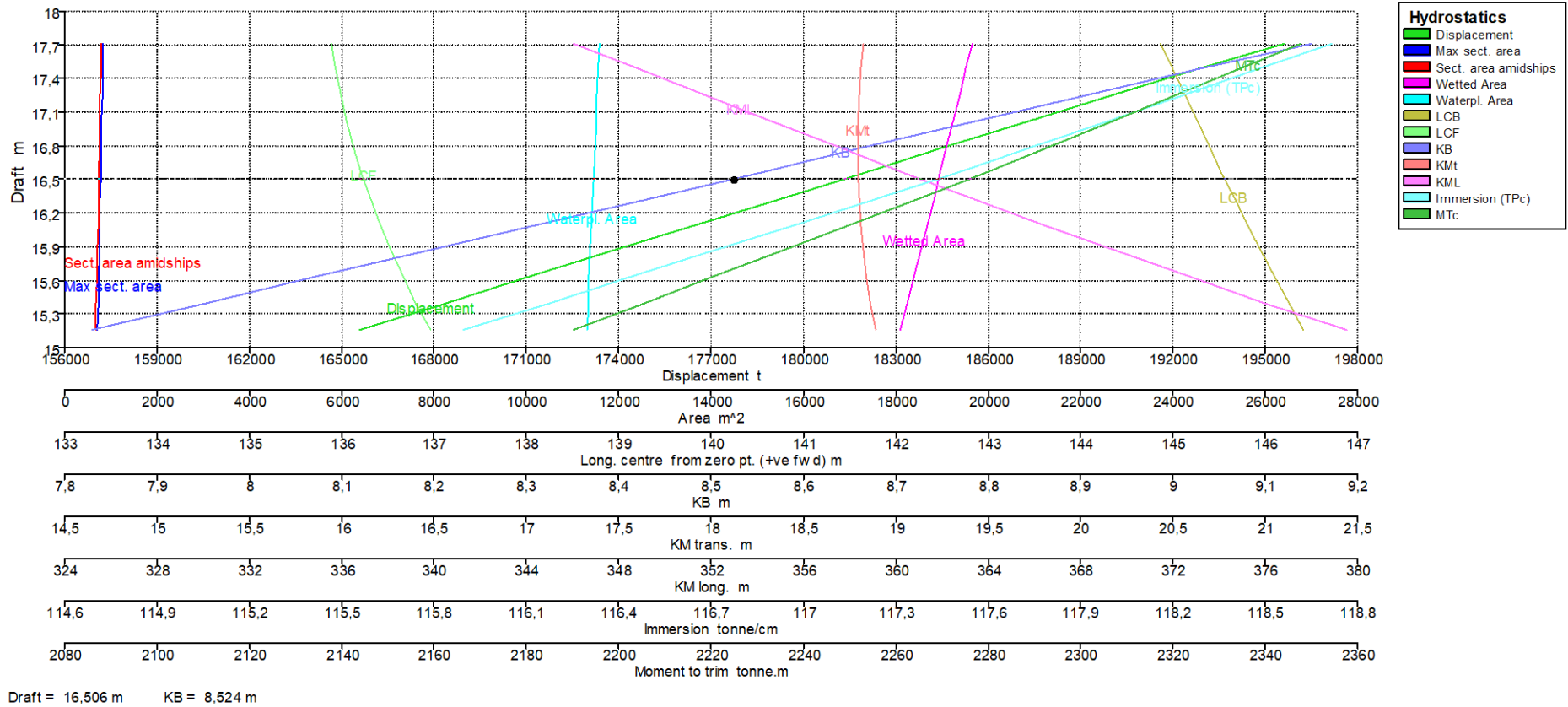
Draft = 16,500 m      Displacement = 181397,776 t

1.8. Hidrostáticas Trimado por Proa ( 1%Lpp = - 2,735 ).

Draft Amidships (m)	17,714	17,485	17,254	17,023	16,792	16,560	16,328	16,095	15,862	15,628	15,393	15,158
Displacement t	195606	192879	190152	187424	184697	181970	179242	176515	173788	171061	168333	165606
Heel deg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Draft at FP m	19,08	18,85	18,62	18,39	18,16	17,93	17,70	17,46	17,23	17,00	16,76	16,53
Draft at AP m	16,35	16,12	15,89	15,66	15,43	15,19	14,96	14,73	14,49	14,26	14,03	13,79
Draft at LCF m	17,71	17,48	17,25	17,02	16,79	16,56	16,32	16,09	15,86	15,63	15,39	15,16
Trim (+ve by stern) m	-2,74	-2,74	-2,74	-2,74	-2,74	-2,74	-2,74	-2,74	-2,74	-2,74	-2,74	-2,74
WL Length m	277,40	277,34	277,29	277,26	277,23	277,22	277,21	277,21	277,22	277,24	277,26	277,30
Beam max extents on WL m	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30
Wetted Area m <sup>2</sup>	19664,81	19525,60	19385,95	19245,80	19105,09	18963,81	18821,96	18679,66	18536,84	18393,71	18250,30	18106,58
Waterpl. Area m <sup>2</sup>	11582,10	11559,29	11535,97	11512,20	11487,89	11463,05	11437,72	11412,02	11385,95	11359,73	11333,45	11307,07
Prismatic coeff. (Cp)	0,82	0,82	0,82	0,82	0,82	0,82	0,82	0,81	0,81	0,81	0,81	0,81
Block coeff. (Cb)	0,80	0,80	0,80	0,80	0,79	0,79	0,79	0,79	0,79	0,79	0,78	0,78
Max Sect. area coeff. (Cm)	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99
Waterpl. area coeff. (Cwp)	0,92	0,92	0,92	0,92	0,92	0,91	0,91	0,91	0,91	0,91	0,90	0,90
LCB from zero pt. (+ve fwd) m	144,87	144,99	145,12	145,26	145,39	145,53	145,67	145,81	145,96	146,11	146,26	146,41
LCF from zero pt. (+ve fwd) m	135,89	135,94	135,99	136,06	136,13	136,22	136,31	136,42	136,54	136,67	136,81	136,96
KB m	9,15	9,03	8,91	8,79	8,67	8,55	8,43	8,31	8,19	8,07	7,95	7,83
KG m	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70
BMt m	9,68	9,78	9,89	10,01	10,12	10,25	10,37	10,50	10,63	10,77	10,91	11,06
BML m	336,89	339,79	342,73	345,72	348,75	351,82	354,94	358,12	361,37	364,70	368,14	371,69
GMt m	1,04	1,03	1,02	1,01	1,01	1,01	1,01	1,02	1,03	1,05	1,07	1,10
GML m	328,25	331,03	333,85	336,72	339,63	342,58	345,58	348,64	351,77	354,98	358,30	361,72
KMt m	18,82	18,81	18,80	18,80	18,80	18,80	18,80	18,81	18,82	18,84	18,86	18,89
KML m	346,02	348,80	351,62	354,49	357,40	360,35	363,35	366,41	369,54	372,75	376,07	379,50
Immersion (TPc) tonne/cm	118,72	118,48	118,24	118,00	117,75	117,50	117,24	116,97	116,71	116,44	116,17	115,90



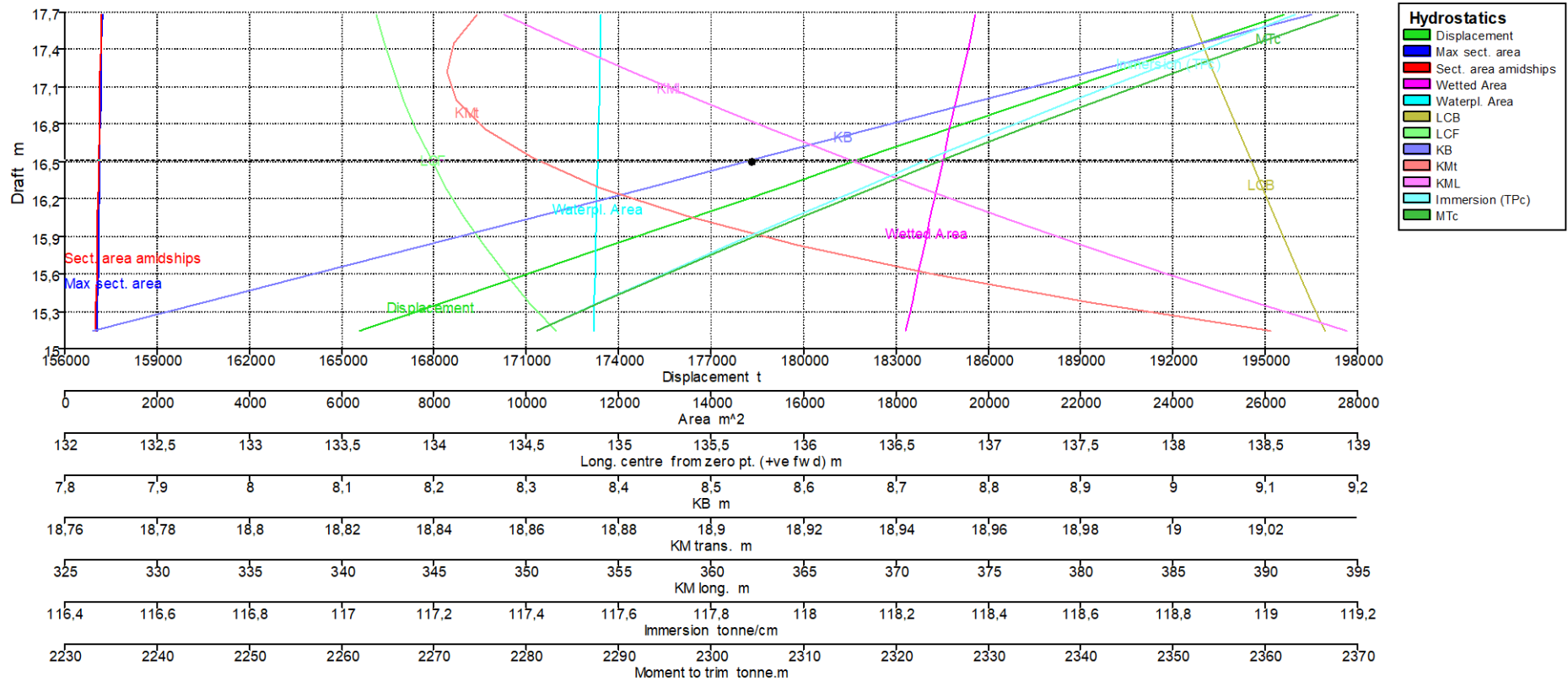
MTc tonne.m	2347,66	2334,53	2321,13	2307,49	2293,55	2279,32	2264,81	2250,09	2235,19	2220,22	2205,24	2190,25
RM at 1deg = GMt.Disp.sin(1) tonne.m	3562,85	3469,24	3386,32	3314,55	3253,72	3204,58	3166,91	3141,54	3128,26	3127,55	3139,81	3164,58
Max deck inclination deg	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729
Trim angle (+ve by stern) deg	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729	-0,5729



1.9. Hidrostáticas Trimado por Popa ( 1%Lpp = + 2,735 ).

Draft Amidships (m)	17,675	14,445	17,216	16,986	16,756	16,526	16,295	16,064	15,833	15,601	15,370	15,137
Displacement t	195606	192879	190151	187424	184697	181970	179242	176515	173788	171061	168333	165606
Heel deg	0	0	0	0	0	0	0	0	0	0	0	0
Draft at FP m	16,31	16,08	15,85	15,62	15,39	15,16	14,93	14,70	14,47	14,23	14,00	13,77
Draft at AP m	19,04	18,81	18,58	18,35	18,12	17,89	17,66	17,43	17,20	16,97	16,74	16,51
Draft at LCF m	17,71	17,48	17,25	17,02	16,79	16,55	16,32	16,09	15,86	15,63	15,39	15,16
Trim (+ve by stern) m	2,74	2,74	2,74	2,74	2,74	2,74	2,74	2,74	2,74	2,74	2,74	2,74
WL Length m	277,33	277,38	277,43	277,49	277,55	277,62	277,69	277,76	277,85	277,93	278,02	278,11
Beam max extents on WL m	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30	45,30
Wetted Area m <sup>2</sup>	19725,54	19589,13	19452,57	19315,98	19171,72	19032,78	18895,60	18758,20	18620,63	18484,31	18350,73	18216,33
Waterpl. Area m <sup>2</sup>	11616,09	11600,27	11584,63	11569,30	11554,18	11539,35	11524,80	11510,54	11496,54	11482,80	11469,23	11455,87
Prismatic coeff. (Cp)	0,84	0,84	0,84	0,84	0,84	0,84	0,83	0,83	0,83	0,83	0,83	0,83
Block coeff. (Cb)	0,80	0,80	0,80	0,80	0,79	0,79	0,79	0,79	0,79	0,79	0,78	0,78
Max Sect. area coeff. (Cm)	0,99	0,99	0,99	0,99	0,99	0,98	0,98	0,98	0,98	0,98	0,98	0,98
Waterpl. area coeff. (Cwp)	0,93	0,92	0,92	0,92	0,92	0,92	0,92	0,92	0,91	0,91	0,91	0,91
LCB from zero pt. (+ve fwd) m	138,10	138,16	138,22	138,29	138,35	138,42	138,48	138,55	138,62	138,68	138,75	138,82
LCF from zero pt. (+ve fwd) m	133,69	133,73	133,78	133,84	133,90	133,98	134,06	134,16	134,27	134,39	134,52	134,66
KB m	9,15	9,03	8,91	8,79	8,67	8,55	8,43	8,31	8,19	8,07	7,95	7,83
KG m	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70	17,70
BMt m	9,70	9,81	9,93	10,05	10,18	10,31	10,44	10,58	10,73	10,88	11,03	11,19
BML m	339,63	343,18	346,84	350,64	354,58	358,66	362,90	367,30	371,86	376,59	381,49	386,57
GMt m	1,16	1,16	1,16	1,16	1,17	1,18	1,19	1,21	1,24	1,27	1,30	1,34
GML m	331,10	334,52	338,07	341,75	345,57	349,53	353,65	357,93	362,37	366,98	371,76	376,72
KMt m	18,85	18,84	18,84	18,85	18,85	18,86	18,88	18,90	18,92	18,95	18,98	19,02
KML m	348,77	352,19	355,74	359,42	363,24	367,20	371,31	375,59	380,03	384,64	389,42	394,38

Immersion (TPc) tonne/cm	119,07	118,90	118,74	118,59	118,43	118,28	118,13	117,98	117,84	117,70	117,56	117,42
MTc tonne.m	2368,00	2359,14	2350,44	2341,96	2333,66	2325,57	2317,70	2310,03	2302,56	2295,27	2288,11	2281,09
RM at 1deg = GMt.Disp.sin(1) tonne.m	3972,84	3902,43	3844,14	3798,47	3764,78	3744,00	3735,28	3739,44	3755,83	3785,11	3826,68	3881,13
Max deck inclination deg	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57
Trim angle (+ve by stern) deg	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729	0,5729





## 8 CURVAS KN'S (CARENAS INCLINADAS).

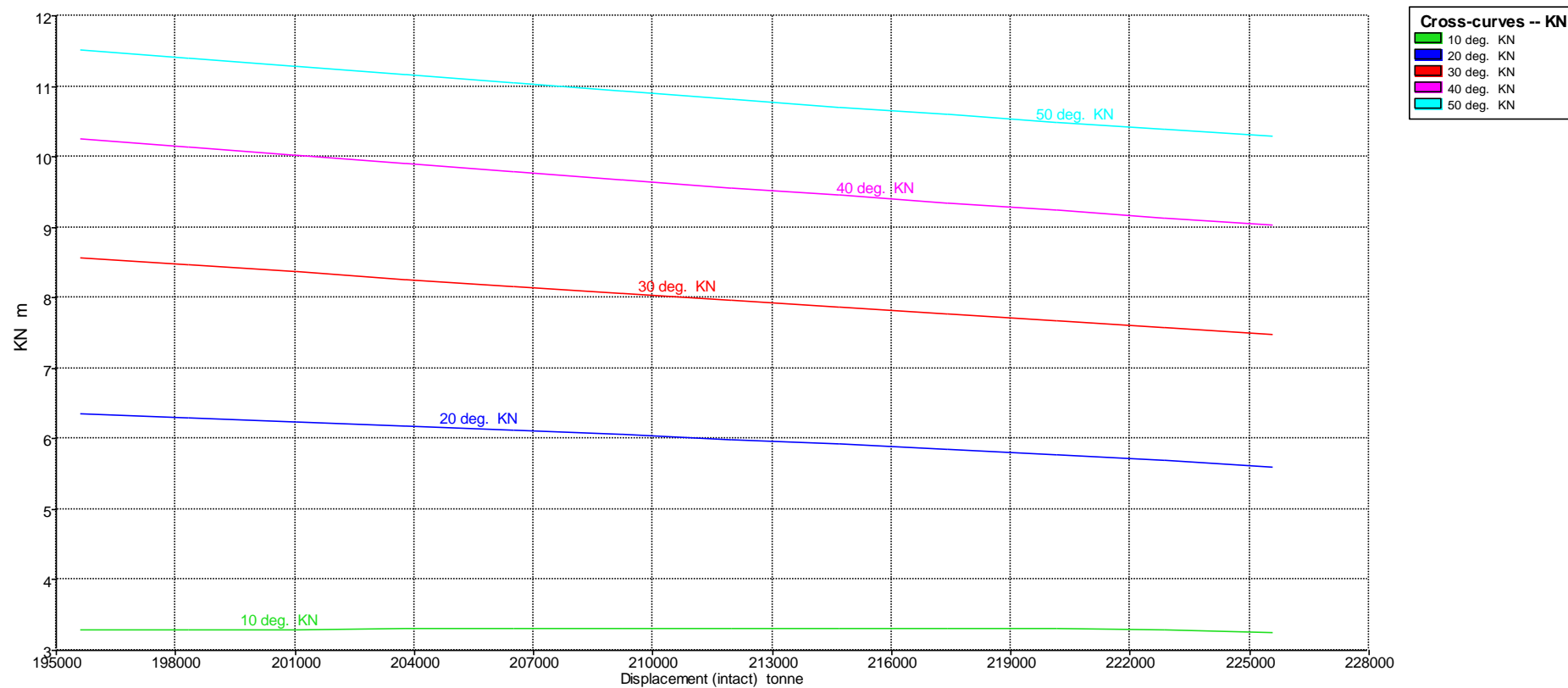
Las curvas de KN's se calculan mediante Maxsurf Stability con la herramienta "KN Values" para los trimados:

- Asiento por Proa:  $t = - 2,735$  m.
- Asiento cero:  $t = 0$ .
- Asiento por Popa:  $t = + 2,735$  m.



### 8.1 Curva KN's (Trimado 0).

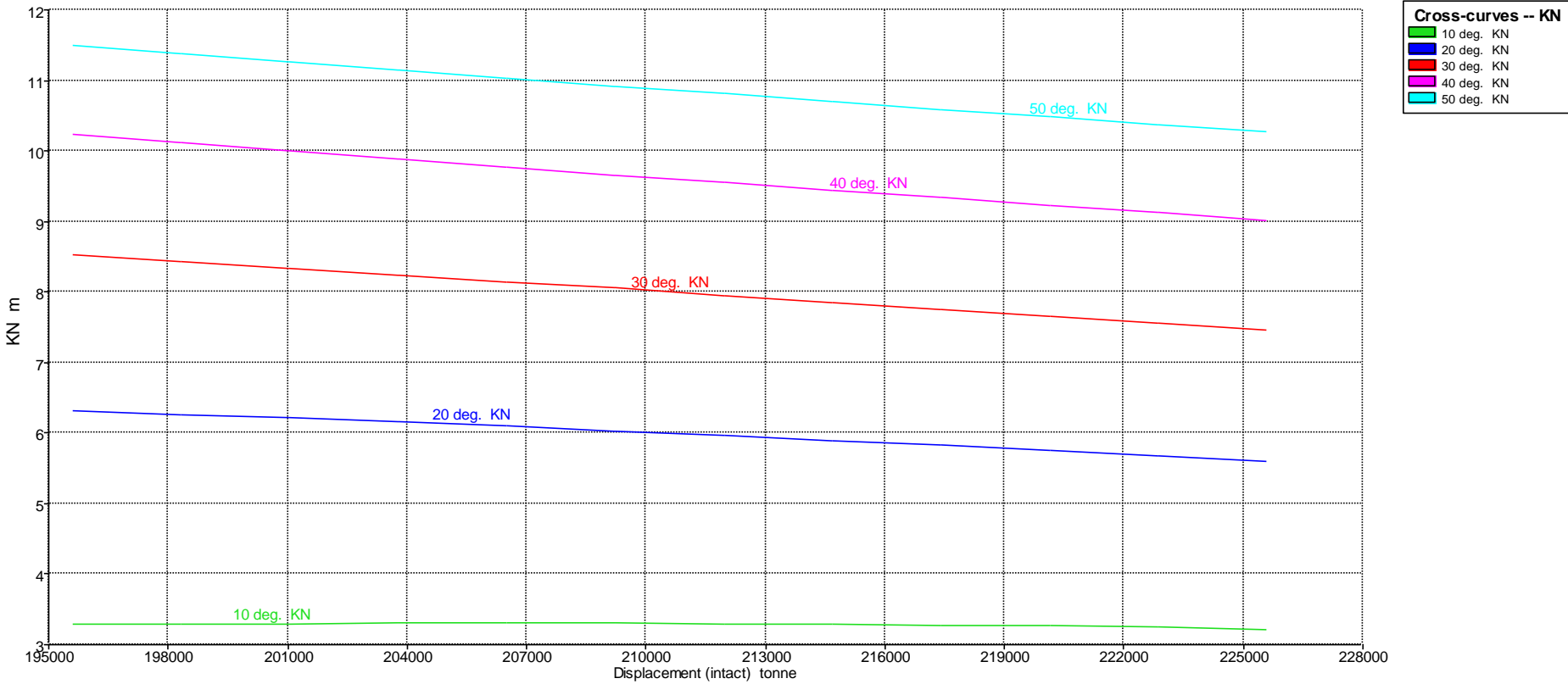
Displacement (intact) t	Draft Amidships m	Trim	LCG (m)	TCG(m)	Assumed VCG (m)	KN 10,0 deg	KN 20,0 deg	KN 30,0 deg	KN 40,0 deg	KN 50,0
195606	17,7	0	141,489	0	0	3,295	6,355	8,558	10,256	11,50
198333	17,929	0	141,396	0	0	3,297	6,302	8,461	10,138	11,39
201061	18,158	0	141,305	0	0	3,299	6,246	8,363	10,02	11,27
203788	18,387	0	141,216	0	0	3,301	6,187	8,266	9,904	11,1
206515	18,615	0	141,129	0	0	3,304	6,125	8,169	9,79	11,04
209242	18,842	0	141,045	0	0	3,308	6,06	8,071	9,676	10,93
211970	19,07	0	140,963	0	0	3,312	5,992	7,972	9,565	10,82
214697	19,297	0	140,882	0	0	3,315	5,922	7,874	9,455	10,7
217424	19,523	0	140,804	0	0	3,312	5,848	7,775	9,346	10,60
220151	19,749	0	140,728	0	0	3,303	5,771	7,675	9,239	10,49
222879	19,975	0	140,653	0	0	3,286	5,691	7,575	9,133	10,38
225606	20,201	0	140,581	0	0	3,261	5,608	7,475	9,028	10,28





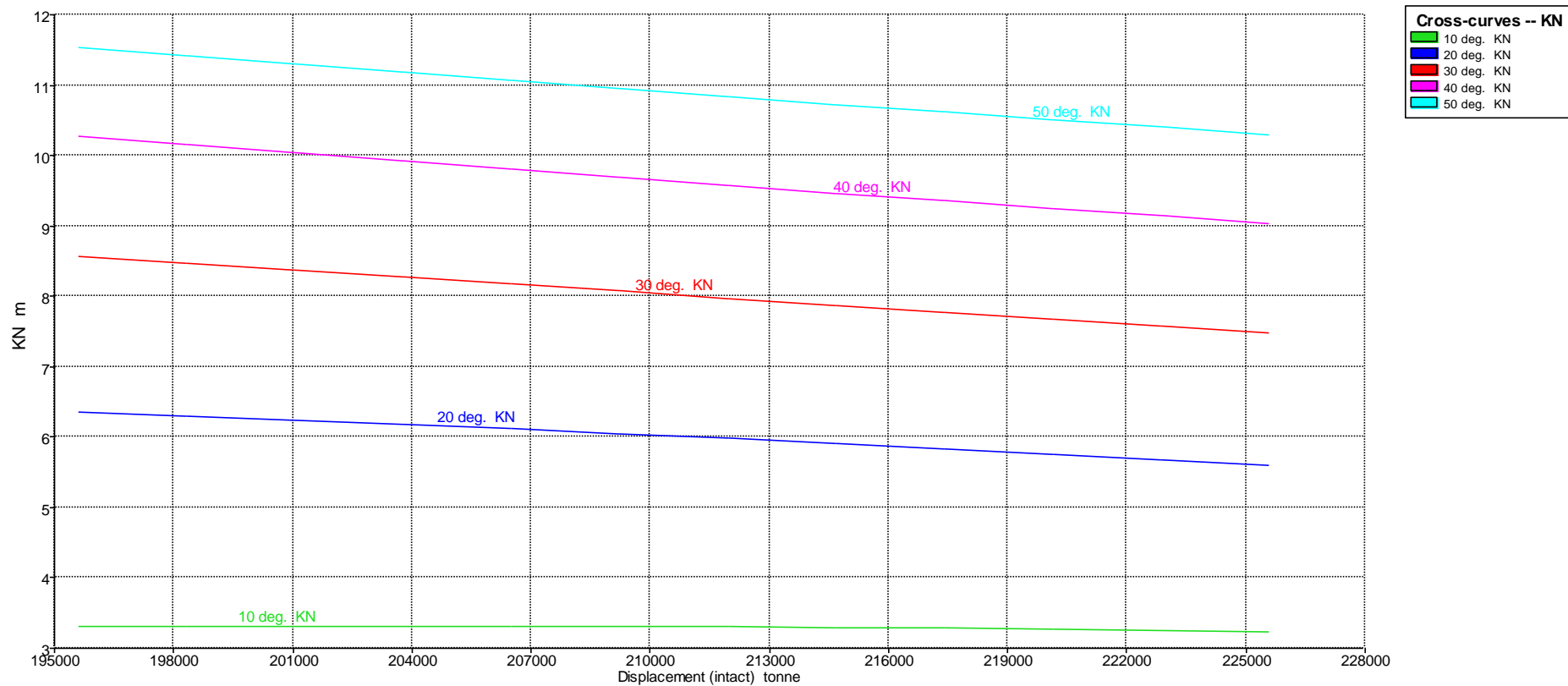
## 8.2 Curva KN's Trimado por Proa ( 1%Lpp = -2,735 m ).

Displacement (intact) t	Draft Amidships m	Trim	LCG (m)	TCG(m)	Assumed VCG (m)	KN 10,0 deg	KN 20,0 deg	KN 30,0 deg	KN 40,0 deg	KN 50,0 deg
195606	17,716	-2,735 (fixed)	144,959	0	0	3,295	6,32	8,533	10,238	11,496
198333	17,944	-2,735 (fixed)	144,837	0	0	3,297	6,268	8,438	10,12	11,379
201061	18,173	-2,735 (fixed)	144,718	0	0	3,299	6,213	8,342	10,003	11,263
203788	18,402	-2,735 (fixed)	144,602	0	0	3,301	6,156	8,246	9,888	11,148
206515	18,63	-2,735 (fixed)	144,488	0	0	3,302	6,095	8,15	9,774	11,034
209242	18,858	-2,735 (fixed)	144,377	0	0	3,301	6,032	8,053	9,662	10,921
211970	19,085	-2,735 (fixed)	144,269	0	0	3,298	5,966	7,956	9,551	10,809
214697	19,312	-2,735 (fixed)	144,164	0	0	3,291	5,897	7,858	9,442	10,699
217424	19,539	-2,735 (fixed)	144,061	0	0	3,281	5,825	7,76	9,334	10,591
220151	19,765	-2,735 (fixed)	143,96	0	0	3,266	5,75	7,662	9,228	10,484
222879	19,991	-2,735 (fixed)	143,863	0	0	3,247	5,671	7,563	9,123	10,38
225606	20,216	-2,735 (fixed)	143,767	0	0	3,221	5,589	7,462	9,019	10,278



### 8.3 Curva KN's Trimado por Proa ( 1%Lpp = + 2,735 m ).

Displacement (intact) t	Draft Amidships m	Trim	LCG (m)	TCG(m)	Assumed VCG (m)	KN 10,0 deg	KN 20,0 deg	KN 30,0 deg	KN 40,0 deg	KN 50,0 deg
195606	17,676	2,735 (fixed)	138,005	0	0	3,302	6,354	8,571	10,278	11,536
198333	17,904	2,735 (fixed)	137,944	0	0	3,303	6,3	8,471	10,158	11,418
201061	18,132	2,735 (fixed)	137,884	0	0	3,305	6,242	8,372	10,039	11,301
203788	18,361	2,735 (fixed)	137,825	0	0	3,307	6,182	8,273	9,921	11,184
206515	18,588	2,735 (fixed)	137,767	0	0	3,308	6,119	8,174	9,805	11,069
209242	18,816	2,735 (fixed)	137,711	0	0	3,307	6,054	8,075	9,69	10,954
211970	19,043	2,735 (fixed)	137,656	0	0	3,305	5,985	7,975	9,577	10,841
214697	19,27	2,735 (fixed)	137,602	0	0	3,299	5,914	7,875	9,465	10,729
217424	19,497	2,735 (fixed)	137,549	0	0	3,289	5,839	7,776	9,355	10,618
220151	19,723	2,735 (fixed)	137,498	0	0	3,275	5,762	7,675	9,247	10,509
222879	19,949	2,735 (fixed)	137,448	0	0	3,256	5,682	7,575	9,14	10,403
225606	20,174	2,735 (fixed)	137,4	0	0	3,231	5,599	7,473	9,034	10,299



## 2. DEFINICIÓN DE LA ZONA ESTANCA Y PUNTOS DE INUNDACIÓN PROGRESIVA (PIP).

Sobre la cubierta principal del buque se encuentran el guardacalor para los conductos de los gases de escape y una superestructura que consta de 4 cubiertas más el puente de mando.

Bajo la cubierta principal la disposición consta del propio casco del buque, donde se encuentran tanques de carga y lastre, cámara de máquinas y piques de Proa y Popa, para garantizar la estanqueidad de esta zona se dotará al buque de puertas y escotillas estancas.

Las aberturas del buque definidas como estancas a la entrada de agua son:

- Puertas laterales de entrada estancas a la habitación.
- Puertas laterales estancas de entrada a los locales del guardacalor.
- Puertas de entrada estancas a los almacenes de proa.

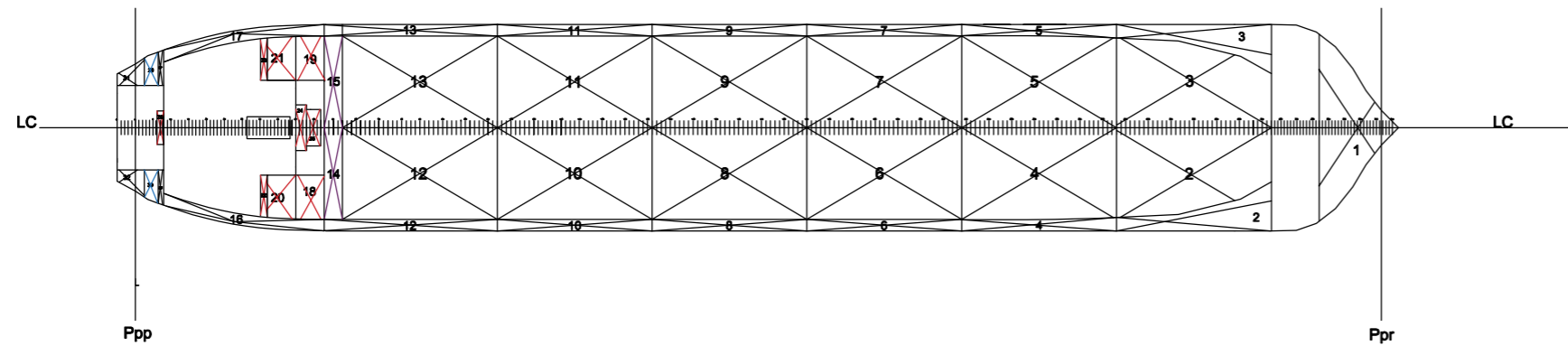
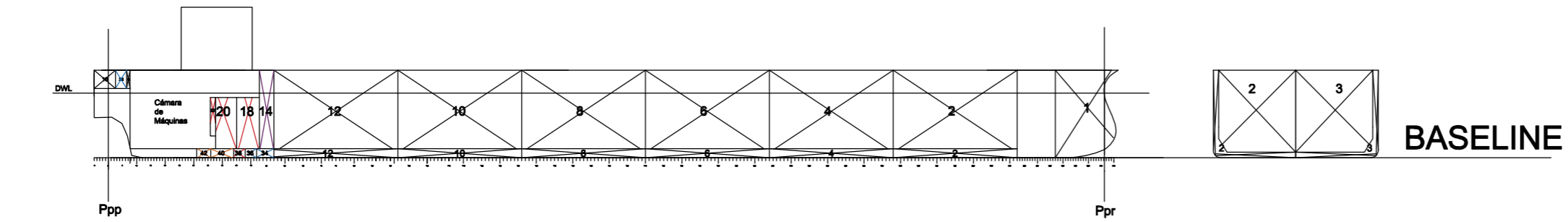
Los PIP son los puntos del buque por donde puede entrar el agua de forma progresiva, y lo más desfavorables son los que están cerca de la cubierta principal y más hacia uno de los costados.

Los PIP de este buque serán:

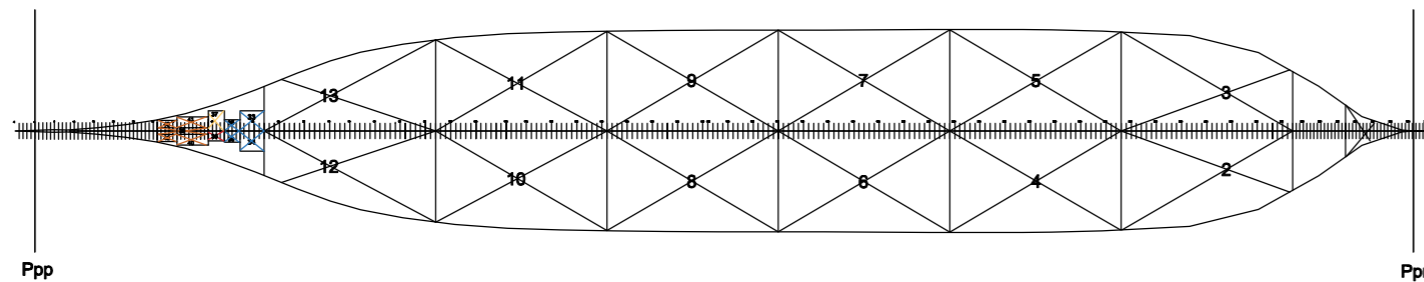
- Puertas laterales a la intemperie de entrada al puente de mando.
- Conductos de ventilación de la cámara de máquinas.
- Reboses de los tanques de carga.

Los PIP se ven representados en el plano del buque en el Anexo I de este cuaderno.

## **9 ANEXO I DISTRIBUCIÓN DE TANQUES**



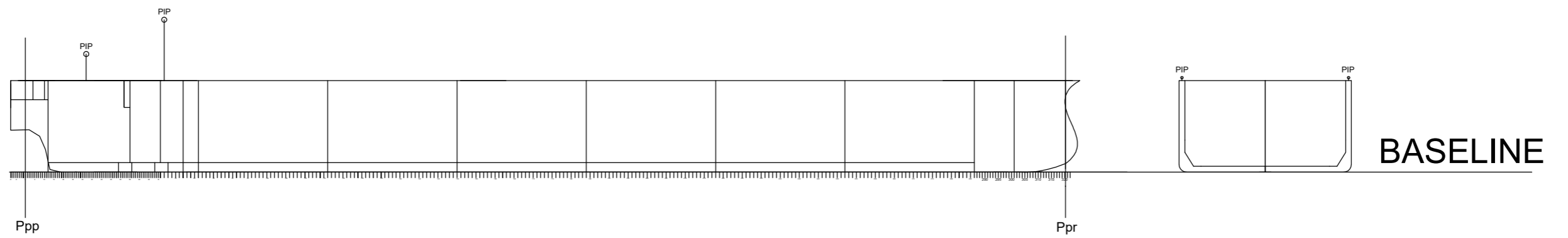
**DOBLE FONDO**



Nº	TANQUE	LOCALIZACIÓN	VOLUMEN (m3)
1	Lastre pique de proa	292 - 315	5607,042
2	Carga Nº 1 ER	244 - 277	14143,283
2	Lastre Nº1 ER Costado	244 - 277	1528,63
2	Lastre Nº1 ER Fondo	244 - 277	1725,738
3	Carga Nº 1 BR	244 - 277	14143,283
3	Lastre Nº1 BR Costado	244 - 277	1528,63
3	Lastre Nº1 BR Fondo	244 - 277	1725,738
4	Carga Nº 2 ER	209 - 244	14144,574
4	Lastre Nº2 ER Costado	209 - 244	1743,418
4	Lastre Nº2 ER Fondo	209 - 244	1827,452
5	Carga Nº 2 BR	209 - 244	14144,574
5	Lastre Nº2 BR Costado	209 - 244	1743,418
5	Lastre Nº2 BR Fondo	209 - 244	1827,452
6	Carga Nº 3 ER	175 - 209	14144,574
6	Lastre Nº3 ER Costado	175 - 209	1732,474
6	Lastre Nº3 ER Fondo	175 - 209	1821,427
7	Carga Nº 3 BR	175 - 209	14144,574
7	Lastre Nº3 BR Costado	175 - 209	1732,474
7	Lastre Nº3 BR Fondo	175 - 209	1821,427
8	Carga Nº 4 ER	131 - 175	14144,574
8	Lastre Nº4 ER Costado	131 - 175	1750,422
8	Lastre Nº4 ER Fondo	131 - 175	1828,875
9	Carga Nº 4 BR	131 - 175	14144,574
9	Lastre Nº4 BR Costado	131 - 175	1750,422
9	Lastre Nº4 BR Fondo	131 - 175	1828,875
10	Carga Nº 5 ER	97 - 131	14144,574
10	Lastre Nº5 ER Costado	97 - 131	1749,478
10	Lastre Nº5 ER Fondo	97 - 131	1805,214
11	Carga Nº 5 BR	97 - 131	14144,574
11	Lastre Nº5 BR Costado	97 - 131	1749,478
11	Lastre Nº5 BR Fondo	97 - 131	1805,214
12	Carga Nº 6 ER	57 - 97	14131,338
12	Lastre Nº6 ER Costado	57 - 97	1722,98
12	Lastre Nº6 ER Fondo	57 - 97	1652,082
13	Carga Nº 6 BR	57 - 97	14131,338
13	Lastre Nº6 BR Costado	57 - 97	1722,98
13	Lastre Nº6 BR Fondo	57 - 97	1652,082
14	SLOP ER	53 - 57	1641,097
15	SLOP BR	53 - 57	1641,097
16	Lastre CM ER	12 - 77	295,99
17	Lastre CM BR	12 - 77	295,99
18	HFO Nº 1 ER	45 - 53	794,894
19	HFO Nº 1 BR	45 - 53	794,894
20	HFO Nº 2 ER	37 - 45	609,516
21	HFO Nº 2 BR	37 - 45	609,516
22	HFO Uso diario ER	34 - 37	114,480
23	HFO Uso diario BR	34 - 37	114,480
24	MDO Almacén	45 - 48	450
25	MDO Uso diario	48 - 52	228
26	HFO Decantación	9 - 13	86,150
27	Agua Dulce BR	10 - 12	28,561
28	Agua Dulce ER	10 - 12	28,561
29	Agua Sanitaria BR	4 - 10	69,5
30	Agua Sanitaria ER	4 - 10	69,5
31	Lastre Pique de Popa BR	-8 - 4	78,597
32	Lastre Pique de Popa ER	-8 - 4	78,597
33	Agua Negra y Grises BR	76 - 81	50
34	Agua Negra y Grises ER	76 - 81	50
35	Agua Negra BR	73 - 76	18,5
36	Agua Negra ER	73 - 76	18,5
37	Lodos BR	44 - 48	35
38	Raboseo HFO ER	44 - 48	17,5
39	Acelle Retorno Carter	31 - 44	30,875
40	Acelle Motor ER	31 - 36	23,25
41	Acelle Motor BR	31 - 36	23,25
42	Acelle Cilindros ER	36 - 44	12,688
43	Acelle Cilindros BR	36 - 44	12,688

**ESCOLA POLITECNICA SUPERIOR DE FERROL**

<b>ALUMNO</b>	<b>PABLO MARTÍNEZ MARTÍNEZ</b>	<b>FIRMA</b>	
<b>TRABAJO</b>	<b>DISTRIBUCIÓN DE TANQUES</b>	<b>NUMERO</b>	<b>ESCALA</b>
		1/1	1/1500
			FECHA



ESCOLA POLITECNICA SUPERIOR DE FERROL			
ALUMNO	PABLO MARTÍNEZ MARTÍNEZ	FIRMA	
TRABAJO 	PUNTOS INUNDACIÓN PROGRESIVA	NUMERO	ESCALA
		1/1	1/1250
			FECHA



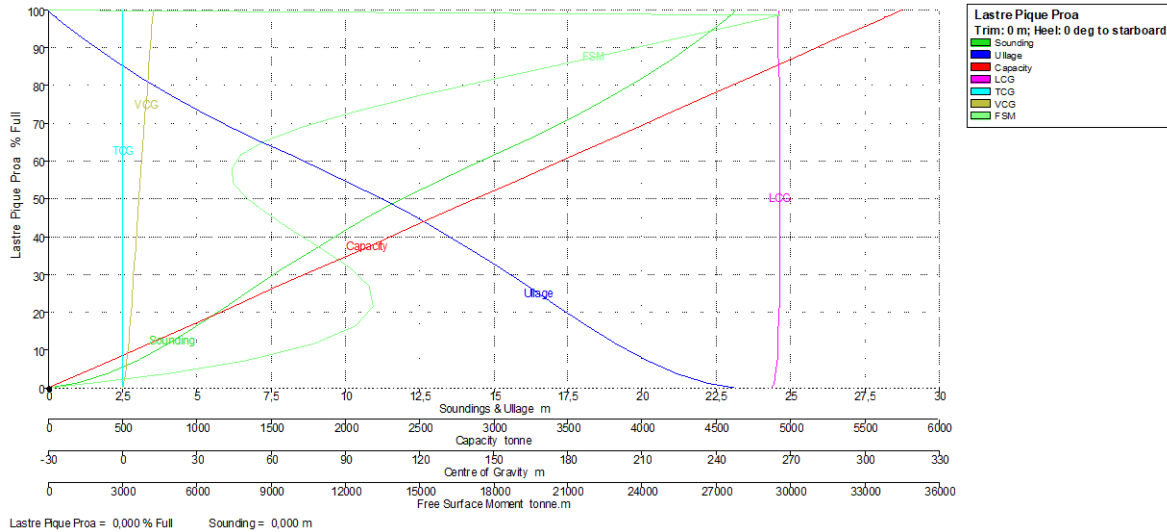
# 10 ANEXO II TANK CALIBRATION

### Tank Calibrations - tanques

Stability 20.00.02.31, build: 31

### Tank Calibrations - Lastre Pique Proa

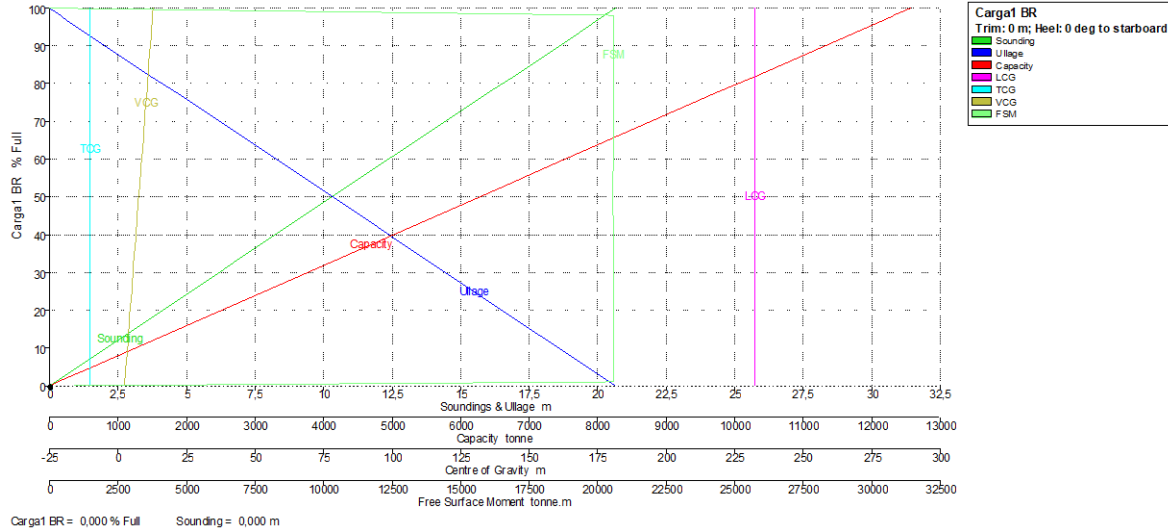
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre Pique Proa	23,146	0,000	100,000	5607,042	5747,218	265,221	0,000	12,291	0,000
	23,000	0,146	98,734	5536,036	5674,437	265,182	0,000	12,200	29588,436
	22,884	0,262	98,000	5494,900	5632,273	265,181	0,000	12,120	29111,856
	22,868	0,278	97,900	5489,293	5626,526	265,180	0,000	12,109	29047,106
	22,000	1,146	92,643	5194,536	5324,399	265,175	0,000	11,523	25558,630
	21,000	2,146	87,091	4883,208	5005,288	265,188	0,000	10,886	21717,922
	20,000	3,146	82,023	4599,062	4714,039	265,217	0,000	10,291	18159,243
	19,000	4,146	77,369	4338,135	4446,589	265,257	0,000	9,737	14994,195
	18,000	5,146	73,072	4097,197	4199,626	265,304	0,000	9,222	12328,288
	17,000	6,146	69,070	3872,791	3969,611	265,355	0,000	8,742	10232,321
	16,000	7,146	65,289	3660,769	3752,288	265,409	0,000	8,292	8717,048
	15,000	8,146	61,639	3456,099	3542,502	265,463	0,000	7,865	7786,498
	14,000	9,146	58,014	3252,854	3334,175	265,514	0,000	7,450	7397,513
	13,000	10,146	54,304	3044,844	3120,965	265,559	0,000	7,037	7506,366
	12,000	11,146	50,403	2826,122	2896,775	265,593	0,000	6,615	7991,812
	11,000	12,146	46,244	2592,897	2657,720	265,611	0,000	6,176	8794,132
	10,000	13,146	41,794	2343,386	2401,971	265,607	0,000	5,716	9837,466
	9,000	14,146	37,054	2077,639	2129,580	265,576	0,000	5,233	11011,277
	8,000	15,146	32,061	1797,686	1842,628	265,513	0,000	4,725	12137,647
	7,000	16,146	26,891	1507,797	1545,492	265,411	0,000	4,192	12952,277
	6,000	17,146	21,664	1214,715	1245,083	265,264	0,000	3,635	13141,864
	5,000	18,146	16,541	927,454	950,640	265,064	0,000	3,056	12418,999
	4,000	19,146	11,713	656,777	673,196	264,797	0,000	2,458	10677,680
	3,000	20,146	7,398	414,827	425,198	264,437	0,000	1,843	8022,441
	2,000	21,146	3,842	215,447	220,833	263,957	0,000	1,215	4818,092
	1,000	22,146	1,301	72,951	74,775	263,304	0,000	0,586	1834,396
	0,837	22,309	1,000	56,071	57,473	263,182	0,000	0,486	1450,577
	0,000	23,146	0,000	0,000	0,000	262,057	0,000	0,000	0,000

**Tank Calibrations - Carga1 BR**

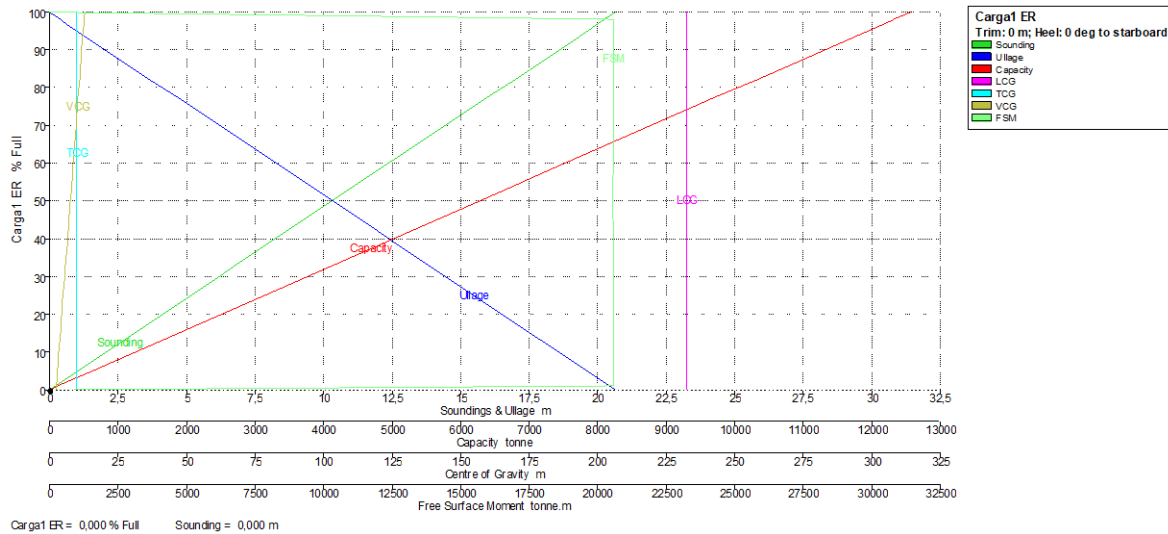
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga1 BR	20,646	0,000	100,000	14143,263	12563,460	232,499	-10,074	12,823	0,000
	20,233	0,413	98,000	13860,398	12312,192	232,498	-10,074	12,617	20591,238
	20,212	0,434	97,900	13846,254	12299,627	232,498	-10,074	12,606	20591,238
	20,000	0,646	96,871	13700,688	12170,321	232,498	-10,074	12,500	20591,238
	19,000	1,646	92,027	13015,588	11561,747	232,498	-10,074	12,000	20591,238
	18,000	2,646	87,183	12330,488	10953,172	232,498	-10,074	11,500	20591,238
	17,000	3,646	82,339	11645,388	10344,598	232,498	-10,074	11,000	20591,238
	16,000	4,646	77,495	10960,288	9736,024	232,498	-10,074	10,500	20591,238
	15,000	5,646	72,651	10275,188	9127,450	232,498	-10,074	10,000	20591,238
	14,000	6,646	67,807	9590,088	8518,875	232,498	-10,074	9,500	20591,238
	13,000	7,646	62,963	8904,988	7910,301	232,498	-10,074	8,999	20590,836
	12,000	8,646	58,119	8219,950	7301,782	232,498	-10,073	8,499	20575,386
	11,000	9,646	53,277	7535,164	6693,486	232,498	-10,074	8,000	20555,458
	10,000	10,646	48,436	6850,484	6085,285	232,499	-10,074	7,500	20555,487
	9,000	11,646	43,595	6165,717	5477,007	232,500	-10,075	7,000	20570,180
	8,000	12,646	38,752	5480,737	4868,538	232,500	-10,075	6,500	20587,169
	7,000	13,646	33,908	4795,655	4259,980	232,500	-10,075	6,000	20591,238
	6,000	14,646	29,064	4110,555	3651,406	232,500	-10,075	5,500	20591,238
	5,000	15,646	24,220	3425,455	3042,831	232,500	-10,075	5,000	20591,238
	4,000	16,646	19,376	2740,355	2434,257	232,500	-10,075	4,500	20591,238
	3,000	17,646	14,532	2055,255	1825,683	232,500	-10,075	4,000	20591,238
	2,000	18,646	9,688	1370,155	1217,108	232,499	-10,075	3,500	20591,238
	1,000	19,646	4,844	685,055	608,534	232,499	-10,074	3,000	20591,238
	0,207	20,439	1,000	141,433	125,635	232,495	-10,072	2,603	20587,684
	0,000	20,646	0,000	0,000	0,000	232,490	-10,069	2,500	0,000

### Tank Calibrations - Carga1 ER

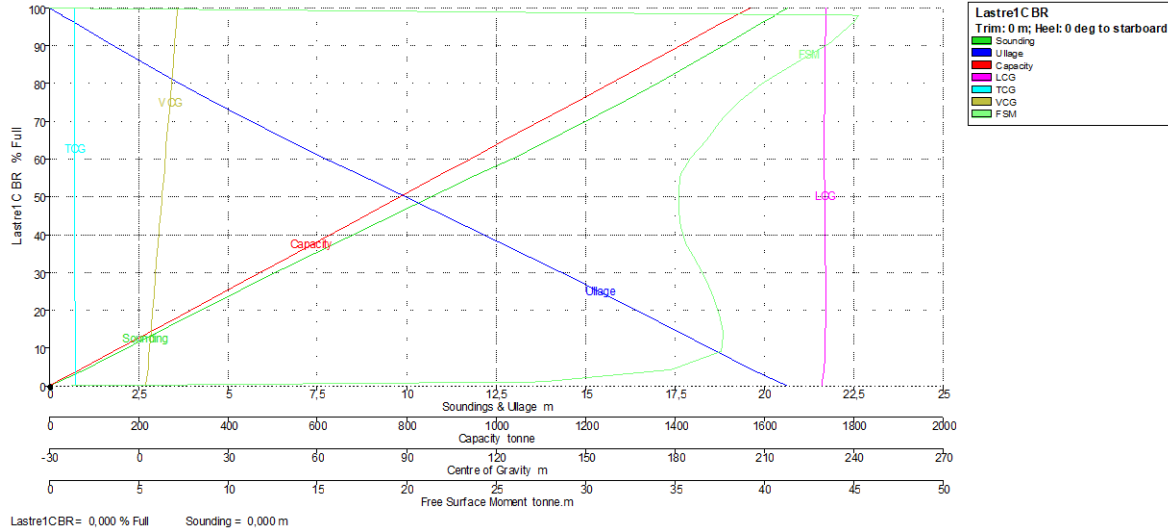
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga1 ER	20,646	0,000	100,000	14143,263	12563,460	232,499	10,074	12,823	0,000
	20,233	0,413	98,000	13860,398	12312,192	232,498	10,074	12,617	20591,238
	20,212	0,434	97,900	13846,254	12299,627	232,498	10,074	12,606	20591,238
	20,000	0,646	96,871	13700,688	12170,321	232,498	10,074	12,500	20591,238
	19,000	1,646	92,027	13015,588	11561,747	232,498	10,074	12,000	20591,238
	18,000	2,646	87,183	12330,488	10953,172	232,498	10,074	11,500	20591,238
	17,000	3,646	82,339	11645,388	10344,598	232,498	10,074	11,000	20591,238
	16,000	4,646	77,495	10960,288	9736,024	232,498	10,074	10,500	20591,238
	15,000	5,646	72,651	10275,188	9127,450	232,498	10,074	10,000	20591,238
	14,000	6,646	67,807	9590,088	8518,875	232,498	10,074	9,500	20591,238
	13,000	7,646	62,963	8904,988	7910,301	232,498	10,074	8,999	20590,836
	12,000	8,646	58,119	8219,950	7301,782	232,498	10,073	8,499	20575,386
	11,000	9,646	53,277	7535,164	6693,486	232,498	10,074	8,000	20555,458
	10,000	10,646	48,436	6850,484	6085,285	232,499	10,074	7,500	20555,487
	9,000	11,646	43,595	6165,717	5477,007	232,500	10,075	7,000	20570,180
	8,000	12,646	38,752	5480,737	4868,538	232,500	10,075	6,500	20587,169
	7,000	13,646	33,908	4795,655	4259,980	232,500	10,075	6,000	20591,238
	6,000	14,646	29,064	4110,555	3651,406	232,500	10,075	5,500	20591,238
	5,000	15,646	24,220	3425,455	3042,831	232,500	10,075	5,000	20591,238
	4,000	16,646	19,376	2740,355	2434,257	232,500	10,075	4,500	20591,238
	3,000	17,646	14,532	2055,255	1825,683	232,500	10,075	4,000	20591,238
	2,000	18,646	9,688	1370,155	1217,108	232,499	10,075	3,500	20591,238
	1,000	19,646	4,844	685,055	608,534	232,499	10,074	3,000	20591,238
	0,207	20,439	1,000	141,433	125,635	232,495	10,072	2,603	20587,684
	0,000	20,646	0,000	0,000	0,000	232,490	10,069	2,500	0,000

**Tank Calibrations - Lastre1C BR**

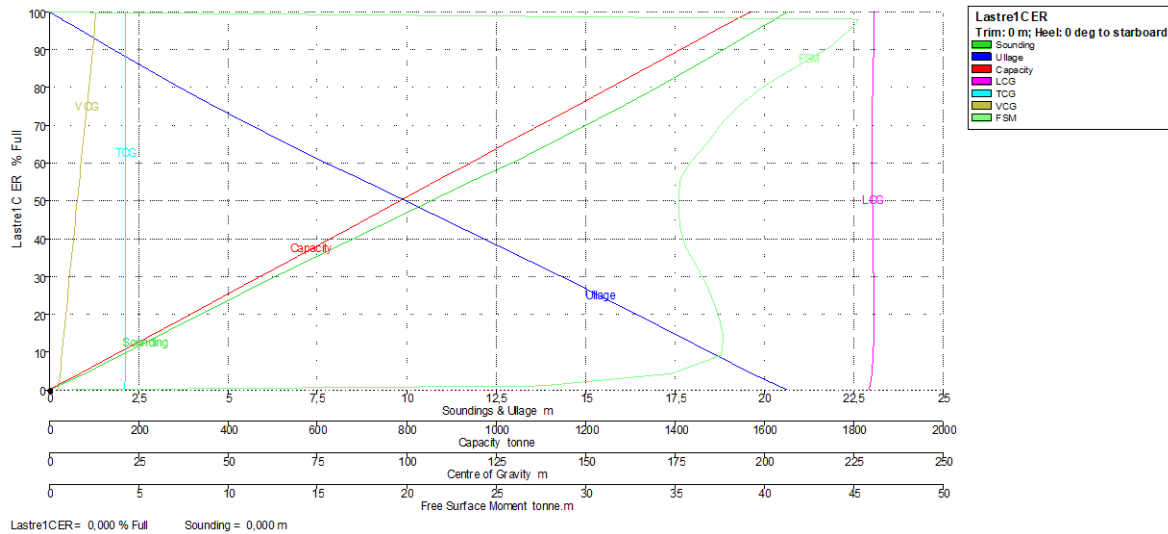
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre1C BR	20,646	0,000	100,000	1528,630	1566,846	230,682	-21,316	13,090	0,000
	20,286	0,360	98,000	1498,057	1535,509	230,645	-21,314	12,888	45,246
	20,268	0,378	97,900	1496,529	1533,942	230,643	-21,314	12,878	45,239
	20,000	0,646	96,411	1473,774	1510,618	230,615	-21,312	12,728	45,036
	19,000	1,646	90,891	1389,393	1424,127	230,505	-21,308	12,164	43,666
	18,000	2,646	85,456	1306,305	1338,962	230,396	-21,304	11,602	41,730
	17,000	3,646	80,146	1225,131	1255,759	230,294	-21,300	11,046	39,852
	16,000	4,646	74,990	1146,314	1174,972	230,209	-21,299	10,499	38,472
	15,000	5,646	70,002	1070,070	1096,822	230,148	-21,298	9,964	37,548
	14,000	6,646	65,180	996,366	1021,275	230,116	-21,298	9,443	36,765
	13,000	7,646	60,506	924,910	948,033	230,116	-21,297	8,937	35,894
	12,000	8,646	55,940	855,121	876,499	230,145	-21,297	8,442	35,299
	11,000	9,646	51,426	786,116	805,768	230,194	-21,296	7,954	35,184
	10,000	10,646	46,925	717,312	735,245	230,257	-21,295	7,470	35,200
	9,000	11,646	42,412	648,328	664,536	230,329	-21,294	6,988	35,312
	8,000	12,646	37,868	578,868	593,340	230,408	-21,293	6,506	35,608
	7,000	13,646	33,267	508,525	521,238	230,483	-21,292	6,023	36,157
	6,000	14,646	28,590	437,032	447,958	230,545	-21,290	5,537	36,702
	5,000	15,646	23,832	364,309	373,417	230,582	-21,289	5,045	37,146
	4,000	16,646	18,999	290,427	297,687	230,579	-21,285	4,548	37,490
	3,000	17,646	14,107	215,638	221,029	230,514	-21,279	4,045	37,707
	2,000	18,646	9,191	140,501	144,013	230,340	-21,264	3,534	37,566
	1,000	19,646	4,365	66,730	68,399	229,963	-21,232	3,015	34,792
	0,247	20,399	1,000	15,286	15,668	229,439	-21,188	2,625	27,576
	0,000	20,646	0,000	0,000	0,000	229,252	-21,167	2,500	0,000

### Tank Calibrations - Lastre1C ER

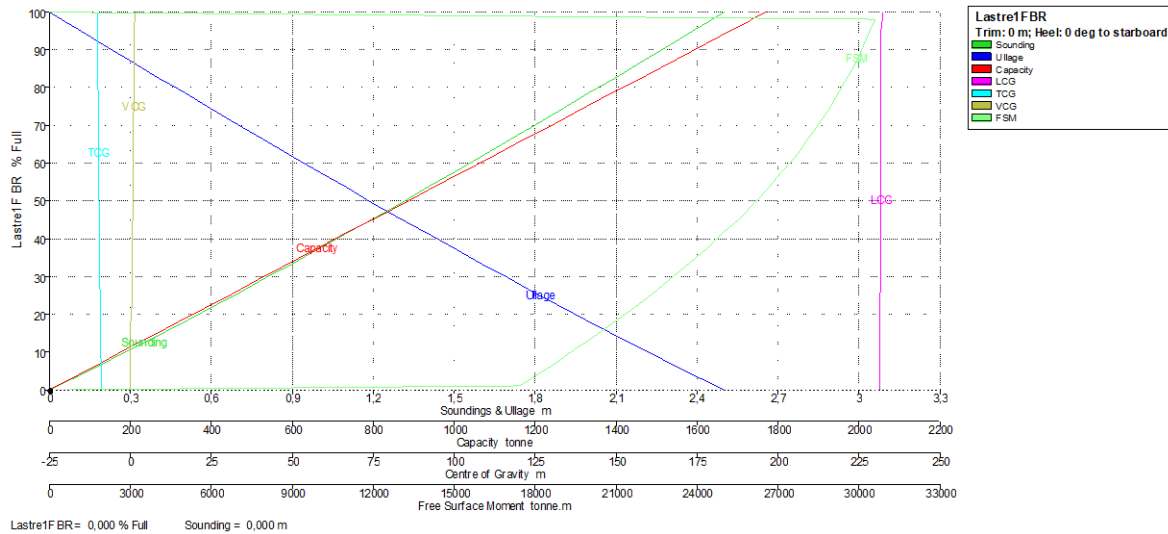
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre1C ER	20,646	0,000	100,000	1528,630	1566,846	230,682	21,316	13,090	0,000
	20,286	0,360	98,000	1498,057	1535,509	230,645	21,314	12,888	45,246
	20,268	0,378	97,900	1496,529	1533,942	230,643	21,314	12,878	45,239
	20,000	0,646	96,411	1473,774	1510,618	230,615	21,312	12,728	45,036
	19,000	1,646	90,891	1389,393	1424,127	230,505	21,308	12,164	43,666
	18,000	2,646	85,456	1306,305	1338,962	230,396	21,304	11,602	41,730
	17,000	3,646	80,146	1225,131	1255,759	230,294	21,300	11,046	39,852
	16,000	4,646	74,990	1146,314	1174,972	230,209	21,299	10,499	38,472
	15,000	5,646	70,002	1070,070	1096,822	230,148	21,298	9,964	37,548
	14,000	6,646	65,180	996,366	1021,275	230,116	21,298	9,443	36,765
	13,000	7,646	60,506	924,910	948,033	230,116	21,297	8,937	35,894
	12,000	8,646	55,940	855,121	876,499	230,145	21,297	8,442	35,299
	11,000	9,646	51,426	786,116	805,768	230,194	21,296	7,954	35,184
	10,000	10,646	46,925	717,312	735,245	230,257	21,295	7,470	35,200
	9,000	11,646	42,412	648,328	664,536	230,329	21,294	6,988	35,312
	8,000	12,646	37,868	578,868	593,340	230,408	21,293	6,506	35,608
	7,000	13,646	33,267	508,525	521,238	230,483	21,292	6,023	36,157
	6,000	14,646	28,590	437,032	447,958	230,545	21,290	5,537	36,702
	5,000	15,646	23,832	364,309	373,417	230,582	21,289	5,045	37,146
	4,000	16,646	18,999	290,427	297,687	230,579	21,285	4,548	37,490
	3,000	17,646	14,107	215,638	221,029	230,514	21,279	4,045	37,707
	2,000	18,646	9,191	140,501	144,013	230,340	21,264	3,534	37,566
	1,000	19,646	4,365	66,730	68,399	229,963	21,232	3,015	34,792
	0,247	20,399	1,000	15,286	15,668	229,439	21,188	2,625	27,576
	0,000	20,646	0,000	0,000	0,000	229,252	21,167	2,500	0,000

**Tank Calibrations - Lastre1F BR**

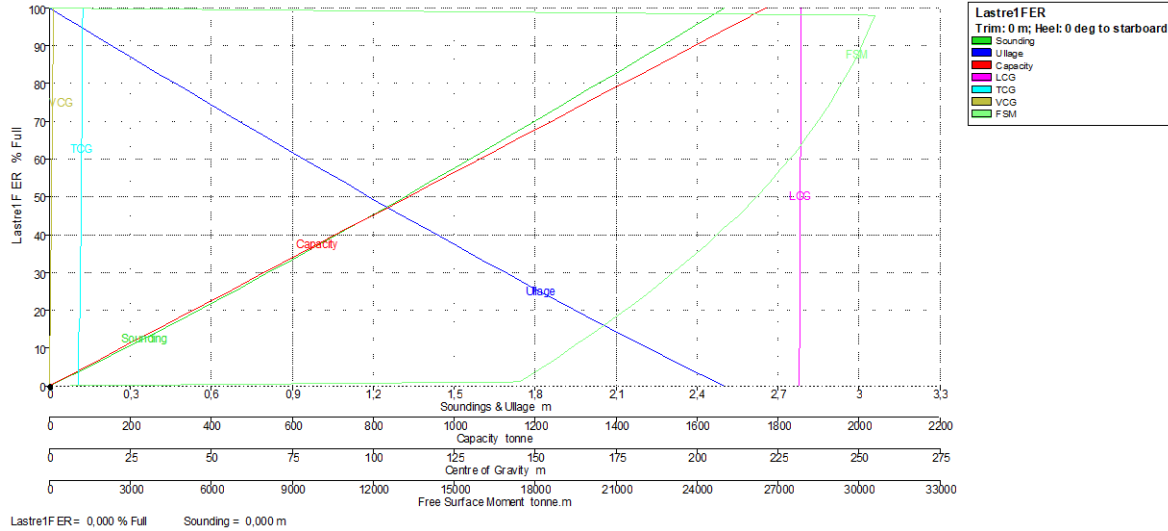
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre1F BR	2,500	0,000	100,000	1725,736	1768,880	231,940	-10,235	1,293	0,000
	2,454	0,046	98,000	1691,222	1733,502	231,934	-10,220	1,269	30583,902
	2,451	0,049	97,900	1689,496	1731,734	231,934	-10,220	1,268	30577,792
	2,400	0,100	95,692	1651,384	1692,669	231,927	-10,203	1,241	30443,039
	2,300	0,200	91,396	1577,257	1616,689	231,914	-10,169	1,189	30181,999
	2,200	0,300	87,114	1503,364	1540,948	231,900	-10,134	1,137	29892,697
	2,100	0,400	82,848	1429,743	1465,487	231,885	-10,098	1,085	29577,449
	2,000	0,500	78,598	1356,403	1390,313	231,870	-10,060	1,032	29245,231
	1,900	0,600	74,367	1283,384	1315,469	231,854	-10,020	0,980	28872,310
	1,800	0,700	70,156	1210,701	1240,969	231,838	-9,979	0,928	28492,297
	1,700	0,800	65,966	1138,394	1166,854	231,821	-9,936	0,876	28059,549
	1,600	0,900	61,799	1066,485	1093,147	231,803	-9,891	0,823	27627,731
	1,500	1,000	57,657	995,011	1019,887	231,784	-9,845	0,771	27134,613
	1,400	1,100	53,543	924,003	947,103	231,764	-9,796	0,719	26648,457
	1,300	1,200	49,457	853,496	874,834	231,744	-9,746	0,667	26096,302
	1,200	1,300	45,402	783,527	803,115	231,723	-9,695	0,615	25554,397
	1,100	1,400	41,381	714,131	731,985	231,701	-9,641	0,563	24947,497
	1,000	1,500	37,396	645,349	661,482	231,677	-9,586	0,511	24352,549
	0,900	1,600	33,448	577,217	591,647	231,653	-9,529	0,459	23695,638
	0,800	1,700	29,540	509,776	522,521	231,628	-9,470	0,407	23053,377
	0,700	1,800	25,674	443,067	454,144	231,602	-9,409	0,356	22352,835
	0,600	1,900	21,853	377,130	386,558	231,575	-9,347	0,304	21669,978
	0,500	2,000	18,080	312,006	319,806	231,547	-9,284	0,253	20935,566
	0,400	2,100	14,355	247,735	253,928	231,518	-9,219	0,202	20221,499
	0,300	2,200	10,683	184,359	188,968	231,487	-9,152	0,151	19463,928
	0,200	2,300	7,065	121,918	124,966	231,455	-9,085	0,101	18730,009
	0,100	2,400	3,503	60,452	61,963	231,422	-9,016	0,050	17960,525
	0,029	2,471	1,000	17,257	17,689	231,399	-8,967	0,014	17429,176
	0,000	2,500	0,000	0,000	0,000	231,389	-8,947	0,000	0,000

**Tank Calibrations - Lastre1F ER**

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

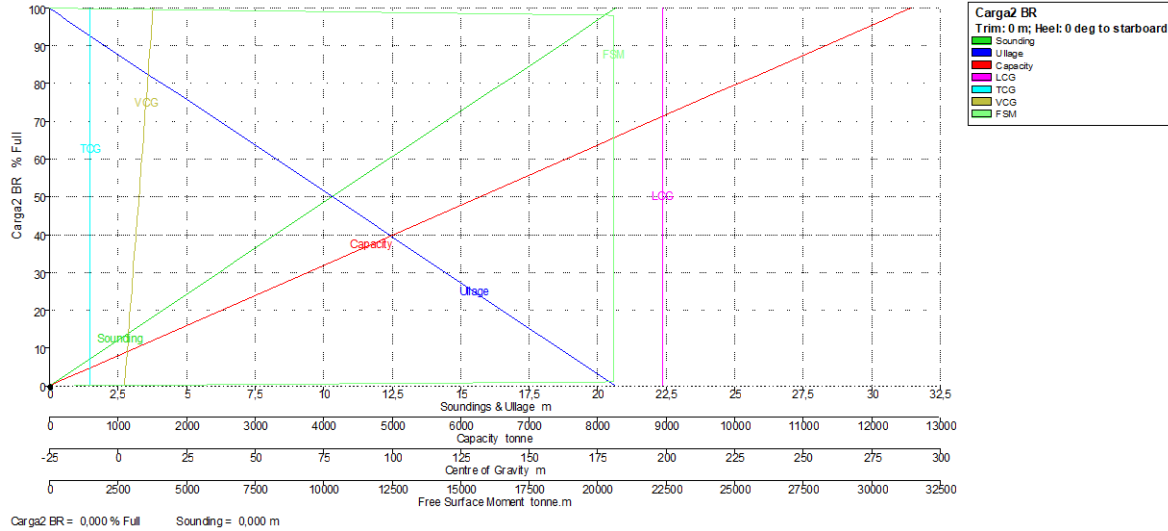


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre1F ER	2,500	0,000	100,000	1725,736	1768,880	231,940	10,235	1,293	0,000
	2,454	0,046	98,000	1691,222	1733,502	231,934	10,220	1,269	30583,902
	2,451	0,049	97,900	1689,496	1731,734	231,934	10,220	1,268	30577,792
	2,400	0,100	95,692	1651,384	1692,669	231,927	10,203	1,241	30443,039
	2,300	0,200	91,396	1577,257	1616,689	231,914	10,169	1,189	30181,999
	2,200	0,300	87,114	1503,364	1540,948	231,900	10,134	1,137	29892,697
	2,100	0,400	82,848	1429,743	1465,487	231,885	10,098	1,085	29577,449
	2,000	0,500	78,598	1356,403	1390,313	231,870	10,060	1,032	29245,231
	1,900	0,600	74,367	1283,384	1315,469	231,854	10,020	0,980	28872,310
	1,800	0,700	70,156	1210,701	1240,969	231,838	9,979	0,928	28492,297
	1,700	0,800	65,966	1138,394	1166,854	231,821	9,936	0,876	28059,549
	1,600	0,900	61,799	1066,485	1093,147	231,803	9,891	0,823	27627,731
	1,500	1,000	57,657	995,011	1019,887	231,784	9,845	0,771	27134,613
	1,400	1,100	53,543	924,003	947,103	231,764	9,796	0,719	26648,457
	1,300	1,200	49,457	853,496	874,834	231,744	9,746	0,667	26096,302
	1,200	1,300	45,402	783,527	803,115	231,723	9,695	0,615	25554,397
	1,100	1,400	41,381	714,131	731,985	231,701	9,641	0,563	24947,497
	1,000	1,500	37,396	645,349	661,482	231,677	9,586	0,511	24352,549
	0,900	1,600	33,448	577,217	591,647	231,653	9,529	0,459	23695,638
	0,800	1,700	29,540	509,776	522,521	231,628	9,470	0,407	23053,377
	0,700	1,800	25,674	443,067	454,144	231,602	9,409	0,356	22352,835
	0,600	1,900	21,853	377,130	386,558	231,575	9,347	0,304	21669,978
	0,500	2,000	18,080	312,006	319,806	231,547	9,284	0,253	20935,566
	0,400	2,100	14,355	247,735	253,928	231,518	9,219	0,202	20221,499
	0,300	2,200	10,683	184,359	188,968	231,487	9,152	0,151	19463,928
	0,200	2,300	7,065	121,918	124,966	231,455	9,085	0,101	18730,009
	0,100	2,400	3,503	60,452	61,963	231,422	9,016	0,050	17960,525
	0,029	2,471	1,000	17,257	17,689	231,399	8,967	0,014	17429,176
	0,000	2,500	0,000	0,000	0,000	231,389	8,947	0,000	0,000



**Tank Calibrations - Carga2 BR**

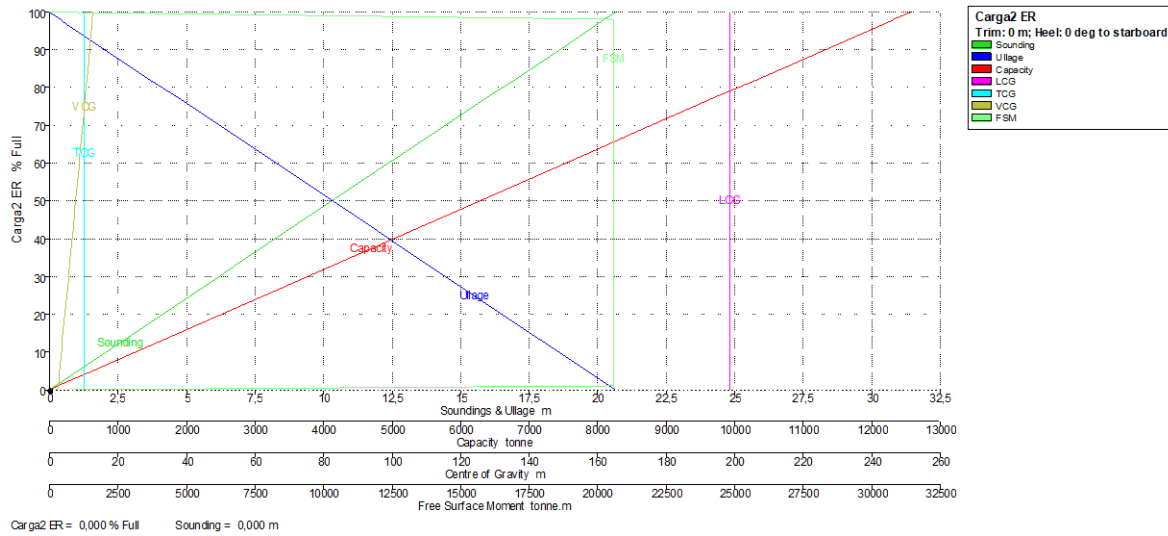
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga2 BR	20,646	0,000	100,000	14144,574	12564,625	198,500	-10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	198,500	-10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	198,500	-10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	198,500	-10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	198,500	-10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	198,500	-10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	198,500	-10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	198,500	-10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	198,500	-10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	198,500	-10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	198,500	-10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	198,500	-10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	198,500	-10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	198,500	-10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	198,500	-10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	198,500	-10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	198,500	-10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	198,500	-10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	198,500	-10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	198,500	-10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	198,500	-10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	198,500	-10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	198,500	-10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	198,500	-10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	198,500	-10,075	2,500	0,000

**Tank Calibrations - Carga2 ER**

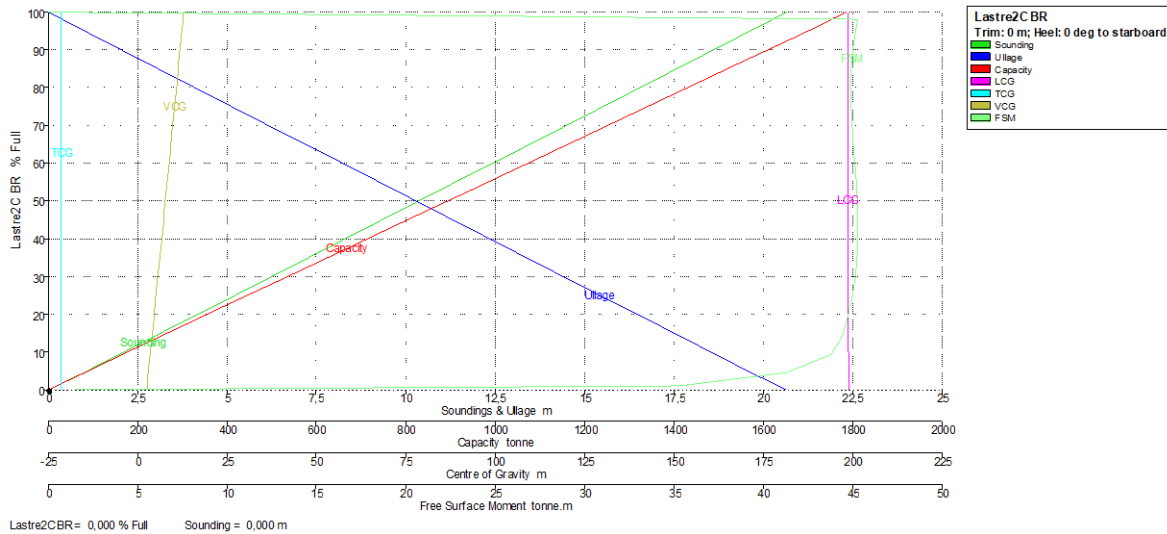
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga2 ER	20,646	0,000	100,000	14144,574	12564,625	198,500	10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	198,500	10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	198,500	10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	198,500	10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	198,500	10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	198,500	10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	198,500	10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	198,500	10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	198,500	10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	198,500	10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	198,500	10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	198,500	10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	198,500	10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	198,500	10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	198,500	10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	198,500	10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	198,500	10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	198,500	10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	198,500	10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	198,500	10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	198,500	10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	198,500	10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	198,500	10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	198,500	10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	198,500	10,075	2,500	0,000

**Tank Calibrations - Lastre2C BR**

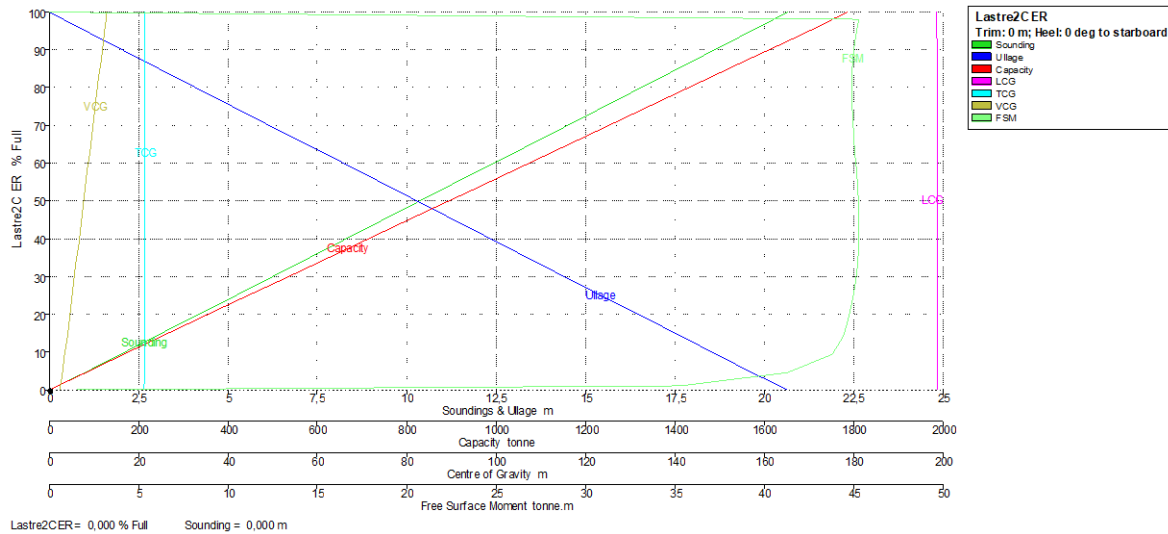
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre2C BR	20,646	0,000	100,000	1743,418	1787,004	198,518	-21,392	12,863	0,000
	20,236	0,410	98,000	1708,550	1751,264	198,518	-21,392	12,657	45,276
	20,215	0,431	97,900	1706,807	1749,477	198,518	-21,392	12,647	45,271
	20,000	0,646	96,852	1688,540	1730,754	198,519	-21,392	12,539	45,224
	19,000	1,646	91,986	1603,698	1643,791	198,520	-21,392	12,038	45,042
	18,000	2,646	87,125	1518,951	1556,925	198,523	-21,391	11,538	44,925
	17,000	3,646	82,267	1434,257	1470,114	198,527	-21,391	11,039	44,872
	16,000	4,646	77,410	1349,581	1383,321	198,531	-21,391	10,539	44,871
	15,000	5,646	72,552	1264,892	1296,514	198,535	-21,391	10,040	44,911
	14,000	6,646	67,693	1180,167	1209,671	198,540	-21,390	9,540	44,978
	13,000	7,646	62,830	1095,394	1122,779	198,545	-21,390	9,040	45,059
	12,000	8,646	57,965	1010,569	1035,833	198,550	-21,389	8,540	45,138
	11,000	9,646	53,097	925,698	948,840	198,556	-21,388	8,039	45,204
	10,000	10,646	48,227	840,791	861,811	198,563	-21,387	7,538	45,250
	9,000	11,646	43,355	755,864	774,760	198,571	-21,386	7,037	45,269
	8,000	12,646	38,484	670,933	687,707	198,580	-21,384	6,535	45,257
	7,000	13,646	33,613	586,022	600,673	198,591	-21,382	6,033	45,207
	6,000	14,646	28,746	501,158	513,687	198,603	-21,379	5,531	45,110
	5,000	15,646	23,883	416,373	426,782	198,619	-21,376	5,028	44,953
	4,000	16,646	19,027	331,712	340,005	198,637	-21,371	4,525	44,723
	3,000	17,646	14,181	247,234	253,415	198,659	-21,363	4,021	44,391
	2,000	18,646	9,351	163,035	167,111	198,683	-21,350	3,515	43,820
	1,000	19,646	4,571	79,694	81,686	198,705	-21,323	3,007	41,302
	0,226	20,420	1,000	17,434	17,870	198,714	-21,283	2,614	35,294
	0,000	20,646	0,000	0,000	0,000	198,715	-21,267	2,500	0,000

**Tank Calibrations - Lastre2C ER**

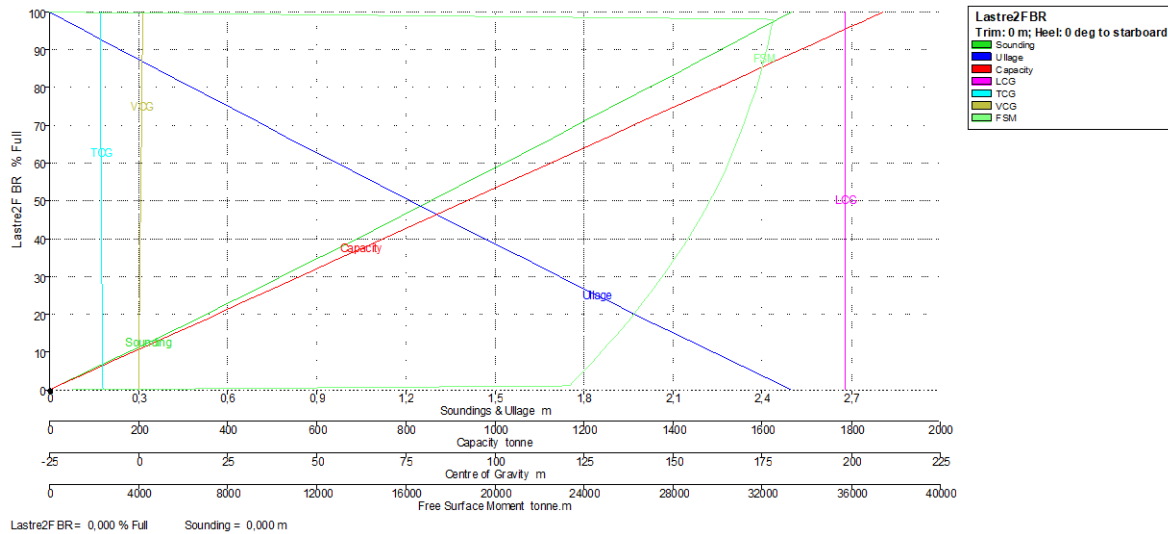
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre2C ER	20,646	0,000	100,000	1743,418	1787,004	198,518	21,392	12,863	0,000
	20,236	0,410	98,000	1708,550	1751,264	198,518	21,392	12,657	45,276
	20,215	0,431	97,900	1706,807	1749,477	198,518	21,392	12,647	45,271
	20,000	0,646	96,852	1688,540	1730,754	198,519	21,392	12,539	45,224
	19,000	1,646	91,986	1603,698	1643,791	198,520	21,392	12,038	45,042
	18,000	2,646	87,125	1518,951	1556,925	198,523	21,391	11,538	44,925
	17,000	3,646	82,267	1434,257	1470,114	198,527	21,391	11,039	44,872
	16,000	4,646	77,410	1349,581	1383,321	198,531	21,391	10,539	44,871
	15,000	5,646	72,552	1264,892	1296,514	198,535	21,391	10,040	44,911
	14,000	6,646	67,693	1180,167	1209,671	198,540	21,390	9,540	44,978
	13,000	7,646	62,830	1095,394	1122,779	198,545	21,390	9,040	45,059
	12,000	8,646	57,965	1010,569	1035,833	198,550	21,389	8,540	45,138
	11,000	9,646	53,097	925,698	948,840	198,556	21,388	8,039	45,204
	10,000	10,646	48,227	840,791	861,811	198,563	21,387	7,538	45,250
	9,000	11,646	43,355	755,864	774,760	198,571	21,386	7,037	45,269
	8,000	12,646	38,484	670,933	687,707	198,580	21,384	6,535	45,257
	7,000	13,646	33,613	586,022	600,673	198,591	21,382	6,033	45,207
	6,000	14,646	28,746	501,158	513,687	198,603	21,379	5,531	45,110
	5,000	15,646	23,883	416,373	426,782	198,619	21,376	5,028	44,953
	4,000	16,646	19,027	331,712	340,005	198,637	21,371	4,525	44,723
	3,000	17,646	14,181	247,234	253,415	198,659	21,363	4,021	44,391
	2,000	18,646	9,351	163,035	167,111	198,683	21,350	3,515	43,820
	1,000	19,646	4,571	79,694	81,686	198,705	21,323	3,007	41,302
	0,226	20,420	1,000	17,434	17,870	198,714	21,283	2,614	35,294
	0,000	20,646	0,000	0,000	0,000	198,715	21,267	2,500	0,000

**Tank Calibrations - Lastre2F BR**

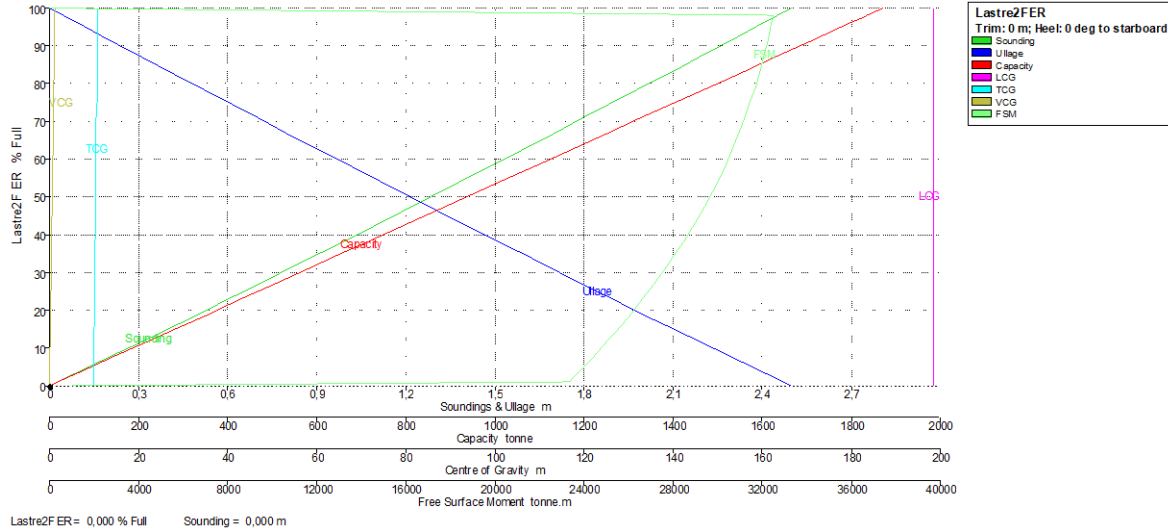
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre2F BR	2,500	0,000	100,000	1827,452	1873,139	198,495	-10,761	1,273	0,000
	2,452	0,048	98,000	1790,903	1835,676	198,494	-10,752	1,248	32502,327
	2,450	0,050	97,900	1789,076	1833,803	198,494	-10,752	1,247	32498,603
	2,400	0,100	95,839	1751,405	1795,190	198,493	-10,743	1,222	32421,485
	2,300	0,200	91,684	1675,478	1717,365	198,492	-10,724	1,171	32266,217
	2,200	0,300	87,536	1599,676	1639,668	198,491	-10,704	1,119	32094,695
	2,100	0,400	83,396	1524,020	1562,120	198,489	-10,683	1,068	31903,822
	2,000	0,500	79,264	1448,515	1484,728	198,488	-10,661	1,017	31703,385
	1,900	0,600	75,142	1373,184	1407,514	198,486	-10,638	0,966	31473,300
	1,800	0,700	71,030	1298,036	1330,487	198,485	-10,614	0,915	31238,992
	1,700	0,800	66,929	1223,093	1253,670	198,483	-10,589	0,864	30967,099
	1,600	0,900	62,840	1148,368	1177,078	198,481	-10,563	0,812	30694,140
	1,500	1,000	58,764	1073,883	1100,730	198,479	-10,536	0,761	30378,459
	1,400	1,100	54,702	999,655	1024,646	198,477	-10,507	0,710	30063,075
	1,300	1,200	50,655	925,704	948,847	198,475	-10,478	0,659	29701,966
	1,200	1,300	46,625	852,053	873,354	198,472	-10,447	0,608	29341,322
	1,100	1,400	42,612	778,722	798,190	198,470	-10,416	0,557	28934,101
	1,000	1,500	38,619	705,735	723,378	198,467	-10,383	0,506	28527,396
	0,900	1,600	34,645	633,113	648,941	198,464	-10,349	0,455	28073,725
	0,800	1,700	30,692	560,882	574,904	198,461	-10,314	0,404	27621,672
	0,700	1,800	26,762	489,065	501,291	198,458	-10,277	0,353	27122,431
	0,600	1,900	22,856	417,686	428,128	198,455	-10,240	0,302	26626,555
	0,500	2,000	18,976	346,770	355,439	198,452	-10,201	0,252	26084,719
	0,400	2,100	15,122	276,342	283,250	198,449	-10,161	0,201	25548,102
	0,300	2,200	11,296	206,426	211,587	198,445	-10,120	0,151	24967,950
	0,200	2,300	7,499	137,048	140,474	198,441	-10,078	0,100	24395,239
	0,100	2,400	3,734	68,231	69,937	198,437	-10,035	0,050	23782,086
	0,027	2,473	1,000	18,275	18,732	198,435	-10,003	0,013	23340,161
	0,000	2,500	0,000	0,000	0,000	198,434	-9,992	0,000	0,000

**Tank Calibrations - Lastre2F ER**

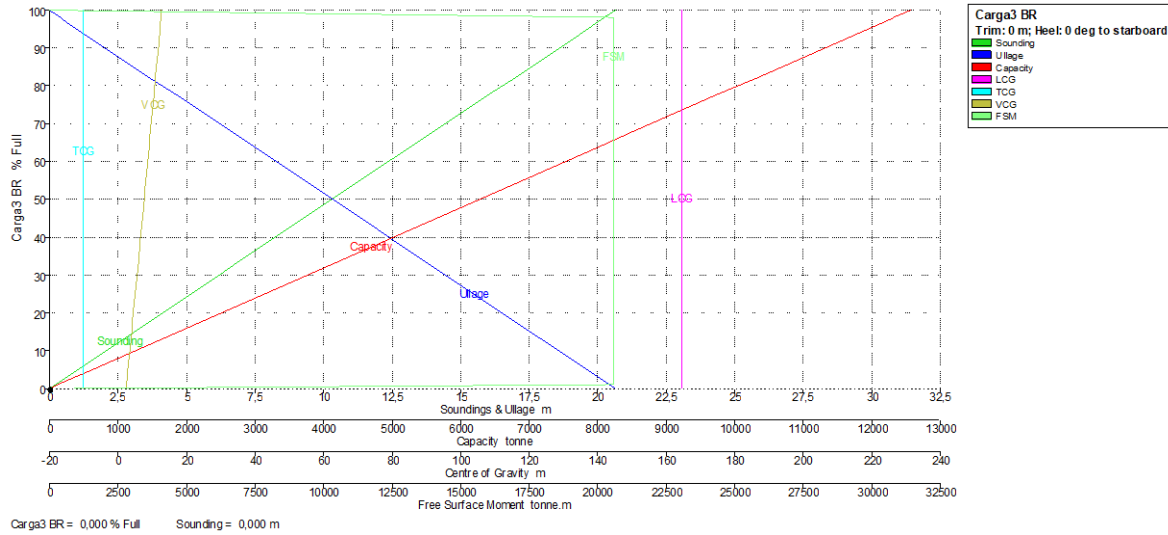
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre2F ER	2,500	0,000	100,000	1827,452	1873,139	198,495	10,761	1,273	0,000
	2,452	0,048	98,000	1790,903	1835,676	198,494	10,752	1,248	32502,327
	2,450	0,050	97,900	1789,076	1833,803	198,494	10,752	1,247	32498,603
	2,400	0,100	95,839	1751,405	1795,190	198,493	10,743	1,222	32421,485
	2,300	0,200	91,684	1675,478	1717,365	198,492	10,724	1,171	32266,217
	2,200	0,300	87,536	1599,676	1639,668	198,491	10,704	1,119	32094,695
	2,100	0,400	83,396	1524,020	1562,120	198,489	10,683	1,068	31903,822
	2,000	0,500	79,264	1448,515	1484,728	198,488	10,661	1,017	31703,385
	1,900	0,600	75,142	1373,184	1407,514	198,486	10,638	0,966	31473,300
	1,800	0,700	71,030	1298,036	1330,487	198,485	10,614	0,915	31238,992
	1,700	0,800	66,929	1223,093	1253,670	198,483	10,589	0,864	30967,099
	1,600	0,900	62,840	1148,368	1177,078	198,481	10,563	0,812	30694,140
	1,500	1,000	58,764	1073,883	1100,730	198,479	10,536	0,761	30378,459
	1,400	1,100	54,702	999,655	1024,646	198,477	10,507	0,710	30063,075
	1,300	1,200	50,655	925,704	948,847	198,475	10,478	0,659	29701,966
	1,200	1,300	46,625	852,053	873,354	198,472	10,447	0,608	29341,322
	1,100	1,400	42,612	778,722	798,190	198,470	10,416	0,557	28934,101
	1,000	1,500	38,619	705,735	723,378	198,467	10,383	0,506	28527,396
	0,900	1,600	34,645	633,113	648,941	198,464	10,349	0,455	28073,725
	0,800	1,700	30,692	560,882	574,904	198,461	10,314	0,404	27621,672
	0,700	1,800	26,762	489,065	501,291	198,458	10,277	0,353	27122,431
	0,600	1,900	22,856	417,686	428,128	198,455	10,240	0,302	26626,555
	0,500	2,000	18,976	346,770	355,439	198,452	10,201	0,252	26084,719
	0,400	2,100	15,122	276,342	283,250	198,449	10,161	0,201	25548,102
	0,300	2,200	11,296	206,426	211,587	198,445	10,120	0,151	24967,950
	0,200	2,300	7,499	137,048	140,474	198,441	10,078	0,100	24395,239
	0,100	2,400	3,734	68,231	69,937	198,437	10,035	0,050	23782,087
	0,027	2,473	1,000	18,275	18,732	198,435	10,003	0,013	23340,162
	0,000	2,500	0,000	0,000	0,000	198,434	9,992	0,000	0,000

### Tank Calibrations - Carga3 BR

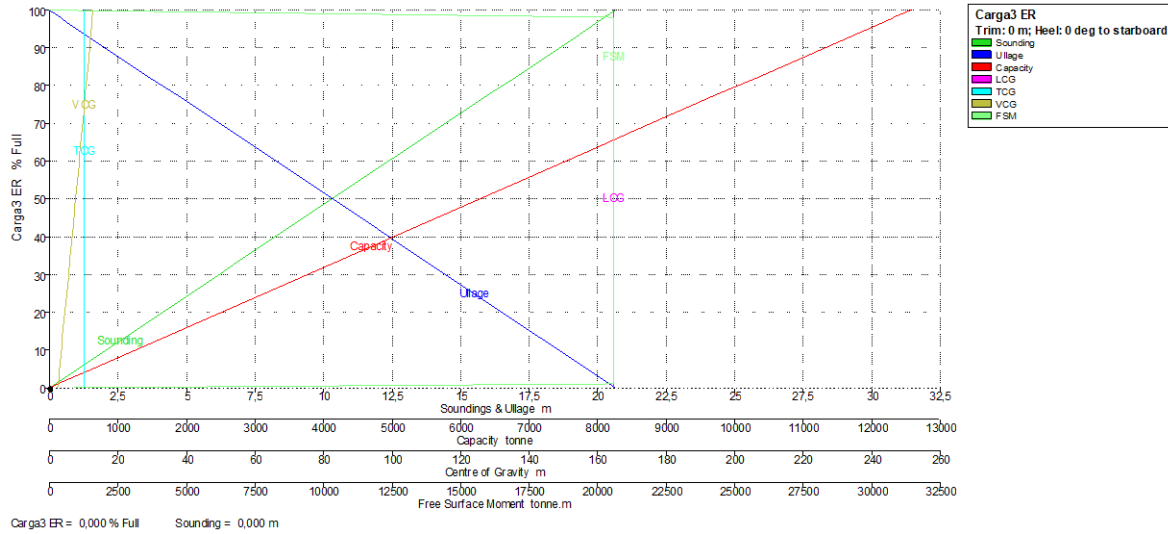
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga3 BR	20,646	0,000	100,000	14144,574	12564,625	164,500	-10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	164,500	-10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	164,500	-10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	164,500	-10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	164,500	-10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	164,500	-10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	164,500	-10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	164,500	-10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	164,500	-10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	164,500	-10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	164,500	-10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	164,500	-10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	164,500	-10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	164,500	-10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	164,500	-10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	164,500	-10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	164,500	-10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	164,500	-10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	164,500	-10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	164,500	-10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	164,500	-10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	164,500	-10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	164,500	-10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	164,500	-10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	164,500	-10,075	2,500	0,000

### Tank Calibrations - Carga3 ER

Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

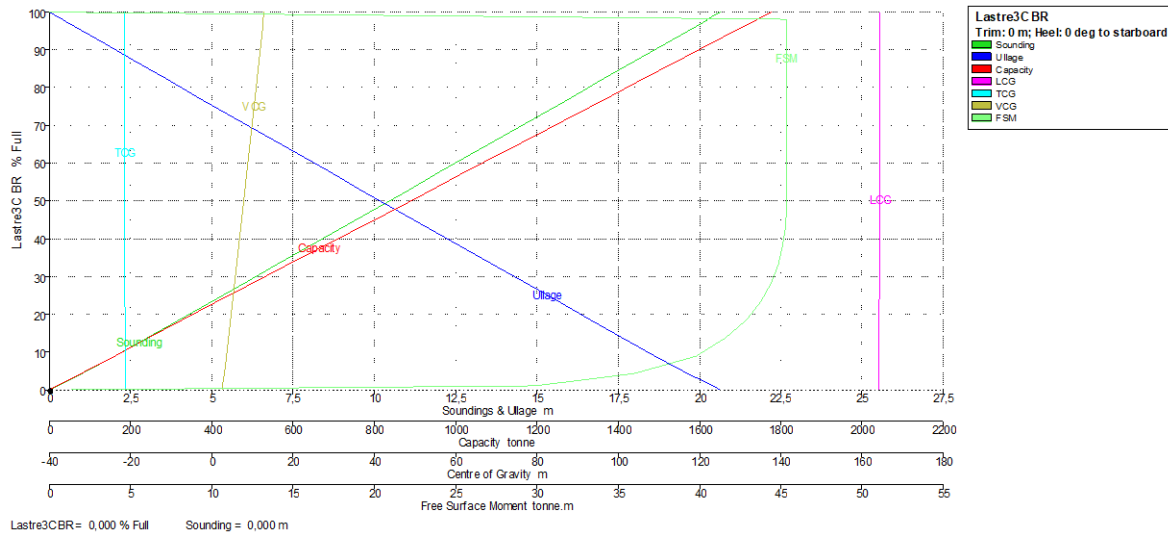


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga3 ER	20,646	0,000	100,000	14144,574	12564,625	164,500	10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	164,500	10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	164,500	10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	164,500	10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	164,500	10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	164,500	10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	164,500	10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	164,500	10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	164,500	10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	164,500	10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	164,500	10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	164,500	10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	164,500	10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	164,500	10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	164,500	10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	164,500	10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	164,500	10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	164,500	10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	164,500	10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	164,500	10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	164,500	10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	164,500	10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	164,500	10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	164,500	10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	164,500	10,075	2,500	0,000



**Tank Calibrations - Lastre3C BR**

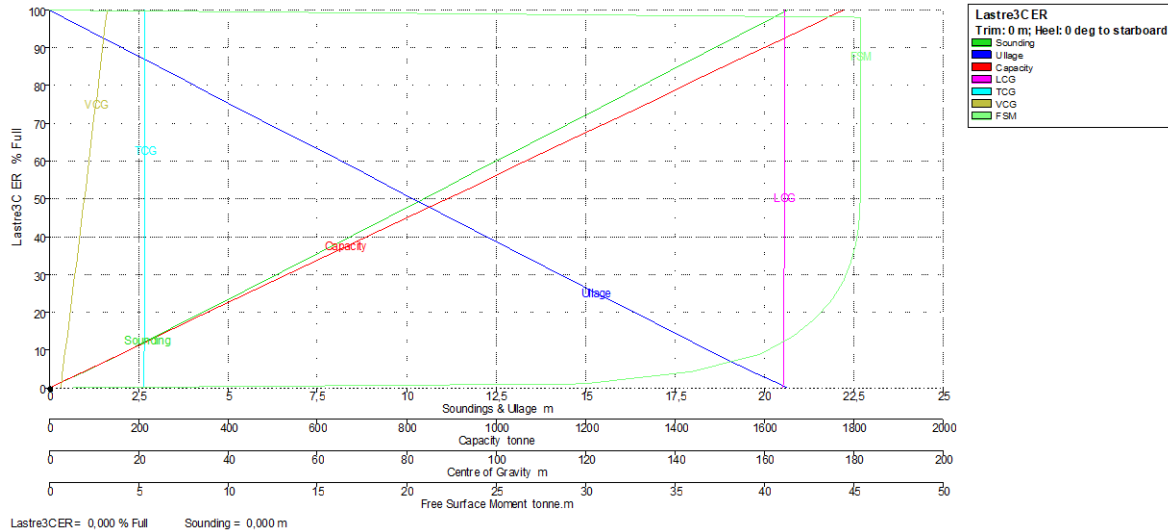
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre3C BR	20,646	0,000	100,000	1732,474	1775,786	164,454	-21,385	12,932	0,000
	20,238	0,408	98,000	1697,825	1740,271	164,453	-21,385	12,728	45,378
	20,218	0,428	97,900	1696,092	1738,495	164,453	-21,385	12,718	45,378
	20,000	0,646	96,831	1677,564	1719,503	164,452	-21,385	12,609	45,378
	19,000	1,646	91,924	1592,564	1632,378	164,450	-21,384	12,107	45,378
	18,000	2,646	87,018	1507,564	1545,253	164,447	-21,383	11,606	45,378
	17,000	3,646	82,112	1422,564	1458,128	164,444	-21,382	11,104	45,378
	16,000	4,646	77,205	1337,564	1371,003	164,440	-21,381	10,603	45,378
	15,000	5,646	72,299	1252,564	1283,878	164,436	-21,379	10,101	45,378
	14,000	6,646	67,393	1167,564	1196,753	164,432	-21,378	9,598	45,378
	13,000	7,646	62,487	1082,564	1109,628	164,426	-21,376	9,096	45,378
	12,000	8,646	57,580	997,564	1022,503	164,420	-21,374	8,593	45,378
	11,000	9,646	52,674	912,565	935,379	164,413	-21,372	8,089	45,376
	10,000	10,646	47,768	827,572	848,261	164,404	-21,369	7,585	45,351
	9,000	11,646	42,864	742,609	761,175	164,393	-21,365	7,080	45,272
	8,000	12,646	37,964	657,720	674,163	164,380	-21,361	6,574	45,111
	7,000	13,646	33,072	572,966	587,290	164,364	-21,356	6,067	44,837
	6,000	14,646	28,193	488,432	500,643	164,344	-21,349	5,559	44,412
	5,000	15,646	23,333	404,233	414,338	164,321	-21,341	5,051	43,779
	4,000	16,646	18,501	320,523	328,536	164,292	-21,331	4,541	42,886
	3,000	17,646	13,710	237,519	243,457	164,256	-21,317	4,031	41,624
	2,000	18,646	8,979	155,552	159,441	164,212	-21,296	3,520	39,768
	1,000	19,646	4,356	75,467	77,353	164,164	-21,262	3,008	35,952
	0,239	20,407	1,000	17,325	17,758	164,128	-21,219	2,620	29,882
	0,000	20,646	0,000	0,000	0,000	164,117	-21,202	2,500	0,000

**Tank Calibrations - Lastre3C ER**

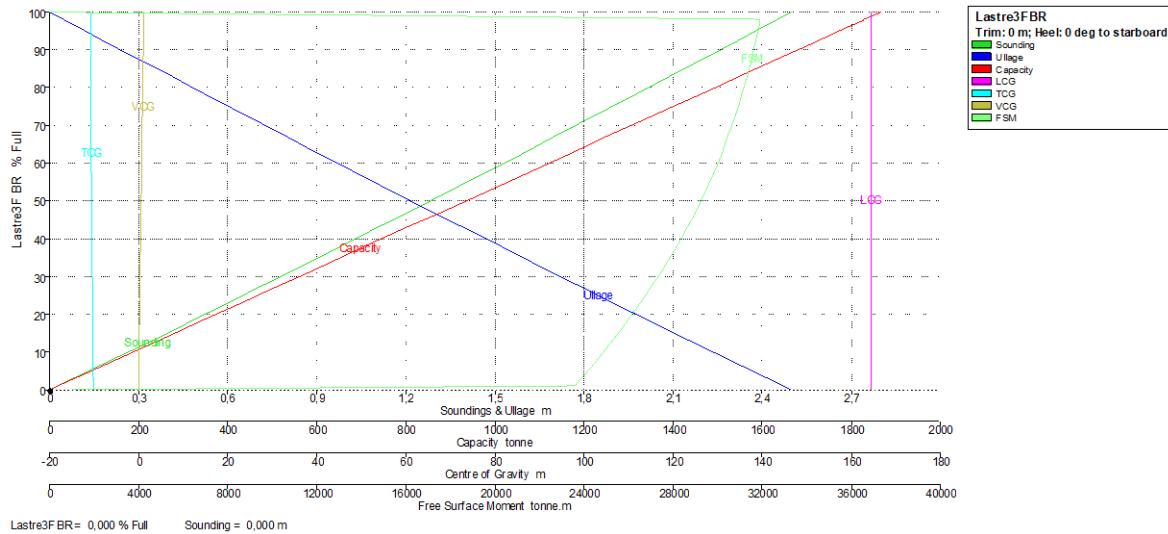
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre3C ER	20,646	0,000	100,000	1732,474	1775,786	164,454	21,385	12,932	0,000
	20,238	0,408	98,000	1697,825	1740,271	164,453	21,385	12,728	45,378
	20,218	0,428	97,900	1696,092	1738,495	164,453	21,385	12,718	45,378
	20,000	0,646	96,831	1677,564	1719,503	164,452	21,385	12,609	45,378
	19,000	1,646	91,924	1592,564	1632,378	164,450	21,384	12,107	45,378
	18,000	2,646	87,018	1507,564	1545,253	164,447	21,383	11,606	45,378
	17,000	3,646	82,112	1422,564	1458,128	164,444	21,382	11,104	45,378
	16,000	4,646	77,205	1337,564	1371,003	164,440	21,381	10,603	45,378
	15,000	5,646	72,299	1252,564	1283,878	164,436	21,379	10,101	45,378
	14,000	6,646	67,393	1167,564	1196,753	164,432	21,378	9,598	45,378
	13,000	7,646	62,487	1082,564	1109,628	164,426	21,376	9,096	45,378
	12,000	8,646	57,580	997,564	1022,503	164,420	21,374	8,593	45,378
	11,000	9,646	52,674	912,565	935,379	164,413	21,372	8,089	45,376
	10,000	10,646	47,768	827,572	848,261	164,404	21,369	7,585	45,351
	9,000	11,646	42,864	742,609	761,175	164,393	21,365	7,080	45,272
	8,000	12,646	37,964	657,720	674,163	164,380	21,361	6,574	45,111
	7,000	13,646	33,072	572,966	587,290	164,364	21,356	6,067	44,837
	6,000	14,646	28,193	488,432	500,643	164,344	21,349	5,559	44,412
	5,000	15,646	23,333	404,233	414,338	164,321	21,341	5,051	43,779
	4,000	16,646	18,501	320,523	328,536	164,292	21,331	4,541	42,886
	3,000	17,646	13,710	237,519	243,457	164,256	21,317	4,031	41,624
	2,000	18,646	8,979	155,552	159,441	164,212	21,296	3,520	39,768
	1,000	19,646	4,356	75,467	77,353	164,164	21,262	3,008	35,952
	0,239	20,407	1,000	17,325	17,758	164,128	21,219	2,620	29,882
	0,000	20,646	0,000	0,000	0,000	164,117	21,202	2,500	0,000

**Tank Calibrations - Lastre3F BR**

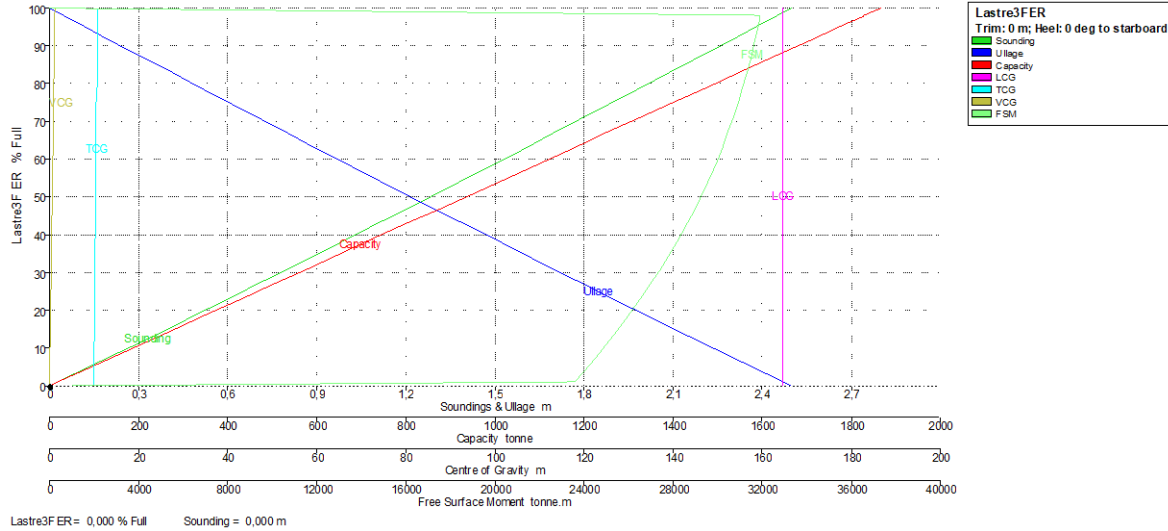
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre3F BR	2,500	0,000	100,000	1821,427	1866,963	164,478	-10,724	1,271	0,000
	2,452	0,048	98,000	1784,999	1829,624	164,478	-10,716	1,246	31927,315
	2,449	0,051	97,900	1783,177	1827,757	164,478	-10,715	1,245	31923,902
	2,400	0,100	95,850	1745,833	1789,479	164,478	-10,707	1,220	31847,559
	2,300	0,200	91,706	1670,359	1712,118	164,479	-10,689	1,169	31691,715
	2,200	0,300	87,569	1595,011	1634,886	164,480	-10,670	1,118	31527,789
	2,100	0,400	83,440	1519,803	1557,799	164,481	-10,651	1,067	31341,378
	2,000	0,500	79,319	1444,745	1480,864	164,482	-10,631	1,015	31152,467
	1,900	0,600	75,208	1369,851	1404,098	164,482	-10,610	0,964	30933,510
	1,800	0,700	71,105	1295,134	1327,512	164,484	-10,588	0,913	30713,595
	1,700	0,800	67,014	1220,607	1251,122	164,485	-10,566	0,862	30461,744
	1,600	0,900	62,933	1146,287	1174,945	164,486	-10,542	0,811	30207,107
	1,500	1,000	58,865	1072,187	1098,992	164,487	-10,517	0,760	29920,254
	1,400	1,100	54,810	998,328	1023,286	164,488	-10,492	0,709	29628,199
	1,300	1,200	50,769	924,721	947,839	164,490	-10,465	0,658	29304,193
	1,200	1,300	46,743	851,391	872,675	164,491	-10,438	0,607	28973,299
	1,100	1,400	42,733	778,349	797,808	164,493	-10,410	0,556	28610,132
	1,000	1,500	38,740	705,622	723,262	164,495	-10,380	0,505	28239,913
	0,900	1,600	34,765	633,223	649,054	164,497	-10,350	0,454	27836,466
	0,800	1,700	30,810	561,178	575,208	164,499	-10,318	0,403	27427,322
	0,700	1,800	26,875	489,503	501,741	164,501	-10,286	0,353	26983,733
	0,600	1,900	22,961	418,224	428,680	164,503	-10,252	0,302	26537,006
	0,500	2,000	19,071	347,357	356,041	164,505	-10,217	0,251	26054,809
	0,400	2,100	15,204	276,928	283,851	164,508	-10,182	0,201	25572,745
	0,300	2,200	11,362	206,956	212,130	164,510	-10,145	0,151	25054,932
	0,200	2,300	7,547	137,463	140,900	164,513	-10,108	0,100	24540,709
	0,100	2,400	3,759	68,471	70,182	164,515	-10,069	0,050	23991,557
	0,027	2,473	1,000	18,214	18,670	164,517	-10,041	0,013	23593,157
	0,000	2,500	0,000	0,000	0,000	164,518	-10,031	0,000	0,000

### Tank Calibrations - Lastre3F ER

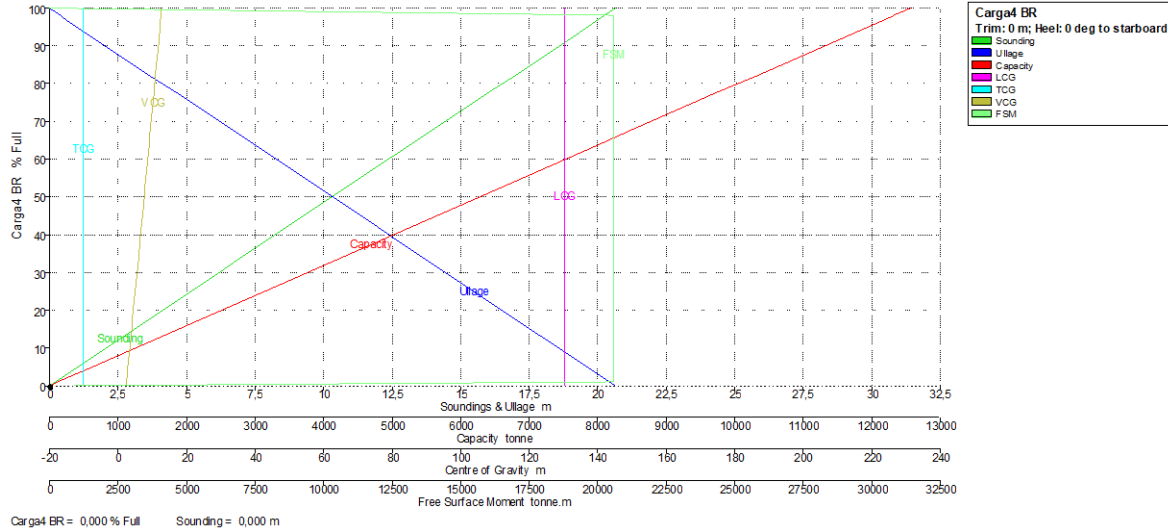
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre3F ER	2,500	0,000	100,000	1821,427	1866,963	164,478	10,724	1,271	0,000
	2,452	0,048	98,000	1784,999	1829,624	164,478	10,716	1,246	31927,315
	2,449	0,051	97,900	1783,177	1827,757	164,478	10,715	1,245	31923,902
	2,400	0,100	95,850	1745,833	1789,479	164,478	10,707	1,220	31847,559
	2,300	0,200	91,706	1670,359	1712,118	164,479	10,689	1,169	31691,715
	2,200	0,300	87,569	1595,011	1634,886	164,480	10,670	1,118	31527,789
	2,100	0,400	83,440	1519,803	1557,799	164,481	10,651	1,067	31341,378
	2,000	0,500	79,319	1444,745	1480,864	164,482	10,631	1,015	31152,467
	1,900	0,600	75,208	1369,851	1404,098	164,482	10,610	0,964	30933,510
	1,800	0,700	71,105	1295,134	1327,512	164,484	10,588	0,913	30713,595
	1,700	0,800	67,014	1220,607	1251,122	164,485	10,566	0,862	30461,744
	1,600	0,900	62,933	1146,287	1174,945	164,486	10,542	0,811	30207,107
	1,500	1,000	58,865	1072,187	1098,992	164,487	10,517	0,760	29920,254
	1,400	1,100	54,810	998,328	1023,286	164,488	10,492	0,709	29628,199
	1,300	1,200	50,769	924,721	947,839	164,490	10,465	0,658	29304,193
	1,200	1,300	46,743	851,391	872,675	164,491	10,438	0,607	28973,299
	1,100	1,400	42,733	778,349	797,808	164,493	10,410	0,556	28610,132
	1,000	1,500	38,740	705,622	723,262	164,495	10,380	0,505	28239,913
	0,900	1,600	34,765	633,223	649,054	164,497	10,350	0,454	27836,466
	0,800	1,700	30,810	561,178	575,208	164,499	10,318	0,403	27427,322
	0,700	1,800	26,875	489,503	501,741	164,501	10,286	0,353	26983,733
	0,600	1,900	22,961	418,224	428,680	164,503	10,252	0,302	26537,006
	0,500	2,000	19,071	347,357	356,041	164,505	10,217	0,251	26054,809
	0,400	2,100	15,204	276,928	283,851	164,508	10,182	0,201	25572,745
	0,300	2,200	11,362	206,956	212,130	164,510	10,145	0,151	25054,932
	0,200	2,300	7,547	137,463	140,900	164,513	10,108	0,100	24540,709
	0,100	2,400	3,759	68,471	70,182	164,515	10,069	0,050	23991,557
	0,027	2,473	1,000	18,214	18,670	164,517	10,041	0,013	23593,157
	0,000	2,500	0,000	0,000	0,000	164,518	10,031	0,000	0,000

**Tank Calibrations - Carga4 BR**

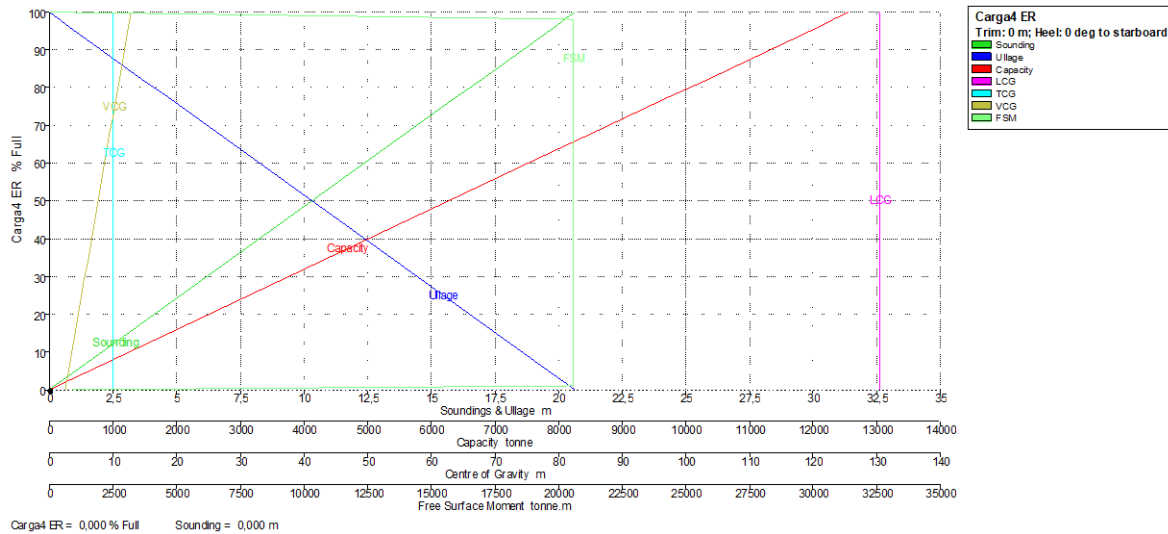
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga4 BR	20,646	0,000	100,000	14144,574	12564,625	130,500	-10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	130,500	-10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	130,500	-10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	130,500	-10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	130,500	-10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	130,500	-10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	130,500	-10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	130,500	-10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	130,500	-10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	130,500	-10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	130,500	-10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	130,500	-10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	130,500	-10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	130,500	-10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	130,500	-10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	130,500	-10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	130,500	-10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	130,500	-10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	130,500	-10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	130,500	-10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	130,500	-10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	130,500	-10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	130,500	-10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	130,500	-10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	130,500	-10,075	2,500	0,000

### Tank Calibrations - Carga4 ER

Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

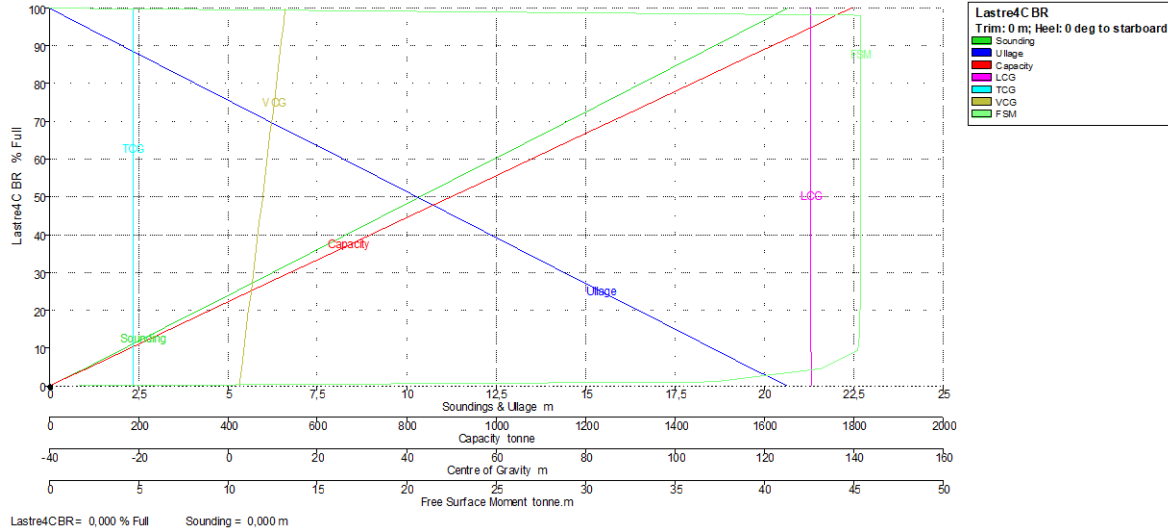


Carga4 ER = 0.000 % Full      Sounding = 0.000 m

Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga4 ER	20,646	0,000	100,000	14144,574	12564,625	130,500	10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	130,500	10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	130,500	10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	130,500	10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	130,500	10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	130,500	10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	130,500	10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	130,500	10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	130,500	10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	130,500	10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	130,500	10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	130,500	10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	130,500	10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	130,500	10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	130,500	10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	130,500	10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	130,500	10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	130,500	10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	130,500	10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	130,500	10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	130,500	10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	130,500	10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	130,500	10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	130,500	10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	130,500	10,075	2,500	0,000

**Tank Calibrations - Lastre4C BR**

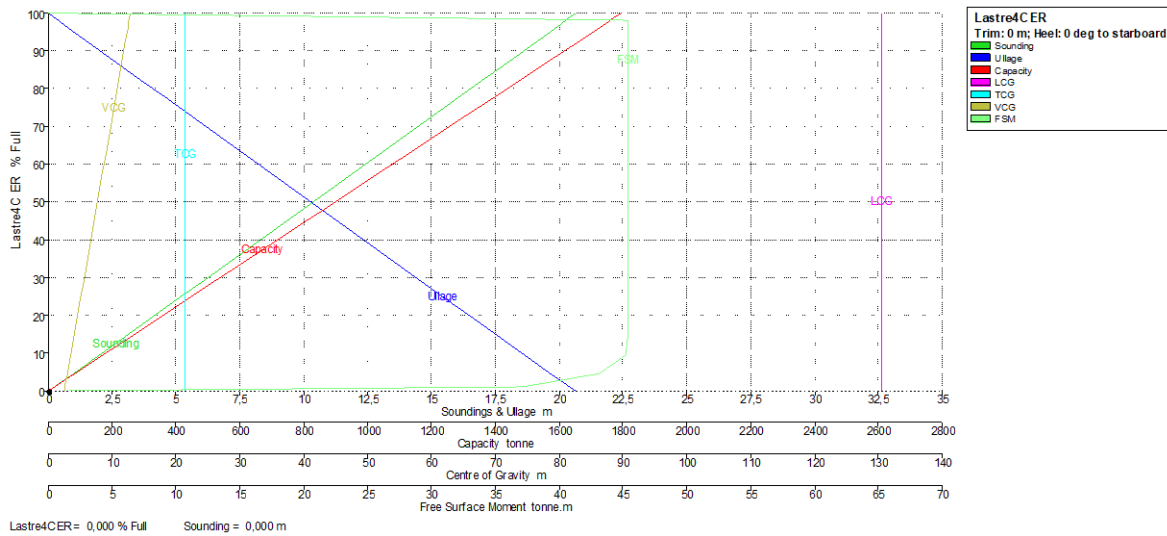
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre4C BR	20,646	0,000	100,000	1750,422	1794,183	130,499	-21,397	12,848	0,000
	20,234	0,412	98,000	1715,414	1758,299	130,499	-21,397	12,642	45,378
	20,214	0,432	97,900	1713,664	1756,505	130,499	-21,397	12,632	45,378
	20,000	0,646	96,863	1695,512	1737,900	130,499	-21,397	12,525	45,378
	19,000	1,646	92,007	1610,512	1650,775	130,499	-21,397	12,025	45,378
	18,000	2,646	87,151	1525,512	1563,650	130,499	-21,397	11,525	45,378
	17,000	3,646	82,295	1440,512	1476,525	130,499	-21,396	11,025	45,378
	16,000	4,646	77,439	1355,512	1389,400	130,499	-21,396	10,525	45,378
	15,000	5,646	72,583	1270,512	1302,275	130,499	-21,396	10,025	45,378
	14,000	6,646	67,727	1185,512	1215,150	130,499	-21,395	9,524	45,378
	13,000	7,646	62,871	1100,512	1128,025	130,499	-21,395	9,024	45,378
	12,000	8,646	58,015	1015,512	1040,900	130,499	-21,395	8,524	45,378
	11,000	9,646	53,159	930,512	953,775	130,499	-21,394	8,024	45,378
	10,000	10,646	48,303	845,513	866,650	130,499	-21,394	7,524	45,377
	9,000	11,646	43,447	760,513	779,526	130,499	-21,393	7,023	45,377
	8,000	12,646	38,591	675,514	692,401	130,498	-21,392	6,523	45,376
	7,000	13,646	33,736	590,515	605,278	130,498	-21,391	6,023	45,374
	6,000	14,646	28,880	505,519	518,157	130,498	-21,389	5,522	45,370
	5,000	15,646	24,024	420,525	431,038	130,498	-21,387	5,021	45,365
	4,000	16,646	19,169	335,535	343,923	130,498	-21,384	4,520	45,358
	3,000	17,646	14,314	250,550	256,813	130,498	-21,379	4,018	45,348
	2,000	18,646	9,460	165,582	169,722	130,499	-21,368	3,514	45,228
	1,000	19,646	4,635	81,124	83,152	130,502	-21,344	3,006	43,161
	0,223	20,423	1,000	17,504	17,942	130,509	-21,304	2,612	37,167
	0,000	20,646	0,000	0,000	0,000	130,513	-21,289	2,500	0,000

**Tank Calibrations - Lastre4C ER**

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

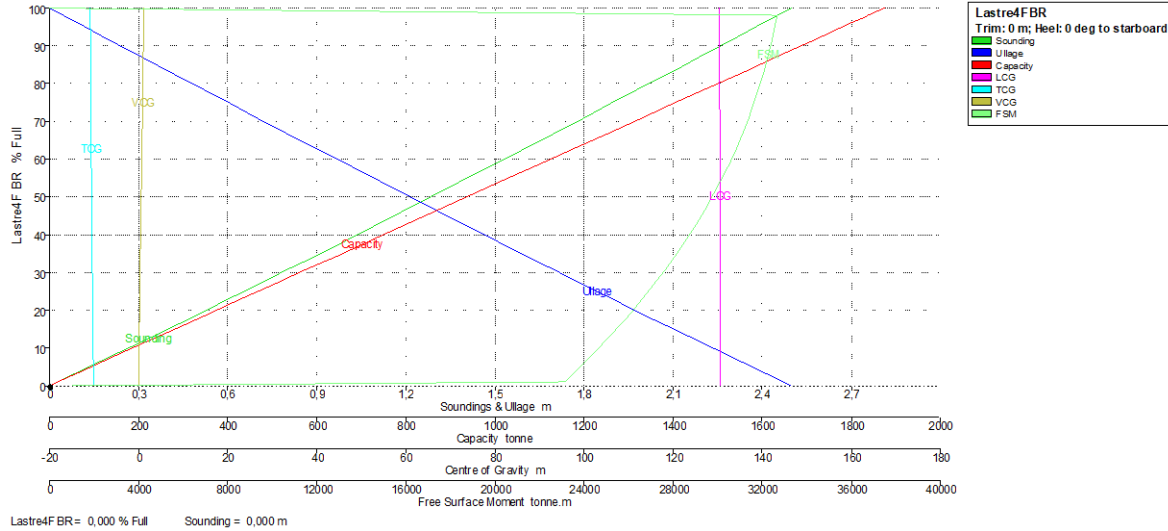


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre4C ER	20,646	0,000	100,000	1750,422	1794,183	130,499	21,397	12,848	0,000
	20,234	0,412	98,000	1715,414	1758,299	130,499	21,397	12,642	45,378
	20,214	0,432	97,900	1713,664	1756,505	130,499	21,397	12,632	45,378
	20,000	0,646	96,863	1695,512	1737,900	130,499	21,397	12,525	45,378
	19,000	1,646	92,007	1610,512	1650,775	130,499	21,397	12,025	45,378
	18,000	2,646	87,151	1525,512	1563,650	130,499	21,397	11,525	45,378
	17,000	3,646	82,295	1440,512	1476,525	130,499	21,396	11,025	45,378
	16,000	4,646	77,439	1355,512	1389,400	130,499	21,396	10,525	45,378
	15,000	5,646	72,583	1270,512	1302,275	130,499	21,396	10,025	45,378
	14,000	6,646	67,727	1185,512	1215,150	130,499	21,395	9,524	45,378
	13,000	7,646	62,871	1100,512	1128,025	130,499	21,395	9,024	45,378
	12,000	8,646	58,015	1015,512	1040,900	130,499	21,395	8,524	45,378
	11,000	9,646	53,159	930,512	953,775	130,499	21,394	8,024	45,378
	10,000	10,646	48,303	845,513	866,650	130,499	21,394	7,524	45,377
	9,000	11,646	43,447	760,513	779,526	130,499	21,393	7,023	45,377
	8,000	12,646	38,591	675,514	692,401	130,498	21,392	6,523	45,376
	7,000	13,646	33,736	590,515	605,278	130,498	21,391	6,023	45,374
	6,000	14,646	28,880	505,519	518,157	130,498	21,389	5,522	45,370
	5,000	15,646	24,024	420,525	431,038	130,498	21,387	5,021	45,365
	4,000	16,646	19,169	335,535	343,923	130,498	21,384	4,520	45,358
	3,000	17,646	14,314	250,550	256,813	130,498	21,379	4,018	45,348
	2,000	18,646	9,460	165,582	169,722	130,499	21,368	3,514	45,228
	1,000	19,646	4,635	81,124	83,152	130,502	21,344	3,006	43,161
	0,223	20,423	1,000	17,504	17,942	130,509	21,304	2,612	37,167
	0,000	20,646	0,000	0,000	0,000	130,513	21,289	2,500	0,000



**Tank Calibrations - Lastre4F BR**

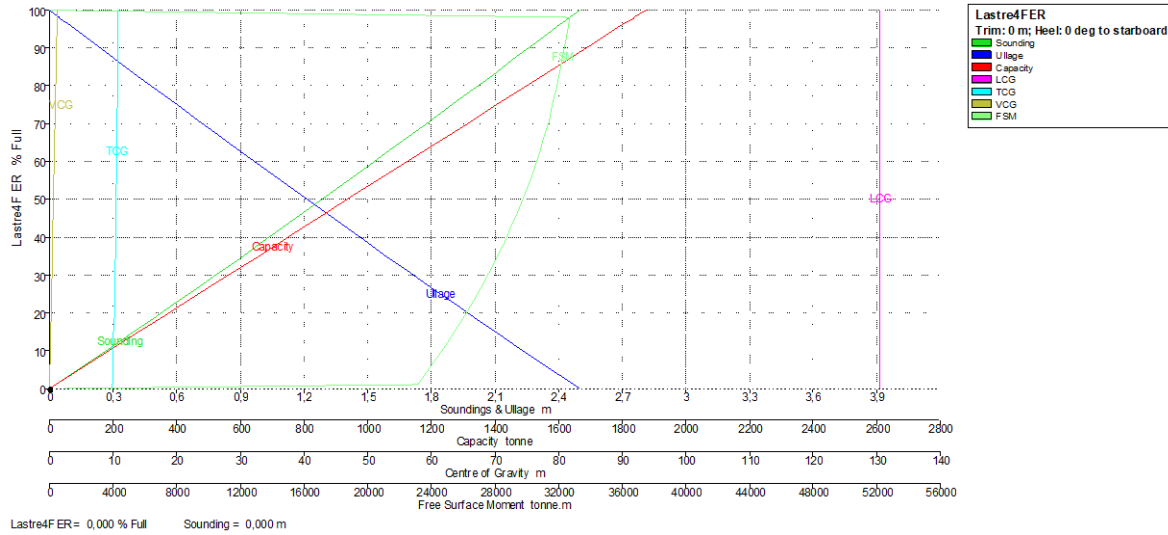
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre4F BR	2,500	0,000	100,000	1828,875	1874,597	130,511	-10,770	1,274	0,000
	2,452	0,048	98,000	1792,297	1837,105	130,511	-10,761	1,249	32693,534
	2,450	0,050	97,900	1790,468	1835,230	130,511	-10,761	1,248	32689,776
	2,400	0,100	95,834	1752,677	1796,494	130,512	-10,751	1,223	32612,169
	2,300	0,200	91,674	1676,601	1718,516	130,512	-10,731	1,171	32456,125
	2,200	0,300	87,521	1600,650	1640,666	130,513	-10,711	1,120	32280,744
	2,100	0,400	83,376	1524,847	1562,968	130,513	-10,689	1,069	32087,118
	2,000	0,500	79,240	1449,198	1485,428	130,514	-10,666	1,018	31880,918
	1,900	0,600	75,113	1373,727	1408,070	130,514	-10,642	0,967	31645,833
	1,800	0,700	70,997	1298,443	1330,904	130,515	-10,618	0,915	31404,153
	1,700	0,800	66,892	1223,369	1253,954	130,515	-10,592	0,864	31124,258
	1,600	0,900	62,799	1148,520	1177,233	130,516	-10,565	0,813	30842,589
	1,500	1,000	58,720	1073,918	1100,766	130,517	-10,536	0,762	30515,263
	1,400	1,100	54,656	999,582	1024,571	130,517	-10,507	0,710	30189,625
	1,300	1,200	50,607	925,533	948,671	130,518	-10,476	0,659	29813,205
	1,200	1,300	46,575	851,794	873,089	130,519	-10,445	0,608	29439,906
	1,100	1,400	42,561	778,388	797,848	130,520	-10,411	0,557	29014,516
	1,000	1,500	38,567	705,339	722,972	130,520	-10,377	0,506	28592,501
	0,900	1,600	34,593	632,670	648,487	130,521	-10,342	0,455	28118,207
	0,800	1,700	30,642	560,408	574,418	130,522	-10,305	0,404	27648,296
	0,700	1,800	26,715	488,576	500,790	130,523	-10,267	0,353	27126,248
	0,600	1,900	22,812	417,201	427,631	130,524	-10,228	0,302	26609,898
	0,500	2,000	18,936	346,310	354,967	130,525	-10,187	0,252	26043,727
	0,400	2,100	15,087	275,926	282,825	130,526	-10,145	0,201	25484,336
	0,300	2,200	11,268	206,078	211,230	130,527	-10,103	0,151	24878,782
	0,200	2,300	7,479	136,791	140,210	130,528	-10,059	0,100	24281,694
	0,100	2,400	3,723	68,090	69,792	130,530	-10,013	0,050	23642,298
	0,027	2,473	1,000	18,289	18,746	130,531	-9,980	0,013	23182,384
	0,000	2,500	0,000	0,000	0,000	130,531	-9,968	0,000	0,000

**Tank Calibrations - Lastre4F ER**

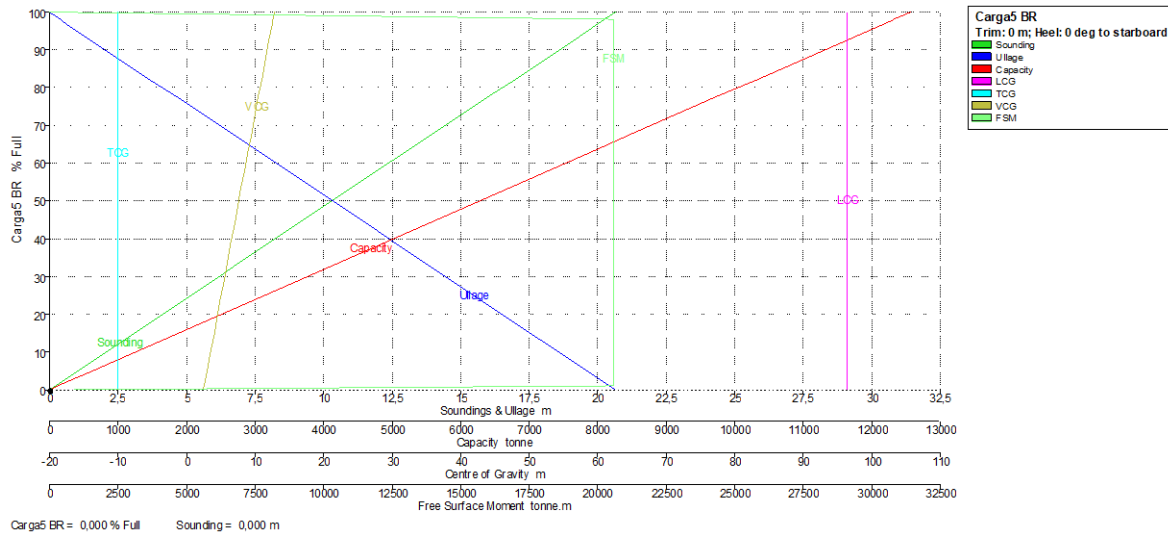
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre4F ER	2,500	0,000	100,000	1828,875	1874,597	130,511	10,770	1,274	0,000
	2,452	0,048	98,000	1792,297	1837,105	130,511	10,761	1,249	32693,534
	2,450	0,050	97,900	1790,468	1835,230	130,511	10,761	1,248	32689,776
	2,400	0,100	95,834	1752,677	1796,494	130,512	10,751	1,223	32612,169
	2,300	0,200	91,674	1676,601	1718,516	130,512	10,731	1,171	32456,125
	2,200	0,300	87,521	1600,650	1640,666	130,513	10,711	1,120	32280,744
	2,100	0,400	83,376	1524,847	1562,968	130,513	10,689	1,069	32087,118
	2,000	0,500	79,240	1449,198	1485,428	130,514	10,666	1,018	31880,918
	1,900	0,600	75,113	1373,727	1408,070	130,514	10,642	0,967	31645,833
	1,800	0,700	70,997	1298,443	1330,904	130,515	10,618	0,915	31404,153
	1,700	0,800	66,892	1223,369	1253,954	130,515	10,592	0,864	31124,258
	1,600	0,900	62,799	1148,520	1177,233	130,516	10,565	0,813	30842,589
	1,500	1,000	58,720	1073,918	1100,766	130,517	10,536	0,762	30515,263
	1,400	1,100	54,656	999,582	1024,571	130,517	10,507	0,710	30189,625
	1,300	1,200	50,607	925,533	948,671	130,518	10,476	0,659	29813,205
	1,200	1,300	46,575	851,794	873,089	130,519	10,445	0,608	29439,906
	1,100	1,400	42,561	778,388	797,848	130,520	10,411	0,557	29014,516
	1,000	1,500	38,567	705,339	722,972	130,520	10,377	0,506	28592,501
	0,900	1,600	34,593	632,670	648,487	130,521	10,342	0,455	28118,207
	0,800	1,700	30,642	560,408	574,418	130,522	10,305	0,404	27648,296
	0,700	1,800	26,715	488,576	500,790	130,523	10,267	0,353	27126,248
	0,600	1,900	22,812	417,201	427,631	130,524	10,228	0,302	26609,898
	0,500	2,000	18,936	346,310	354,967	130,525	10,187	0,252	26043,727
	0,400	2,100	15,087	275,926	282,825	130,526	10,145	0,201	25484,336
	0,300	2,200	11,268	206,078	211,230	130,527	10,103	0,151	24878,782
	0,200	2,300	7,479	136,791	140,210	130,528	10,059	0,100	24281,694
	0,100	2,400	3,723	68,090	69,792	130,530	10,013	0,050	23642,298
	0,027	2,473	1,000	18,289	18,746	130,531	9,980	0,013	23182,384
	0,000	2,500	0,000	0,000	0,000	130,531	9,968	0,000	0,000

**Tank Calibrations - Carga5 BR**

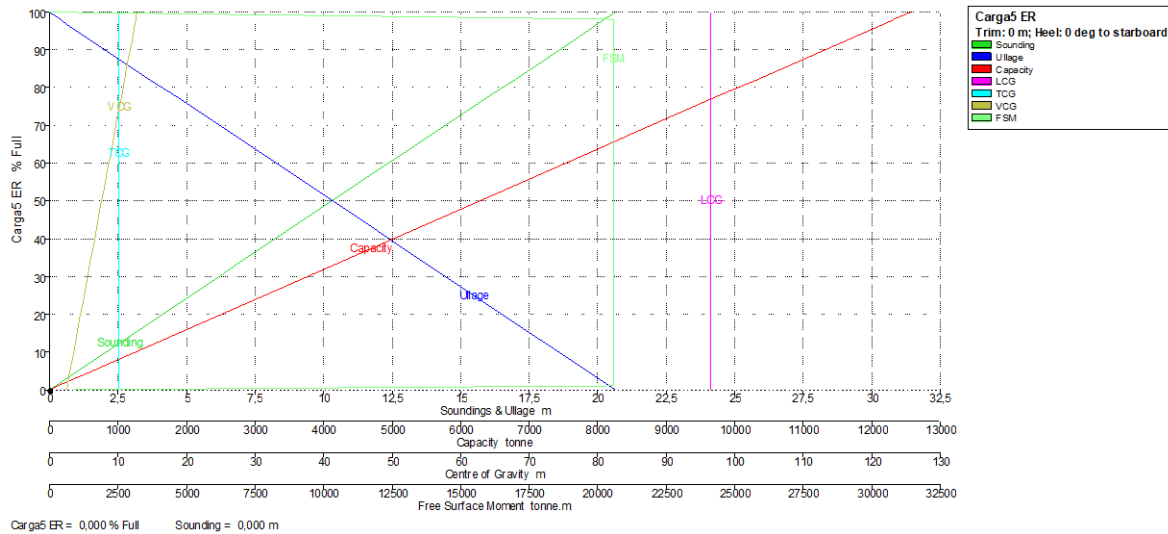
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga5 BR	20,646	0,000	100,000	14144,574	12564,625	96,500	-10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	96,500	-10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	96,500	-10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	96,500	-10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	96,500	-10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	96,500	-10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	96,500	-10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	96,500	-10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	96,500	-10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	96,500	-10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	96,500	-10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	96,500	-10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	96,500	-10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	96,500	-10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	96,500	-10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	96,500	-10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	96,500	-10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	96,500	-10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	96,500	-10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	96,500	-10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	96,500	-10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	96,500	-10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	96,500	-10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	96,500	-10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	96,500	-10,075	2,500	0,000

### Tank Calibrations - Carga5 ER

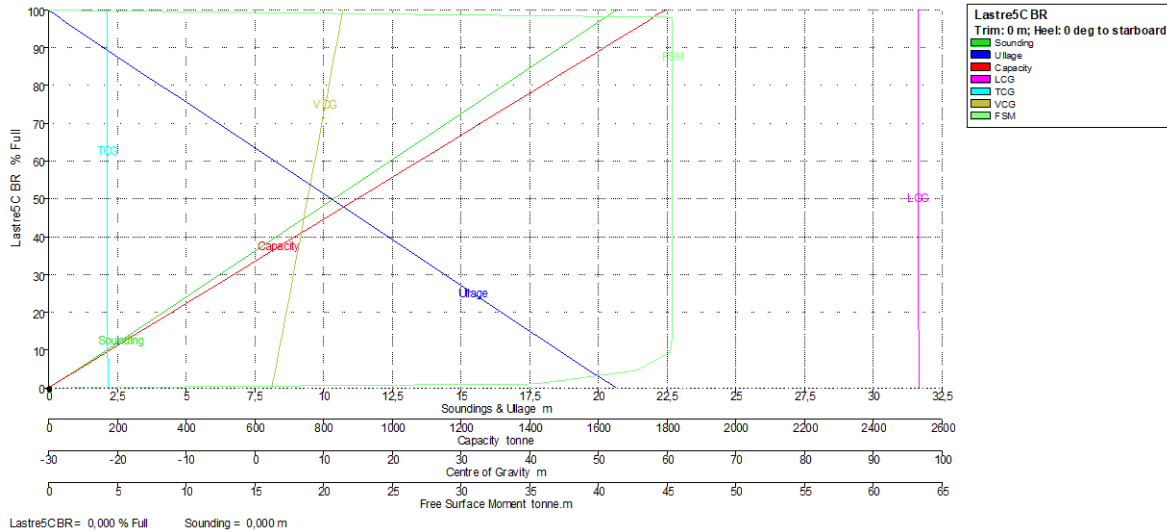
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga5 ER	20,646	0,000	100,000	14144,574	12564,625	96,500	10,075	12,823	0,000
	20,233	0,413	98,000	13861,683	12313,333	96,500	10,075	12,617	20591,238
	20,212	0,434	97,900	13847,538	12300,768	96,500	10,075	12,606	20591,238
	20,000	0,646	96,871	13702,000	12171,486	96,500	10,075	12,500	20591,238
	19,000	1,646	92,028	13016,900	11562,912	96,500	10,075	12,000	20591,238
	18,000	2,646	87,184	12331,800	10954,338	96,500	10,075	11,500	20591,238
	17,000	3,646	82,340	11646,700	10345,763	96,500	10,075	11,000	20591,238
	16,000	4,646	77,497	10961,600	9737,189	96,500	10,075	10,500	20591,238
	15,000	5,646	72,653	10276,500	9128,615	96,500	10,075	10,000	20591,238
	14,000	6,646	67,810	9591,400	8520,040	96,500	10,075	9,500	20591,238
	13,000	7,646	62,966	8906,300	7911,466	96,500	10,075	9,000	20591,238
	12,000	8,646	58,123	8221,200	7302,892	96,500	10,075	8,500	20591,238
	11,000	9,646	53,279	7536,100	6694,317	96,500	10,075	8,000	20591,238
	10,000	10,646	48,436	6851,000	6085,743	96,500	10,075	7,500	20591,238
	9,000	11,646	43,592	6165,900	5477,169	96,500	10,075	7,000	20591,238
	8,000	12,646	38,748	5480,800	4868,594	96,500	10,075	6,500	20591,238
	7,000	13,646	33,905	4795,700	4260,020	96,500	10,075	6,000	20591,238
	6,000	14,646	29,061	4110,600	3651,446	96,500	10,075	5,500	20591,238
	5,000	15,646	24,218	3425,500	3042,872	96,500	10,075	5,000	20591,238
	4,000	16,646	19,374	2740,400	2434,297	96,500	10,075	4,500	20591,238
	3,000	17,646	14,531	2055,300	1825,723	96,500	10,075	4,000	20591,238
	2,000	18,646	9,687	1370,200	1217,149	96,500	10,075	3,500	20591,238
	1,000	19,646	4,844	685,100	608,574	96,500	10,075	3,000	20591,238
	0,206	20,440	1,000	141,446	125,646	96,500	10,075	2,603	20591,238
	0,000	20,646	0,000	0,000	0,000	96,500	10,075	2,500	0,000

**Tank Calibrations - Lastre5C BR**

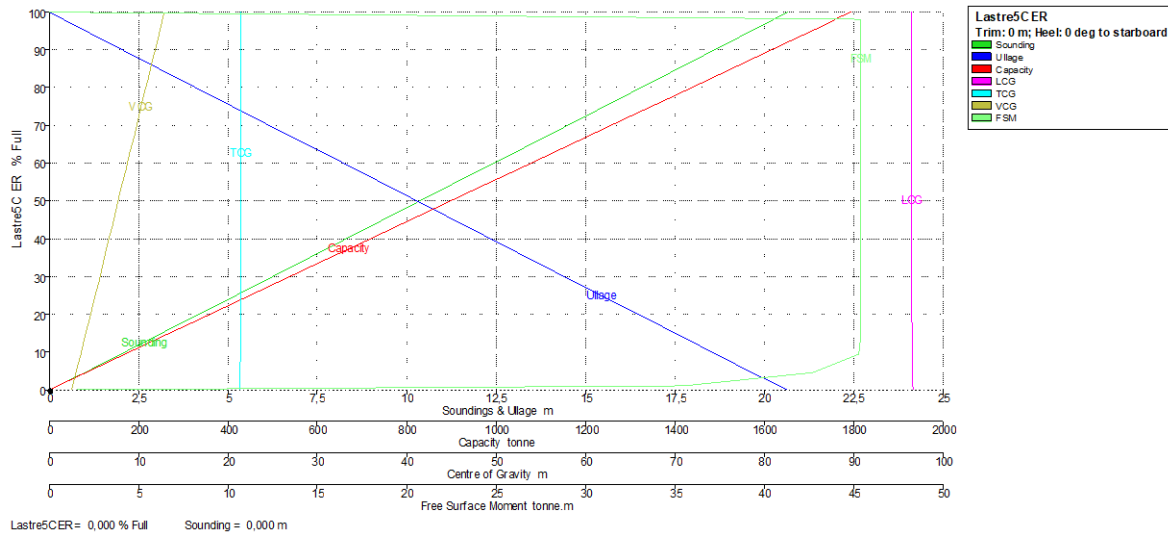
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre5C BR	20,646	0,000	100,000	1749,487	1793,224	96,504	-21,396	12,854	0,000
	20,234	0,412	98,000	1714,497	1757,360	96,504	-21,396	12,648	45,378
	20,214	0,432	97,900	1712,748	1755,566	96,504	-21,396	12,637	45,378
	20,000	0,646	96,861	1694,577	1736,941	96,504	-21,396	12,530	45,378
	19,000	1,646	92,003	1609,577	1649,816	96,504	-21,396	12,030	45,378
	18,000	2,646	87,144	1524,577	1562,691	96,504	-21,396	11,530	45,378
	17,000	3,646	82,286	1439,577	1475,566	96,505	-21,396	11,030	45,378
	16,000	4,646	77,427	1354,577	1388,441	96,505	-21,395	10,530	45,378
	15,000	5,646	72,569	1269,577	1301,316	96,505	-21,395	10,030	45,378
	14,000	6,646	67,710	1184,577	1214,191	96,506	-21,395	9,530	45,378
	13,000	7,646	62,851	1099,577	1127,066	96,506	-21,394	9,030	45,378
	12,000	8,646	57,993	1014,577	1039,941	96,507	-21,394	8,530	45,378
	11,000	9,646	53,134	929,577	952,816	96,507	-21,393	8,029	45,378
	10,000	10,646	48,276	844,577	865,691	96,508	-21,392	7,529	45,378
	9,000	11,646	43,417	759,577	778,566	96,509	-21,392	7,029	45,378
	8,000	12,646	38,559	674,577	691,441	96,510	-21,391	6,528	45,378
	7,000	13,646	33,700	589,577	604,316	96,511	-21,389	6,028	45,378
	6,000	14,646	28,841	504,577	517,191	96,513	-21,387	5,527	45,378
	5,000	15,646	23,983	419,577	430,066	96,516	-21,385	5,026	45,378
	4,000	16,646	19,124	334,577	342,941	96,520	-21,381	4,525	45,378
	3,000	17,646	14,266	249,577	255,816	96,527	-21,375	4,022	45,378
	2,000	18,646	9,408	164,589	168,704	96,540	-21,361	3,517	45,245
	1,000	19,646	4,585	80,223	82,228	96,573	-21,331	3,008	42,702
	0,227	20,419	1,000	17,495	17,932	96,627	-21,282	2,614	35,465
	0,000	20,646	0,000	0,000	0,000	96,651	-21,262	2,500	0,000

### Tank Calibrations - Lastre5C ER

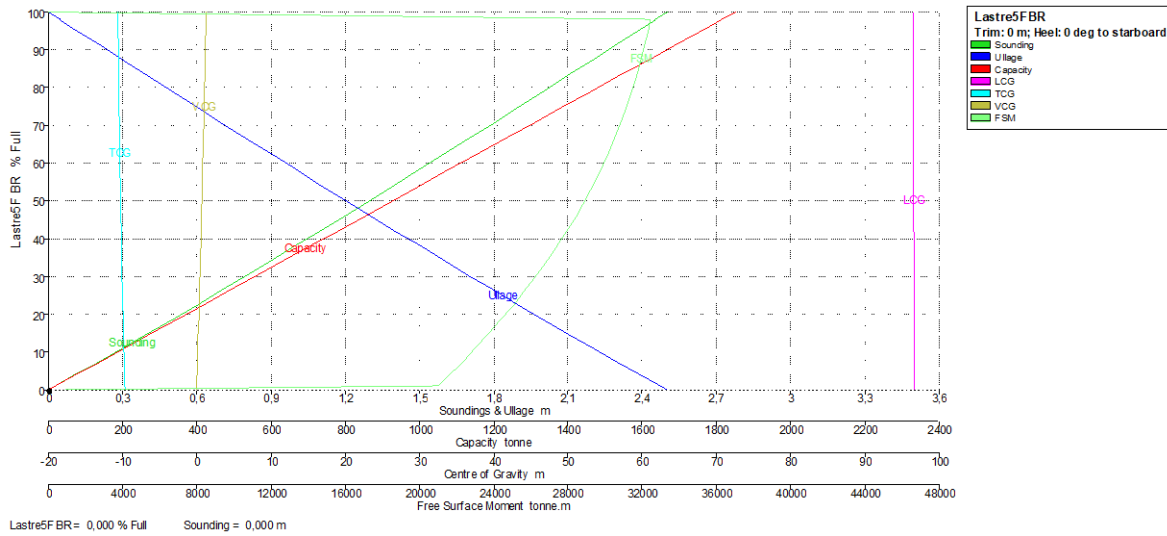
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre5C ER	20,646	0,000	100,000	1749,487	1793,224	96,504	21,396	12,854	0,000
	20,234	0,412	98,000	1714,497	1757,360	96,504	21,396	12,648	45,378
	20,214	0,432	97,900	1712,748	1755,566	96,504	21,396	12,637	45,378
	20,000	0,646	96,861	1694,577	1736,941	96,504	21,396	12,530	45,378
	19,000	1,646	92,003	1609,577	1649,816	96,504	21,396	12,030	45,378
	18,000	2,646	87,144	1524,577	1562,691	96,504	21,396	11,530	45,378
	17,000	3,646	82,286	1439,577	1475,566	96,505	21,396	11,030	45,378
	16,000	4,646	77,427	1354,577	1388,441	96,505	21,395	10,530	45,378
	15,000	5,646	72,569	1269,577	1301,316	96,505	21,395	10,030	45,378
	14,000	6,646	67,710	1184,577	1214,191	96,506	21,395	9,530	45,378
	13,000	7,646	62,851	1099,577	1127,066	96,506	21,394	9,030	45,378
	12,000	8,646	57,993	1014,577	1039,941	96,507	21,394	8,530	45,378
	11,000	9,646	53,134	929,577	952,816	96,507	21,393	8,029	45,378
	10,000	10,646	48,276	844,577	865,691	96,508	21,392	7,529	45,378
	9,000	11,646	43,417	759,577	778,566	96,509	21,392	7,029	45,378
	8,000	12,646	38,559	674,577	691,441	96,510	21,391	6,528	45,378
	7,000	13,646	33,700	589,577	604,316	96,511	21,389	6,028	45,378
	6,000	14,646	28,841	504,577	517,191	96,513	21,387	5,527	45,378
	5,000	15,646	23,983	419,577	430,066	96,516	21,385	5,026	45,378
	4,000	16,646	19,124	334,577	342,941	96,520	21,381	4,525	45,378
	3,000	17,646	14,266	249,577	255,816	96,527	21,375	4,022	45,378
	2,000	18,646	9,408	164,589	168,704	96,540	21,361	3,517	45,245
	1,000	19,646	4,585	80,223	82,228	96,573	21,331	3,008	42,702
	0,227	20,419	1,000	17,495	17,932	96,627	21,282	2,614	35,465
	0,000	20,646	0,000	0,000	0,000	96,651	21,262	2,500	0,000

**Tank Calibrations - Lastre5F BR**

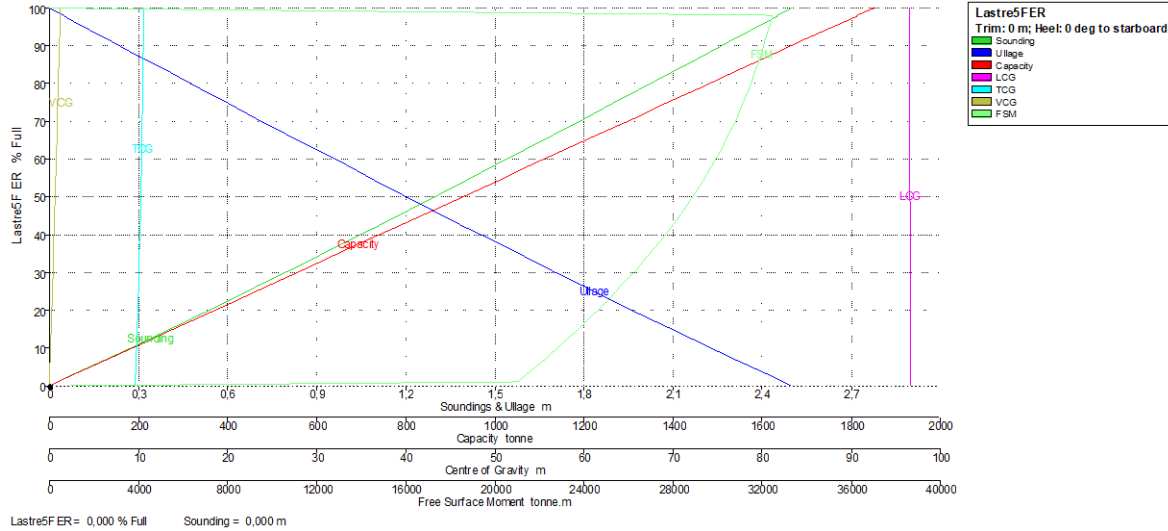
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre5F BR	2,500	0,000	100,000	1805,214	1850,344	96,581	-10,639	1,280	0,000
	2,453	0,047	98,000	1769,110	1813,337	96,582	-10,628	1,255	32446,539
	2,450	0,050	97,900	1767,305	1811,487	96,583	-10,627	1,254	32441,933
	2,400	0,100	95,790	1729,211	1772,441	96,584	-10,616	1,228	32344,803
	2,300	0,200	91,588	1653,358	1694,692	96,587	-10,591	1,177	32151,706
	2,200	0,300	87,395	1577,662	1617,104	96,590	-10,565	1,126	31934,775
	2,100	0,400	83,212	1502,152	1539,705	96,593	-10,538	1,074	31695,613
	2,000	0,500	79,039	1426,832	1462,503	96,597	-10,509	1,023	31441,112
	1,900	0,600	74,879	1351,735	1385,528	96,601	-10,480	0,971	31151,427
	1,800	0,700	70,732	1276,870	1308,792	96,604	-10,448	0,919	30853,939
	1,700	0,800	66,600	1202,268	1232,325	96,609	-10,416	0,868	30510,063
	1,600	0,900	62,483	1127,946	1156,145	96,613	-10,382	0,816	30164,507
	1,500	1,000	58,383	1053,933	1080,281	96,617	-10,347	0,765	29763,817
	1,400	1,100	54,301	980,250	1004,756	96,622	-10,310	0,713	29365,960
	1,300	1,200	50,239	906,926	929,600	96,627	-10,272	0,662	28907,153
	1,200	1,300	46,199	833,989	854,839	96,632	-10,232	0,610	28453,334
	1,100	1,400	42,182	761,467	780,504	96,637	-10,191	0,559	27937,457
	1,000	1,500	38,189	689,390	706,625	96,643	-10,148	0,508	27427,308
	0,900	1,600	34,222	617,788	633,233	96,649	-10,103	0,456	26855,664
	0,800	1,700	30,284	546,692	560,360	96,655	-10,058	0,405	26291,365
	0,700	1,800	26,376	476,134	488,038	96,661	-10,010	0,354	25666,664
	0,600	1,900	22,499	406,146	416,300	96,668	-9,961	0,303	25051,267
	0,500	2,000	18,655	336,761	345,180	96,675	-9,911	0,252	24379,428
	0,400	2,100	14,846	268,010	274,710	96,682	-9,859	0,201	23718,618
	0,300	2,200	11,075	199,927	204,925	96,690	-9,805	0,151	23006,799
	0,200	2,300	7,342	132,542	135,856	96,698	-9,751	0,100	22308,550
	0,100	2,400	3,650	65,890	67,537	96,706	-9,695	0,050	21564,964
	0,028	2,472	1,000	18,052	18,503	96,712	-9,654	0,014	21036,895
	0,000	2,500	0,000	0,000	0,000	96,714	-9,639	0,000	0,000

**Tank Calibrations - Lastre5F ER**

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

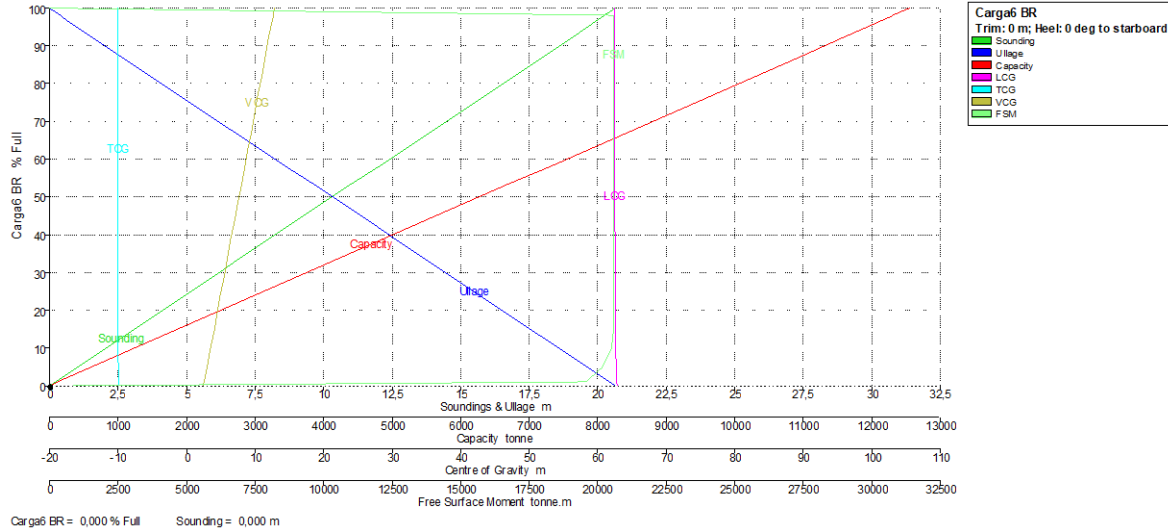


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre5F ER	2,500	0,000	100,000	1805,214	1850,344	96,581	10,639	1,280	0,000
	2,453	0,047	98,000	1769,110	1813,337	96,582	10,628	1,255	32446,539
	2,450	0,050	97,900	1767,305	1811,487	96,583	10,627	1,254	32441,933
	2,400	0,100	95,790	1729,211	1772,441	96,584	10,616	1,228	32344,803
	2,300	0,200	91,588	1653,358	1694,692	96,587	10,591	1,177	32151,706
	2,200	0,300	87,395	1577,662	1617,104	96,590	10,565	1,126	31934,775
	2,100	0,400	83,212	1502,152	1539,705	96,593	10,538	1,074	31695,613
	2,000	0,500	79,039	1426,832	1462,503	96,597	10,509	1,023	31441,112
	1,900	0,600	74,879	1351,735	1385,528	96,601	10,480	0,971	31151,427
	1,800	0,700	70,732	1276,870	1308,792	96,604	10,448	0,919	30853,939
	1,700	0,800	66,600	1202,268	1232,325	96,609	10,416	0,868	30510,063
	1,600	0,900	62,483	1127,946	1156,145	96,613	10,382	0,816	30164,507
	1,500	1,000	58,383	1053,933	1080,281	96,617	10,347	0,765	29763,817
	1,400	1,100	54,301	980,250	1004,756	96,622	10,310	0,713	29365,960
	1,300	1,200	50,239	906,926	929,600	96,627	10,272	0,662	28907,153
	1,200	1,300	46,199	833,989	854,839	96,632	10,232	0,610	28453,334
	1,100	1,400	42,182	761,467	780,504	96,637	10,191	0,559	27937,457
	1,000	1,500	38,189	689,390	706,625	96,643	10,148	0,508	27427,308
	0,900	1,600	34,222	617,788	633,233	96,649	10,103	0,456	26855,664
	0,800	1,700	30,284	546,692	560,360	96,655	10,058	0,405	26291,365
	0,700	1,800	26,376	476,134	488,038	96,661	10,010	0,354	25666,664
	0,600	1,900	22,499	406,146	416,300	96,668	9,961	0,303	25051,267
	0,500	2,000	18,655	336,761	345,180	96,675	9,911	0,252	24379,428
	0,400	2,100	14,846	268,010	274,710	96,682	9,859	0,201	23718,618
	0,300	2,200	11,075	199,927	204,925	96,690	9,805	0,151	23006,799
	0,200	2,300	7,342	132,542	135,856	96,698	9,751	0,100	22308,550
	0,100	2,400	3,650	65,890	67,537	96,706	9,695	0,050	21564,964
	0,028	2,472	1,000	18,052	18,503	96,712	9,654	0,014	21036,896
	0,000	2,500	0,000	0,000	0,000	96,714	9,639	0,000	0,000



**Tank Calibrations - Carga6 BR**

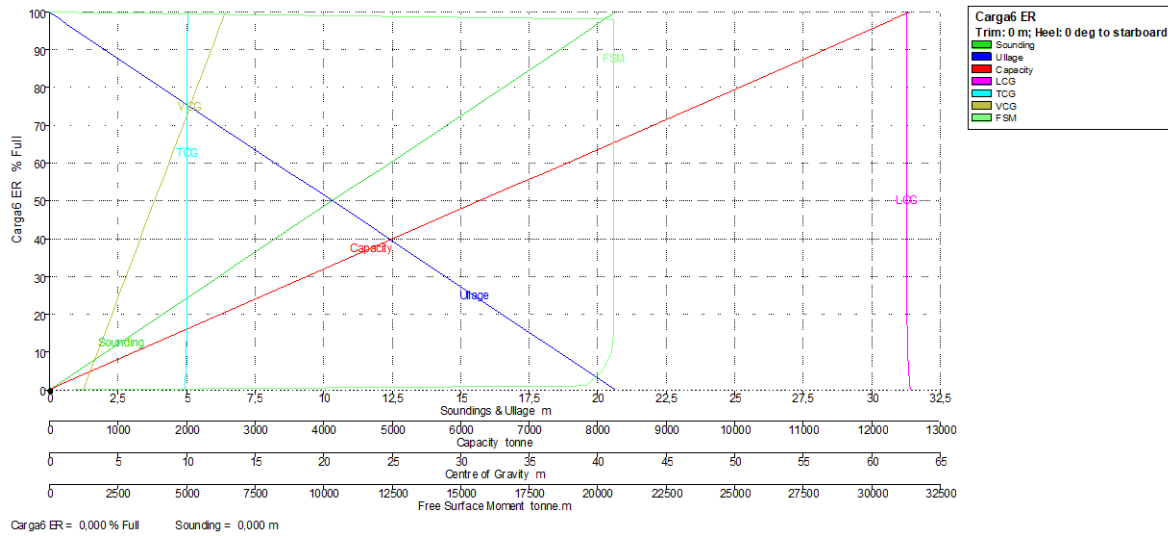
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga6 BR	20,646	0,000	100,000	14131,338	12552,867	62,513	-10,066	12,832	0,000
	20,233	0,413	98,000	13848,711	12301,809	62,514	-10,066	12,626	20591,238
	20,213	0,433	97,900	13834,580	12289,257	62,514	-10,066	12,615	20591,238
	20,000	0,646	96,868	13688,763	12159,728	62,514	-10,066	12,509	20591,238
	19,000	1,646	92,020	13003,663	11551,154	62,515	-10,066	12,009	20591,238
	18,000	2,646	87,172	12318,563	10942,580	62,515	-10,065	11,509	20591,238
	17,000	3,646	82,324	11633,463	10334,005	62,516	-10,064	11,009	20591,238
	16,000	4,646	77,476	10948,363	9725,431	62,517	-10,064	10,509	20591,238
	15,000	5,646	72,628	10263,263	9116,857	62,518	-10,063	10,009	20591,238
	14,000	6,646	67,780	9578,163	8508,282	62,520	-10,062	9,509	20591,238
	13,000	7,646	62,932	8893,063	7899,708	62,521	-10,061	9,009	20591,238
	12,000	8,646	58,083	8207,963	7291,134	62,523	-10,060	8,509	20591,238
	11,000	9,646	53,235	7522,863	6682,559	62,525	-10,059	8,009	20591,238
	10,000	10,646	48,387	6837,763	6073,985	62,528	-10,057	7,508	20591,238
	9,000	11,646	43,539	6152,663	5465,411	62,531	-10,055	7,008	20591,238
	8,000	12,646	38,691	5467,563	4856,836	62,535	-10,052	6,508	20591,238
	7,000	13,646	33,843	4782,463	4248,262	62,540	-10,049	6,008	20591,238
	6,000	14,646	28,995	4097,363	3639,688	62,546	-10,045	5,508	20591,238
	5,000	15,646	24,147	3412,263	3031,114	62,556	-10,039	5,007	20591,238
	4,000	16,646	19,299	2727,163	2422,539	62,569	-10,030	4,507	20591,238
	3,000	17,646	14,451	2042,063	1813,965	62,593	-10,015	4,006	20591,238
	2,000	18,646	9,605	1357,280	1205,671	62,636	-9,986	3,504	20499,951
	1,000	19,646	4,776	674,903	599,517	62,712	-9,936	3,001	20162,307
	0,211	20,435	1,000	141,313	125,529	62,808	-9,870	2,606	19566,655
	0,000	20,646	0,000	0,000	0,000	62,842	-9,846	2,500	0,000

**Tank Calibrations - Carga6 ER**

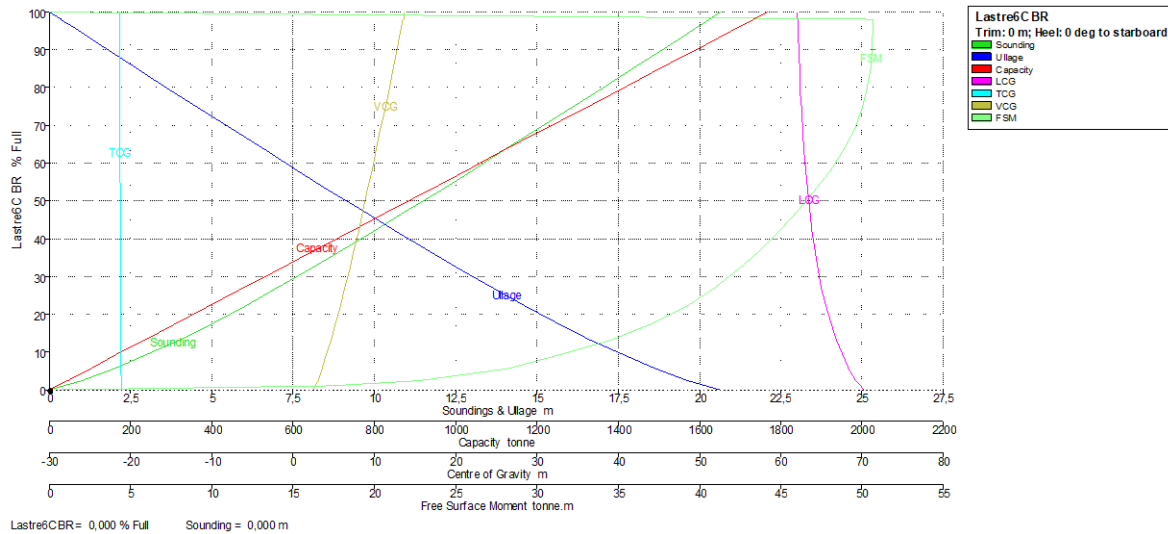
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Carga6 ER	20,646	0,000	100,000	14131,338	12552,867	62,513	10,066	12,832	0,000
	20,233	0,413	98,000	13848,711	12301,809	62,514	10,066	12,626	20591,238
	20,213	0,433	97,900	13834,580	12289,257	62,514	10,066	12,615	20591,238
	20,000	0,646	96,868	13688,763	12159,728	62,514	10,066	12,509	20591,238
	19,000	1,646	92,020	13003,663	11551,154	62,515	10,066	12,009	20591,238
	18,000	2,646	87,172	12318,563	10942,580	62,515	10,065	11,509	20591,238
	17,000	3,646	82,324	11633,463	10334,005	62,516	10,064	11,009	20591,238
	16,000	4,646	77,476	10948,363	9725,431	62,517	10,064	10,509	20591,238
	15,000	5,646	72,628	10263,263	9116,857	62,518	10,063	10,009	20591,238
	14,000	6,646	67,780	9578,163	8508,282	62,520	10,062	9,509	20591,238
	13,000	7,646	62,932	8893,063	7899,708	62,521	10,061	9,009	20591,238
	12,000	8,646	58,083	8207,963	7291,134	62,523	10,060	8,509	20591,238
	11,000	9,646	53,235	7522,863	6682,559	62,525	10,059	8,009	20591,238
	10,000	10,646	48,387	6837,763	6073,985	62,528	10,057	7,508	20591,238
	9,000	11,646	43,539	6152,663	5465,411	62,531	10,055	7,008	20591,238
	8,000	12,646	38,691	5467,563	4856,836	62,535	10,052	6,508	20591,238
	7,000	13,646	33,843	4782,463	4248,262	62,540	10,049	6,008	20591,238
	6,000	14,646	28,995	4097,363	3639,688	62,546	10,045	5,508	20591,238
	5,000	15,646	24,147	3412,263	3031,114	62,556	10,039	5,007	20591,238
	4,000	16,646	19,299	2727,163	2422,539	62,569	10,030	4,507	20591,238
	3,000	17,646	14,451	2042,063	1813,965	62,593	10,015	4,006	20591,238
	2,000	18,646	9,605	1357,280	1205,671	62,636	9,986	3,504	20499,951
	1,000	19,646	4,776	674,903	599,517	62,712	9,936	3,001	20162,307
	0,211	20,435	1,000	141,313	125,529	62,808	9,870	2,606	19566,655
	0,000	20,646	0,000	0,000	0,000	62,842	9,846	2,500	0,000

**Tank Calibrations - Lastre6C BR**

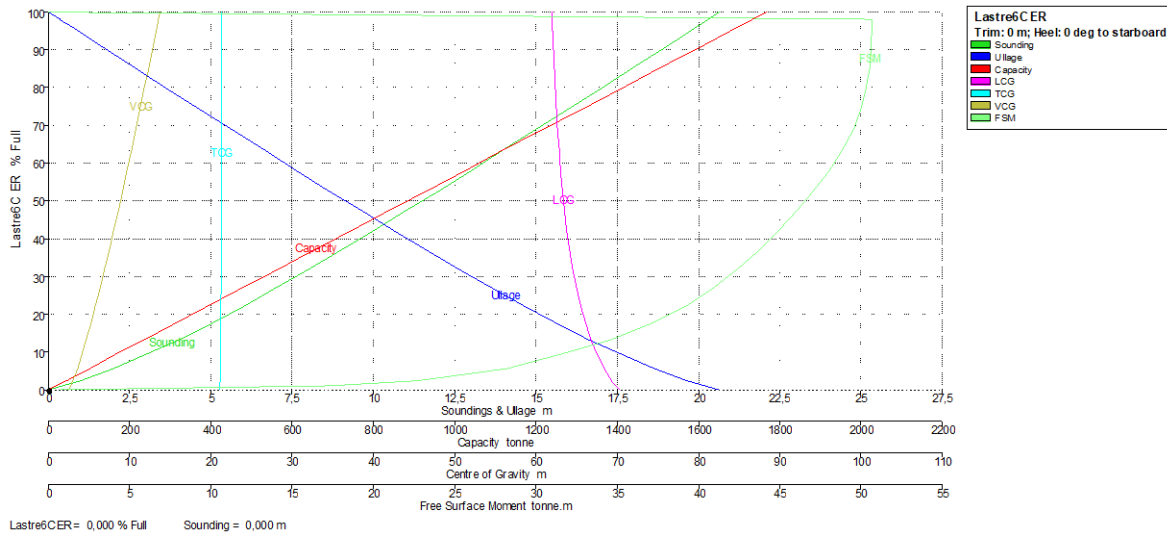
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre6C BR	20,646	0,000	100,000	1722,960	1766,034	62,016	-21,337	13,734	0,000
	20,283	0,363	98,000	1688,501	1730,714	62,047	-21,335	13,546	50,657
	20,265	0,381	97,900	1686,778	1728,947	62,049	-21,335	13,536	50,657
	20,000	0,646	96,440	1661,614	1703,155	62,072	-21,334	13,398	50,652
	19,000	1,646	90,929	1566,664	1605,831	62,167	-21,330	12,877	50,616
	18,000	2,646	85,420	1471,754	1508,548	62,273	-21,326	12,353	50,524
	17,000	3,646	79,917	1376,932	1411,355	62,393	-21,321	11,827	50,332
	16,000	4,646	74,423	1282,275	1314,332	62,529	-21,315	11,297	50,011
	15,000	5,646	68,945	1187,889	1217,587	62,683	-21,309	10,765	49,521
	14,000	6,646	63,490	1093,908	1121,256	62,857	-21,303	10,229	48,859
	13,000	7,646	58,068	1000,488	1025,500	63,055	-21,295	9,690	48,025
	12,000	8,646	52,689	907,804	930,499	63,279	-21,288	9,148	47,071
	11,000	9,646	47,363	816,038	836,439	63,536	-21,279	8,602	46,040
	10,000	10,646	42,102	725,409	743,544	63,830	-21,270	8,052	44,927
	9,000	11,646	36,926	636,212	652,118	64,170	-21,261	7,499	43,710
	8,000	12,646	31,854	548,840	562,561	64,564	-21,252	6,941	42,376
	7,000	13,646	26,918	463,790	475,385	65,022	-21,242	6,379	40,906
	6,000	14,646	22,153	381,693	391,235	65,554	-21,234	5,815	39,229
	5,000	15,646	17,607	303,355	310,939	66,162	-21,225	5,250	37,092
	4,000	16,646	13,332	229,697	235,439	66,834	-21,216	4,687	34,558
	3,000	17,646	9,371	161,455	165,492	67,560	-21,205	4,128	31,497
	2,000	18,646	5,755	99,156	101,635	68,349	-21,185	3,575	28,241
	1,000	19,646	2,555	44,014	45,115	69,236	-21,141	3,027	22,759
	0,432	20,214	1,000	17,230	17,660	69,791	-21,095	2,723	17,266
	0,000	20,646	0,000	0,000	0,000	70,240	-21,047	2,500	0,000

**Tank Calibrations - Lastre6C ER**

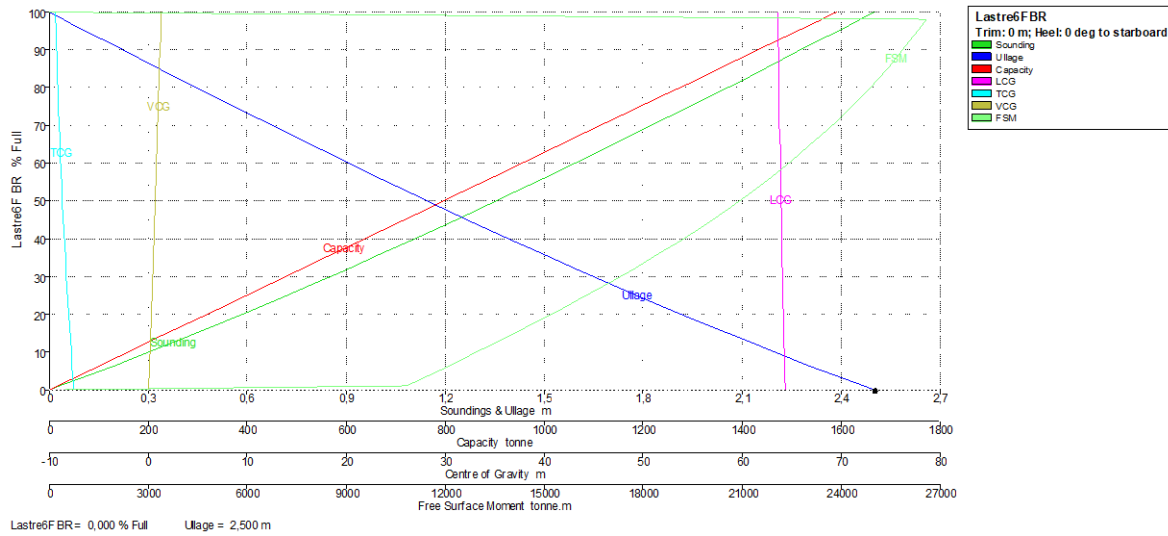
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre6C ER	20,646	0,000	100,000	1722,960	1766,034	62,016	21,337	13,734	0,000
	20,283	0,363	98,000	1688,501	1730,714	62,047	21,335	13,546	50,657
	20,265	0,381	97,900	1686,778	1728,947	62,049	21,335	13,536	50,657
	20,000	0,646	96,440	1661,614	1703,155	62,072	21,334	13,398	50,652
	19,000	1,646	90,929	1566,664	1605,831	62,167	21,330	12,877	50,616
	18,000	2,646	85,420	1471,754	1508,548	62,273	21,326	12,353	50,524
	17,000	3,646	79,917	1376,932	1411,355	62,393	21,321	11,827	50,332
	16,000	4,646	74,423	1282,275	1314,332	62,529	21,315	11,297	50,011
	15,000	5,646	68,945	1187,889	1217,587	62,683	21,309	10,765	49,521
	14,000	6,646	63,490	1093,908	1121,256	62,857	21,303	10,229	48,859
	13,000	7,646	58,068	1000,488	1025,500	63,055	21,295	9,690	48,025
	12,000	8,646	52,689	907,804	930,499	63,279	21,288	9,148	47,071
	11,000	9,646	47,363	816,038	836,439	63,536	21,279	8,602	46,040
	10,000	10,646	42,102	725,409	743,544	63,830	21,270	8,052	44,927
	9,000	11,646	36,926	636,212	652,118	64,170	21,261	7,499	43,710
	8,000	12,646	31,854	548,840	562,561	64,564	21,252	6,941	42,376
	7,000	13,646	26,918	463,790	475,385	65,022	21,242	6,379	40,906
	6,000	14,646	22,153	381,693	391,235	65,554	21,234	5,815	39,229
	5,000	15,646	17,607	303,355	310,939	66,162	21,225	5,250	37,092
	4,000	16,646	13,332	229,697	235,439	66,834	21,216	4,687	34,558
	3,000	17,646	9,371	161,455	165,492	67,560	21,205	4,128	31,497
	2,000	18,646	5,755	99,156	101,635	68,349	21,185	3,575	28,241
	1,000	19,646	2,555	44,014	45,115	69,236	21,141	3,027	22,759
	0,432	20,214	1,000	17,230	17,660	69,791	21,095	2,723	17,266
	0,000	20,646	0,000	0,000	0,000	70,240	21,047	2,500	0,000

**Tank Calibrations - Lastre6F BR**

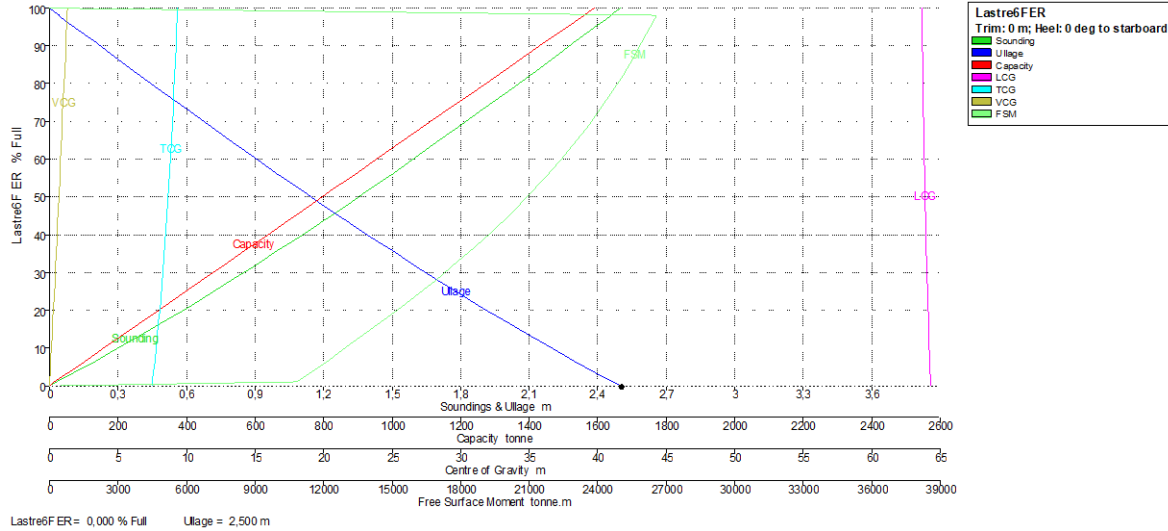
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre6F BR	2,500	0,000	100,000	1552,062	1590,864	63,641	-9,358	1,320	0,000
	2,456	0,044	98,000	1521,021	1559,047	63,650	-9,336	1,297	26571,318
	2,454	0,046	97,900	1519,469	1557,456	63,650	-9,335	1,296	26562,711
	2,400	0,100	95,474	1481,824	1518,869	63,661	-9,308	1,267	26354,101
	2,300	0,200	90,975	1411,985	1447,284	63,680	-9,257	1,213	25962,568
	2,200	0,300	86,502	1342,564	1376,128	63,701	-9,204	1,160	25540,205
	2,100	0,400	82,059	1273,603	1305,443	63,722	-9,149	1,106	25092,580
	2,000	0,500	77,646	1205,122	1235,250	63,743	-9,092	1,052	24624,386
	1,900	0,600	73,268	1137,166	1165,595	63,765	-9,033	0,999	24117,939
	1,800	0,700	68,925	1069,759	1096,503	63,788	-8,971	0,945	23600,923
	1,700	0,800	64,620	1002,949	1028,023	63,811	-8,908	0,891	23034,774
	1,600	0,900	60,356	936,766	960,185	63,835	-8,842	0,838	22466,689
	1,500	1,000	56,135	871,257	893,038	63,859	-8,774	0,784	21842,267
	1,400	1,100	51,960	806,457	826,618	63,884	-8,703	0,731	21222,775
	1,300	1,200	47,834	742,415	760,975	63,910	-8,630	0,677	20543,504
	1,200	1,300	43,759	679,171	696,150	63,937	-8,556	0,624	19874,589
	1,100	1,400	39,739	616,774	632,194	63,964	-8,478	0,571	19147,211
	1,000	1,500	35,776	555,270	569,151	63,992	-8,399	0,518	18434,086
	0,900	1,600	31,874	494,705	507,073	64,021	-8,317	0,465	17667,065
	0,800	1,700	28,036	435,129	446,007	64,051	-8,234	0,412	16918,414
	0,700	1,800	24,264	376,591	386,006	64,082	-8,148	0,360	16121,461
	0,600	1,900	20,562	319,138	327,116	64,114	-8,060	0,307	15347,892
	0,500	2,000	16,934	262,824	269,395	64,147	-7,970	0,255	14533,936
	0,400	2,100	13,382	207,692	212,884	64,181	-7,879	0,203	13748,594
	0,300	2,200	9,909	153,798	157,643	64,216	-7,786	0,152	12931,717
	0,200	2,300	6,519	101,183	103,713	64,253	-7,691	0,101	12149,379
	0,100	2,400	3,215	49,904	51,151	64,290	-7,596	0,050	11344,354
	0,031	2,469	1,000	15,521	15,909	64,317	-7,531	0,016	10815,740
	0,000	2,500	0,000	0,000	0,000	64,329	-7,501	0,000	0,000

**Tank Calibrations - Lastre6F ER**

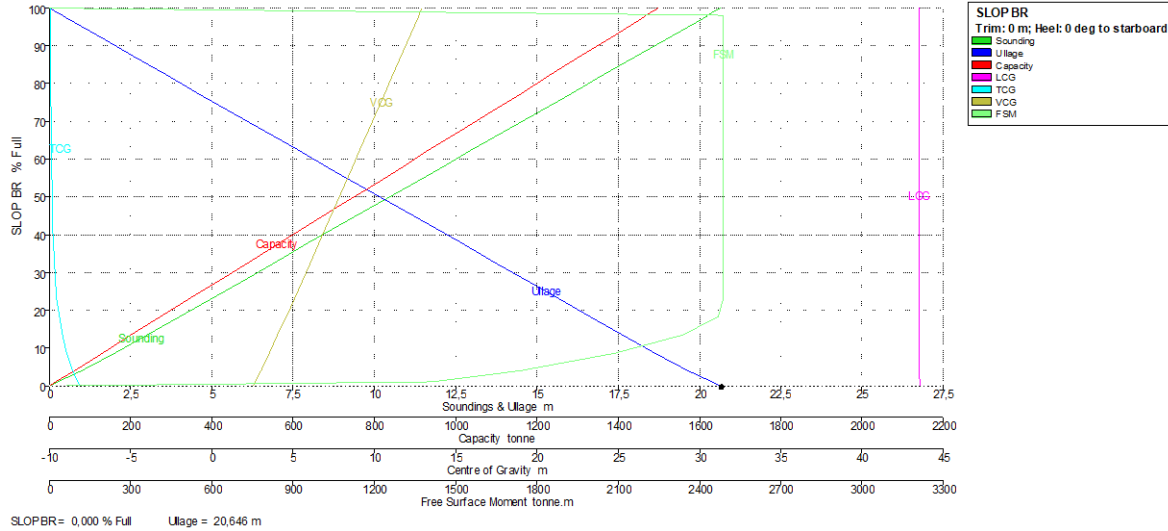
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre6F ER	2,500	0,000	100,000	1552,062	1590,864	63,641	9,358	1,320	0,000
	2,456	0,044	98,000	1521,021	1559,047	63,650	9,336	1,297	26571,318
	2,454	0,046	97,900	1519,469	1557,456	63,650	9,335	1,296	26562,711
	2,400	0,100	95,474	1481,824	1518,869	63,661	9,308	1,267	26354,101
	2,300	0,200	90,975	1411,985	1447,284	63,680	9,257	1,213	25962,568
	2,200	0,300	86,502	1342,564	1376,128	63,701	9,204	1,160	25540,205
	2,100	0,400	82,059	1273,603	1305,443	63,722	9,149	1,106	25092,580
	2,000	0,500	77,646	1205,122	1235,250	63,743	9,092	1,052	24624,386
	1,900	0,600	73,268	1137,166	1165,595	63,765	9,033	0,999	24117,939
	1,800	0,700	68,925	1069,759	1096,503	63,788	8,971	0,945	23600,923
	1,700	0,800	64,620	1002,949	1028,023	63,811	8,908	0,891	23034,774
	1,600	0,900	60,356	936,766	960,185	63,835	8,842	0,838	22466,689
	1,500	1,000	56,135	871,257	893,038	63,859	8,774	0,784	21842,267
	1,400	1,100	51,960	806,457	826,618	63,884	8,703	0,731	21222,775
	1,300	1,200	47,834	742,415	760,975	63,910	8,630	0,677	20543,504
	1,200	1,300	43,759	679,171	696,150	63,937	8,556	0,624	19874,589
	1,100	1,400	39,739	616,774	632,194	63,964	8,478	0,571	19147,211
	1,000	1,500	35,776	555,270	569,151	63,992	8,399	0,518	18434,086
	0,900	1,600	31,874	494,705	507,073	64,021	8,317	0,465	17667,065
	0,800	1,700	28,036	435,129	446,007	64,051	8,234	0,412	16918,414
	0,700	1,800	24,264	376,591	386,006	64,082	8,148	0,360	16121,461
	0,600	1,900	20,562	319,138	327,116	64,114	8,060	0,307	15347,892
	0,500	2,000	16,934	262,824	269,395	64,147	7,970	0,255	14533,936
	0,400	2,100	13,382	207,692	212,884	64,181	7,879	0,203	13748,594
	0,300	2,200	9,909	153,798	157,643	64,216	7,786	0,152	12931,717
	0,200	2,300	6,519	101,183	103,713	64,253	7,691	0,101	12149,379
	0,100	2,400	3,215	49,904	51,151	64,290	7,596	0,050	11344,354
	0,031	2,469	1,000	15,521	15,909	64,317	7,531	0,016	10815,740
	0,000	2,500	0,000	0,000	0,000	64,329	7,501	0,000	0,000

**Tank Calibrations - SLOP BR**

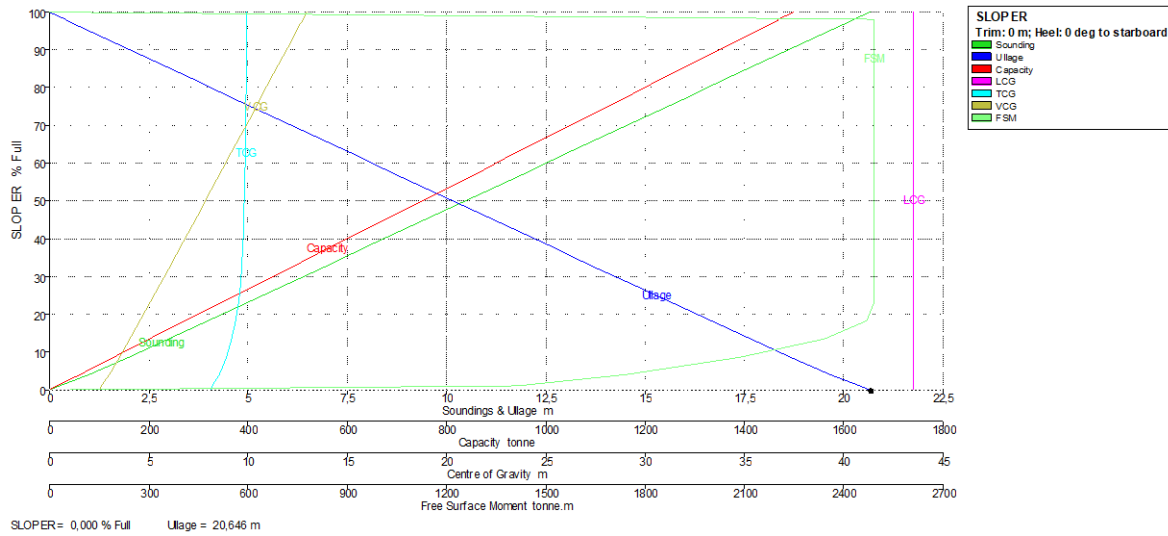
Fluid Type = Slops      Specific gravity = 0,913  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
SLOP BR	20,646	0,000	100,000	1641,097	1498,321	43,503	-9,951	12,952	0,000
	20,239	0,407	98,000	1608,275	1468,355	43,504	-9,948	12,748	2489,858
	20,218	0,428	97,900	1606,634	1466,857	43,504	-9,948	12,738	2489,858
	20,000	0,646	96,827	1589,029	1450,784	43,504	-9,947	12,628	2489,858
	19,000	1,646	91,916	1508,429	1377,196	43,504	-9,940	12,128	2489,858
	18,000	2,646	87,005	1427,829	1303,608	43,504	-9,932	11,627	2489,858
	17,000	3,646	82,093	1347,229	1230,020	43,504	-9,924	11,126	2489,858
	16,000	4,646	77,182	1266,629	1156,432	43,505	-9,914	10,625	2489,858
	15,000	5,646	72,271	1186,029	1082,845	43,505	-9,903	10,124	2489,858
	14,000	6,646	67,359	1105,429	1009,257	43,505	-9,890	9,622	2489,858
	13,000	7,646	62,448	1024,829	935,669	43,506	-9,876	9,121	2489,858
	12,000	8,646	57,536	944,229	862,081	43,506	-9,859	8,619	2489,858
	11,000	9,646	52,625	863,629	788,493	43,507	-9,839	8,116	2489,858
	10,000	10,646	47,714	783,029	714,906	43,507	-9,814	7,614	2489,858
	9,000	11,646	42,802	702,429	641,318	43,508	-9,785	7,111	2489,858
	8,000	12,646	37,891	621,829	567,730	43,509	-9,747	6,606	2489,858
	7,000	13,646	32,980	541,229	494,142	43,511	-9,698	6,101	2489,858
	6,000	14,646	28,068	460,629	420,555	43,512	-9,632	5,594	2489,858
	5,000	15,646	23,157	380,029	346,967	43,515	-9,538	5,083	2489,858
	4,000	16,646	18,249	299,478	273,423	43,519	-9,395	4,568	2469,373
	3,000	17,646	13,387	219,700	200,586	43,522	-9,185	4,047	2339,456
	2,000	18,646	8,664	142,190	129,820	43,524	-8,909	3,526	2085,200
	1,000	19,646	4,164	68,328	62,383	43,526	-8,553	3,008	1741,417
	0,250	20,396	1,000	16,411	14,983	43,529	-8,218	2,626	1413,725
	0,000	20,646	0,000	0,000	0,000	43,530	-8,092	2,500	0,000

**Tank Calibrations - SLOP ER**

Fluid Type = Slops      Specific gravity = 0,913  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

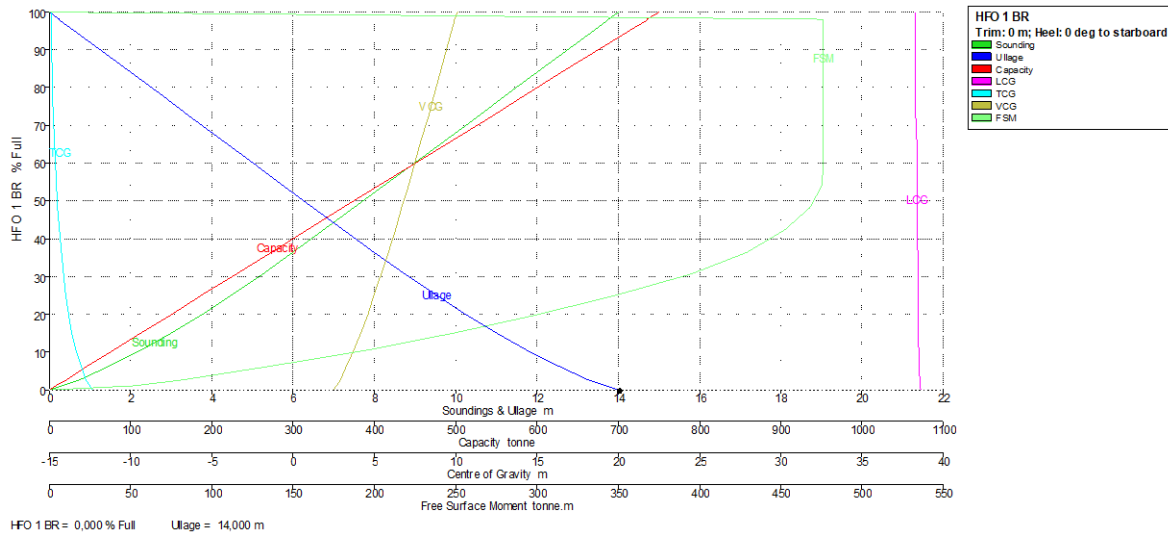


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
SLOP ER	20,646	0,000	100,000	1641,097	1498,321	43,503	9,951	12,952	0,000
	20,239	0,407	98,000	1608,275	1468,355	43,504	9,948	12,748	2489,858
	20,218	0,428	97,900	1606,634	1466,857	43,504	9,948	12,738	2489,858
	20,000	0,646	96,827	1589,029	1450,784	43,504	9,947	12,628	2489,858
	19,000	1,646	91,916	1508,429	1377,196	43,504	9,940	12,128	2489,858
	18,000	2,646	87,005	1427,829	1303,608	43,504	9,932	11,627	2489,858
	17,000	3,646	82,093	1347,229	1230,020	43,504	9,924	11,126	2489,858
	16,000	4,646	77,182	1266,629	1156,432	43,505	9,914	10,625	2489,858
	15,000	5,646	72,271	1186,029	1082,845	43,505	9,903	10,124	2489,858
	14,000	6,646	67,359	1105,429	1009,257	43,505	9,890	9,622	2489,858
	13,000	7,646	62,448	1024,829	935,669	43,506	9,876	9,121	2489,858
	12,000	8,646	57,536	944,229	862,081	43,506	9,859	8,619	2489,858
	11,000	9,646	52,625	863,629	788,493	43,507	9,839	8,116	2489,858
	10,000	10,646	47,714	783,029	714,906	43,507	9,814	7,614	2489,858
	9,000	11,646	42,802	702,429	641,318	43,508	9,785	7,111	2489,858
	8,000	12,646	37,891	621,829	567,730	43,509	9,747	6,606	2489,858
	7,000	13,646	32,980	541,229	494,142	43,511	9,698	6,101	2489,858
	6,000	14,646	28,068	460,629	420,555	43,512	9,632	5,594	2489,858
	5,000	15,646	23,157	380,029	346,967	43,515	9,538	5,083	2489,858
	4,000	16,646	18,249	299,478	273,423	43,519	9,395	4,568	2469,373
	3,000	17,646	13,387	219,700	200,586	43,522	9,185	4,047	2339,456
	2,000	18,646	8,664	142,190	129,820	43,524	8,909	3,526	2085,200
	1,000	19,646	4,164	68,328	62,383	43,526	8,553	3,008	1741,417
	0,250	20,396	1,000	16,411	14,983	43,529	8,218	2,626	1413,725
	0,000	20,646	0,000	0,000	0,000	43,530	8,092	2,500	0,000



**Tank Calibrations - HFO 1 BR**

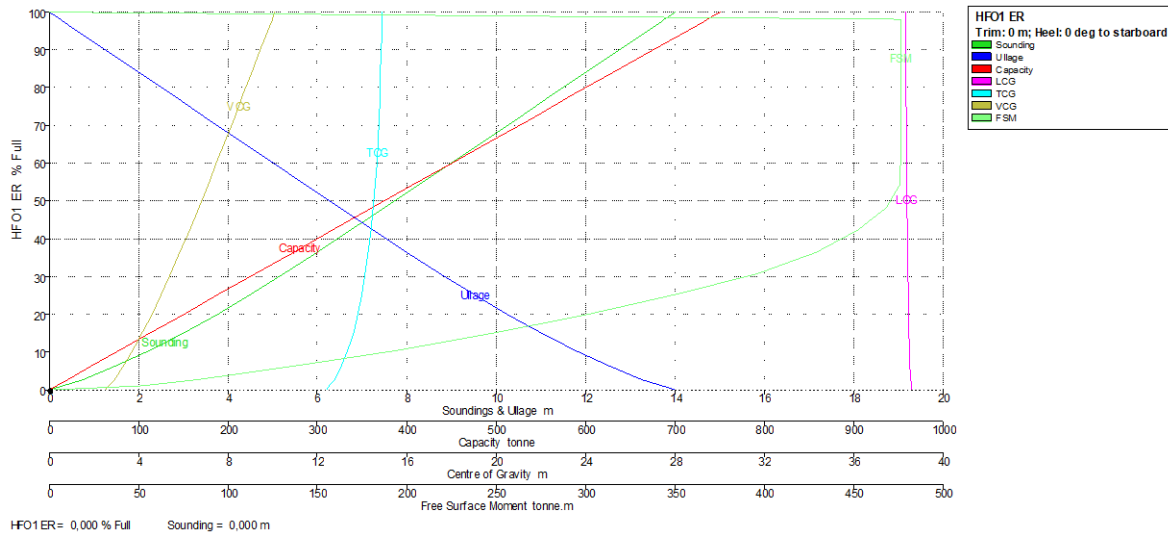
Fluid Type = Fuel Oil      Specific gravity = 0,9443  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO 1 BR	14,000	0,000	100,000	794,894	750,618	38,314	-14,896	10,090	0,000
	13,750	0,250	98,000	778,996	735,606	38,316	-14,889	9,961	476,276
	13,737	0,263	97,900	778,201	734,855	38,316	-14,888	9,955	476,276
	13,500	0,500	96,007	763,158	720,650	38,317	-14,881	9,833	476,276
	12,750	1,250	90,019	715,553	675,697	38,321	-14,855	9,448	476,276
	12,000	2,000	84,030	667,949	630,744	38,326	-14,826	9,061	476,276
	11,250	2,750	78,041	620,345	585,791	38,332	-14,792	8,673	476,276
	10,500	3,500	72,052	572,740	540,839	38,339	-14,752	8,282	476,276
	9,750	4,250	66,064	525,136	495,886	38,347	-14,706	7,888	476,276
	9,000	5,000	60,075	477,531	450,933	38,357	-14,650	7,491	476,276
	8,250	5,750	54,087	429,931	405,984	38,369	-14,581	7,088	475,535
	7,500	6,500	48,115	382,463	361,159	38,382	-14,498	6,680	468,246
	6,750	7,250	42,196	335,414	316,731	38,397	-14,398	6,267	452,365
	6,000	8,000	36,372	289,117	273,013	38,411	-14,279	5,850	429,046
	5,250	8,750	30,690	243,955	230,366	38,424	-14,140	5,428	395,517
	4,500	9,500	25,210	200,394	189,232	38,436	-13,981	5,004	350,657
	3,750	10,250	19,991	158,904	150,053	38,449	-13,802	4,580	300,408
	3,000	11,000	15,071	119,795	113,122	38,464	-13,599	4,156	249,027
	2,250	11,750	10,501	83,470	78,821	38,483	-13,362	3,732	195,339
	1,500	12,500	6,367	50,614	47,795	38,509	-13,081	3,310	138,749
	0,750	13,250	2,804	22,292	21,050	38,546	-12,748	2,894	82,477
	0,296	13,704	1,000	7,949	7,506	38,578	-12,523	2,651	51,756
	0,000	14,000	0,000	0,000	0,000	38,605	-12,369	2,500	0,000

**Tank Calibrations - HFO1 ER**

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

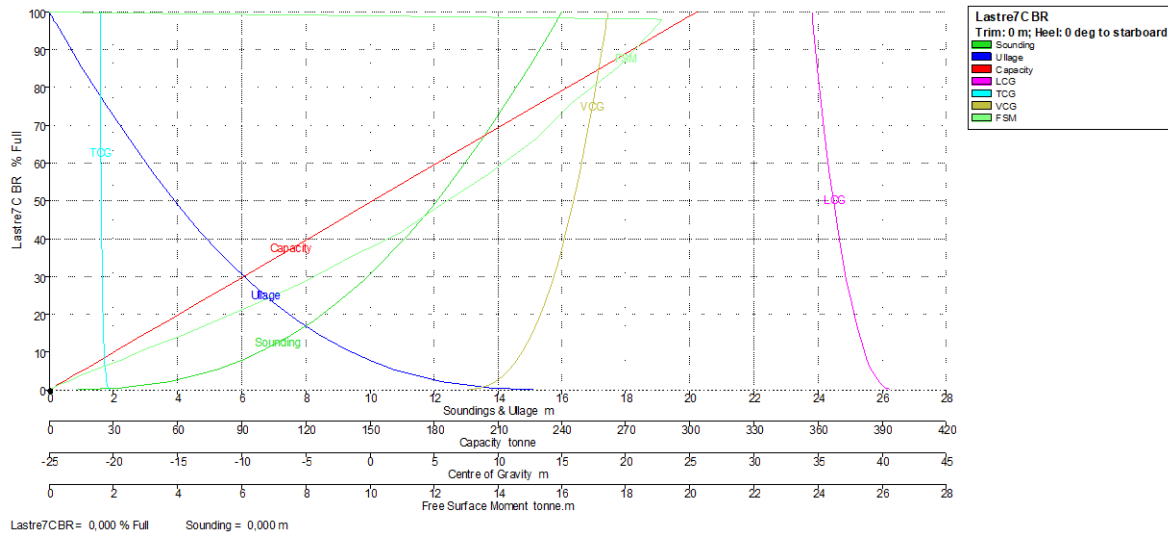


HFO1 ER = 0,000 % Full      Sounding = 0,000 m

Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO1 ER	14,000	0,000	100,000	794,894	750,618	38,314	14,896	10,090	0,000
	13,750	0,250	98,000	778,996	735,606	38,316	14,889	9,961	476,276
	13,737	0,263	97,900	778,201	734,855	38,316	14,888	9,955	476,276
	13,500	0,500	96,007	763,158	720,650	38,317	14,881	9,833	476,276
	12,750	1,250	90,019	715,553	675,697	38,321	14,855	9,448	476,276
	12,000	2,000	84,030	667,949	630,744	38,326	14,826	9,061	476,276
	11,250	2,750	78,041	620,345	585,791	38,332	14,792	8,673	476,276
	10,500	3,500	72,052	572,740	540,839	38,339	14,752	8,282	476,276
	9,750	4,250	66,064	525,136	495,886	38,347	14,706	7,888	476,276
	9,000	5,000	60,075	477,531	450,933	38,357	14,650	7,491	476,276
	8,250	5,750	54,087	429,931	405,984	38,369	14,581	7,088	475,535
	7,500	6,500	48,115	382,463	361,159	38,382	14,498	6,680	468,246
	6,750	7,250	42,196	335,414	316,731	38,397	14,398	6,267	452,365
	6,000	8,000	36,372	289,117	273,013	38,411	14,279	5,850	429,046
	5,250	8,750	30,690	243,955	230,366	38,424	14,140	5,428	395,517
	4,500	9,500	25,210	200,394	189,232	38,436	13,981	5,004	350,657
	3,750	10,250	19,991	158,904	150,053	38,449	13,802	4,580	300,408
	3,000	11,000	15,071	119,795	113,122	38,464	13,599	4,156	249,027
	2,250	11,750	10,501	83,470	78,821	38,483	13,362	3,732	195,339
	1,500	12,500	6,367	50,614	47,795	38,509	13,081	3,310	138,749
	0,750	13,250	2,804	22,292	21,050	38,546	12,748	2,894	82,477
	0,296	13,704	1,000	7,949	7,506	38,578	12,523	2,651	51,756
	0,000	14,000	0,000	0,000	0,000	38,605	12,369	2,500	0,000

**Tank Calibrations - Lastre7C BR**

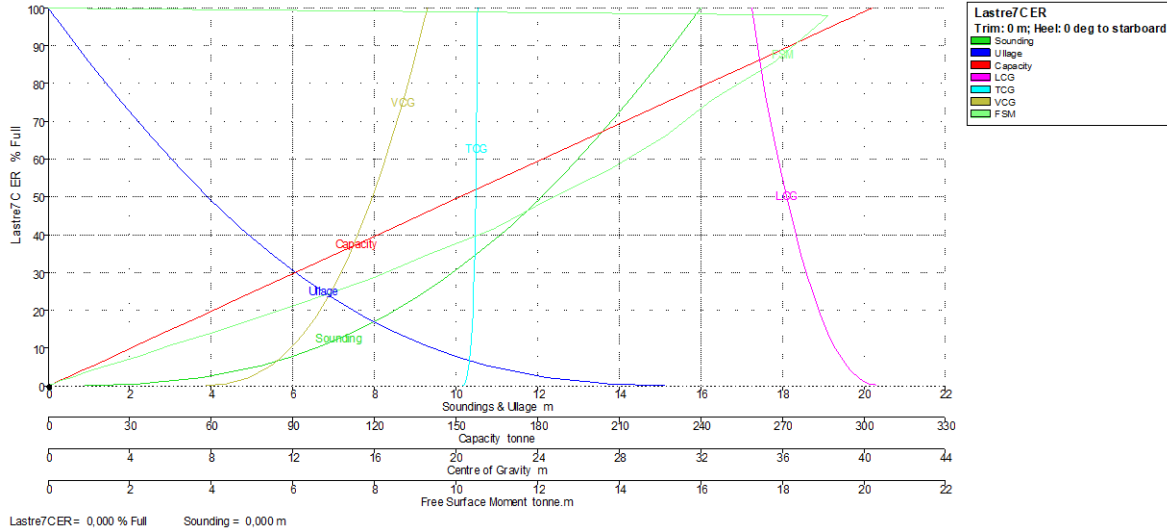
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre7C BR	15,996	0,000	100,000	295,590	302,979	34,512	-21,053	18,597	0,000
	15,859	0,136	98,000	289,678	296,920	34,565	-21,050	18,505	19,122
	15,853	0,143	97,900	289,382	296,617	34,568	-21,050	18,501	19,113
	15,750	0,246	96,405	284,965	292,089	34,609	-21,048	18,432	18,975
	15,000	0,996	85,781	253,560	259,899	34,913	-21,033	17,924	17,812
	14,250	1,746	75,721	223,824	229,420	35,225	-21,016	17,412	16,287
	13,500	2,496	66,231	195,773	200,667	35,550	-20,997	16,894	15,160
	12,750	3,246	57,347	169,512	173,750	35,887	-20,977	16,369	13,772
	12,000	3,996	48,948	144,686	148,303	36,273	-20,956	15,831	12,223
	11,250	4,746	41,533	122,767	125,837	36,584	-20,930	15,304	10,918
	10,500	5,496	34,735	102,674	105,241	36,910	-20,902	14,770	9,318
	9,750	6,246	28,596	84,526	86,639	37,244	-20,872	14,231	7,958
	9,000	6,996	23,123	68,349	70,058	37,586	-20,840	13,686	6,547
	8,250	7,746	18,368	54,295	55,653	37,903	-20,804	13,143	5,225
	7,500	8,496	14,239	42,088	43,140	38,231	-20,767	12,594	4,097
	6,750	9,246	10,772	31,840	32,636	38,530	-20,725	12,049	2,992
	6,000	9,996	7,861	23,236	23,817	38,840	-20,682	11,499	2,223
	5,250	10,746	5,508	16,282	16,689	39,144	-20,636	10,946	1,445
	4,500	11,496	3,671	10,850	11,121	39,412	-20,585	10,399	0,961
	3,750	12,246	2,253	6,660	6,827	39,732	-20,536	9,836	0,576
	3,000	12,996	1,276	3,771	3,865	39,963	-20,477	9,289	0,276
	2,728	13,267	1,000	2,956	3,030	40,051	-20,456	9,088	0,218
	2,250	13,746	0,604	1,787	1,831	40,257	-20,422	8,719	0,136
	1,500	14,496	0,231	0,684	0,701	40,580	-20,366	8,139	0,030
	0,750	15,246	0,060	0,179	0,183	40,580	-20,264	7,647	0,005
	0,000	15,996	0,000	0,000	0,000	40,580	-20,150	7,150	0,000

**Tank Calibrations - Lastre7C ER**

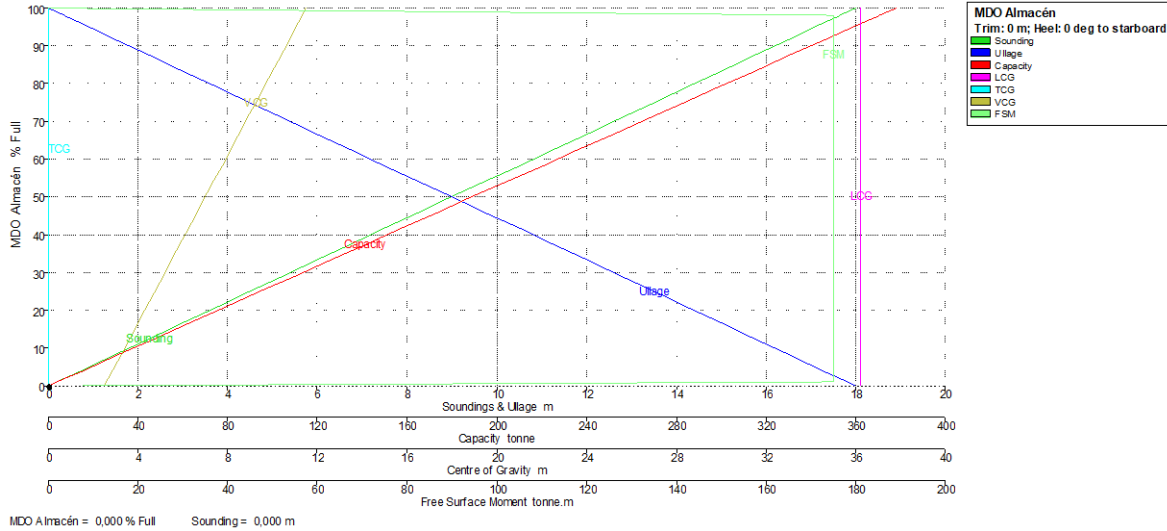
Fluid Type = Water Ballast      Specific gravity = 1,025  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre7C ER	15,996	0,000	100,000	295,590	302,979	34,512	21,053	18,597	0,000
	15,859	0,136	98,000	289,678	296,920	34,565	21,050	18,505	19,122
	15,853	0,143	97,900	289,382	296,617	34,568	21,050	18,501	19,113
	15,750	0,246	96,405	284,965	292,089	34,609	21,048	18,432	18,975
	15,000	0,996	85,781	253,560	259,899	34,913	21,033	17,924	17,812
	14,250	1,746	75,721	223,824	229,420	35,225	21,016	17,412	16,287
	13,500	2,496	66,231	195,773	200,667	35,550	20,997	16,894	15,160
	12,750	3,246	57,347	169,512	173,750	35,887	20,977	16,369	13,772
	12,000	3,996	48,948	144,686	148,303	36,273	20,956	15,831	12,223
	11,250	4,746	41,533	122,767	125,837	36,584	20,930	15,304	10,918
	10,500	5,496	34,735	102,674	105,241	36,910	20,902	14,770	9,318
	9,750	6,246	28,596	84,526	86,639	37,244	20,872	14,231	7,958
	9,000	6,996	23,123	68,349	70,058	37,586	20,840	13,686	6,547
	8,250	7,746	18,368	54,295	55,653	37,903	20,804	13,143	5,225
	7,500	8,496	14,239	42,088	43,140	38,231	20,767	12,594	4,097
	6,750	9,246	10,772	31,840	32,636	38,530	20,725	12,049	2,992
	6,000	9,996	7,861	23,236	23,817	38,840	20,682	11,499	2,223
	5,250	10,746	5,508	16,282	16,689	39,144	20,636	10,946	1,445
	4,500	11,496	3,671	10,850	11,121	39,412	20,585	10,399	0,961
	3,750	12,246	2,253	6,660	6,827	39,732	20,536	9,836	0,576
	3,000	12,996	1,276	3,771	3,865	39,963	20,477	9,289	0,276
	2,728	13,267	1,000	2,956	3,030	40,051	20,456	9,088	0,218
	2,250	13,746	0,604	1,787	1,831	40,257	20,422	8,719	0,136
	1,500	14,496	0,231	0,684	0,701	40,580	20,366	8,139	0,030
	0,750	15,246	0,060	0,179	0,183	40,580	20,264	7,647	0,005
	0,000	15,996	0,000	0,000	0,000	40,580	20,150	7,150	0,000

**Tank Calibrations - MDO Almacén**

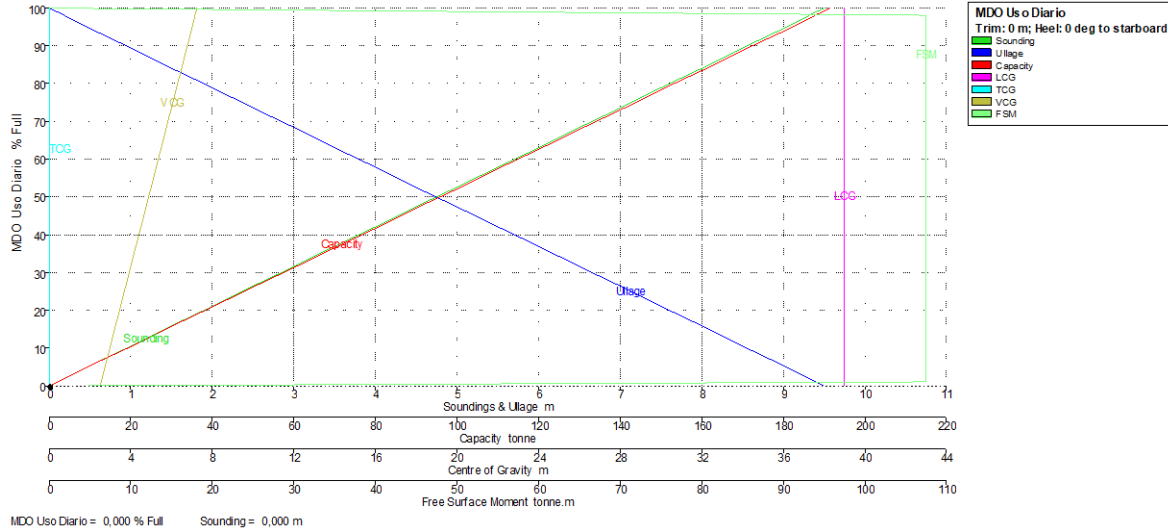
Fluid Type = Diesel      Specific gravity = 0,84  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
MDO Almacén	18,000	0,000	100,000	450,000	378,000	36,250	0,000	11,500	0,000
	17,640	0,360	98,000	441,000	370,440	36,250	0,000	11,320	175,000
	17,622	0,378	97,900	440,550	370,062	36,250	0,000	11,311	175,000
	17,250	0,750	95,833	431,250	362,250	36,250	0,000	11,125	175,000
	16,500	1,500	91,667	412,500	346,500	36,250	0,000	10,750	175,000
	15,750	2,250	87,500	393,750	330,750	36,250	0,000	10,375	175,000
	15,000	3,000	83,333	375,000	315,000	36,250	0,000	10,000	175,000
	14,250	3,750	79,167	356,250	299,250	36,250	0,000	9,625	175,000
	13,500	4,500	75,000	337,500	283,500	36,250	0,000	9,250	175,000
	12,750	5,250	70,833	318,750	267,750	36,250	0,000	8,875	175,000
	12,000	6,000	66,667	300,000	252,000	36,250	0,000	8,500	175,000
	11,250	6,750	62,500	281,250	236,250	36,250	0,000	8,125	175,000
	10,500	7,500	58,333	262,500	220,500	36,250	0,000	7,750	175,000
	9,750	8,250	54,167	243,750	204,750	36,250	0,000	7,375	175,000
	9,000	9,000	50,000	225,000	189,000	36,250	0,000	7,000	175,000
	8,250	9,750	45,833	206,250	173,250	36,250	0,000	6,625	175,000
	7,500	10,500	41,667	187,500	157,500	36,250	0,000	6,250	175,000
	6,750	11,250	37,500	168,750	141,750	36,250	0,000	5,875	175,000
	6,000	12,000	33,333	150,000	126,000	36,250	0,000	5,500	175,000
	5,250	12,750	29,167	131,250	110,250	36,250	0,000	5,125	175,000
	4,500	13,500	25,000	112,500	94,500	36,250	0,000	4,750	175,000
	3,750	14,250	20,833	93,750	78,750	36,250	0,000	4,375	175,000
	3,000	15,000	16,667	75,000	63,000	36,250	0,000	4,000	175,000
	2,250	15,750	12,500	56,250	47,250	36,250	0,000	3,625	175,000
	1,500	16,500	8,333	37,500	31,500	36,250	0,000	3,250	175,000
	0,750	17,250	4,167	18,750	15,750	36,250	0,000	2,875	175,000
	0,180	17,820	1,000	4,500	3,780	36,250	0,000	2,590	175,000
	0,000	18,000	0,000	0,000	0,000	36,250	0,000	2,500	0,000

**Tank Calibrations - MDO Uso Diario**

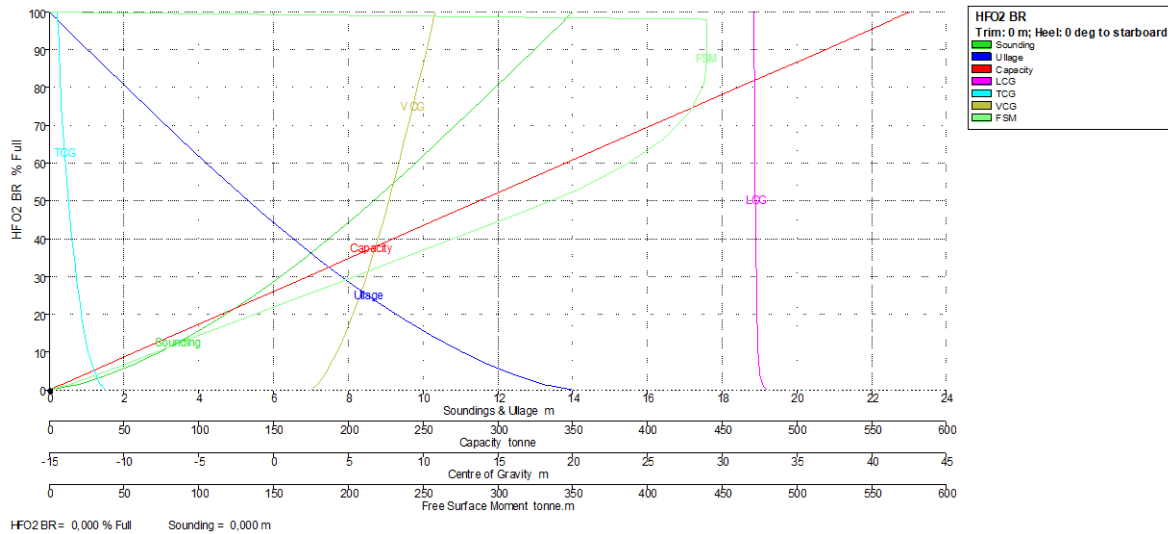
Fluid Type = Diesel      Specific gravity = 0,84  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
MDO Uso Diario	9,500	0,000	100,000	228,000	191,520	39,000	0,000	7,250	0,000
	9,310	0,190	98,000	223,440	187,690	39,000	0,000	7,155	107,520
	9,300	0,200	97,900	223,212	187,498	39,000	0,000	7,150	107,520
	9,000	0,500	94,737	216,000	181,440	39,000	0,000	7,000	107,520
	8,500	1,000	89,474	204,000	171,360	39,000	0,000	6,750	107,520
	8,000	1,500	84,211	192,000	161,280	39,000	0,000	6,500	107,520
	7,500	2,000	78,947	180,000	151,200	39,000	0,000	6,250	107,520
	7,000	2,500	73,684	168,000	141,120	39,000	0,000	6,000	107,520
	6,500	3,000	68,421	156,000	131,040	39,000	0,000	5,750	107,520
	6,000	3,500	63,158	144,000	120,960	39,000	0,000	5,500	107,520
	5,500	4,000	57,895	132,000	110,880	39,000	0,000	5,250	107,520
	5,000	4,500	52,632	120,000	100,800	39,000	0,000	5,000	107,520
	4,500	5,000	47,368	108,000	90,720	39,000	0,000	4,750	107,520
	4,000	5,500	42,105	96,000	80,640	39,000	0,000	4,500	107,520
	3,500	6,000	36,842	84,000	70,560	39,000	0,000	4,250	107,520
	3,000	6,500	31,579	72,000	60,480	39,000	0,000	4,000	107,520
	2,500	7,000	26,316	60,000	50,400	39,000	0,000	3,750	107,520
	2,000	7,500	21,053	48,000	40,320	39,000	0,000	3,500	107,520
	1,500	8,000	15,789	36,000	30,240	39,000	0,000	3,250	107,520
	1,000	8,500	10,526	24,000	20,160	39,000	0,000	3,000	107,520
	0,500	9,000	5,263	12,000	10,080	39,000	0,000	2,750	107,520
	0,095	9,405	1,000	2,280	1,915	39,000	0,000	2,548	107,520
	0,000	9,500	0,000	0,000	0,000	39,000	0,000	2,500	0,000

**Tank Calibrations - HFO2 BR**

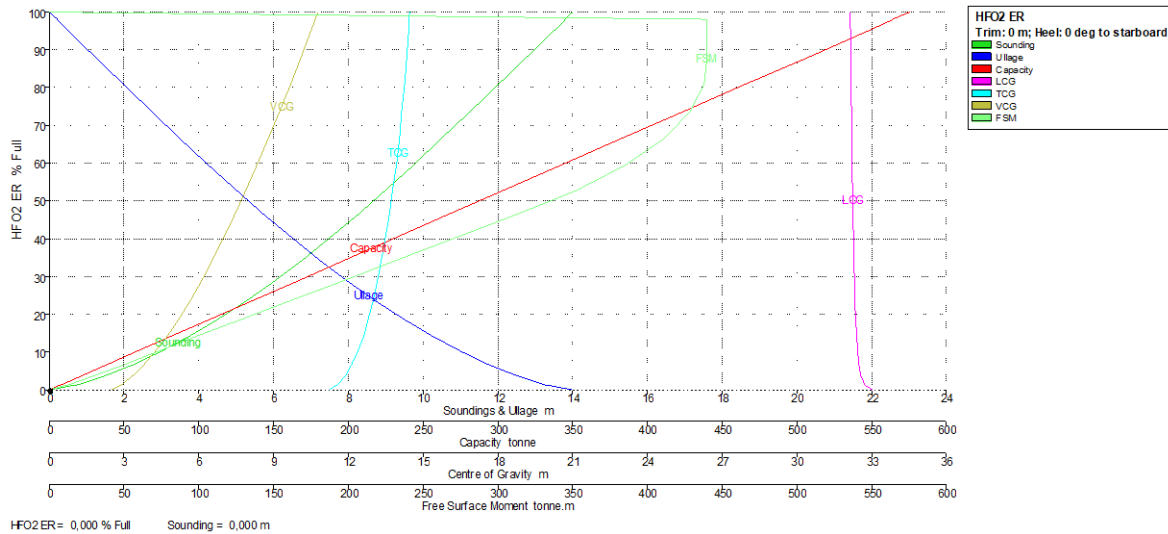
Fluid Type = Fuel Oil      Specific gravity = 0,9443  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m³	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO2 BR	14,000	0,000	100,000	609,516	575,566	32,135	-14,447	10,795	0,000
	13,792	0,208	98,000	597,325	564,054	32,137	-14,430	10,680	439,639
	13,782	0,218	97,900	596,716	563,479	32,138	-14,430	10,674	439,639
	13,500	0,500	95,194	580,221	547,902	32,142	-14,406	10,519	439,639
	12,750	1,250	87,984	536,278	506,407	32,153	-14,335	10,101	439,639
	12,000	2,000	80,776	492,344	464,921	32,167	-14,252	9,675	438,204
	11,250	2,750	73,598	448,590	423,604	32,182	-14,155	9,241	428,680
	10,500	3,500	66,502	405,339	382,762	32,198	-14,044	8,799	411,451
	9,750	4,250	59,544	362,928	342,713	32,213	-13,920	8,352	385,577
	9,000	5,000	52,781	321,707	303,788	32,229	-13,784	7,900	352,495
	8,250	5,750	46,272	282,037	266,327	32,244	-13,639	7,446	311,993
	7,500	6,500	40,062	244,182	230,581	32,261	-13,488	6,992	270,972
	6,750	7,250	34,169	208,266	196,666	32,281	-13,329	6,537	231,725
	6,000	8,000	28,614	174,406	164,692	32,302	-13,163	6,083	194,609
	5,250	8,750	23,416	142,726	134,776	32,327	-12,988	5,628	159,943
	4,500	9,500	18,599	113,362	107,048	32,356	-12,804	5,175	128,000
	3,750	10,250	14,186	86,465	81,649	32,390	-12,607	4,722	99,019
	3,000	11,000	10,207	62,213	58,748	32,432	-12,393	4,269	73,185
	2,250	11,750	6,701	40,845	38,570	32,487	-12,154	3,817	50,111
	1,500	12,500	3,739	22,789	21,520	32,569	-11,880	3,364	29,639
	0,750	13,250	1,442	8,791	8,301	32,713	-11,568	2,917	12,966
	0,566	13,434	1,000	6,095	5,756	32,768	-11,488	2,810	9,756
	0,000	14,000	0,000	0,000	0,000	33,043	-11,254	2,500	0,000

**Tank Calibrations - HFO2 ER**

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

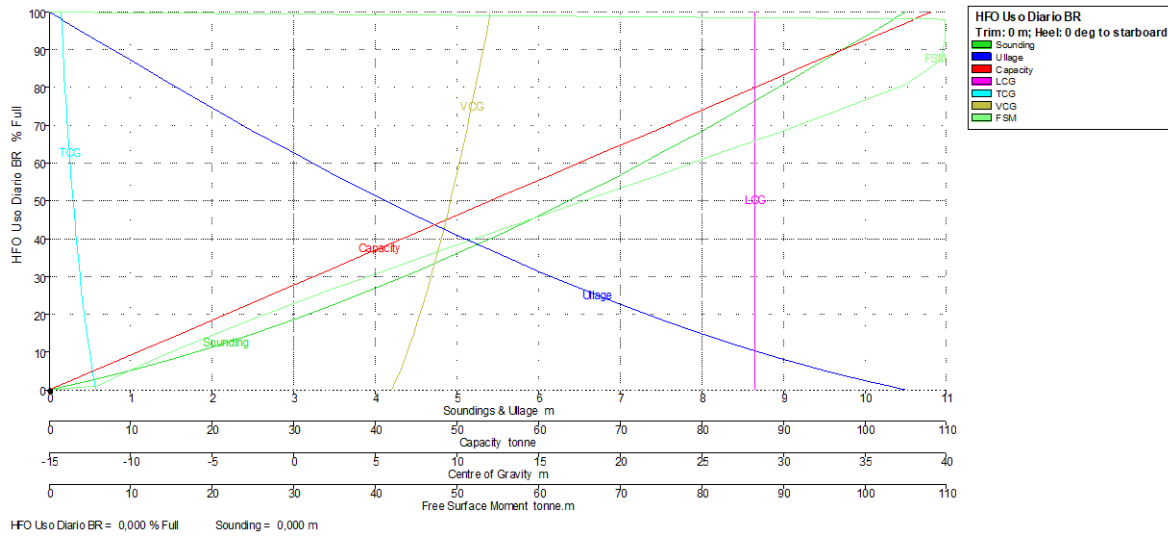


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO2 ER	14,000	0,000	100,000	609,516	575,566	32,135	14,447	10,795	0,000
	13,792	0,208	98,000	597,325	564,054	32,137	14,430	10,680	439,639
	13,782	0,218	97,900	596,716	563,479	32,138	14,430	10,674	439,639
	13,500	0,500	95,194	580,221	547,902	32,142	14,406	10,519	439,639
	12,750	1,250	87,984	536,278	506,407	32,153	14,335	10,101	439,639
	12,000	2,000	80,776	492,344	464,921	32,167	14,252	9,675	438,204
	11,250	2,750	73,598	448,590	423,604	32,182	14,155	9,241	428,680
	10,500	3,500	66,502	405,339	382,762	32,198	14,044	8,799	411,451
	9,750	4,250	59,544	362,928	342,713	32,213	13,920	8,352	385,577
	9,000	5,000	52,781	321,707	303,788	32,229	13,784	7,900	352,495
	8,250	5,750	46,272	282,037	266,327	32,244	13,639	7,446	311,993
	7,500	6,500	40,062	244,182	230,581	32,261	13,488	6,992	270,972
	6,750	7,250	34,169	208,266	196,666	32,281	13,329	6,537	231,725
	6,000	8,000	28,614	174,406	164,692	32,302	13,163	6,083	194,609
	5,250	8,750	23,416	142,726	134,776	32,327	12,988	5,628	159,943
	4,500	9,500	18,599	113,362	107,048	32,356	12,804	5,175	128,000
	3,750	10,250	14,186	86,465	81,649	32,390	12,607	4,722	99,019
	3,000	11,000	10,207	62,213	58,748	32,432	12,393	4,269	73,185
	2,250	11,750	6,701	40,845	38,570	32,487	12,154	3,817	50,111
	1,500	12,500	3,739	22,789	21,520	32,569	11,880	3,364	29,639
	0,750	13,250	1,442	8,791	8,301	32,713	11,568	2,917	12,966
	0,566	13,434	1,000	6,095	5,756	32,768	11,488	2,810	9,756
	0,000	14,000	0,000	0,000	0,000	33,043	11,254	2,500	0,000



**Tank Calibrations - HFO Uso Diario BR**

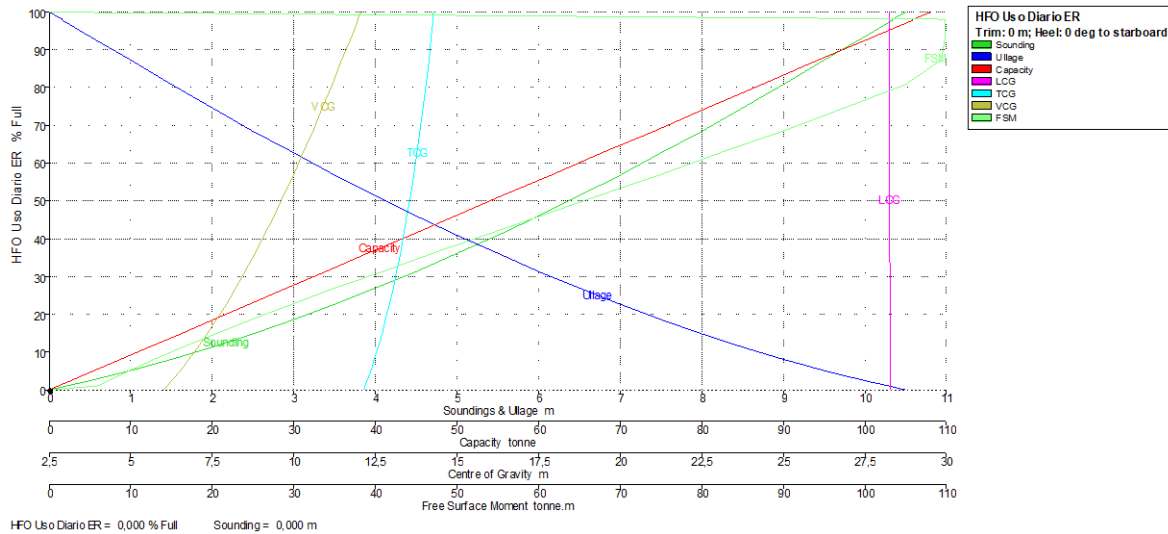
Fluid Type = Fuel Oil      Specific gravity = 0,9443  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO Uso Diario BR	10,500	0,000	100,000	114,480	108,103	28,260	-14,279	12,050	0,000
	10,344	0,156	98,000	112,190	105,941	28,260	-14,259	11,961	109,910
	10,336	0,164	97,900	112,076	105,833	28,260	-14,258	11,956	109,910
	10,000	0,500	93,603	107,156	101,187	28,260	-14,211	11,763	109,910
	9,500	1,000	87,207	99,834	94,274	28,261	-14,134	11,470	109,325
	9,000	1,500	80,858	92,566	87,410	28,261	-14,048	11,173	104,963
	8,500	2,000	74,634	85,441	80,682	28,262	-13,957	10,875	97,496
	8,000	2,500	68,571	78,500	74,127	28,263	-13,863	10,577	89,885
	7,500	3,000	62,677	71,752	67,755	28,263	-13,767	10,278	82,304
	7,000	3,500	56,961	65,208	61,576	28,264	-13,669	9,980	74,809
	6,500	4,000	51,431	58,878	55,599	28,264	-13,568	9,682	67,451
	6,000	4,500	46,098	52,772	49,833	28,265	-13,465	9,384	60,314
	5,500	5,000	40,967	46,899	44,286	28,266	-13,360	9,088	53,460
	5,000	5,500	36,047	41,266	38,968	28,267	-13,253	8,792	46,933
	4,500	6,000	31,345	35,884	33,885	28,268	-13,145	8,499	40,775
	4,000	6,500	26,869	30,759	29,046	28,269	-13,035	8,206	35,005
	3,500	7,000	22,624	25,900	24,458	28,270	-12,924	7,916	29,654
	3,000	7,500	18,620	21,316	20,128	28,271	-12,812	7,629	24,755
	2,500	8,000	14,861	17,013	16,065	28,272	-12,699	7,345	20,321
	2,000	8,500	11,355	12,999	12,275	28,274	-12,585	7,064	16,354
	1,500	9,000	8,109	9,283	8,766	28,275	-12,471	6,789	12,854
	1,000	9,500	5,130	5,872	5,545	28,277	-12,358	6,518	9,828
	0,500	10,000	2,424	2,775	2,621	28,279	-12,246	6,255	7,261
	0,213	10,287	1,000	1,145	1,081	28,280	-12,182	6,108	5,992
	0,000	10,500	0,000	0,000	0,000	28,281	-12,135	6,000	0,000

**Tank Calibrations - HFO Uso Diario ER**

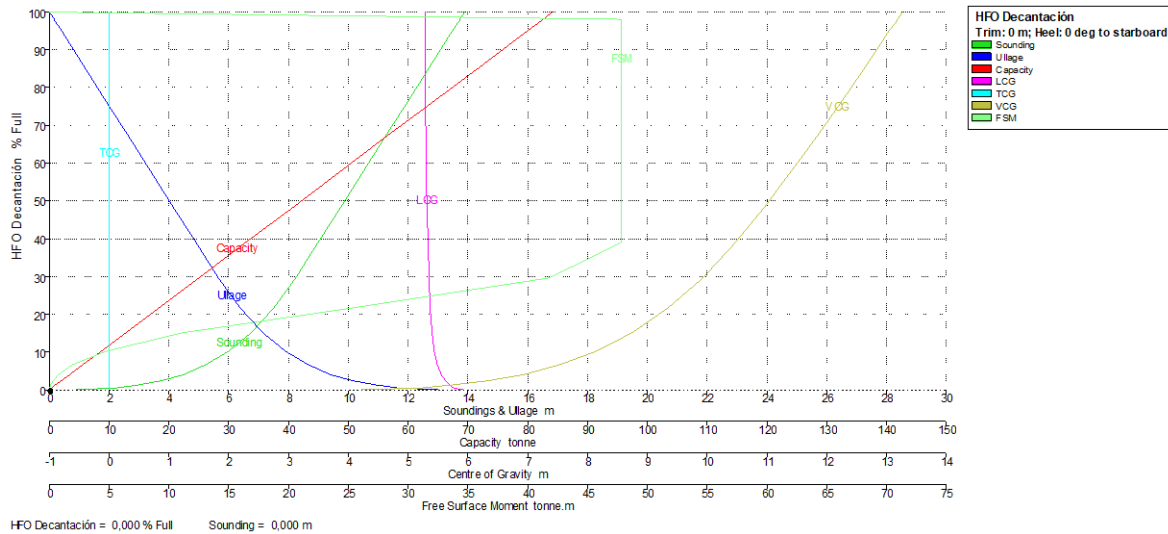
Fluid Type = Fuel Oil      Specific gravity = 0,9443  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO Uso Diario ER	10,500	0,000	100,000	114,480	108,103	28,260	14,279	12,050	0,000
	10,344	0,156	98,000	112,190	105,941	28,260	14,259	11,961	109,910
	10,336	0,164	97,900	112,076	105,833	28,260	14,258	11,956	109,910
	10,000	0,500	93,603	107,156	101,187	28,260	14,211	11,763	109,910
	9,500	1,000	87,207	99,834	94,274	28,261	14,134	11,470	109,325
	9,000	1,500	80,858	92,566	87,410	28,261	14,048	11,173	104,963
	8,500	2,000	74,634	85,441	80,682	28,262	13,957	10,875	97,496
	8,000	2,500	68,571	78,500	74,127	28,263	13,863	10,577	89,885
	7,500	3,000	62,677	71,752	67,755	28,263	13,767	10,278	82,304
	7,000	3,500	56,961	65,208	61,576	28,264	13,669	9,980	74,809
	6,500	4,000	51,431	58,878	55,599	28,264	13,568	9,682	67,451
	6,000	4,500	46,098	52,772	49,833	28,265	13,465	9,384	60,314
	5,500	5,000	40,967	46,899	44,286	28,266	13,360	9,088	53,460
	5,000	5,500	36,047	41,266	38,968	28,267	13,253	8,792	46,933
	4,500	6,000	31,345	35,884	33,885	28,268	13,145	8,499	40,775
	4,000	6,500	26,869	30,759	29,046	28,269	13,035	8,206	35,005
	3,500	7,000	22,624	25,900	24,458	28,270	12,924	7,916	29,654
	3,000	7,500	18,620	21,316	20,128	28,271	12,812	7,629	24,755
	2,500	8,000	14,861	17,013	16,065	28,272	12,699	7,345	20,321
	2,000	8,500	11,355	12,999	12,275	28,274	12,585	7,064	16,354
	1,500	9,000	8,109	9,283	8,766	28,275	12,471	6,789	12,854
	1,000	9,500	5,130	5,872	5,545	28,277	12,358	6,518	9,828
	0,500	10,000	2,424	2,775	2,621	28,279	12,246	6,255	7,261
	0,213	10,287	1,000	1,145	1,081	28,280	12,182	6,108	5,992
	0,000	10,500	0,000	0,000	0,000	28,281	12,135	6,000	0,000

### Tank Calibrations - HFO Decantación

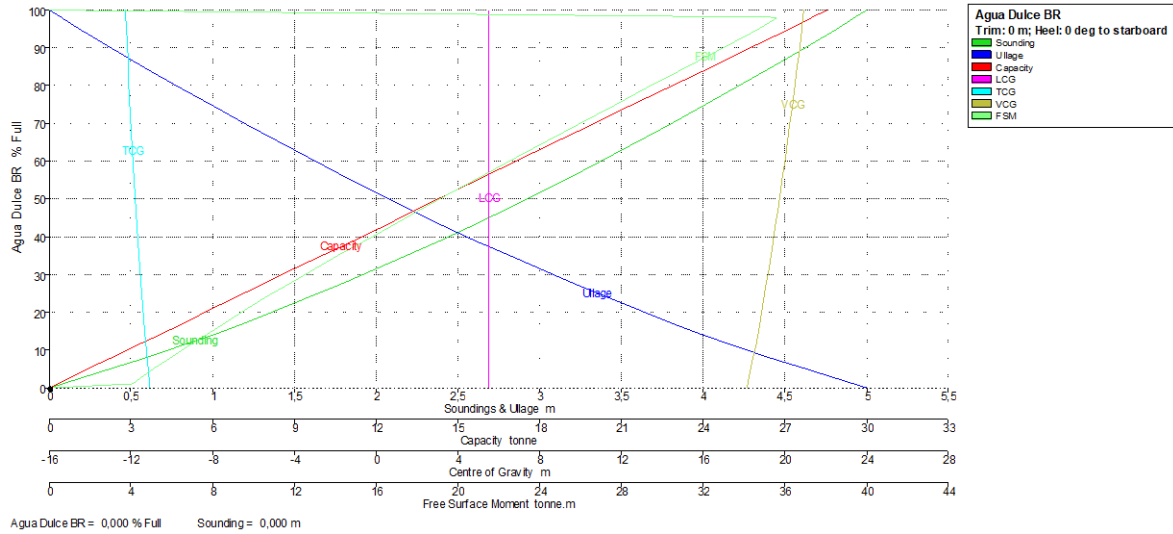
Fluid Type = Fuel Oil      Specific gravity = 0,9443  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
HFO Decantación	13,900	0,000	100,000	89,150	84,184	5,281	0,000	13,264	0,000
	13,740	0,161	98,000	87,367	82,500	5,282	0,000	13,179	47,832
	13,732	0,169	97,900	87,278	82,416	5,282	0,000	13,175	47,832
	13,500	0,400	95,016	84,706	79,988	5,283	0,000	13,052	47,832
	12,750	1,150	85,678	76,381	72,127	5,286	0,000	12,652	47,832
	12,000	1,900	76,339	68,056	64,266	5,291	0,000	12,246	47,832
	11,250	2,650	67,001	59,731	56,404	5,297	0,000	11,831	47,832
	10,500	3,400	57,663	51,406	48,543	5,304	0,000	11,402	47,832
	9,750	4,150	48,325	43,081	40,682	5,315	0,000	10,954	47,832
	9,000	4,900	38,986	34,756	32,820	5,330	0,000	10,470	47,832
	8,250	5,650	29,756	26,527	25,050	5,353	0,000	9,924	41,834
	7,500	6,400	21,576	19,235	18,164	5,374	0,000	9,332	25,056
	6,750	7,150	15,141	13,498	12,746	5,398	0,000	8,733	11,079
	6,000	7,900	10,289	9,173	8,662	5,432	0,000	8,139	4,774
	5,250	8,650	6,690	5,964	5,632	5,480	0,000	7,544	1,991
	4,500	9,400	4,097	3,652	3,449	5,547	0,000	6,941	0,790
	3,750	10,150	2,357	2,101	1,984	5,624	0,000	6,341	0,298
	3,000	10,900	1,260	1,124	1,061	5,697	0,000	5,764	0,107
	2,741	11,159	1,000	0,891	0,842	5,715	0,000	5,580	0,076
	2,250	11,650	0,601	0,536	0,506	5,759	0,000	5,226	0,038
	1,500	12,400	0,211	0,188	0,178	5,831	0,000	4,696	0,014
	0,750	13,150	0,037	0,033	0,031	5,943	0,000	4,107	0,003
	0,000	13,900	0,000	0,000	0,000	5,991	0,000	3,600	0,000

**Tank Calibrations - Agua Dulce BR**

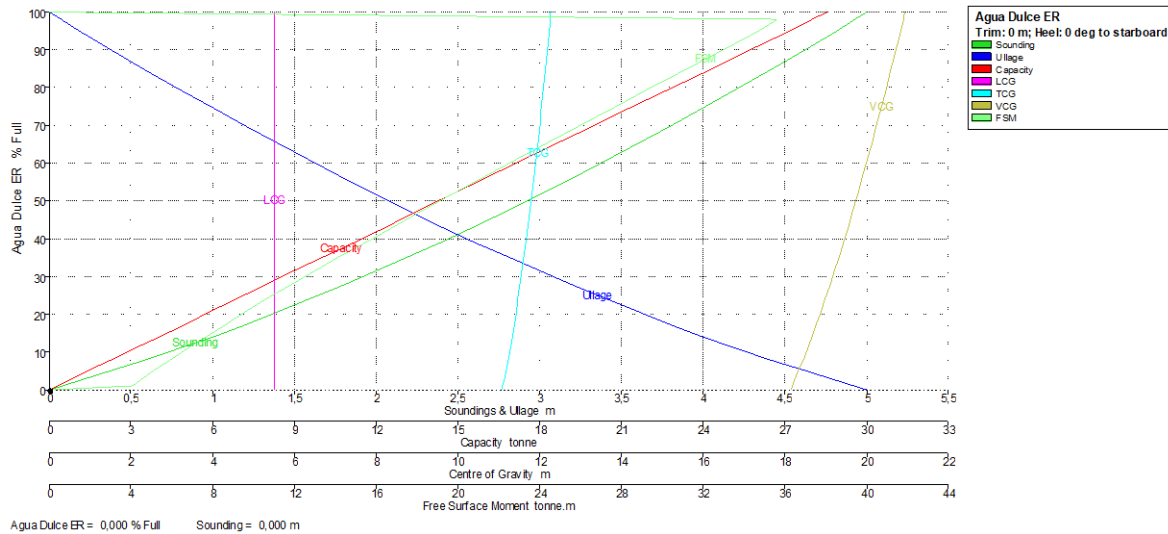
Fluid Type = Fresh Water      Specific gravity = 1  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Agua Dulce BR	5,000	0,000	100,000	28,561	28,561	5,508	-12,268	20,939	0,000
	4,924	0,076	98,000	27,990	27,990	5,508	-12,252	20,895	35,587
	4,921	0,079	97,900	27,961	27,961	5,508	-12,251	20,892	35,559
	4,800	0,200	94,739	27,058	27,058	5,508	-12,225	20,822	34,576
	4,600	0,400	89,564	25,581	25,581	5,508	-12,181	20,705	32,787
	4,400	0,600	84,482	24,129	24,129	5,508	-12,136	20,588	31,016
	4,200	0,800	79,496	22,705	22,705	5,509	-12,091	20,472	29,273
	4,000	1,000	74,606	21,308	21,308	5,509	-12,046	20,355	27,588
	3,800	1,200	69,816	19,940	19,940	5,509	-12,000	20,239	25,906
	3,600	1,400	65,126	18,601	18,601	5,509	-11,954	20,124	24,295
	3,400	1,600	60,538	17,290	17,290	5,509	-11,907	20,008	22,703
	3,200	1,800	56,055	16,010	16,010	5,510	-11,860	19,893	21,168
	3,000	2,000	51,678	14,760	14,760	5,510	-11,813	19,779	19,679
	2,800	2,200	47,409	13,541	13,541	5,510	-11,765	19,664	18,232
	2,600	2,400	43,250	12,353	12,353	5,511	-11,717	19,551	16,850
	2,400	2,600	39,202	11,197	11,197	5,511	-11,669	19,438	15,500
	2,200	2,800	35,267	10,073	10,073	5,511	-11,620	19,325	14,223
	2,000	3,000	31,448	8,982	8,982	5,511	-11,571	19,213	12,982
	1,800	3,200	27,746	7,924	7,924	5,512	-11,522	19,102	11,812
	1,600	3,400	24,162	6,901	6,901	5,512	-11,473	18,991	10,688
	1,400	3,600	20,699	5,912	5,912	5,512	-11,424	18,882	9,630
	1,200	3,800	17,359	4,958	4,958	5,513	-11,375	18,773	8,624
	1,000	4,000	14,143	4,039	4,039	5,513	-11,325	18,665	7,680
	0,800	4,200	11,053	3,157	3,157	5,514	-11,276	18,559	6,794
	0,600	4,400	8,093	2,311	2,311	5,514	-11,226	18,453	5,967
	0,400	4,600	5,262	1,503	1,503	5,515	-11,177	18,349	5,199
	0,200	4,800	2,564	0,732	0,732	5,515	-11,128	18,247	4,490
	0,079	4,921	1,000	0,286	0,286	5,515	-11,099	18,186	4,091
	0,000	5,000	0,000	0,000	0,000	5,516	-11,079	18,146	0,000

### Tank Calibrations - Agua Dulce ER

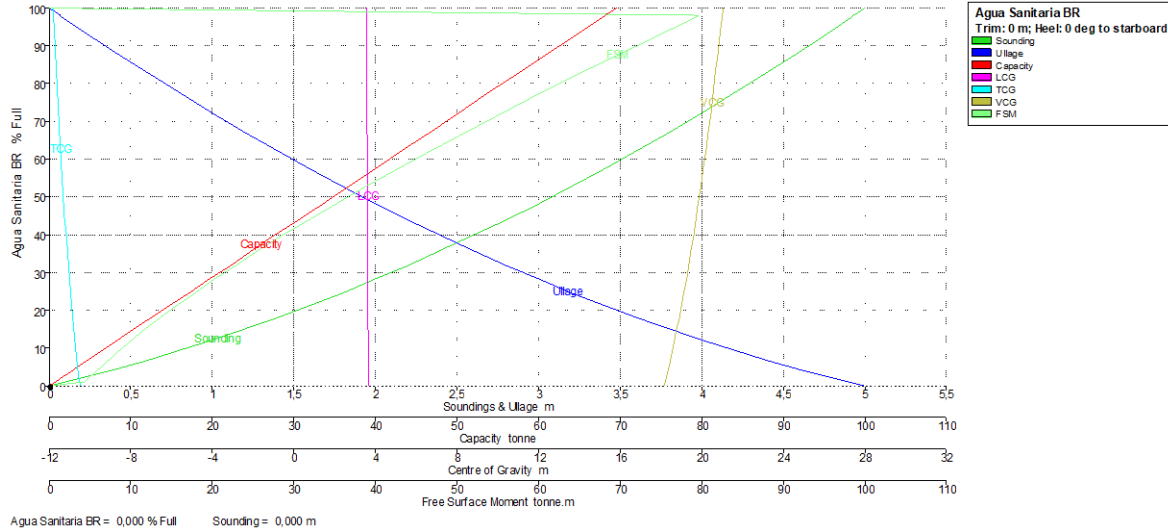
Fluid Type = Fresh Water      Specific gravity = 1  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Agua Dulce ER	5,000	0,000	100,000	28,561	28,561	5,508	12,268	20,939	0,000
	4,924	0,076	98,000	27,990	27,990	5,508	12,252	20,895	35,587
	4,921	0,079	97,900	27,961	27,961	5,508	12,251	20,892	35,559
	4,800	0,200	94,739	27,058	27,058	5,508	12,225	20,822	34,576
	4,600	0,400	89,564	25,581	25,581	5,508	12,181	20,705	32,787
	4,400	0,600	84,482	24,129	24,129	5,508	12,136	20,588	31,016
	4,200	0,800	79,496	22,705	22,705	5,509	12,091	20,472	29,273
	4,000	1,000	74,606	21,308	21,308	5,509	12,046	20,355	27,588
	3,800	1,200	69,816	19,940	19,940	5,509	12,000	20,239	25,906
	3,600	1,400	65,126	18,601	18,601	5,509	11,954	20,124	24,295
	3,400	1,600	60,538	17,290	17,290	5,509	11,907	20,008	22,703
	3,200	1,800	56,055	16,010	16,010	5,510	11,860	19,893	21,168
	3,000	2,000	51,678	14,760	14,760	5,510	11,813	19,779	19,679
	2,800	2,200	47,409	13,541	13,541	5,510	11,765	19,664	18,232
	2,600	2,400	43,250	12,353	12,353	5,511	11,717	19,551	16,850
	2,400	2,600	39,202	11,197	11,197	5,511	11,669	19,438	15,500
	2,200	2,800	35,267	10,073	10,073	5,511	11,620	19,325	14,223
	2,000	3,000	31,448	8,982	8,982	5,511	11,571	19,213	12,982
	1,800	3,200	27,746	7,924	7,924	5,512	11,522	19,102	11,812
	1,600	3,400	24,162	6,901	6,901	5,512	11,473	18,991	10,688
	1,400	3,600	20,699	5,912	5,912	5,512	11,424	18,882	9,630
	1,200	3,800	17,359	4,958	4,958	5,513	11,375	18,773	8,624
	1,000	4,000	14,143	4,039	4,039	5,513	11,325	18,665	7,680
	0,800	4,200	11,053	3,157	3,157	5,514	11,276	18,559	6,794
	0,600	4,400	8,093	2,311	2,311	5,514	11,226	18,453	5,967
	0,400	4,600	5,262	1,503	1,503	5,515	11,177	18,349	5,199
	0,200	4,800	2,564	0,732	0,732	5,515	11,128	18,247	4,490
	0,079	4,921	1,000	0,286	0,286	5,515	11,099	18,186	4,091
	0,000	5,000	0,000	0,000	0,000	5,516	11,079	18,146	0,000

**Tank Calibrations - Agua Sanitaria BR**

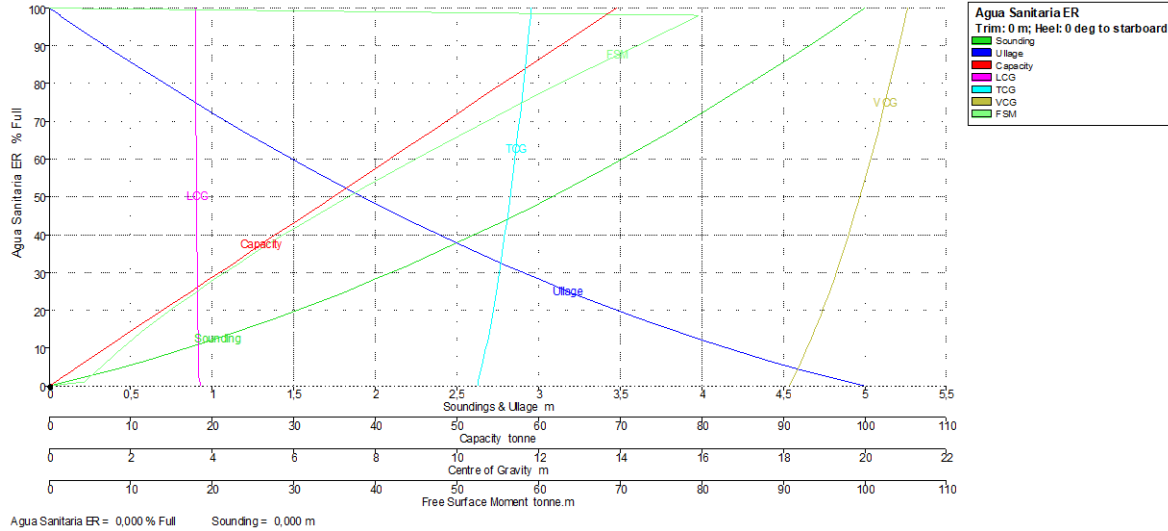
Fluid Type = Fresh Water      Specific gravity = 1  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Agua Sanitaria BR	5,000	0,000	100,000	69,500	69,500	3,590	-11,820	21,054	0,000
	4,932	0,068	98,000	68,110	68,110	3,591	-11,802	21,012	79,661
	4,929	0,071	97,900	68,041	68,041	3,591	-11,801	21,010	79,563
	4,800	0,200	94,158	65,440	65,440	3,593	-11,766	20,931	75,943
	4,600	0,400	88,462	61,481	61,481	3,595	-11,713	20,808	70,551
	4,400	0,600	82,912	57,624	57,624	3,598	-11,659	20,684	65,343
	4,200	0,800	77,511	53,870	53,870	3,601	-11,605	20,562	60,360
	4,000	1,000	72,259	50,220	50,220	3,604	-11,551	20,439	55,607
	3,800	1,200	67,159	46,676	46,676	3,607	-11,496	20,317	51,060
	3,600	1,400	62,211	43,237	43,237	3,610	-11,442	20,195	46,779
	3,400	1,600	57,415	39,904	39,904	3,613	-11,388	20,074	42,689
	3,200	1,800	52,774	36,678	36,678	3,616	-11,334	19,954	38,858
	3,000	2,000	48,286	33,559	33,559	3,620	-11,280	19,833	35,222
	2,800	2,200	43,953	30,548	30,548	3,623	-11,226	19,714	31,824
	2,600	2,400	39,776	27,645	27,645	3,626	-11,172	19,595	28,625
	2,400	2,600	35,756	24,850	24,850	3,630	-11,119	19,477	25,640
	2,200	2,800	31,892	22,165	22,165	3,633	-11,065	19,359	22,849
	2,000	3,000	28,187	19,590	19,590	3,637	-11,012	19,242	20,262
	1,800	3,200	24,641	17,125	17,125	3,641	-10,959	19,127	17,867
	1,600	3,400	21,254	14,771	14,771	3,645	-10,906	19,012	15,661
	1,400	3,600	18,026	12,528	12,528	3,649	-10,854	18,898	13,636
	1,200	3,800	14,960	10,397	10,397	3,654	-10,802	18,786	11,785
	1,000	4,000	12,056	8,379	8,379	3,659	-10,750	18,675	10,102
	0,800	4,200	9,314	6,473	6,473	3,664	-10,699	18,565	8,580
	0,600	4,400	6,736	4,682	4,682	3,669	-10,649	18,457	7,213
	0,400	4,600	4,324	3,005	3,005	3,675	-10,599	18,351	5,993
	0,200	4,800	2,078	1,444	1,444	3,681	-10,550	18,247	4,913
	0,098	4,902	1,000	0,695	0,695	3,684	-10,525	18,195	4,416
	0,000	5,000	0,000	0,000	0,000	3,687	-10,502	18,146	0,000

**Tank Calibrations - Agua Sanitaria ER**

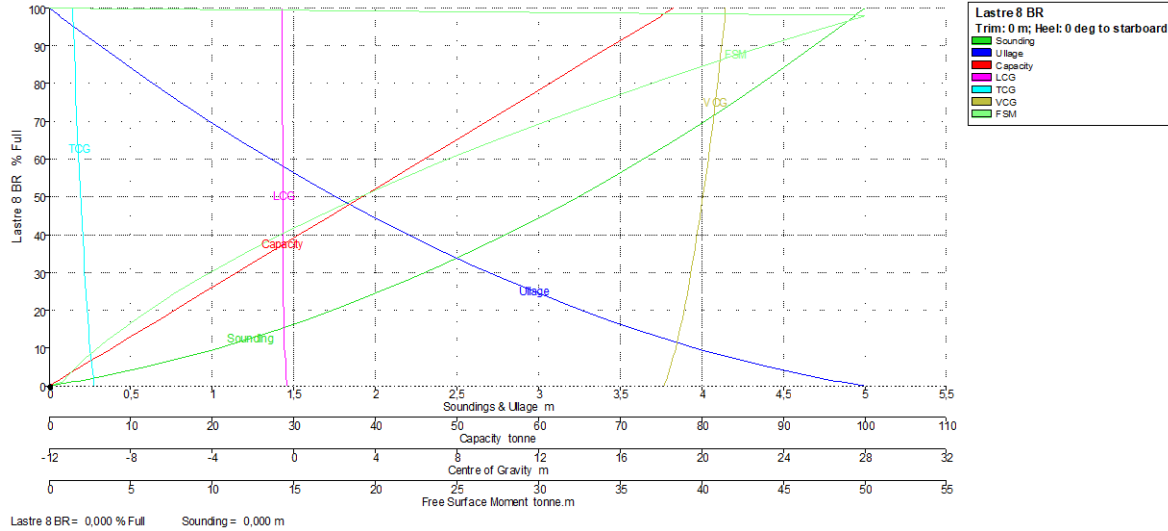
Fluid Type = Fresh Water      Specific gravity = 1  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Agua Sanitaria ER	5,000	0,000	100,000	69,500	69,500	3,590	11,820	21,054	0,000
	4,932	0,068	98,000	68,110	68,110	3,591	11,802	21,012	79,661
	4,929	0,071	97,900	68,041	68,041	3,591	11,801	21,010	79,563
	4,800	0,200	94,158	65,440	65,440	3,593	11,766	20,931	75,943
	4,600	0,400	88,462	61,481	61,481	3,595	11,713	20,808	70,551
	4,400	0,600	82,912	57,624	57,624	3,598	11,659	20,684	65,343
	4,200	0,800	77,511	53,870	53,870	3,601	11,605	20,562	60,360
	4,000	1,000	72,259	50,220	50,220	3,604	11,551	20,439	55,607
	3,800	1,200	67,159	46,676	46,676	3,607	11,496	20,317	51,060
	3,600	1,400	62,211	43,237	43,237	3,610	11,442	20,195	46,779
	3,400	1,600	57,415	39,904	39,904	3,613	11,388	20,074	42,689
	3,200	1,800	52,774	36,678	36,678	3,616	11,334	19,954	38,858
	3,000	2,000	48,286	33,559	33,559	3,620	11,280	19,833	35,222
	2,800	2,200	43,953	30,548	30,548	3,623	11,226	19,714	31,824
	2,600	2,400	39,776	27,645	27,645	3,626	11,172	19,595	28,625
	2,400	2,600	35,756	24,850	24,850	3,630	11,119	19,477	25,640
	2,200	2,800	31,892	22,165	22,165	3,633	11,065	19,359	22,849
	2,000	3,000	28,187	19,590	19,590	3,637	11,012	19,242	20,262
	1,800	3,200	24,641	17,125	17,125	3,641	10,959	19,127	17,867
	1,600	3,400	21,254	14,771	14,771	3,645	10,906	19,012	15,661
	1,400	3,600	18,026	12,528	12,528	3,649	10,854	18,898	13,636
	1,200	3,800	14,960	10,397	10,397	3,654	10,802	18,786	11,785
	1,000	4,000	12,056	8,379	8,379	3,659	10,750	18,675	10,102
	0,800	4,200	9,314	6,473	6,473	3,664	10,699	18,565	8,580
	0,600	4,400	6,736	4,682	4,682	3,669	10,649	18,457	7,213
	0,400	4,600	4,324	3,005	3,005	3,675	10,599	18,351	5,993
	0,200	4,800	2,078	1,444	1,444	3,681	10,550	18,247	4,913
	0,098	4,902	1,000	0,695	0,695	3,684	10,525	18,195	4,416
	0,000	5,000	0,000	0,000	0,000	3,687	10,502	18,146	0,000

**Tank Calibrations - Lastre 8 BR**

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

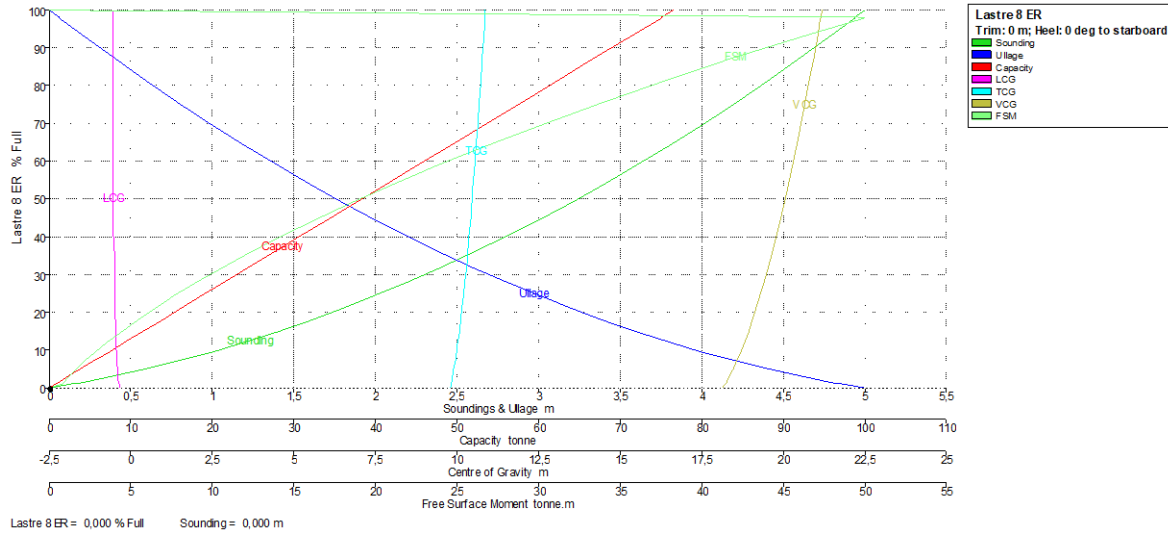


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre 8 BR	5,000	0,000	100,000	76,597	76,597	-0,542	-10,861	21,186	0,000
	4,939	0,061	98,000	75,065	75,065	-0,542	-10,847	21,147	50,004
	4,936	0,064	97,900	74,989	74,989	-0,542	-10,847	21,145	49,926
	4,800	0,200	93,504	71,621	71,621	-0,542	-10,815	21,057	46,552
	4,600	0,400	87,223	66,811	66,811	-0,541	-10,769	20,928	41,880
	4,400	0,600	81,156	62,163	62,163	-0,541	-10,724	20,800	37,639
	4,200	0,800	75,300	57,678	57,678	-0,540	-10,678	20,672	33,708
	4,000	1,000	69,653	53,353	53,353	-0,538	-10,634	20,544	30,132
	3,800	1,200	64,214	49,186	49,186	-0,537	-10,589	20,417	26,834
	3,600	1,400	58,981	45,178	45,178	-0,535	-10,545	20,290	23,832
	3,400	1,600	53,953	41,326	41,326	-0,532	-10,501	20,163	21,077
	3,200	1,800	49,128	37,631	37,631	-0,529	-10,457	20,037	18,569
	3,000	2,000	44,508	34,092	34,092	-0,526	-10,413	19,912	16,282
	2,800	2,200	40,090	30,708	30,708	-0,522	-10,370	19,787	14,203
	2,600	2,400	35,876	27,480	27,480	-0,518	-10,327	19,662	12,318
	2,400	2,600	31,865	24,408	24,408	-0,513	-10,284	19,538	10,613
	2,200	2,800	28,057	21,491	21,491	-0,507	-10,241	19,415	9,078
	2,000	3,000	24,454	18,731	18,731	-0,500	-10,198	19,292	7,699
	1,800	3,200	21,055	16,128	16,128	-0,492	-10,155	19,171	6,468
	1,600	3,400	17,864	13,683	13,683	-0,484	-10,113	19,050	5,375
	1,400	3,600	14,879	11,397	11,397	-0,474	-10,070	18,930	4,410
	1,200	3,800	12,105	9,272	9,272	-0,462	-10,028	18,812	3,566
	1,000	4,000	9,542	7,309	7,309	-0,449	-9,987	18,694	2,834
	0,800	4,200	7,193	5,510	5,510	-0,433	-9,945	18,579	2,207
	0,600	4,400	5,061	3,877	3,877	-0,415	-9,905	18,466	1,678
	0,400	4,600	3,149	2,412	2,412	-0,394	-9,865	18,356	1,238
	0,200	4,800	1,461	1,119	1,119	-0,369	-9,826	18,249	0,881
	0,140	4,860	1,000	0,766	0,766	-0,361	-9,814	18,217	0,789
	0,000	5,000	0,000	0,000	0,000	-0,339	-9,788	18,146	0,000



**Tank Calibrations - Lastre 8 ER**

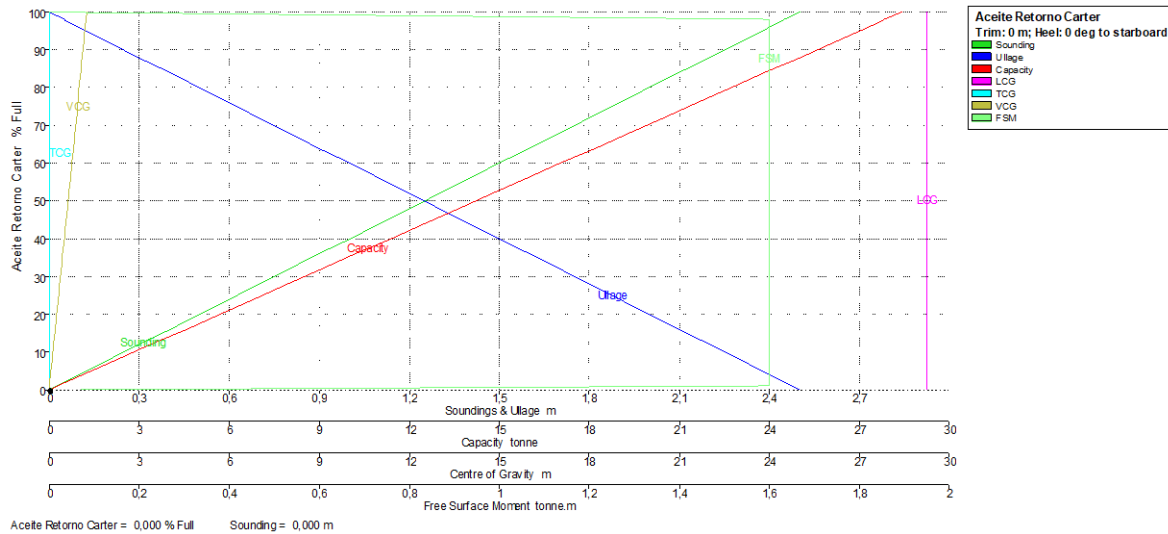
Fluid Type = Fresh Water      Specific gravity = 1  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lastre 8 ER	5,000	0,000	100,000	76,597	76,597	-0,542	10,861	21,186	0,000
	4,939	0,061	98,000	75,065	75,065	-0,542	10,847	21,147	50,004
	4,936	0,064	97,900	74,989	74,989	-0,542	10,847	21,145	49,926
	4,800	0,200	93,504	71,621	71,621	-0,542	10,815	21,057	46,552
	4,600	0,400	87,223	66,811	66,811	-0,541	10,769	20,928	41,880
	4,400	0,600	81,156	62,163	62,163	-0,541	10,724	20,800	37,639
	4,200	0,800	75,300	57,678	57,678	-0,540	10,678	20,672	33,708
	4,000	1,000	69,653	53,353	53,353	-0,538	10,634	20,544	30,132
	3,800	1,200	64,214	49,186	49,186	-0,537	10,589	20,417	26,834
	3,600	1,400	58,981	45,178	45,178	-0,535	10,545	20,290	23,832
	3,400	1,600	53,953	41,326	41,326	-0,532	10,501	20,163	21,077
	3,200	1,800	49,128	37,631	37,631	-0,529	10,457	20,037	18,569
	3,000	2,000	44,508	34,092	34,092	-0,526	10,413	19,912	16,282
	2,800	2,200	40,090	30,708	30,708	-0,522	10,370	19,787	14,203
	2,600	2,400	35,876	27,480	27,480	-0,518	10,327	19,662	12,318
	2,400	2,600	31,865	24,408	24,408	-0,513	10,284	19,538	10,613
	2,200	2,800	28,057	21,491	21,491	-0,507	10,241	19,415	9,078
	2,000	3,000	24,454	18,731	18,731	-0,500	10,198	19,292	7,699
	1,800	3,200	21,055	16,128	16,128	-0,492	10,155	19,171	6,468
	1,600	3,400	17,864	13,683	13,683	-0,484	10,113	19,050	5,375
	1,400	3,600	14,879	11,397	11,397	-0,474	10,070	18,930	4,410
	1,200	3,800	12,105	9,272	9,272	-0,462	10,028	18,812	3,566
	1,000	4,000	9,542	7,309	7,309	-0,449	9,987	18,694	2,834
	0,800	4,200	7,193	5,510	5,510	-0,433	9,945	18,579	2,207
	0,600	4,400	5,061	3,877	3,877	-0,415	9,905	18,466	1,678
	0,400	4,600	3,149	2,412	2,412	-0,394	9,865	18,356	1,238
	0,200	4,800	1,461	1,119	1,119	-0,369	9,826	18,249	0,881
	0,140	4,860	1,000	0,766	0,766	-0,361	9,814	18,217	0,789
	0,000	5,000	0,000	0,000	0,000	-0,339	9,788	18,146	0,000

**Tank Calibrations - Aceite Retorno Carter**

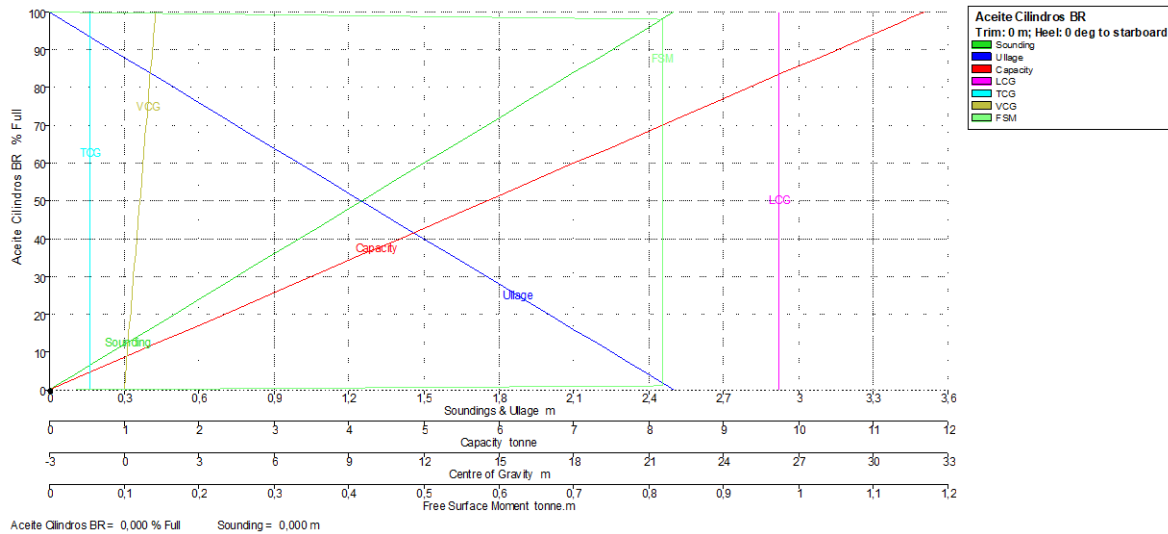
Fluid Type = Lube Oil      Specific gravity = 0,92  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aceite Retorno Carter	2,500	0,000	100,000	30,875	28,405	29,250	0,000	1,250	0,000
	2,450	0,050	98,000	30,257	27,837	29,250	0,000	1,225	1,600
	2,447	0,053	97,900	30,227	27,808	29,250	0,000	1,224	1,600
	2,400	0,100	96,000	29,640	27,269	29,250	0,000	1,200	1,600
	2,300	0,200	92,000	28,405	26,133	29,250	0,000	1,150	1,600
	2,200	0,300	88,000	27,170	24,996	29,250	0,000	1,100	1,600
	2,100	0,400	84,000	25,935	23,860	29,250	0,000	1,050	1,600
	2,000	0,500	80,000	24,700	22,724	29,250	0,000	1,000	1,600
	1,900	0,600	76,000	23,465	21,588	29,250	0,000	0,950	1,600
	1,800	0,700	72,000	22,230	20,452	29,250	0,000	0,900	1,600
	1,700	0,800	68,000	20,995	19,315	29,250	0,000	0,850	1,600
	1,600	0,900	64,000	19,760	18,179	29,250	0,000	0,800	1,600
	1,500	1,000	60,000	18,525	17,043	29,250	0,000	0,750	1,600
	1,400	1,100	56,000	17,290	15,907	29,250	0,000	0,700	1,600
	1,300	1,200	52,000	16,055	14,771	29,250	0,000	0,650	1,600
	1,200	1,300	48,000	14,820	13,634	29,250	0,000	0,600	1,600
	1,100	1,400	44,000	13,585	12,498	29,250	0,000	0,550	1,600
	1,000	1,500	40,000	12,350	11,362	29,250	0,000	0,500	1,600
	0,900	1,600	36,000	11,115	10,226	29,250	0,000	0,450	1,600
	0,800	1,700	32,000	9,880	9,090	29,250	0,000	0,400	1,600
	0,700	1,800	28,000	8,645	7,953	29,250	0,000	0,350	1,600
	0,600	1,900	24,000	7,410	6,817	29,250	0,000	0,300	1,600
	0,500	2,000	20,000	6,175	5,681	29,250	0,000	0,250	1,600
	0,400	2,100	16,000	4,940	4,545	29,250	0,000	0,200	1,600
	0,300	2,200	12,000	3,705	3,409	29,250	0,000	0,150	1,600
	0,200	2,300	8,000	2,470	2,272	29,250	0,000	0,100	1,600
	0,100	2,400	4,000	1,235	1,136	29,250	0,000	0,050	1,600
	0,025	2,475	1,000	0,309	0,284	29,250	0,000	0,012	1,600
	0,000	2,500	0,000	0,000	0,000	29,250	0,000	0,000	0,000

**Tank Calibrations - Aceite Cilindros BR**

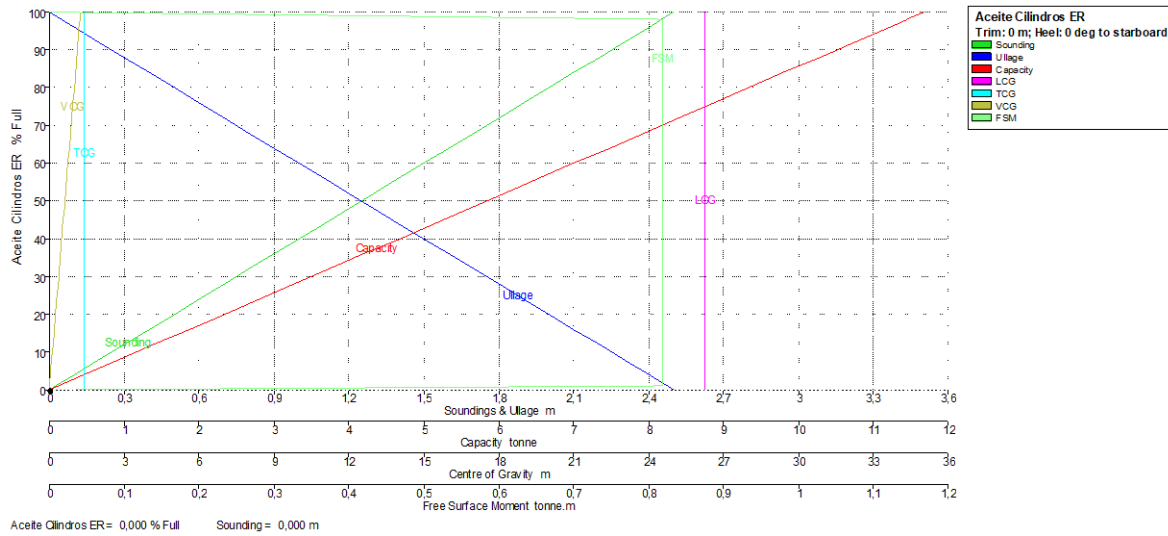
Fluid Type = Lube Oil      Specific gravity = 0,92  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aceite Cilindros BR	2,500	0,000	100,000	12,687	11,672	26,250	-1,375	1,250	0,000
	2,450	0,050	98,000	12,434	11,439	26,250	-1,375	1,225	0,818
	2,447	0,053	97,900	12,421	11,427	26,250	-1,375	1,224	0,818
	2,400	0,100	96,000	12,180	11,206	26,250	-1,375	1,200	0,818
	2,300	0,200	92,000	11,672	10,739	26,250	-1,375	1,150	0,818
	2,200	0,300	88,000	11,165	10,272	26,250	-1,375	1,100	0,818
	2,100	0,400	84,000	10,657	9,805	26,250	-1,375	1,050	0,818
	2,000	0,500	80,000	10,150	9,338	26,250	-1,375	1,000	0,818
	1,900	0,600	76,000	9,642	8,871	26,250	-1,375	0,950	0,818
	1,800	0,700	72,000	9,135	8,404	26,250	-1,375	0,900	0,818
	1,700	0,800	68,000	8,627	7,937	26,250	-1,375	0,850	0,818
	1,600	0,900	64,000	8,120	7,470	26,250	-1,375	0,800	0,818
	1,500	1,000	60,000	7,612	7,003	26,250	-1,375	0,750	0,818
	1,400	1,100	56,000	7,105	6,537	26,250	-1,375	0,700	0,818
	1,300	1,200	52,000	6,597	6,070	26,250	-1,375	0,650	0,818
	1,200	1,300	48,000	6,090	5,603	26,250	-1,375	0,600	0,818
	1,100	1,400	44,000	5,582	5,136	26,250	-1,375	0,550	0,818
	1,000	1,500	40,000	5,075	4,669	26,250	-1,375	0,500	0,818
	0,900	1,600	36,000	4,567	4,202	26,250	-1,375	0,450	0,818
	0,800	1,700	32,000	4,060	3,735	26,250	-1,375	0,400	0,818
	0,700	1,800	28,000	3,552	3,268	26,250	-1,375	0,350	0,818
	0,600	1,900	24,000	3,045	2,801	26,250	-1,375	0,300	0,818
	0,500	2,000	20,000	2,537	2,334	26,250	-1,375	0,250	0,818
	0,400	2,100	16,000	2,030	1,868	26,250	-1,375	0,200	0,818
	0,300	2,200	12,000	1,522	1,401	26,250	-1,375	0,150	0,818
	0,200	2,300	8,000	1,015	0,934	26,250	-1,375	0,100	0,818
	0,100	2,400	4,000	0,507	0,467	26,250	-1,375	0,050	0,818
	0,025	2,475	1,000	0,127	0,117	26,250	-1,375	0,013	0,818
	0,000	2,500	0,000	0,000	0,000	26,250	-1,375	0,000	0,000

**Tank Calibrations - Aceite Cilindros ER**

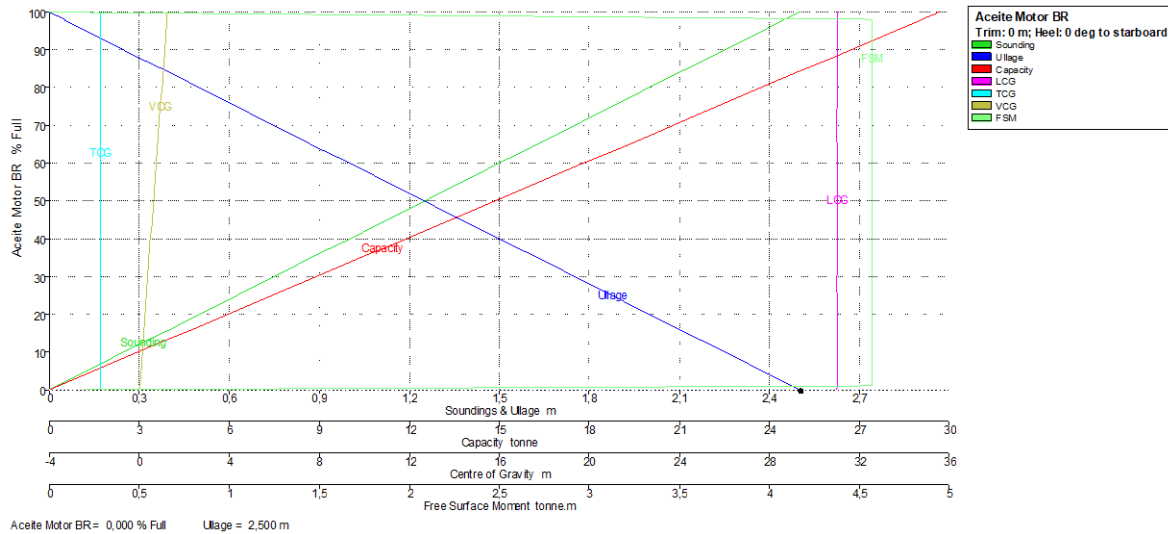
Fluid Type = Lube Oil      Specific gravity = 0,92  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aceite Cilindros ER	2,500	0,000	100,000	12,687	11,672	26,250	1,375	1,250	0,000
	2,450	0,050	98,000	12,434	11,439	26,250	1,375	1,225	0,818
	2,447	0,053	97,900	12,421	11,427	26,250	1,375	1,224	0,818
	2,400	0,100	96,000	12,180	11,206	26,250	1,375	1,200	0,818
	2,300	0,200	92,000	11,672	10,739	26,250	1,375	1,150	0,818
	2,200	0,300	88,000	11,165	10,272	26,250	1,375	1,100	0,818
	2,100	0,400	84,000	10,657	9,805	26,250	1,375	1,050	0,818
	2,000	0,500	80,000	10,150	9,338	26,250	1,375	1,000	0,818
	1,900	0,600	76,000	9,642	8,871	26,250	1,375	0,950	0,818
	1,800	0,700	72,000	9,135	8,404	26,250	1,375	0,900	0,818
	1,700	0,800	68,000	8,627	7,937	26,250	1,375	0,850	0,818
	1,600	0,900	64,000	8,120	7,470	26,250	1,375	0,800	0,818
	1,500	1,000	60,000	7,612	7,003	26,250	1,375	0,750	0,818
	1,400	1,100	56,000	7,105	6,537	26,250	1,375	0,700	0,818
	1,300	1,200	52,000	6,597	6,070	26,250	1,375	0,650	0,818
	1,200	1,300	48,000	6,090	5,603	26,250	1,375	0,600	0,818
	1,100	1,400	44,000	5,582	5,136	26,250	1,375	0,550	0,818
	1,000	1,500	40,000	5,075	4,669	26,250	1,375	0,500	0,818
	0,900	1,600	36,000	4,567	4,202	26,250	1,375	0,450	0,818
	0,800	1,700	32,000	4,060	3,735	26,250	1,375	0,400	0,818
	0,700	1,800	28,000	3,552	3,268	26,250	1,375	0,350	0,818
	0,600	1,900	24,000	3,045	2,801	26,250	1,375	0,300	0,818
	0,500	2,000	20,000	2,537	2,334	26,250	1,375	0,250	0,818
	0,400	2,100	16,000	2,030	1,868	26,250	1,375	0,200	0,818
	0,300	2,200	12,000	1,522	1,401	26,250	1,375	0,150	0,818
	0,200	2,300	8,000	1,015	0,934	26,250	1,375	0,100	0,818
	0,100	2,400	4,000	0,507	0,467	26,250	1,375	0,050	0,818
	0,025	2,475	1,000	0,127	0,117	26,250	1,375	0,013	0,818
	0,000	2,500	0,000	0,000	0,000	26,250	1,375	0,000	0,000

**Tank Calibrations - Aceite Motor BR**

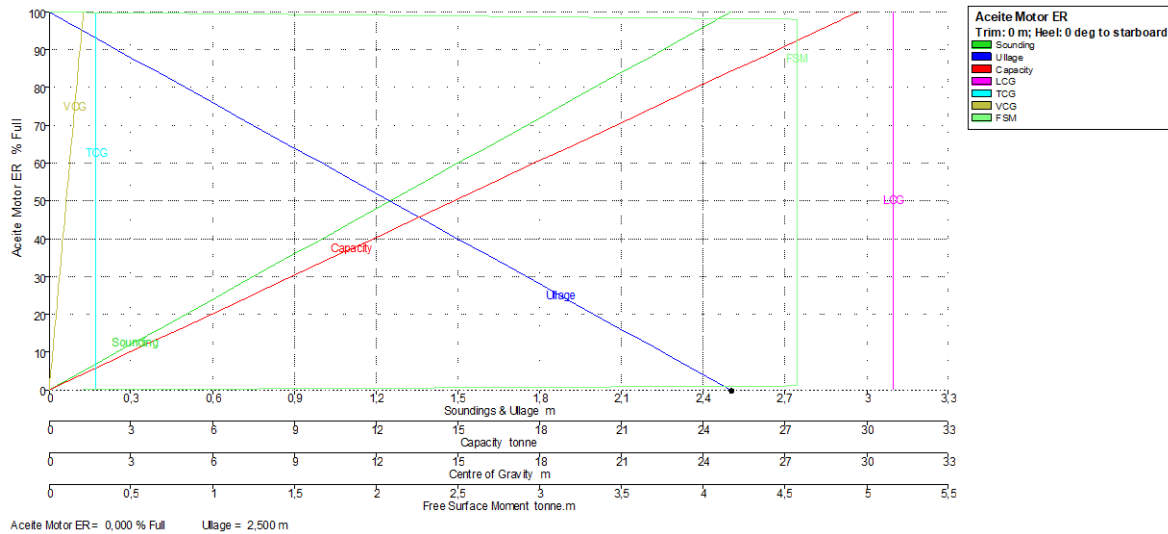
Fluid Type = Lube Oil      Specific gravity = 0,92  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aceite Motor BR	2,500	0,000	100,000	32,250	29,670	31,000	-1,725	1,250	0,000
	2,450	0,050	98,000	31,605	29,077	31,000	-1,725	1,225	4,572
	2,447	0,053	97,900	31,573	29,047	31,000	-1,725	1,224	4,572
	2,400	0,100	96,000	30,960	28,483	31,000	-1,725	1,200	4,572
	2,300	0,200	92,000	29,670	27,296	31,000	-1,725	1,150	4,572
	2,200	0,300	88,000	28,380	26,110	31,000	-1,725	1,100	4,572
	2,100	0,400	84,000	27,090	24,923	31,000	-1,725	1,050	4,572
	2,000	0,500	80,000	25,800	23,736	31,000	-1,725	1,000	4,572
	1,900	0,600	76,000	24,510	22,549	31,000	-1,725	0,950	4,572
	1,800	0,700	72,000	23,220	21,362	31,000	-1,725	0,900	4,572
	1,700	0,800	68,000	21,930	20,176	31,000	-1,725	0,850	4,572
	1,600	0,900	64,000	20,640	18,989	31,000	-1,725	0,800	4,572
	1,500	1,000	60,000	19,350	17,802	31,000	-1,725	0,750	4,572
	1,400	1,100	56,000	18,060	16,615	31,000	-1,725	0,700	4,572
	1,300	1,200	52,000	16,770	15,428	31,000	-1,725	0,650	4,572
	1,200	1,300	48,000	15,480	14,242	31,000	-1,725	0,600	4,572
	1,100	1,400	44,000	14,190	13,055	31,000	-1,725	0,550	4,572
	1,000	1,500	40,000	12,900	11,868	31,000	-1,725	0,500	4,572
	0,900	1,600	36,000	11,610	10,681	31,000	-1,725	0,450	4,572
	0,800	1,700	32,000	10,320	9,494	31,000	-1,725	0,400	4,572
	0,700	1,800	28,000	9,030	8,308	31,000	-1,725	0,350	4,572
	0,600	1,900	24,000	7,740	7,121	31,000	-1,725	0,300	4,572
	0,500	2,000	20,000	6,450	5,934	31,000	-1,725	0,250	4,572
	0,400	2,100	16,000	5,160	4,747	31,000	-1,725	0,200	4,572
	0,300	2,200	12,000	3,870	3,560	31,000	-1,725	0,150	4,572
	0,200	2,300	8,000	2,580	2,374	31,000	-1,725	0,100	4,572
	0,100	2,400	4,000	1,290	1,187	31,000	-1,725	0,050	4,572
	0,025	2,475	1,000	0,322	0,297	31,000	-1,725	0,013	4,572
	0,000	2,500	0,000	0,000	0,000	31,000	-1,725	0,000	0,000

**Tank Calibrations - Aceite Motor ER**

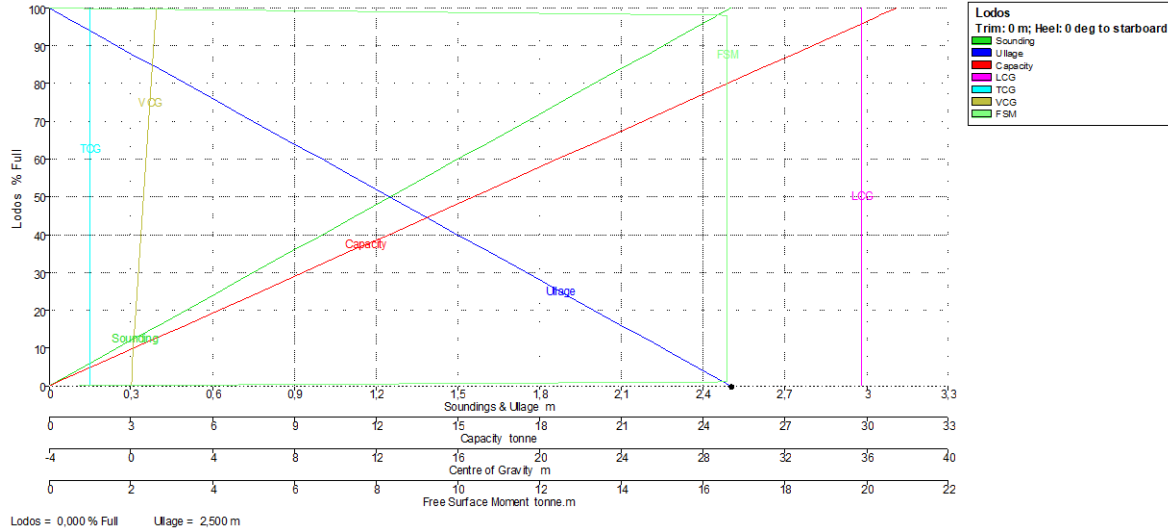
Fluid Type = Lube Oil      Specific gravity = 0,92  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aceite Motor ER	2,500	0,000	100,000	32,250	29,670	31,000	1,725	1,250	0,000
	2,450	0,050	98,000	31,605	29,077	31,000	1,725	1,225	4,572
	2,447	0,053	97,900	31,573	29,047	31,000	1,725	1,224	4,572
	2,400	0,100	96,000	30,960	28,483	31,000	1,725	1,200	4,572
	2,300	0,200	92,000	29,670	27,296	31,000	1,725	1,150	4,572
	2,200	0,300	88,000	28,380	26,110	31,000	1,725	1,100	4,572
	2,100	0,400	84,000	27,090	24,923	31,000	1,725	1,050	4,572
	2,000	0,500	80,000	25,800	23,736	31,000	1,725	1,000	4,572
	1,900	0,600	76,000	24,510	22,549	31,000	1,725	0,950	4,572
	1,800	0,700	72,000	23,220	21,362	31,000	1,725	0,900	4,572
	1,700	0,800	68,000	21,930	20,176	31,000	1,725	0,850	4,572
	1,600	0,900	64,000	20,640	18,989	31,000	1,725	0,800	4,572
	1,500	1,000	60,000	19,350	17,802	31,000	1,725	0,750	4,572
	1,400	1,100	56,000	18,060	16,615	31,000	1,725	0,700	4,572
	1,300	1,200	52,000	16,770	15,428	31,000	1,725	0,650	4,572
	1,200	1,300	48,000	15,480	14,242	31,000	1,725	0,600	4,572
	1,100	1,400	44,000	14,190	13,055	31,000	1,725	0,550	4,572
	1,000	1,500	40,000	12,900	11,868	31,000	1,725	0,500	4,572
	0,900	1,600	36,000	11,610	10,681	31,000	1,725	0,450	4,572
	0,800	1,700	32,000	10,320	9,494	31,000	1,725	0,400	4,572
	0,700	1,800	28,000	9,030	8,308	31,000	1,725	0,350	4,572
	0,600	1,900	24,000	7,740	7,121	31,000	1,725	0,300	4,572
	0,500	2,000	20,000	6,450	5,934	31,000	1,725	0,250	4,572
	0,400	2,100	16,000	5,160	4,747	31,000	1,725	0,200	4,572
	0,300	2,200	12,000	3,870	3,560	31,000	1,725	0,150	4,572
	0,200	2,300	8,000	2,580	2,374	31,000	1,725	0,100	4,572
	0,100	2,400	4,000	1,290	1,187	31,000	1,725	0,050	4,572
	0,025	2,475	1,000	0,322	0,297	31,000	1,725	0,013	4,572
	0,000	2,500	0,000	0,000	0,000	31,000	1,725	0,000	0,000

### Tank Calibrations - Lodos

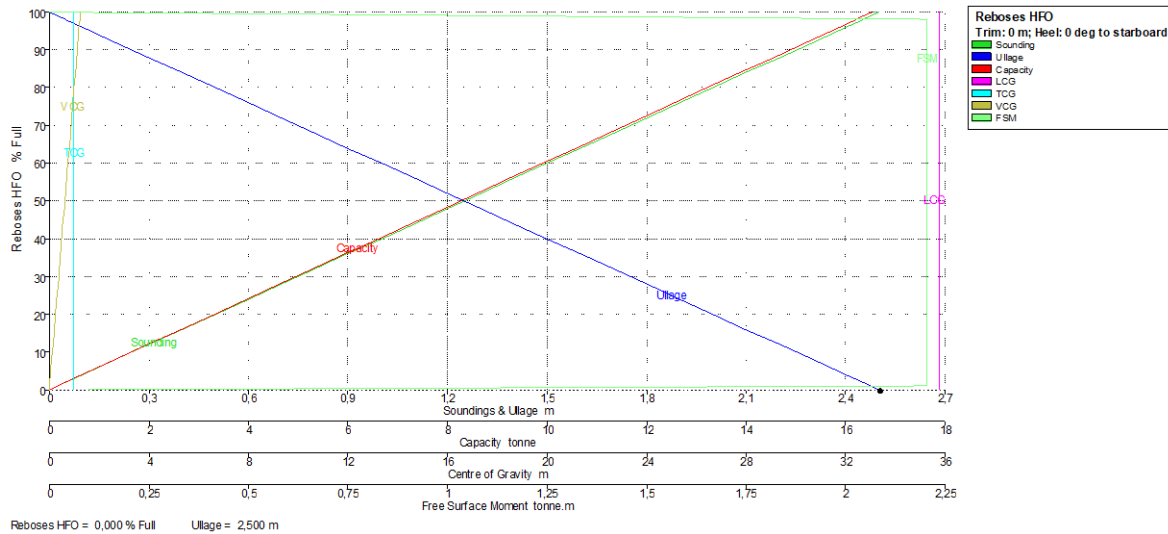
Fluid Type = ANS Crude      Specific gravity = 0,8883  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Lodos	2,500	0,000	100,000	35,000	31,090	35,750	-2,000	1,250	0,000
	2,450	0,050	98,000	34,300	30,469	35,750	-2,000	1,225	16,582
	2,447	0,053	97,900	34,265	30,438	35,750	-2,000	1,224	16,582
	2,400	0,100	96,000	33,600	29,847	35,750	-2,000	1,200	16,582
	2,300	0,200	92,000	32,200	28,603	35,750	-2,000	1,150	16,582
	2,200	0,300	88,000	30,800	27,360	35,750	-2,000	1,100	16,582
	2,100	0,400	84,000	29,400	26,116	35,750	-2,000	1,050	16,582
	2,000	0,500	80,000	28,000	24,872	35,750	-2,000	1,000	16,582
	1,900	0,600	76,000	26,600	23,629	35,750	-2,000	0,950	16,582
	1,800	0,700	72,000	25,200	22,385	35,750	-2,000	0,900	16,582
	1,700	0,800	68,000	23,800	21,142	35,750	-2,000	0,850	16,582
	1,600	0,900	64,000	22,400	19,898	35,750	-2,000	0,800	16,582
	1,500	1,000	60,000	21,000	18,654	35,750	-2,000	0,750	16,582
	1,400	1,100	56,000	19,600	17,411	35,750	-2,000	0,700	16,582
	1,300	1,200	52,000	18,200	16,167	35,750	-2,000	0,650	16,582
	1,200	1,300	48,000	16,800	14,923	35,750	-2,000	0,600	16,582
	1,100	1,400	44,000	15,400	13,680	35,750	-2,000	0,550	16,582
	1,000	1,500	40,000	14,000	12,436	35,750	-2,000	0,500	16,582
	0,900	1,600	36,000	12,600	11,193	35,750	-2,000	0,450	16,582
	0,800	1,700	32,000	11,200	9,949	35,750	-2,000	0,400	16,582
	0,700	1,800	28,000	9,800	8,705	35,750	-2,000	0,350	16,582
	0,600	1,900	24,000	8,400	7,462	35,750	-2,000	0,300	16,582
	0,500	2,000	20,000	7,000	6,218	35,750	-2,000	0,250	16,582
	0,400	2,100	16,000	5,600	4,974	35,750	-2,000	0,200	16,582
	0,300	2,200	12,000	4,200	3,731	35,750	-2,000	0,150	16,582
	0,200	2,300	8,000	2,800	2,487	35,750	-2,000	0,100	16,582
	0,100	2,400	4,000	1,400	1,244	35,750	-2,000	0,050	16,582
	0,025	2,475	1,000	0,350	0,311	35,750	-2,000	0,013	16,582
	0,000	2,500	0,000	0,000	0,000	35,750	-2,000	0,000	0,000

**Tank Calibrations - Rebores HFO**

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

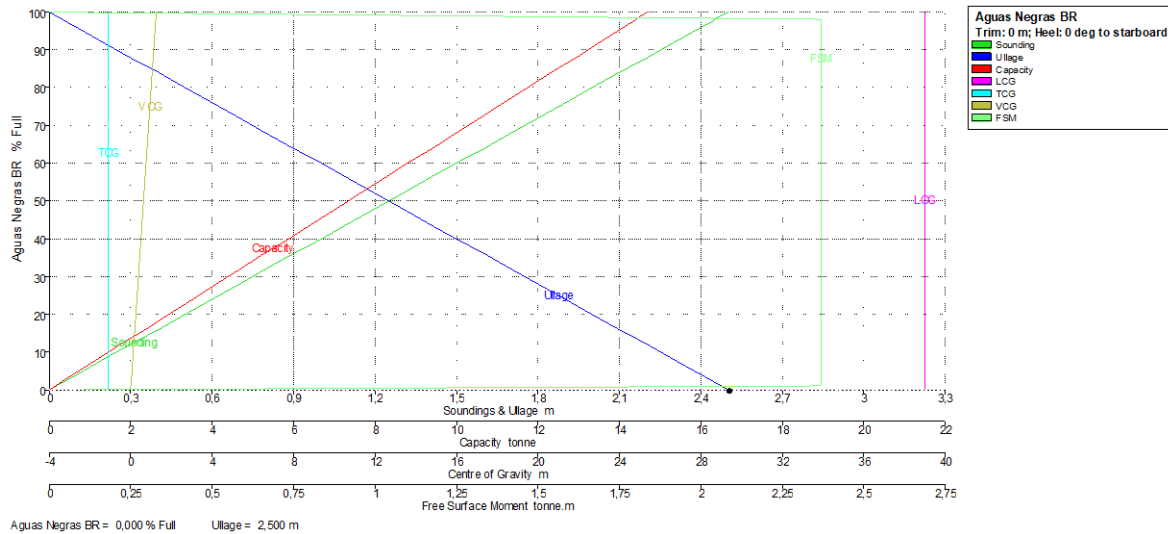


Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Rebores HFO	2,500	0,000	100,000	17,500	16,525	35,750	1,000	1,250	0,000
	2,450	0,050	98,000	17,150	16,195	35,750	1,000	1,225	2,203
	2,447	0,053	97,900	17,132	16,178	35,750	1,000	1,224	2,203
	2,400	0,100	96,000	16,800	15,864	35,750	1,000	1,200	2,203
	2,300	0,200	92,000	16,100	15,203	35,750	1,000	1,150	2,203
	2,200	0,300	88,000	15,400	14,542	35,750	1,000	1,100	2,203
	2,100	0,400	84,000	14,700	13,881	35,750	1,000	1,050	2,203
	2,000	0,500	80,000	14,000	13,220	35,750	1,000	1,000	2,203
	1,900	0,600	76,000	13,300	12,559	35,750	1,000	0,950	2,203
	1,800	0,700	72,000	12,600	11,898	35,750	1,000	0,900	2,203
	1,700	0,800	68,000	11,900	11,237	35,750	1,000	0,850	2,203
	1,600	0,900	64,000	11,200	10,576	35,750	1,000	0,800	2,203
	1,500	1,000	60,000	10,500	9,915	35,750	1,000	0,750	2,203
	1,400	1,100	56,000	9,800	9,254	35,750	1,000	0,700	2,203
	1,300	1,200	52,000	9,100	8,593	35,750	1,000	0,650	2,203
	1,200	1,300	48,000	8,400	7,932	35,750	1,000	0,600	2,203
	1,100	1,400	44,000	7,700	7,271	35,750	1,000	0,550	2,203
	1,000	1,500	40,000	7,000	6,610	35,750	1,000	0,500	2,203
	0,900	1,600	36,000	6,300	5,949	35,750	1,000	0,450	2,203
	0,800	1,700	32,000	5,600	5,288	35,750	1,000	0,400	2,203
	0,700	1,800	28,000	4,900	4,627	35,750	1,000	0,350	2,203
	0,600	1,900	24,000	4,200	3,966	35,750	1,000	0,300	2,203
	0,500	2,000	20,000	3,500	3,305	35,750	1,000	0,250	2,203
	0,400	2,100	16,000	2,800	2,644	35,750	1,000	0,200	2,203
	0,300	2,200	12,000	2,100	1,983	35,750	1,000	0,150	2,203
	0,200	2,300	8,000	1,400	1,322	35,750	1,000	0,100	2,203
	0,100	2,400	4,000	0,700	0,661	35,750	1,000	0,050	2,203
	0,025	2,475	1,000	0,175	0,165	35,750	1,000	0,013	2,203
	0,000	2,500	0,000	0,000	0,000	35,750	1,000	0,000	0,000



### Tank Calibrations - Aguas Negras BR

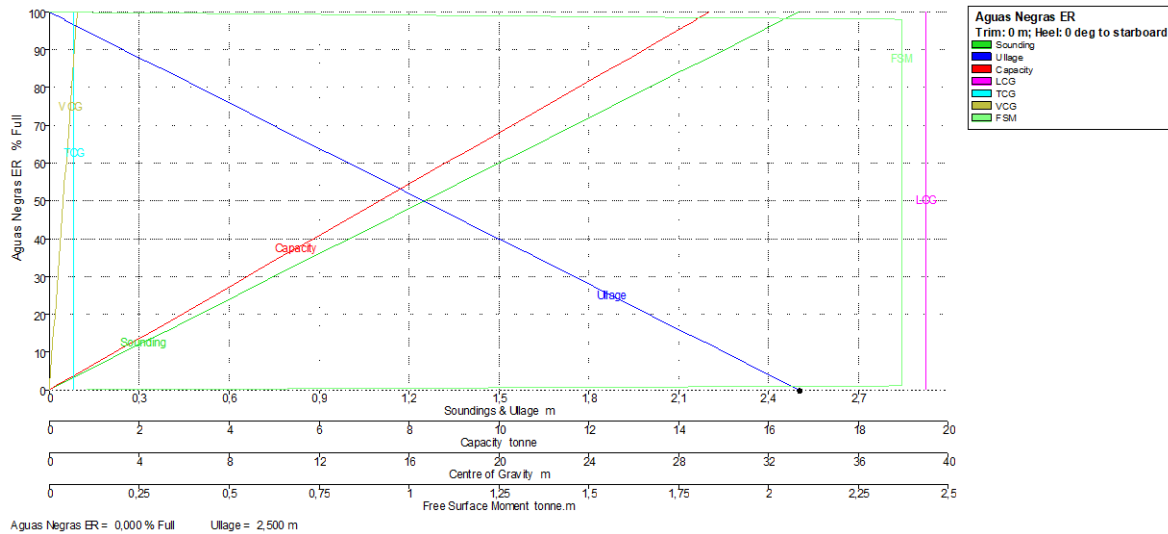
Fluid Type = DMA (ISO 8217)      Specific gravity = 0,89  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aguas Negras BR	2,500	0,000	100,000	16,500	14,685	39,000	-1,100	1,250	0,000
	2,450	0,050	98,000	16,170	14,391	39,000	-1,100	1,225	2,369
	2,447	0,053	97,900	16,154	14,377	39,000	-1,100	1,224	2,369
	2,400	0,100	96,000	15,840	14,098	39,000	-1,100	1,200	2,369
	2,300	0,200	92,000	15,180	13,510	39,000	-1,100	1,150	2,369
	2,200	0,300	88,000	14,520	12,923	39,000	-1,100	1,100	2,369
	2,100	0,400	84,000	13,860	12,335	39,000	-1,100	1,050	2,369
	2,000	0,500	80,000	13,200	11,748	39,000	-1,100	1,000	2,369
	1,900	0,600	76,000	12,540	11,161	39,000	-1,100	0,950	2,369
	1,800	0,700	72,000	11,880	10,573	39,000	-1,100	0,900	2,369
	1,700	0,800	68,000	11,220	9,986	39,000	-1,100	0,850	2,369
	1,600	0,900	64,000	10,560	9,398	39,000	-1,100	0,800	2,369
	1,500	1,000	60,000	9,900	8,811	39,000	-1,100	0,750	2,369
	1,400	1,100	56,000	9,240	8,224	39,000	-1,100	0,700	2,369
	1,300	1,200	52,000	8,580	7,636	39,000	-1,100	0,650	2,369
	1,200	1,300	48,000	7,920	7,049	39,000	-1,100	0,600	2,369
	1,100	1,400	44,000	7,260	6,461	39,000	-1,100	0,550	2,369
	1,000	1,500	40,000	6,600	5,874	39,000	-1,100	0,500	2,369
	0,900	1,600	36,000	5,940	5,287	39,000	-1,100	0,450	2,369
	0,800	1,700	32,000	5,280	4,699	39,000	-1,100	0,400	2,369
	0,700	1,800	28,000	4,620	4,112	39,000	-1,100	0,350	2,369
	0,600	1,900	24,000	3,960	3,524	39,000	-1,100	0,300	2,369
	0,500	2,000	20,000	3,300	2,937	39,000	-1,100	0,250	2,369
	0,400	2,100	16,000	2,640	2,350	39,000	-1,100	0,200	2,369
	0,300	2,200	12,000	1,980	1,762	39,000	-1,100	0,150	2,369
	0,200	2,300	8,000	1,320	1,175	39,000	-1,100	0,100	2,369
	0,100	2,400	4,000	0,660	0,587	39,000	-1,100	0,050	2,369
	0,025	2,475	1,000	0,165	0,147	39,000	-1,100	0,012	2,369
	0,000	2,500	0,000	0,000	0,000	39,000	-1,100	0,000	0,000

### Tank Calibrations - Aguas Negras ER

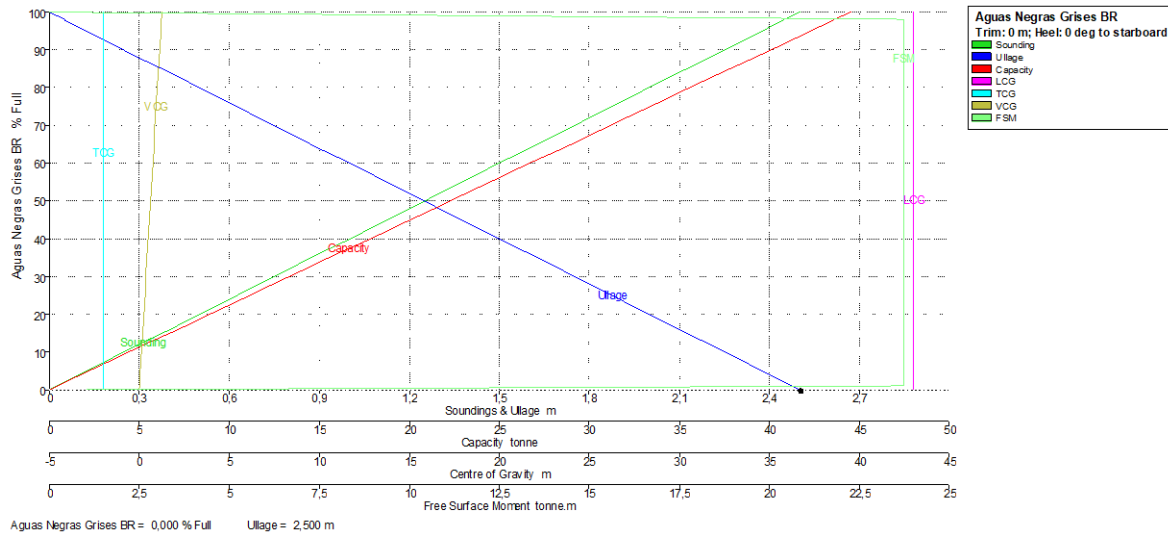
Fluid Type = DMA (ISO 8217)      Specific gravity = 0,89  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aguas Negras ER	2,500	0,000	100,000	16,500	14,685	39,000	1,100	1,250	0,000
	2,450	0,050	98,000	16,170	14,391	39,000	1,100	1,225	2,369
	2,447	0,053	97,900	16,154	14,377	39,000	1,100	1,224	2,369
	2,400	0,100	96,000	15,840	14,098	39,000	1,100	1,200	2,369
	2,300	0,200	92,000	15,180	13,510	39,000	1,100	1,150	2,369
	2,200	0,300	88,000	14,520	12,923	39,000	1,100	1,100	2,369
	2,100	0,400	84,000	13,860	12,335	39,000	1,100	1,050	2,369
	2,000	0,500	80,000	13,200	11,748	39,000	1,100	1,000	2,369
	1,900	0,600	76,000	12,540	11,161	39,000	1,100	0,950	2,369
	1,800	0,700	72,000	11,880	10,573	39,000	1,100	0,900	2,369
	1,700	0,800	68,000	11,220	9,986	39,000	1,100	0,850	2,369
	1,600	0,900	64,000	10,560	9,398	39,000	1,100	0,800	2,369
	1,500	1,000	60,000	9,900	8,811	39,000	1,100	0,750	2,369
	1,400	1,100	56,000	9,240	8,224	39,000	1,100	0,700	2,369
	1,300	1,200	52,000	8,580	7,636	39,000	1,100	0,650	2,369
	1,200	1,300	48,000	7,920	7,049	39,000	1,100	0,600	2,369
	1,100	1,400	44,000	7,260	6,461	39,000	1,100	0,550	2,369
	1,000	1,500	40,000	6,600	5,874	39,000	1,100	0,500	2,369
	0,900	1,600	36,000	5,940	5,287	39,000	1,100	0,450	2,369
	0,800	1,700	32,000	5,280	4,699	39,000	1,100	0,400	2,369
	0,700	1,800	28,000	4,620	4,112	39,000	1,100	0,350	2,369
	0,600	1,900	24,000	3,960	3,524	39,000	1,100	0,300	2,369
	0,500	2,000	20,000	3,300	2,937	39,000	1,100	0,250	2,369
	0,400	2,100	16,000	2,640	2,350	39,000	1,100	0,200	2,369
	0,300	2,200	12,000	1,980	1,762	39,000	1,100	0,150	2,369
	0,200	2,300	8,000	1,320	1,175	39,000	1,100	0,100	2,369
	0,100	2,400	4,000	0,660	0,587	39,000	1,100	0,050	2,369
	0,025	2,475	1,000	0,165	0,147	39,000	1,100	0,012	2,369
	0,000	2,500	0,000	0,000	0,000	39,000	1,100	0,000	0,000

**Tank Calibrations - Aguas Negras Grises BR**

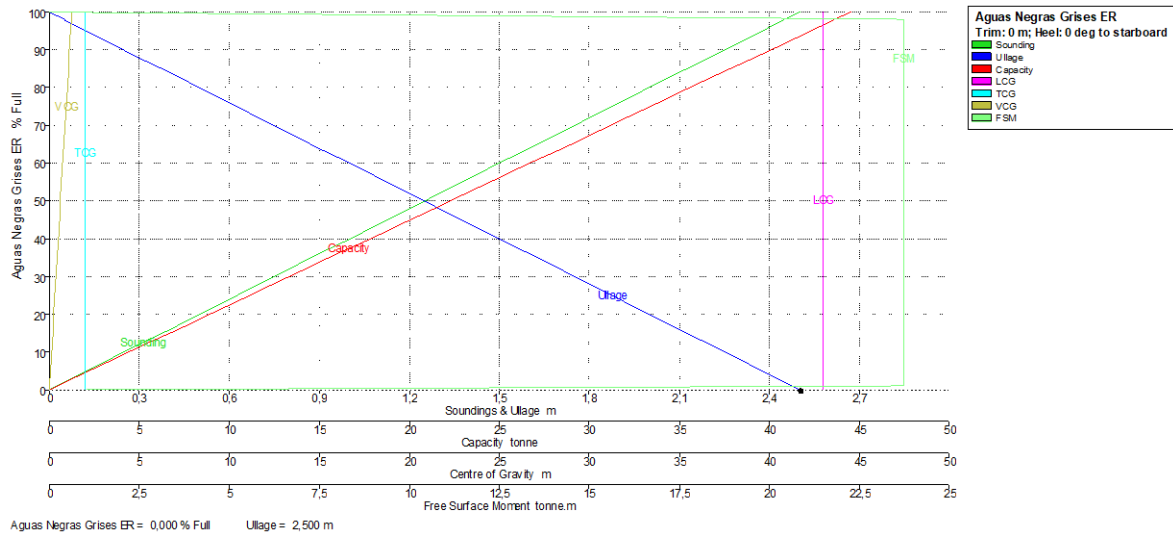
Fluid Type = DMA (ISO 8217)      Specific gravity = 0,89  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



Tank Name	Sounding m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aguas Negras Grises BR	2,500	0,000	100,000	50,000	44,500	43,000	-2,000	1,250	0,000
	2,450	0,050	98,000	49,000	43,610	43,000	-2,000	1,225	23,733
	2,447	0,053	97,900	48,950	43,565	43,000	-2,000	1,224	23,733
	2,400	0,100	96,000	48,000	42,720	43,000	-2,000	1,200	23,733
	2,300	0,200	92,000	46,000	40,940	43,000	-2,000	1,150	23,733
	2,200	0,300	88,000	44,000	39,160	43,000	-2,000	1,100	23,733
	2,100	0,400	84,000	42,000	37,380	43,000	-2,000	1,050	23,733
	2,000	0,500	80,000	40,000	35,600	43,000	-2,000	1,000	23,733
	1,900	0,600	76,000	38,000	33,820	43,000	-2,000	0,950	23,733
	1,800	0,700	72,000	36,000	32,040	43,000	-2,000	0,900	23,733
	1,700	0,800	68,000	34,000	30,260	43,000	-2,000	0,850	23,733
	1,600	0,900	64,000	32,000	28,480	43,000	-2,000	0,800	23,733
	1,500	1,000	60,000	30,000	26,700	43,000	-2,000	0,750	23,733
	1,400	1,100	56,000	28,000	24,920	43,000	-2,000	0,700	23,733
	1,300	1,200	52,000	26,000	23,140	43,000	-2,000	0,650	23,733
	1,200	1,300	48,000	24,000	21,360	43,000	-2,000	0,600	23,733
	1,100	1,400	44,000	22,000	19,580	43,000	-2,000	0,550	23,733
	1,000	1,500	40,000	20,000	17,800	43,000	-2,000	0,500	23,733
	0,900	1,600	36,000	18,000	16,020	43,000	-2,000	0,450	23,733
	0,800	1,700	32,000	16,000	14,240	43,000	-2,000	0,400	23,733
	0,700	1,800	28,000	14,000	12,460	43,000	-2,000	0,350	23,733
	0,600	1,900	24,000	12,000	10,680	43,000	-2,000	0,300	23,733
	0,500	2,000	20,000	10,000	8,900	43,000	-2,000	0,250	23,733
	0,400	2,100	16,000	8,000	7,120	43,000	-2,000	0,200	23,733
	0,300	2,200	12,000	6,000	5,340	43,000	-2,000	0,150	23,733
	0,200	2,300	8,000	4,000	3,560	43,000	-2,000	0,100	23,733
	0,100	2,400	4,000	2,000	1,780	43,000	-2,000	0,050	23,733
	0,025	2,475	1,000	0,500	0,445	43,000	-2,000	0,013	23,733
	0,000	2,500	0,000	0,000	0,000	43,000	-2,000	0,000	0,000

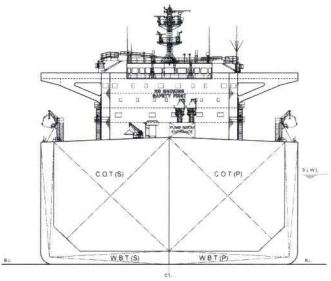
**Tank Calibrations - Aguas Negras Grises ER**

Fluid Type = DMA (ISO 8217)      Specific gravity = 0,89  
 Permeability = 100 %  
 Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

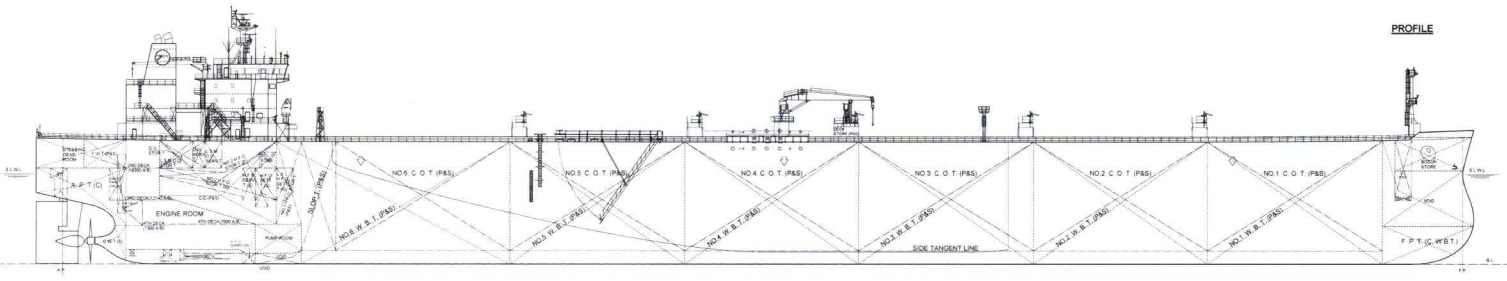


Tank Name	Soundings m	Ullage m	% Full	Capacity m <sup>3</sup>	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Aguas Negras Grises ER	2,500	0,000	100,000	50,000	44,500	43,000	2,000	1,250	0,000
	2,450	0,050	98,000	49,000	43,610	43,000	2,000	1,225	23,733
	2,447	0,053	97,900	48,950	43,565	43,000	2,000	1,224	23,733
	2,400	0,100	96,000	48,000	42,720	43,000	2,000	1,200	23,733
	2,300	0,200	92,000	46,000	40,940	43,000	2,000	1,150	23,733
	2,200	0,300	88,000	44,000	39,160	43,000	2,000	1,100	23,733
	2,100	0,400	84,000	42,000	37,380	43,000	2,000	1,050	23,733
	2,000	0,500	80,000	40,000	35,600	43,000	2,000	1,000	23,733
	1,900	0,600	76,000	38,000	33,820	43,000	2,000	0,950	23,733
	1,800	0,700	72,000	36,000	32,040	43,000	2,000	0,900	23,733
	1,700	0,800	68,000	34,000	30,260	43,000	2,000	0,850	23,733
	1,600	0,900	64,000	32,000	28,480	43,000	2,000	0,800	23,733
	1,500	1,000	60,000	30,000	26,700	43,000	2,000	0,750	23,733
	1,400	1,100	56,000	28,000	24,920	43,000	2,000	0,700	23,733
	1,300	1,200	52,000	26,000	23,140	43,000	2,000	0,650	23,733
	1,200	1,300	48,000	24,000	21,360	43,000	2,000	0,600	23,733
	1,100	1,400	44,000	22,000	19,580	43,000	2,000	0,550	23,733
	1,000	1,500	40,000	20,000	17,800	43,000	2,000	0,500	23,733
	0,900	1,600	36,000	18,000	16,020	43,000	2,000	0,450	23,733
	0,800	1,700	32,000	16,000	14,240	43,000	2,000	0,400	23,733
	0,700	1,800	28,000	14,000	12,460	43,000	2,000	0,350	23,733
	0,600	1,900	24,000	12,000	10,680	43,000	2,000	0,300	23,733
	0,500	2,000	20,000	10,000	8,900	43,000	2,000	0,250	23,733
	0,400	2,100	16,000	8,000	7,120	43,000	2,000	0,200	23,733
	0,300	2,200	12,000	6,000	5,340	43,000	2,000	0,150	23,733
	0,200	2,300	8,000	4,000	3,560	43,000	2,000	0,100	23,733
	0,100	2,400	4,000	2,000	1,780	43,000	2,000	0,050	23,733
	0,025	2,475	1,000	0,500	0,445	43,000	2,000	0,013	23,733
	0,000	2,500	0,000	0,000	0,000	43,000	2,000	0,000	0,000

# ANEXO III BUQUE BASE EAGLE SAN ANTONIO



MIDSHIP SECTION



UPPER DECK PLAN

