UNIVERSIDADE DA CORUÑA

Escola Politécnica Superior

Trabajo Fin de Grado
CURSO 2.017/18

BUQUE ATUNERO CONGELADOR DE 3.700 m³

Grado en Ingeniería Naval y Oceánica

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FECHA:

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1. RPA

GRADO EN INGENIERÍA NAVAL Y OCEÁNICA
TRABAJO FIN DE GRADO

PROYECTO NÚMERO: 18-05

TIPO DE BUQUE: Buque atunero congelador de 3.700 m^3 con bandera española destinado a la pesca de cerco en el Océano Pacífico Oriental.

CLASIFICACIÓN, COTA Y REGLAMENTOS DE APLICACIÓN: El buque ha de cumplir las reglas establecidas por la Sociedad de Clasificación BUREAU VERITAS para alcanzar la cota:

I ✠ HULL ✠ MACH, Fishing vessel, Unrestricted navigation, REF-CARGO-QUICKFREEZE, INWATERSURVEY

Además, el buque deberá ajustarse a los siguientes reglamentos:

Protocolo de Torremolinos 1.993 con sus enmiendas en vigor.

Reglamentos de los Canales de Suez y Panamá.

Reglamento MARPOL 73/78.

CARACTERÍSTICAS DE LA CARGA: Atún que se distribuirá y congelará en cubas por el sistema de inmersión en salmuera.

VELOCIDAD Y AUTONOMÍA: El buque alcanzará una velocidad en pruebas de 19 nudos con el motor desarrollando su potencia máxima continua (100% MCR) y cuya autonomía será de 60-70 días operacionales.

SISTEMAS Y EQUIPOS DE CARGA / DESCARGA: Los equipos de carga y descarga serán la pluma de panga y plumas auxiliares (Br y Er) para carga y descarga de la pesca y en general los habituales para este tipo de buque.

PROPULSIÓN: Motor propulsor diésel 4 tiempos no reversible.

TRIPULACIÓN Y PASAJE: El buque estará operado por 30 tripulantes con camarotes y aseos individuales.

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

Ferrol, 18 Septiembre 2.017

ALUMNO/A: **Dª EVA LUZ VILLAR CHOUCIÑO**

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Grado en Ingeniería Naval y Oceánica

CUADERNO 4

"CÁLCULOS DE ARQUITECTURA NAVAL"

ÍNDICE

2. INTRODUCCIÓN

El Buque correspondiente al proyecto número 18-05 es un pesquero Purse Seiner con capacidad de cubas de 3.700 m³, a motor, con casco de acero, proyectado para la pesca del atún con arte de cerco en el Océano Pacífico Oriental.

El buque con todo su equipo y maquinaria, se construirá de acuerdo con las reglas, y bajo la inspección de la Sociedad de Clasificación Bureau Veritas, para alcanzar la cota:

I ✠ HULL ✠ MACH, Fishing vessel, Unrestricted navigation, REF-CARGO-QUICKFREEZE, INWATERSURVEY

Donde:

- REF-CARGO-QUICKFREEZE: notación de clase adicional asignada a buques diseñados con plantas de congelación, con la condición de que el número y la energía de las unidades de refrigeración son tales que la temperatura específica puede ser mantenida con una unidad en stand-by.

- INWATERSURVEY: notación de clase adicional asignada a buques con los arreglos necesarios para facilitar la inspección bajo agua.

Las dimensiones principales de dicho Buque Proyecto calculadas en el Cuaderno 1, *"Dimensionamiento Preliminar y Elección de la Cifra de Mérito"* y los coeficientes ajustados en el Cuaderno 3 *"Coeficientes y Plano de Formas",* son los que se muestran a continuación:

ESLORA ENTRE PERPENDICULARES................................. 96,70 m
ESLORA TOTAL.. 112,40 m
MANGA... 18,00 m
PUNTAL A LA CUBIERTA PRINCIPAL................................ 8,20 m
PUNTAL A LA CUBIERTA SUPERIOR................................. 11,00 m
CALADO.. 7,50 m
Velocidad (100% MCR)... 19 nudos
Número de Froude... 0,318
COEFICIENTE DE BLOQUE... 0,592
COEFICIENTE DE LA MAESTRA... 0,937
COEFICIENTE PRISMÁTICO.. 0,631
COEFICIENTE DE LA FLOTACIÓN...................................... 0,841
DESPLAZAMIENTO... 7.917 Tn
VOLUMEN DE CUBAS... 3.700 m³
TRIPULACIÓN.. 30
POTENCIA .... 7.200 kW

En el presente Cuaderno 4 *"Cálculo de Arquitectura Naval"* se procederá a la obtención de los siguientes apartados:

- Zona estanca del buque y puntos de inundación progresiva (PIP).
- Espaciado entre cuadernas y explicación de los compartimentados y cubiertas.
- Plano de tanques, capacidades y centros de gravedad de los mismos.
- Tablas hidrostáticas.
- Tablas de KN.

De este modo, se comenzará por la determinación de las zonas estancas del buque, que se definen como aquellas zonas sin aberturas al exterior, o en caso de tenerlas, que posean cierres estancos a la intemperie. En el caso de un buque atunero como es el Buque Proyecto, la zona estanca quedará delimitada como todo el volumen de carena situado por debajo de la cubierta superior.

De forma análoga, se definen los puntos de inundación progresiva (PIP), o lo que es lo mismo, los lugares por los que puede entrar el agua al interior del buque y producirse una inundación progresiva al no disponer de medios de cierre estancos.

El compartimentado estanco del buque permitirá comprobar el cumplimiento de los Requerimientos Previstos de Actividad (RPA) así como el estudio de la estabilidad en las diferentes situaciones de carga.

3. TABLAS HIDROSTÁTICAS

Se presentan las tablas hidrostáticas del Buque Proyecto obtenidas en el Cuaderno 3 *"Coeficientes y Plano de Formas"*.

Hydrostatics at DWL

	Measurement	Value	Units
1	Displacement	7919	t
2	Volume (displaced)	7725,608	m^3
3	Draft Amidships	7,500	m
4	Immersed depth	8,207	m
5	WL Length	103,818	m
6	Beam max extents on	17,999	m
7	Wetted Area	2450,865	m^2
8	Max sect. area	126,525	m^2
9	Waterpl. Area	1463,392	m^2
10	Prismatic coeff. (Cp)	0,631	
11	Block coeff. (Cb)	0,592	
12	Max Sect. area coeff.	0,937	
13	Waterpl. area coeff. (	0,841	
14	LCB length	45,003	from ze
15	LCF length	38,257	from ze
16	LCB %	46,539	from ze
17	LCF %	39,563	from ze
18	KB	4,271	m
19	KG fluid	0,000	m
20	BMt	4,124	m
21	BML	120,988	m
22	GMt corrected	8,395	m
23	GML	125,259	m
24	KMt	8,395	m
25	KML	125,259	m
26	Immersion (TPc)	15,000	tonne/c
27	MTc	102,574	tonne.m
28	RM at 1deg = GMt.Dis	1160,136	tonne.m
29	Length:Beam ratio	5,373	
30	Beam:Draft ratio	2,400	
31	Length:Vol^0.333 rati	4,892	
32	Precision	Highest	215 stat

Density (water) 1,025 tonne/m^3

Std. densities 1,025 tonne/m^3 - Std. Metric sea water (1025.0 kg/m^3)

VCG 0 m Recalculate

Select Rows ... Close

Imagen 1. Tabla de hidrostáticas

4. COMPARTIMENTADO DEL CASCO

La definición del compartimentado del Buque Proyecto servirá como soporte para el estudio de la estabilidad del mismo en las distintas condiciones de carga.

4.1. ZONA ESTANCA DEL CASCO

Como ya se ha indicado, la zona estanca del Buque Proyecto se corresponde con todo el volumen de carena por debajo de la cubierta superior y cubierta castillo. Cabe destacar que ésta cubierta dispone de dos escotillas de carga/descarga, una a proa y otra a popa, sin embargo, no serán un problema ante dicha consideración ya que ambas disponen de mecanismos que permiten considerarlas estancas.
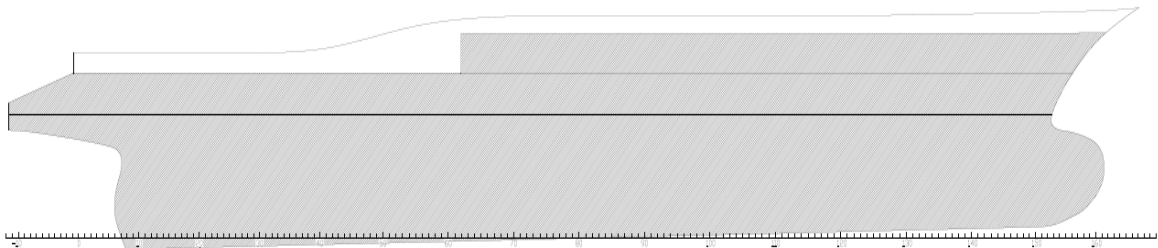
Imagen 2. Zona estanca

4.2. PUNTOS DE INUNDACIÓN PROGRESIVA

Los puntos de inundación progresiva son los lugares por los que puede entrar el agua y producirse una inundación progresiva al no disponer de medios de cierre estancos.

En el caso del Buque Proyecto, se considera como PIP más desfavorable la salida de ventilación situada en el guardacalor, cuyas coordenadas son las que se muestran a continuación:

$$X = 18,60 \, m$$
$$Y = 8,50 \, m$$
$$Z = 16,70 \, m$$
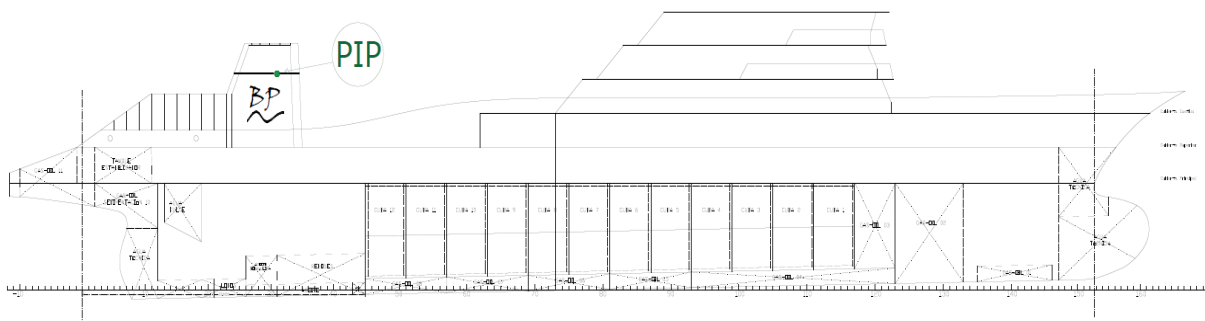
Imagen 3. Punto inundación progresiva

4.3. COMPARTIMENTADO LONGITUDINAL

Para definir el compartimentado longitudinal es importante realizar un determinado procedimiento siguiendo las reglas establecidas por la Sociedad de Clasificación correspondiente, en este caso Bureau Veritas.

4.3.1. Separación entre Cuadernas

El primer paso es determinar el espaciado entre cuadernas. De este modo, se dispondrán a lo largo de la eslora del buque los mamparos transversales estancos.

Basándose en el buque nº 11 de la base de datos "Jocay", se define el espaciado a lo largo de la eslora de tal manera que este sea mayor en la zona central del Buque Proyecto y menor en los extremos del mismo con el fin de reforzar dichas zonas. Así:

- **Zona de Popa**: desde el extremo de popa hasta el mamparo de proa de la cámara de máquinas (C45) se define una separación entre cuadernas de 600 mm.

- **Zona Central**: (C45 a C147) entre los mamparos de colisión y prensaestopas se define una separación entre cuadernas de 650 mm.

- **Zona de Proa**: desde el mamparo de colisión (C147) hasta el extremo de proa se define una separación entre cuadernas de 600 mm.

4.3.2. Situación de los Mamparos

Siguiendo la reglamentación de la *Bureau Veritas, Pt. B, Ch. 2, Sec. 1 – [2],* todos los buques deberán tener como mínimo los siguientes mamparos estancos:

- Mamparo de Colisión o de Pique de Proa.
- Mamparo de Prensaestopas o de Pique de Popa
- Mamparo estanco a proa de la Cámara de Máquinas

4.3.2.1. Mamparo de Colisión

Para determinar la situación de este mamparo, se siguen tanto el Convenio de Torremolinos como el reglamento de la Bureau Veritas.

En el *Apartado 21 de la Regla 2 del Convenio de Torremolinos*, se indica que el mamparo de colisión es el mamparo estanco que llega a la cubierta de trabajo en la sección de proa del buque y satisface las siguientes condiciones:

- Estar ubicado de modo que diste de la perpendicular de proa no menos de $0,05 \cdot L$ ni más de $0,08 \cdot L$ en los buques de eslora igual o superior a 45 metros y un mínimo de 2,0 m. La eslora L tiene la misma definición que la empleada en el Cuaderno 1; el 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, o la eslora medida en esa flotación desde la cara proel de la roda hasta el eje de la mecha del timón, si esta segunda magnitud es mayor.

$$L_{flt} = 103,818\ m\ (extraída\ de\ la\ tabla\ de\ hidrostáticas)$$

$$L_{pp_{flt}} = 96,70\ m$$

De manera que comparando dimensiones:

$$0,96 \cdot L_{flt} = 99,665\ m > L_{pp_{flt}}$$

Por lo que la Eslora L será:

$$Eslora\ L = 0,96 \cdot L_{flt} = \mathbf{99,665\ m}$$

- Cuando cualquier parte de la obra viva se extienda a proa de la perpendicular de proa, como en este caso hace una proa de bulbo, la distancia estipulada en el apartado anterior se medirá desde:

    o El punto medio de la prolongación que sobresalga de la perpendicular de proa.

$$\frac{Bulbo\ Proa}{2} = \frac{5,20}{2} = 2,60\ m$$

    o Desde un punto situado a proa de la perpendicular de proa que diste de ésta 0,015·L, si esta dimensión es menor.

$$0,015 \cdot L = 0,015 \cdot 99,665 = 1,50\ m$$

De modo que el punto de referencia se situará a 1,50 m a proa de la perpendicular de proa.

Siguiendo el buque de referencia *"Jocay",* se toma un mamparo de colisión 3.400 mm a popa de la perpendicular de proa (C147), por lo que la distancia total desde el punto de referencia es la siguiente:

$$3.400 + 1.500 = 4.900\ mm$$
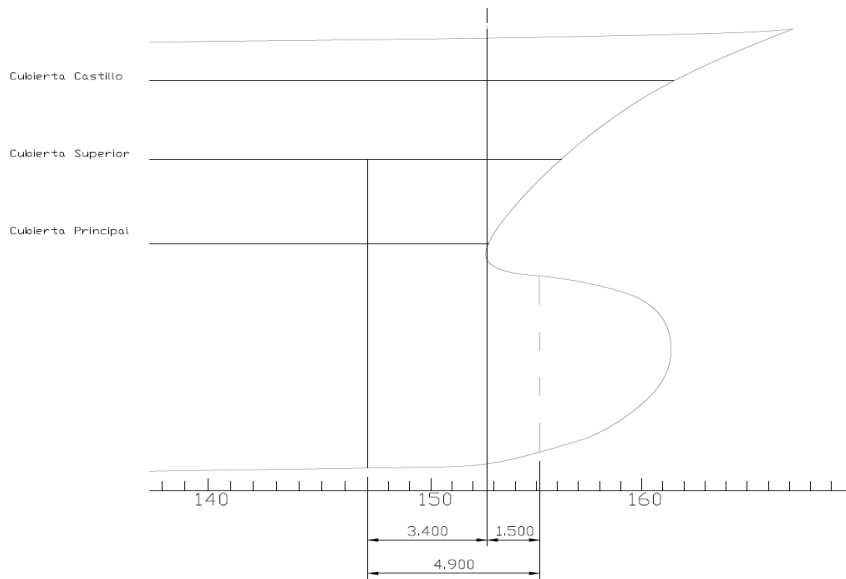
Imagen 4. Mamparo de colisión

4.3.2.2. Mamparo de Pique de Popa

El mamparo de pique de popa se ha situado a 7.200 mm de la perpendicular de popa (C12), teniendo en cuenta las necesidades de espacio y distancia de la cámara de máquinas al codaste, y las necesidades de capacidad de los distintos tanques de líquidos.
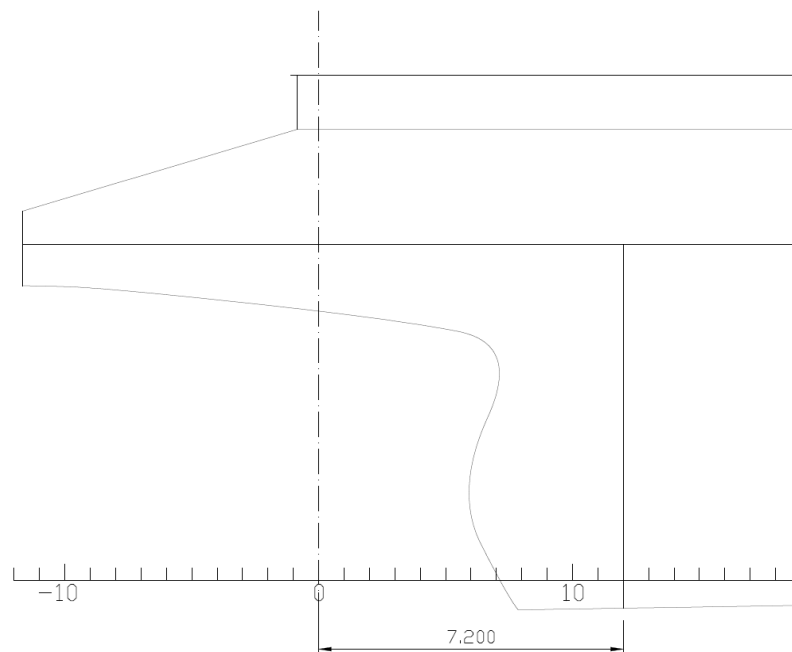
Imagen 5. Mamparo de pique de popa

4.3.2.3. Mamparos de Cámara de Máquinas

La longitud de la cámara de máquinas se ha estimado en función de la longitud aproximada del motor que se va a instalar en el Buque Proyecto, de la reductora y de

un margen adicional. De este modo, y apoyándose en el buque de referencia, se toma una longitud de 19.800 mm (de C12 a C45).

4.3.2.4. Espacio Destinado a Bodegas de Carga

A la hora de definir la longitud de la zona de bodegas de carga se tendrán en cuenta los siguientes aspectos:

- Separación entre cuadernas de 650 mm.

- Un total de 24 cubas de almacenamiento de carga.

- Situación de los mamparos cada 6 claras de cuaderna, coincidentes con las bulárcamas de la zona de entrepuente.

- Cubas de una eslora de 3.900 mm cada una incluyendo el aislamiento de 200 mm.

- Se dispone de un túnel central para el paso de tuberías y bombas, destinadas al proceso de congelación de la pesca, cuyas dimensiones son 2,00 m de manga por 3,30 m de altura.

De esta manera, se destinan 50.700 mm (de C45 a C117) para el almacenamiento de la carga seca.

Además, a proa de la bodega de carga (de C117 a C147), se han situado dos parejas de tanques simétricos de gasoil de 3,90 y 6,50 m de eslora respectivamente, y un compartimentado central de 4,00 m de eslora entre ellos para el local de los sónares.

4.4. COMPARTIMENTADO TRANSVERSAL

En el Buque Proyecto, al igual que en los buques atuneros de la base de datos, se dispone de mamparos que dividen el doble fondo en el sentido transversal, así como las cubas y los tanques de carga líquida.

Lleva también dos mamparos longitudinales, desde la cámara de máquinas hasta el local de la hélice de proa, formando el túnel con una manga útil de 2.000 mm y en donde se instalan las bombas de circulación de salmuera y tuberías frigoríficas entre otros.

4.5. COMPARTIMENTADO VERTICAL

En el sentido vertical del buque se disponen el doble fondo y las cubiertas principal, superior y castillo.

4.5.1. Doble Fondo

El apartado 7 de la Regla 12 del Convenio de Torremolinos dice que los buques de eslora igual o superior a 75 metros llevarán un doble fondo estanco situado, en la medida posible, entre el mamparo de colisión y el mamparo del rasel de popa.

La función del doble fondo es resistir los pantocazos que puedan producirse durante la navegación, así como proteger al barco tanto de la encalladura como de la inundación.

Según la Sociedad de Clasificación aplicada en este anteproyecto, la altura mínima exigida es de 0,7 m de cubierta. Así mismo, este espacio debe ser accesible en cualquier punto del buque.

En el Buque Proyecto se aplicará una altura de 1.200 mm, de tal manera que deje espacio suficiente para permitir el acceso.
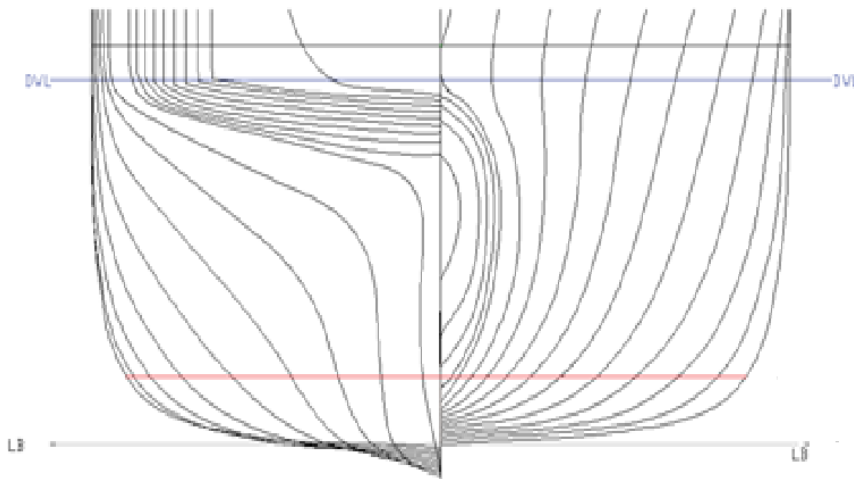
Imagen 6. Doble fondo

4.5.2. Cubiertas

El Buque Proyecto dispone de dos cubiertas corridas, siendo estas la cubierta principal y la cubierta superior, ambas proyectadas sin brusca ni arrufo de tal manera que se facilite la construcción del buque, así como una reducción del coste del mismo.

- **Cubierta Principal:** situada a una altura de 8.200 mm medida desde la línea base. Se toma ésta cubierta como la cubierta de francobordo.

- **Cubierta Superior:** situada a una altura de 11.000 mm.

- **1ª Cubierta Castillo:** situada a una altura de 2.600 mm desde la cubierta superior, que se extiende desde la zona central del buque hasta la proa.

- **2ª Cubierta Castillo y Cubierta Puente:** ambas con una altura entre cubiertas de 2.600 mm como se indica en el Cuaderno 1.

5. CAPACIDADES DE LOS TANQUES

En este apartado se definirá la capacidad de almacenamiento requerida por los diferentes tanques a bordo del Buque Proyecto.

5.1. TANQUE DE GAS OIL

A la hora de calcular la capacidad requerida para el almacenamiento de gas oil se consideran como principales consumidores tanto el motor principal como los generadores auxiliares.

Como se veía en el Cuaderno 2 *"Cálculos de Pesos y Centros de Gravedad del Peso en Rosca"*, los datos de partida del motor principal son los siguientes:

Marca…………………………………………..……… WÄRTSILA
Modelo………………………………………..……… 6L46F
Potencia de Servicio…………………………………. 7.200 kW (9.790 BHP)
Velocidad Nominal………………………………….. 600 r.p.m.
Consumo D.O.……...……………………………….. 177,9 g/kW·h *(75% load)*
Consumo Aceite………………………………………. 0,700 g/kW·h
Autonomía…………………………………………… 65% de 60 días

Este tipo de buques navegan una media de 15 horas diarias, por lo que se supondrá una autonomía del 65% de los 60 días fijados en la RPA. De manera que la capacidad necesaria para el consumo del motor principal se calcula de la siguiente manera:

$$Consumo_{DO} = 0,65 \cdot 60 \cdot 24 \cdot 177,9 \cdot 0,75 \cdot 7.200 \cdot 10^{-6} = 900,00 \, Tn$$

A este resultado se le añade el consumo de los motores diésel generadores de igual manera que se hacía en el Cuaderno 2: tras el balance eléctrico realizado en el Cuaderno 11 *"Planta Eléctrica"*, se instalan en el Buque Proyecto 3 generadores eléctricos CATERPILLAR 3512B de 1.200 kW cada uno con un consumo de 195,6 gr/kW·h a un régimen del 75%. Para obtener el consumo aproximado de diésel por los generadores, se utilizan los resultados de consumos energéticos del Cuaderno 11 *"Planta Eléctrica"*, cuyos resultados, en función de la condición de navegación del buque, se muestran en la siguiente tabla:

SITUACIÓN	TOTAL (kW)	Margen (10%)	POT. TOTAL
MANIOBRANDO (10%)	1.620,26	162,03	1.782,30
NAVEGACIÓN NORMAL (50%)	1.435,66	143,57	1.579,30
PESCANDO Y REFRIGERANDO (30%)	2.090,27	209,03	2.299,30
EN PUERTO: CARGA Y DESCARGA (10%)	673,27	67,33	740,60
EMERGENCIA	633,06	63,31	696,40

De este modo, y teniendo en cuenta cómo se distribuyen las diferentes situaciones de navegación más un margen del 15% del total, se obtiene un consumo final de los generadores en kW de:

$$
\begin{aligned}
Consumo_{MMAA} &= 1{,}15 \cdot 60 \cdot 24 \cdot 195{,}6 \cdot 10^{-6} \\
&\cdot (0{,}1 \cdot 1.782{,}30 + 0{,}5 \cdot 1.579{,}30 + 0{,}3 \cdot 2.299{,}30 + 0{,}2 \cdot 740{,}60) = 560\,Tn
\end{aligned}
$$

De manera que la capacidad total de tanques es la siguiente:

$$
Consumo_{TOTAL} = \frac{900{,}00 + 560{,}00}{0{,}84} = \mathbf{1.739{,}00\,m^3}
$$

El Convenio MARPOL, en su Regla 12 A para la prevención de la contaminación por hidrocarburos, define la capacidad del tanque de combustible líquido como el volumen de un tanque, en m³, con un nivel de llenado (permeabilidad) del 98%.

Además, aplica esta Regla 12A a todos los buques con una capacidad total de combustible líquido igual o superior a 600 m³ entregados el 1 de agosto de 2.010 o posteriormente. Las disposiciones de dicha regla serán aplicables a todos los tanques de combustible líquido con la excepción de los tanques de combustible líquido pequeños (capacidad máxima no supera los 30 m³), siempre que la capacidad total de los tanques excluidos no supere los 600 m³.

Así, en el caso de los buques cuya capacidad total de combustible líquido sea igual o superior a 600 m³ pero inferior a 5.000 m³, como es el caso del Buque Proyecto, los tanques de combustible líquido irán dispuestos por dentro de la línea de trazado de las planchas del forro del fondo y del costado, y en ningún caso a menos de la distancia h (en el caso del fondo) y w (en el caso del costado) medida en cualquier sección transversal perpendicular al forro del costado, donde w:

$$
h = \frac{B}{20}\ (m)\ \acute{o}\ h = 2{,}0\,m, si\ este\ valor\ es\ inferior
$$

$$
w = 0{,}4 + \frac{2{,}4 \cdot C}{20.000}\ (m)\ \acute{o}\ 1{,}0\,m\ si\ este\ valor\ es\ inferior
$$

Siendo el valor mínimo de w y de h de 0,76 para los tanques con una capacidad de combustible líquido inferior a 500 m³ como es el caso del Buque Proyecto.

Sin embargo, y como alternativa a lo dispuesto en dichos párrafos anteriores, los buques cumplirán la norma de aptitud para prevenir escapes accidentales calculando

el parámetro de escape medio de hidrocarburos del modo que se indica en el párrafo 11 de la regla 12A.

De forma en este caso, se puede decir que al combinar los parámetros de escape de hidrocarburos se adoptan una serie de hipótesis que principalmente calculan el escape medio de hidrocarburos por separado para las averías en el costado y para las averías en el fondo, para después combinar ambos resultados en un parámetro adimensional de escape de hidrocarburos, O_M, como se muestra a continuación:

$$O_M = \frac{(0{,}40 \cdot O_{MS} + 0{,}60 \cdot O_{MB})}{C} < 0{,}0157 - 1{,}14 \cdot 10^{-6 \cdot C}$$

donde:

O_{MS} = escape medio para una avería en el costado, en m^3.

$$O_{MS} = \sum_i^n P_{S(i)} \cdot O_{S(i)} \ (m^3)$$

O_{MB} = escape medio para una avería en el fondo, en m^3.

$$O_{MB} = 0{,}70 \cdot O_{MB(0)} + 0{,}30 \cdot 0_{MB(2{,}5)}$$

siendo:

$$O_{MB(0)} = \sum_i^n P_{B(i)} \cdot O_{B(i)} \cdot C_{DB(i)} \ (m^3)$$

$$O_{MB(2{,}5)} = \sum_i^n P_{B(i)} \cdot O_{B(i)} \cdot C_{DB(i)} \ (m^3)$$

C = volumen total de combustible líquido, tomándose en este caso el volumen máximo obtenido según la disposición general de tanques de combustible diseñados en Maxsurf; **1.275,00 m^3.**

Así, utilizando el programa Maxsurf para la realización del cálculo, se toman todos aquellos tanques que están en contacto con el costado, el fondo o con ambos a la vez, asumiendo que, por tratarse de una disposición simétrica, la avería se tomará solamente de un costado del buque como se refleja en las notas explicativas referidas a la Regla 12A. A continuación, se muestran los tanques seleccionados:
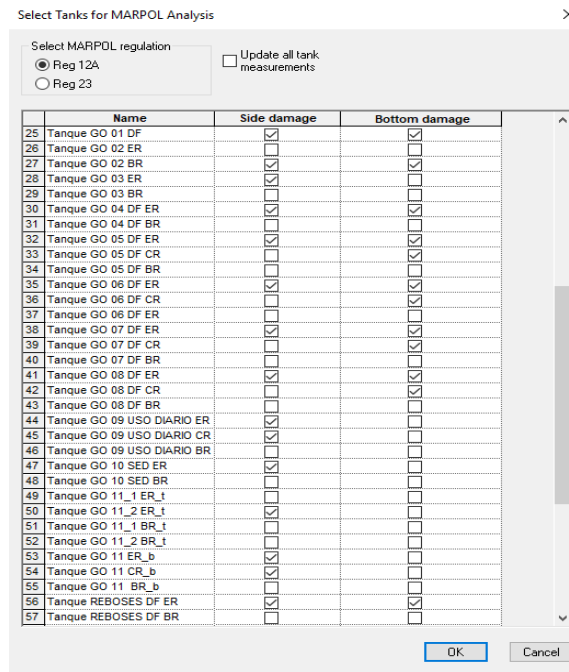
Imagen 7. Tanques Regla 12ª MARPOL

Para el cálculo del derrame medio para cada avería, a cada tanque de combustible líquido se le asigna una probabilidad de que se produzca una penetración en el mismo por avería, P_S (costado) y P_B (fondo), la cual se combina con el escape procedente del tanque de combustible líquido en m^3, O_S (costado) y O_B (fondo).

En caso de avería en el fondo, una parte del escape procedente de un tanque de combustible líquido podrá ser captada por compartimentos no dedicados a hidrocarburos. Este efecto se calcula por aproximación aplicando el factor C_{DB} para cada tanque, que en el caso de los tanques del Buque Proyecto será 1.

A continuación, se muestran los resultados finales. Las tablas obtenidas se muestran en el ANEXO I de este cuaderno.

Main parameters: Reg.12A			
Length (L)	112,40	m	
Aft terminus of Length (L)	-7,00	m	
Deepest loadline draft (d_S)	7,50	m	
Lightship draft (d_L)	4,00	m	
Partial loadline draft (d_P)	6,10	m	
Draft B (d_B)	4,08	m	
Depth amidships to upper deck (D_S)	13,60	m	
Breadth at or below d_S (B_S)	18,00	m	
Breadth at or below d_B (B_B)	17,57	m	
Ignore small tanks: max. capacity not greater than	30,00	m^3	Aggregate capacity of small tanks: 144,648
Total volume of fuel oil at 98% filling (C)	1275,00	m^3	
Nominal seawater density (rho_S)	1,03	tonne/m^3	
Nominal oil fuel density (rho_n)	0,84	tonne/m^3	
Tidal change (t_C)	-2,50	m^3	
Calculations			
Mean outflow for side damage (O_MS)	2,035	m^3	
Mean outflow for bottom damage (O_MB)	13,578	m^3	
Mean outflow parameter (O_M)	0,0070		
Maximum allowable mean outflow parameter (O_M_max)	0,0157		
Satus Reg.12A	Pass		

Tabla 1. Resultados Regla 12A MARPOL

Aplicando la expresión:

$$O_M = \frac{(0,40 \cdot O_{MS} + 0,60 \cdot O_{MB})}{C} = \frac{(0,40 \cdot 2,035 + 0,60 \cdot 13,578)}{1.275}$$

$$O_M = 0,0070 < 0,0157$$

Por tanto, se llega a la conclusión de que **no es necesario aplicar la regla 12A** del Anexo I del Convenio MARPOL para el Buque Proyecto.

5.2. TANQUE DE ACEITE

A la hora de determinar la capacidad de aceite, se considera el consumo del motor principal el empleado en el Cuaderno 2 e indicado en el presente Cuaderno de 0,700 g/kW·h, aplicando la misma autonomía que se ha ido utilizando hasta ahora, de manera que:

$$Consumo_{ACEITE_{MP}} = 0,65 \cdot 60 \cdot 24 \cdot 0,75 \cdot 0,70 \cdot 7.200 \cdot 10^{-6} = 3,60 \, Tn$$

A este se le ha de añadir el consumo total de aceite para reductora, hidráulica, hélices transversales, así como para motores auxiliares. Este se estima aplicando un 4% al consumo de diésel oil del Buque Proyecto, de tal manera que:

$$Consumo_{ACEITE} = 0,04 \cdot 1.739,00 = 58,00 \, Tn$$

La densidad del aceite se considera 890 kg/m³, así:

$$VT_{ACEITE} = \frac{3,50 + 58,00}{0,89} = \mathbf{69,10 \, m^3}$$

5.3. TANQUE DE AGUA DULCE

Para el cálculo de la capacidad de los tanques de agua dulce, se aplica la norma UNE-EN ISO 15748-2. Esta establece un consumo de 150 litros por persona y día, lo que supondría una gran capacidad de tanques para su almacenamiento.

Con el fin de aprovechar la capacidad del buque al máximo, se recurre a la instalación a bordo de una planta potabilizadora que consta de dos generadores de agua dulce, de manera que los tanques de agua dulce se utilizarán para almacenar el 40% del agua necesaria para cubrir la autonomía del buque, mientras que el 70% restante se suministrará a través del uso de la potabilizadora.

De este modo se tiene:

$$Consumo_{AGUA\ DULCE} = 30 \cdot (0,40 \cdot 60) \cdot 0,150 = \boldsymbol{108,00\ m^3}$$

5.4. TANQUE DE AGUAS GRISES Y NEGRAS

Se consideran aguas grises y negras las aguas, según la norma *UNE-EN ISO 15749,* aquellas procedentes de aseos generales, zonas hospitalarias, lavabos y cuartos de baño, cocinas y despensas y otros espacios como centrales de aire acondicionado, lavanderías, pasillos, etc…

La citada norma, en el caso del Buque Proyecto, establece 25 litros como cantidad mínima de agua de desecho por persona y día.

Siguiendo lo establecido por la *Regla 11 del Capítulo 3 del Anexo IV del Convenio MARPOL*, se podrá proceder a la descarga de aguas sucias en el mar si el buque navega a una distancia superior a 3 millas marinas de la tierra más próxima si las aguas sucias han sido previamente desmenuzadas y desinfectadas mediante un sistema aprobado por la Administración o a una distancia superior a 12 millas marinas de la tierra más próxima si no han sido previamente desmenuzadas ni desinfectadas.

Es por ello que se instalará en el Buque Proyecto una planta de tratamiento de aguas negras y grises de tipo biológico con aireación extendida. Esta consta de tres cámaras (aireación, decantación y desinfección) en un único módulo.

De este modo, se tendrá en cuenta para el cálculo de la capacidad de estos tanques la duración habitual de descarga de este tipo de buques; en este caso se tomarán 6 días para dicha actividad.

$$VT_{AGUAS\ SUCIAS} = 6 \cdot 30 \cdot 0,025 = \boldsymbol{4,50\ m^3}$$

5.5. TANQUE DE LODOS

El Convenio MARPOL en su Regla 12 del Anexo I, obliga a todo buque cuyo arqueo bruto sea igual o superior a 400 GT a tener un tanque o tanques de capacidad suficiente para recibir los residuos de hidrocarburos que se generan en la cámara de máquinas, tales como los resultantes de la purificación de los combustibles y aceites lubricantes y de las fugas de hidrocarburos que se producen en los espacios de máquinas.

La capacidad mínima adecuada de los tanques, para buques que no lleven agua de lastre en los tanques de combustible líquido, se calcula conforme a la siguiente fórmula:

$$VT_{FANGOS} = k_1 \cdot C \cdot D\ (m^3)$$

donde:

$K_1 = 0,005$

C = consumo de fueloil diario en toneladas métricas.

$$C = 0,65 \cdot 183,6 \cdot 24 \cdot 0,75 \cdot 7.200 \cdot 10^{-6} = 15,50 \, Tn$$

D = periodo máximo de travesía entre puertos en que se puedan descargar los fangos a tierra en días. **Se toman los 60 días de autonomía.**

De modo que el volumen final del tanque de fangos es el siguiente:

$$VT_{FANGOS} = 0,005 \cdot 15,50 \cdot 60 = \textbf{4,70} \, \boldsymbol{m^3}$$

5.6. TANQUES DE AGUA TÉCNICA

Se destinarán tanques para el almacenamiento de agua técnica utilizada para diferentes usos del buque. Como se verá en el Cuaderno 12 *"Equipos y Servicios"*, el Buque Proyecto transformará toda el agua dulce en agua potable, tanto para consumo humano como para usos técnicos.

Además, se reserva un volumen mínimo de los tanques de agua técnica para el servicio contra incendios de agua nebulizada.

5.7. TANQUE ESTABILIZADOR

El Buque Proyecto dispondrá de un tanque estabilizador en popa. Su función es la de atenuar el balance del buque a través del desplazamiento del agua cuando este se encuentra en situación de navegación.

Este tanque nunca va al máximo de su capacidad, de este modo, el efecto de la superficie libre del agua ayuda a disminuir el balance del buque al producirse el desplazamiento de la masa de agua más lentamente y en sentido contrario al que se produce en el propio balance del buque.

Este tanque se sitúa por debajo de la cubierta principal y está constituido por dos tanques, estribor y babor, que se comunican a través de su base.

En función de la condición de carga del buque y de las condiciones de mar, haciendo uso de una serie de válvulas situadas en el sistema de tuberías de la parte superior del tanque, se puede conseguir que el balance del buque sea más suave y seguro.

5.8. CAPACIDAD DE CUBAS

La capacidad de cubas para el almacenamiento de la carga viene definida por la RPA del Buque Proyecto. Como se indica el principio del cuaderno, se establece un volumen de carga de 3.700 m³.

De tal modo que, para el cálculo de los volúmenes de las cubas se partirá de los siguientes puntos a tener en cuenta:

- La separación entre mamparos es de 6 cuadernas (3.900 mm) incluido un aislamiento de 200 mm.

- El puntal de las cubas se considera desde la cubierta del doble fondo hasta la cubierta principal.

- Se considera una densidad de 0,72 Tn/m^3

- Se tendrá en cuenta la instalación de un túnel de frío en crujía, con bóveda y de aproximadamente 3,00 m de altura desde el doble fondo y 2,00 m de anchura.

6. DISEÑO DEL COMPARTIMENTADO

Se desglosa a continuación la disposición y los volúmenes obtenidos de los diferentes tanques que constituyen el Buque Proyecto en el programa Maxsurf. En el Anexo II se muestran las tablas obtenidas en el programa para cada tanque.

Se presenta en el ANEXO III la disposición general de dichos tanques.

6.1. CUBAS DE CARGA

En el diseño de los tanques de carga se han utilizado los siguientes datos:

- Un total de 24 Cubas (12 Er y 12 Br).
- Permeabilidad = 80% (se incluye un aislamiento de 200 mm en cada mamparo).
- Densidad del atún = 0,72 Tn/m^3.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Cuba 1 ER	Tank	80	0,72	Atún	69,9	73,8	0	10	8,2	4,91	Prismatic	Prismatic	Prismatic	4,846
Cuba 1 ER	Linked Tank	80	0,72	Atún	69,9	73,8	1	10	4,91	1,625	Prismatic	Prismatic	4,846	1,562
Cuba 1 BR	Tank	80	0,72	Atún	69,9	73,8	-10	0	8,2	4,91	Prismatic	Prismatic	Prismatic	4,846
Cuba 1 BR	Linked Tank	80	0,72	Atún	69,9	73,8	-10	-1	4,91	1,625	Prismatic	Prismatic	4,846	1,562
Cuba 2 ER	Tank	80	0,72	Atún	66	69,9	0	10	8,2	4,846	Prismatic	Prismatic	Prismatic	4,782
Cuba 2 ER	Linked Tank	80	0,72	Atún	66	69,9	1	10	4,846	1,562	Prismatic	Prismatic	4,782	1,499
Cuba 2 BR	Tank	80	0,72	Atún	66	69,9	-10	0	8,2	4,846	Prismatic	Prismatic	Prismatic	4,782
Cuba 2 BR	Linked Tank	80	0,72	Atún	66	69,9	-10	-1	4,846	1,562	Prismatic	Prismatic	4,782	1,499
Cuba 3 ER	Tank	80	0,72	Atún	62,1	66	0	10	8,2	4,782	Prismatic	Prismatic	Prismatic	4,718
Cuba 3 ER	Linked Tank	80	0,72	Atún	62,1	66	1	10	4,782	1,499	Prismatic	Prismatic	4,718	1,436
Cuba 3 BR	Tank	80	0,72	Atún	62,1	66	-10	0	8,2	4,782	Prismatic	Prismatic	Prismatic	4,718
Cuba 3 BR	Linked Tank	80	0,72	Atún	62,1	66	-10	-1	4,782	1,499	Prismatic	Prismatic	4,718	1,436
Cuba 4 ER	Tank	80	0,72	Atún	58,2	62,1	0	10	8,2	4,718	Prismatic	Prismatic	Prismatic	4,654
Cuba 4 ER	Linked Tank	80	0,72	Atún	58,2	62,1	1	10	4,718	1,436	Prismatic	Prismatic	4,654	1,373
Cuba 4 BR	Tank	80	0,72	Atún	58,2	62,1	-10	0	8,2	4,718	Prismatic	Prismatic	Prismatic	4,654
Cuba 4 BR	Linked Tank	80	0,72	Atún	58,2	62,1	-10	-1	4,718	1,436	Prismatic	Prismatic	4,654	1,373
Cuba 5 ER	Tank	80	0,72	Atún	54,3	58,2	0	10	8,2	4,654	Prismatic	Prismatic	Prismatic	4,59
Cuba 5 ER	Linked Tank	80	0,72	Atún	54,3	58,2	1	10	4,654	1,373	Prismatic	Prismatic	4,59	1,31
Cuba 5 BR	Tank	80	0,72	Atún	54,3	58,2	-10	0	8,2	4,654	Prismatic	Prismatic	Prismatic	4,59
Cuba 5 BR	Linked Tank	80	0,72	Atún	54,3	58,2	-10	-1	4,654	1,373	Prismatic	Prismatic	4,59	1,31
Cuba 6 ER	Tank	80	0,72	Atún	50,4	54,3	0	10	8,2	4,59	Prismatic	Prismatic	Prismatic	4,526
Cuba 6 ER	Linked Tank	80	0,72	Atún	50,4	54,3	1	10	4,59	1,31	Prismatic	Prismatic	4,526	1,247
Cuba 6 BR	Tank	80	0,72	Atún	50,4	54,3	-10	0	8,2	4,59	Prismatic	Prismatic	Prismatic	4,526
Cuba 6 BR	Linked Tank	80	0,72	Atún	50,4	54,3	-10	-1	4,59	1,31	Prismatic	Prismatic	4,526	1,247
Cuba 7 ER	Tank	80	0,72	Atún	46,5	50,4	0	10	8,2	4,526	Prismatic	Prismatic	Prismatic	4,452
Cuba 7 ER	Linked Tank	80	0,72	Atún	46,5	50,4	1	10	4,526	1,247	Prismatic	Prismatic	4,452	1,184
Cuba 7 BR	Tank	80	0,72	Atún	46,5	50,4	-10	0	8,2	4,526	Prismatic	Prismatic	Prismatic	4,452
Cuba 7 BR	Linked Tank	80	0,72	Atún	46,5	50,4	-10	-1	4,526	1,247	Prismatic	Prismatic	4,452	1,184
Cuba 8 ER	Tank	80	0,72	Atún	42,6	46,5	0	10	8,2	4,452	Prismatic	Prismatic	Prismatic	4,398
Cuba 8 ER	Linked Tank	80	0,72	Atún	42,6	46,5	1	10	4,452	1,184	Prismatic	Prismatic	4,398	1,121
Cuba 8 BR	Tank	80	0,72	Atún	42,6	46,5	-10	0	8,2	4,452	Prismatic	Prismatic	Prismatic	4,398
Cuba 8 BR	Linked Tank	80	0,72	Atún	42,6	46,5	-10	-1	4,452	1,184	Prismatic	Prismatic	4,398	1,121
Cuba 9 ER	Tank	80	0,72	Atún	38,7	42,6	0	10	8,2	4,398	Prismatic	Prismatic	Prismatic	4,334
Cuba 9 ER	Linked Tank	80	0,72	Atún	38,7	42,6	1	10	4,398	1,121	Prismatic	Prismatic	4,334	1,058
Cuba 9 BR	Tank	80	0,72	Atún	38,7	42,6	-10	0	8,2	4,398	Prismatic	Prismatic	Prismatic	4,334
Cuba 9 BR	Linked Tank	80	0,72	Atún	38,7	42,6	-10	-1	4,398	1,121	Prismatic	Prismatic	4,334	1,058
Cuba 10 ER	Tank	80	0,72	Atún	34,8	38,7	0	10	8,2	4,334	Prismatic	Prismatic	Prismatic	4,27
Cuba 10 ER	Linked Tank	80	0,72	Atún	34,8	38,7	1	10	4,334	1,058	Prismatic	Prismatic	4,27	0,995
Cuba 10 BR	Tank	80	0,72	Atún	34,8	38,7	-10	0	8,2	4,334	Prismatic	Prismatic	Prismatic	4,27
Cuba 10 BR	Linked Tank	80	0,72	Atún	34,8	38,7	-10	-1	4,334	1,058	Prismatic	Prismatic	4,27	0,995
Cuba 11 ER	Tank	80	0,72	Atún	30,9	34,8	0	10	8,2	4,27	Prismatic	Prismatic	Prismatic	4,206
Cuba 11 ER	Linked Tank	80	0,72	Atún	30,9	34,8	1	10	4,27	0,995	Prismatic	Prismatic	4,206	0,932
Cuba 11 BR	Tank	80	0,72	Atún	30,9	34,8	-10	0	8,2	4,27	Prismatic	Prismatic	Prismatic	4,206
Cuba 11 BR	Linked Tank	80	0,72	Atún	30,9	34,8	-10	-1	4,27	0,995	Prismatic	Prismatic	4,206	0,932
Cuba 12 ER	Tank	80	0,72	Atún	27	30,9	0	10	8,2	4,206	Prismatic	Prismatic	Prismatic	4,142
Cuba 12 ER	Linked Tank	80	0,72	Atún	27	30,9	1	10	4,206	0,932	Prismatic	Prismatic	4,142	0,869
Cuba 12 BR	Tank	80	0,72	Atún	27	30,9	-10	0	8,2	4,206	Prismatic	Prismatic	Prismatic	4,142
Cuba 12 BR	Linked Tank	80	0,72	Atún	27	30,9	-10	-1	4,206	0,932	Prismatic	Prismatic	4,142	0,869

De este modo, se obtienen los siguientes volúmenes al 97,6 % de llenado por cuba de pescado (las cubas no se llenan al 100%, se tiene en consideración la adición a mayores de salmuera).

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Cuba 1 ER	6,535	0,103	97,9	96,556	69,52	71,791	2,926	5,313	61,991
Cuba 1 BR	6,535	0,103	97,9	96,556	69,52	71,791	-2,926	5,313	61,991
Cuba 2 ER	6,593	0,108	97,9	114,367	82,344	67,899	3,338	5,233	90,435
Cuba 2 BR	6,593	0,108	97,9	114,367	82,344	67,899	-3,338	5,233	90,435
Cuba 3 ER	6,65	0,114	97,9	131,979	95,025	64,008	3,728	5,143	119,12
Cuba 3 BR	6,65	0,114	97,9	131,979	95,025	64,008	-3,728	5,143	119,12
Cuba 4 ER	6,707	0,12	97,9	147,824	106,433	60,118	4,063	5,05	143,145
Cuba 4 BR	6,707	0,12	97,9	147,824	106,433	60,118	-4,063	5,05	143,145
Cuba 5 ER	6,765	0,125	97,9	160,519	115,574	56,228	4,317	4,962	158,832
Cuba 5 BR	6,765	0,125	97,9	160,519	115,574	56,228	-4,317	4,962	158,832
Cuba 6 ER	6,822	0,131	97,9	169,672	122,164	52,335	4,485	4,882	166,445
Cuba 6 BR	6,822	0,131	97,9	169,672	122,164	52,335	-4,485	4,882	166,445
Cuba 7 ER	6,881	0,135	97,9	175,828	126,596	48,441	4,583	4,814	169,419
Cuba 7 BR	6,881	0,135	97,9	175,828	126,596	48,441	-4,583	4,814	169,419
Cuba 8 ER	6,942	0,137	97,9	179,3	129,096	44,546	4,621	4,768	170,434
Cuba 8 BR	6,942	0,137	97,9	179,3	129,096	44,546	-4,621	4,768	170,434
Cuba 9 ER	7,004	0,138	97,9	180,564	130,006	40,649	4,611	4,745	170,573
Cuba 9 BR	7,004	0,138	97,9	180,564	130,006	40,649	-4,611	4,745	170,573
Cuba 10 ER	7,067	0,138	97,9	180,506	129,965	36,751	4,572	4,737	170,336
Cuba 10 BR	7,131	0,137	97,9	178,562	128,565	32,856	4,497	4,749	169,273
Cuba 11 BR	7,131	0,137	97,9	178,562	128,565	32,856	4,497	4,749	169,273
Cuba 11 BR	7,131	0,137	97,9	178,566	128,568	32,856	-4,497	4,749	169,273
Cuba 12 ER	7,197	0,134	97,9	173,595	124,988	28,963	4,367	4,795	167,045
Cuba 12 BR	7,197	0,134	97,9	173,595	124,988	28,963	-4,367	4,795	167,045
				3776,604					

Obteniendo así una capacidad de almacenamiento de atún de 3.776,60 m³.

6.2. TANQUES DE GAS OIL

En el diseño de los tanques de gas - oil se han utilizado los siguientes datos:

- Permeabilidad = 98% establecida por el convenio MARPOL.
- Densidad de gasoil = 0,84 Tn/m³.
- Tanques de USO DIARIO (temperatura 70-80ºC) con capacidad mínima para un día de navegación (15 horas), lo que supone un volumen de 26,00 m³.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque GO 01 DF	Tank	98	0,84	Diesel	85,5	92,65	-10	10	1,923	-2	Prismatic	Prismatic	1,816	Prismatic
Tanque GO 02 ER	Tank	98	0,84	Diesel	77,7	84,2	2	10	8,2	-2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 02 BR	Tank	98	0,84	Diesel	77,7	84,2	-10	-2	8,2	-2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 03 ER	Tank	98	0,84	Diesel	73,8	77,7	2	10	8,2	1,688	Prismatic	Prismatic	Prismatic	1,625
Tanque GO 03 BR	Tank	98	0,84	Diesel	73,8	77,7	-10	-2	8,2	1,688	Prismatic	Prismatic	Prismatic	1,625
Tanque GO 04 DF ER	Tank	98	0,84	Diesel	58,2	77,7	0	10	1,688	-2	Prismatic	Prismatic	1,373	Prismatic
Tanque GO 04 DF BR	Tank	98	0,84	Diesel	58,2	77,7	-10	0	1,688	-2	Prismatic	Prismatic	1,373	Prismatic
Tanque GO 05 DF ER	Tank	98	0,84	Diesel	50,4	58,2	2	10	1,373	-2	Prismatic	Prismatic	1,247	Prismatic
Tanque GO 05 DF CR	Tank	98	0,84	Diesel	50,4	58,2	-2	2	1,373	-2	Prismatic	Prismatic	1,247	Prismatic
Tanque GO 05 DF BR	Tank	98	0,84	Diesel	50,4	58,2	-10	-2	1,373	-2	Prismatic	Prismatic	1,247	Prismatic
Tanque GO 06 DF ER	Tank	98	0,84	Diesel	42,6	50,4	2	10	1,247	-2	Prismatic	Prismatic	1,121	Prismatic
Tanque GO 06 DF CR	Tank	98	0,84	Diesel	42,6	50,4	-2	2	1,247	-2	Prismatic	Prismatic	1,121	Prismatic
Tanque GO 06 DF ER	Tank	98	0,84	Diesel	42,6	50,4	-10	-2	1,247	-2	Prismatic	Prismatic	1,121	Prismatic
Tanque GO 07 DF ER	Tank	98	0,84	Diesel	34,8	42,6	2	10	1,121	-2	Prismatic	Prismatic	0,995	Prismatic
Tanque GO 07 DF CR	Tank	98	0,84	Diesel	34,8	42,6	-2	2	1,121	-2	Prismatic	Prismatic	0,995	Prismatic
Tanque GO 07 DF BR	Tank	98	0,84	Diesel	34,8	42,6	-10	-2	1,121	-2	Prismatic	Prismatic	0,995	Prismatic
Tanque GO 08 DF ER	Tank	98	0,84	Diesel	27	34,8	2	10	0,995	-2	Prismatic	Prismatic	0,869	Prismatic
Tanque GO 08 DF CR	Tank	98	0,84	Diesel	27	34,8	-2	2	0,995	-2	Prismatic	Prismatic	0,869	Prismatic
Tanque GO 08 DF BR	Tank	98	0,84	Diesel	27	34,8	-10	-2	0,995	-2	Prismatic	Prismatic	0,869	Prismatic
Tanque GO 09 USO DIARIO ER	Tank	98	0,84	Diesel	1,2	7,2	1,5	4,5	8,2	4,75	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 09 USO DIARIO CR	Tank	98	0,84	Diesel	1,2	7,2	-1,5	1,5	8,2	4,75	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 09 USO DIARIO BR	Tank	98	0,84	Diesel	1,2	7,2	-4,5	-1,5	8,2	4,75	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 10 SED ER	Tank	98	0,84	Diesel	1,2	7,2	4,5	10	8,2	4,75	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 10 SED BR	Tank	98	0,84	Diesel	1,2	7,2	-10	-4,5	8,2	4,75	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_1 ER_t	Tank	98	0,84	Diesel	-6	-0,6	2	4,5	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_2 ER_t	Tank	98	0,84	Diesel	-6	-0,6	4,5	10	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_1 BR_t	Tank	98	0,84	Diesel	-6	-0,6	-4,5	-2	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_2 BR_t	Tank	98	0,84	Diesel	-6	-0,6	-10	-4,5	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 ER_b	Tank	98	0,84	Diesel	-6	-0,6	3	10	8,2	0	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 ER_b	Linked Tank	98	0,84	Diesel	-0,6	1,2	3	10	8,2	0	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 CR_b	Tank	98	0,84	Diesel	-6	-0,6	-3	3	8,2	0	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 BR_b	Tank	98	0,84	Diesel	-6	-0,6	-10	-3	8,2	0	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 BR_b	Linked Tank	98	0,84	Diesel	-0,6	1,2	-10	-3	8,2	0	Prismatic	Prismatic	Prismatic	Prismatic
Tanque REBOSES DF ER	Tank	98	0,84	Diesel	18,6	27	2	10	2,809	-2	Prismatic	Prismatic	2,647	Prismatic
Tanque REBOSES DF BR	Tank	98	0,84	Diesel	18,6	27	-10	-2	2,809	-2	Prismatic	Prismatic	2,647	Prismatic

De este modo, se obtienen los siguientes volúmenes al 100 % de llenado:

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Tanque GO 01 DF	1,307	0	100	14,127	11,867	88,774	0	1,43	0
Tanque GO 02 BR	6,999	0	100	63,382	53,241	80,533	-2,879	5,513	0
Tanque GO 02_1 ER	6,999	0	100	63,382	53,241	80,533	2,879	5,513	0
Tanque GO 03_1 ER	6,575	0	100	62,247	52,287	75,647	3,343	5,421	0
Tanque GO 03_1 BR	6,575	0	100	62,247	52,287	75,647	-3,343	5,421	0
Tanque GO 04 DF ER	1,499	0	100	65,071	54,66	65,941	1,816	1,012	0
Tanque GO 04 DF BR	1,499	0	100	65,071	54,66	65,941	-1,816	1,012	0
Tanque GO 05 DF ER	1,238	0	100	29,331	24,638	54,055	3,952	0,853	0
Tanque GO 05 DF CR	1,333	0	100	35,113	29,495	54,293	0	0,735	0
Tanque GO 05 DF BR	1,238	0	100	29,327	24,635	54,056	-3,952	0,853	0
Tanque GO 06 DF ER	1,245	0	100	37,124	31,185	46,441	4,38	0,716	0
Tanque GO 06 DF CR	1,335	0	100	35,39	29,728	46,499	0	0,605	0
Tanque GO 06 DF ER	1,245	0	100	37,124	31,185	46,441	-4,38	0,716	0
Tanque GO 07 DF ER	1,21	0	100	35,036	29,43	38,828	4,252	0,594	0
Tanque GO 07 DF CR	1,337	0	100	35,155	29,53	38,708	0	0,483	0
Tanque GO 07 DF BR	1,21	0	100	35,031	29,426	38,829	-4,252	0,594	0
Tanque GO 08 DF ER	1,135	0	100	24,512	20,59	31,265	3,749	0,514	0
Tanque GO 08 DF CR	1,339	0	100	34,504	28,983	30,916	0	0,367	0
Tanque GO 08 DF BR	1,135	0	100	24,512	20,59	31,265	-3,749	0,514	0
Tanque GO 09 USO DIARIO ER	3,352	0	100	36,898	30,994	4,432	2,934	7,128	0
Tanque GO 09 USO DIARIO CR	3,45	0	100	46,051	38,682	4,589	0	6,821	0
Tanque GO 09 USO DIARIO BR	3,352	0	100	36,898	30,994	4,432	-2,934	7,128	0
Tanque GO 10 SED ER	2,192	0	100	28,857	24,24	4,456	6,033	7,446	0
Tanque GO 10 SED BR	2,192	0	100	28,857	24,24	4,456	-6,033	7,446	0
Tanque GO 11_1 ER_t	2,786	0	100	25,743	21,624	-2,91	3,25	9,234	0
Tanque GO 11_2 ER_t	2,786	0	100	19,675	16,527	-2,578	5,501	9,286	0
Tanque GO 11_1 BR_t	2,786	0	100	25,743	21,624	-2,91	-3,25	9,234	0
Tanque GO 11_2 BR_t	2,786	0	100	19,675	16,527	-2,578	-5,501	9,286	0
Tanque GO 11 ER_b	1,64	0	100	26,685	22,416	-1,749	4,714	7,64	0
Tanque GO 11 CR_b	1,563	0	100	38,471	32,315	-3,105	0	7,584	0
Tanque GO 11 BR_b	1,64	0	100	26,685	22,416	-1,749	-4,714	7,64	0
Tanque REBOSES DF ER	2,971	0	100	63,374	53,234	23,452	3,636	1,616	0
Tanque REBOSES DF BR	2,971	0	100	63,374	53,234	23,452	-3,636	1,616	0
				1274,672					

Obteniendo así una capacidad de almacenamiento de gasoil de 1.275,00 m^3.

6.3. TANQUE ESTABILIZADOR

En el diseño de los tanques de gasoil se han utilizado los siguientes datos:

- Permeabilidad = 98%.
- Densidad de agua salada = 1,025 Tn/m^3.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque Estabilizador	Tank	98	1,025	Sea Water	1,2	6,6	2	10	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque Estabilizador	Linked Tank	98	1,025	Sea Water	1,2	6,6	-2	2	9	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque Estabilizador	Linked Tank	98	1,025	Sea Water	1,2	6,6	-10	-2	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic

De este modo, se obtiene la siguiente capacidad al 100 % de llenado:

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Tanque Estabilizador	2,8	0	100	190,456	195,218	3,962	0	9,511	0

Obteniendo así una capacidad de almacenamiento de agua para tanque estabilizador de 190,46 m^3.

6.4. TANQUES DE AGUA DULCE

En el diseño de los tanques de agua dulce de popa se han utilizado los siguientes datos:

- Permeabilidad = 98%.
- Densidad de agua dulce potable = 1,00 Tn/m^3.
- Disposición de planta potabilizadora como se indica en el Cuaderno 2.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque AD 01 ER	Tank	98	1	Fresh Water	7,8	11,4	2	10	8,2	2,52	Prismatic	Prismatic	Prismatic	2,461
Tanque AD 01 BR	Tank	98	1	Fresh Water	7,8	11,4	-10	-2	8,2	2,52	Prismatic	Prismatic	Prismatic	2,461

De este modo, se obtiene la siguiente capacidad al 100 % de llenado:

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Tanque AD 01 ER	5,684	0	100	54,939	54,939	9,699	4,613	6,847	0
Tanque AD 01 BR	5,684	0	100	54,939	54,939	9,699	-4,613	6,847	0
				109,878					

Obteniendo así una capacidad para almacenamiento de agua dulce de 109,88 m^3.

6.5. TANQUES DE AGUA TÉCNICA

En el diseño de los tanques de agua técnica se han utilizado los siguientes datos:

- Permeabilidad = 98%.
- Densidad de agua técnica = 1,00 Tn/m^3.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque AT 01_1 _pique proa_t	Tank	98	1	Fresh Water	93,3	99,3	0	10	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 01_1 _pique proa_t	Linked Tank	98	1	Fresh Water	93,3	99,3	-10	0	11	8,2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 01_1 _pique proa_t	Linked Tank	98	1	Fresh Water	93,3	98,1	0	10	8,2	5,7	Prismatic	Prismatic	Prismatic	5,627
Tanque AT 01_1 _pique proa_t	Linked Tank	98	1	Fresh Water	93,3	98,1	-10	0	8,2	5,7	Prismatic	Prismatic	Prismatic	5,627
Tanque AT 01_2 _pique proa_b	Tank	98	1	Fresh Water	98,1	102,3	0	10	8,2	5,754	Prismatic	Prismatic	Prismatic	5,7
Tanque AT 01_2 _pique proa_b	Linked Tank	98	1	Fresh Water	98,1	102,3	-10	0	8,2	5,754	Prismatic	Prismatic	Prismatic	5,7
Tanque AT 01_2 _pique proa_b	Linked Tank	98	1	Fresh Water	93,3	102,3	0	10	5,754	0	Prismatic	Prismatic	5,627	Prismatic
Tanque AT 01_2 _pique proa_b	Linked Tank	98	1	Fresh Water	93,3	102,3	-10	0	5,754	0	Prismatic	Prismatic	5,627	Prismatic
Tanque AT 02	Tank	98	1	Fresh Water	3	7,2	0	10	4,75	-2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 02	Linked Tank	98	1	Fresh Water	7,2	12,6	0	10	0,82	-2	Prismatic	Prismatic	0,732	Prismatic
Tanque AT 02	Linked Tank	98	1	Fresh Water	3	7,2	-10	0	4,75	-2	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 02	Linked Tank	98	1	Fresh Water	7,2	12,6	-10	0	0,82	-2	Prismatic	Prismatic	0,732	Prismatic

De este modo, se obtiene la siguiente capacidad al 100 % de llenado:

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Tanque AT 02	5,453	0	100	35,569	35,569	7,928	0	1,395	0
Tanque AT 01 _pique proa_t	5,373	0	100	39,236	39,236	95,144	0	8,115	0
Tanque AT 01 _pique proa_b	6,392	0	100	81,928	81,928	96,78	0	3,936	0
				156,733					

Obteniendo así una capacidad para almacenamiento de agua técnica de 156,74 m^3.

6.6. TANQUE DE AGUAS SUCIAS

En el diseño de los tanques de aguas sucias se han utilizado los siguientes datos:

- Permeabilidad = 98%.
- Densidad de aguas sucias = 1,00 Tn/m^3.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque AGUAS SUCIAS	Tank	98	1	Aguas Sucias	25,8	27	-2	2		1,09	-2	Prismatic	Prismatic	1,066	Prismatic

De este modo, se obtiene la siguiente capacidad al 100 % de llenado:

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Tanque AGUAS SUCIAS	1,453	0	100	6,258	6,258	26,401	0	0,411	0
				6,258					

Obteniendo así una capacidad para almacenamiento de aguas sucias de 6,26 m^3.

6.7. TANQUE DE LODOS

En el diseño de los tanques de lodos se han utilizado los siguientes datos:

- Capacidad aproximada de un 1% de la capacidad total de combustible.
- Permeabilidad = 98%.
- Densidad de lodos = 1,00 Tn/m^3.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque LODOS	Tank	98	1	Lodos	12,6	15,6	0	10		0,869	-2	Prismatic	Prismatic	0,82	Prismatic
Tanque LODOS	Linked Tank	98	1	Lodos	12,6	15,6	-10	0		0,869	-2	Prismatic	Prismatic	0,82	Prismatic

De este modo, se obtiene la siguiente capacidad al 100 % de llenado:

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Tanque LODOS	1,449	0	100	13,753	13,753	14,162	0	0,276	0

Obteniendo así una capacidad para almacenamiento de lodos de 13,75 m^3.

6.8. TANQUES DE ACEITE

En el diseño de los tanques de aceite se han utilizado los siguientes datos:

- Permeabilidad = 98%.
- Densidad del aceite = 0,89 Tn/m^3.

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque ACEITE CIRCUITO	Tank	98	0,89	Lube Oil	15,6	18,6	-10	-2	2,647	-2	Prismatic	Prismatic	2,589	Prismatic
Tanque ACEITE HIDRÁULICO ER	Tank	98	0,89	Lube Oil	15,6	18,6	2	10	2,647	-2	Prismatic	Prismatic	2,589	Prismatic
Tanque ACEITE SUCIO	Tank	98	0,89	Lube Oil	24,6	25,8	-2	2	1,067	-2	Prismatic	Prismatic	1,043	Prismatic
Tanque ACEITE M.P	Tank	98	0,89	Lube Oil	15,6	24,6	-0,5	0,5	1,043	-2	Prismatic	Prismatic	0,869	Prismatic
Tanque ACEITE MMAA ER	Tank	98	0,89	Lube Oil	15,6	24,6	0,5	2	1,043	-2	Prismatic	Prismatic	0,869	Prismatic
Tanque ACEITE REDUCTORA + HÉLIC	Tank	98	0,89	Lube Oil	15,6	24,6	-2	-0,5	1,043	-2	Prismatic	Prismatic	0,869	Prismatic

De este modo, se obtiene la siguiente capacidad al 100 % de llenado:

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn)
Tanque ACEITE CIRCUITO	2,766	0	100	8,991	8,002	17,272	-2,713	1,632	0
Tanque ACEITE HIDRÁULICO ER	2,766	0	100	8,991	8,002	17,272	2,713	1,632	0
Tanque ACEITE SUCIO	1,449	0	100	6,221	5,537	25,201	0	0,392	0
Tanque ACEITE M.P	1,574	0	100	12,225	10,88	20,119	0	0,263	0
Tanque ACEITE MMAA ER	1,501	0	100	16,348	14,55	20,193	1,222	0,336	0
Tanque ACEITE REDUCTORA + HÉLIC	1,501	0	100	16,348	14,55	20,193	-1,222	0,336	0
				69,124					

Obteniendo así una capacidad total para almacenamiento de aceites de 69,13 m^3.

6.9. COMPROBACIÓN DE CAPACIDADES

Para poder validar estas capacidades, se establece una tabla comparativa con las capacidades requeridas y las finalmente obtenidas.

TANQUES	V calculado	V Final	Diferencia
Cubas Atún	3700,00	3776,60	76,60
Gasoil	1739,00	1275,00	-464,00
Tanque Estabilizador	-	190,46	190,46
Agua Dulce	108,00	109,88	1,88
Agua Técnica	-	156,74	156,74
Aceite	69,10	69,13	0,03
Lodos	4,70	13,75	9,05
Aguas Sucias	4,50	6,26	1,76

Como se puede observar, se cumplen todos los volúmenes requeridos por el Buque Proyecto, a excepción del volumen necesario para cumplir la autonomía del buque. Dicha falta se suplirá en la salida del buque de puerto con el llenado de determinadas parejas de cubas, como se indicará en el Cuaderno 5 "Condiciones de Carga y Estabilidad", que permitirán completar el volumen total de combustible.

7. CALIBRACIÓN DE TANQUES

En el ANEXO IV se presentan los resultados obtenidos de la calibración de los diferentes tanques del Buque Proyecto.
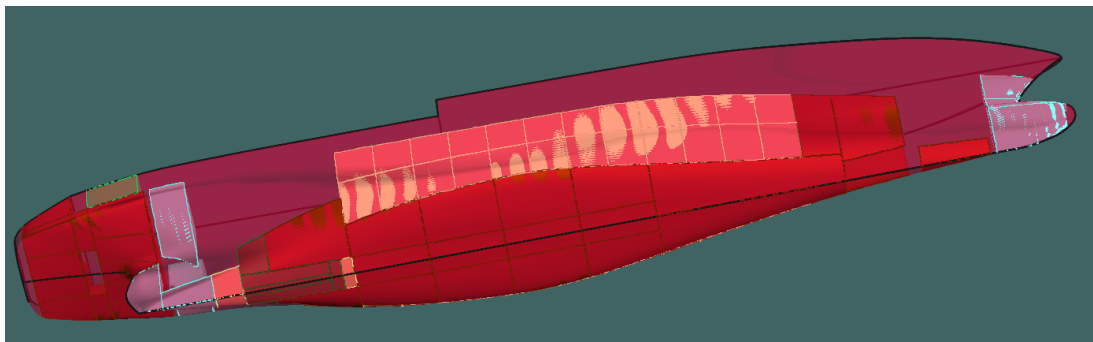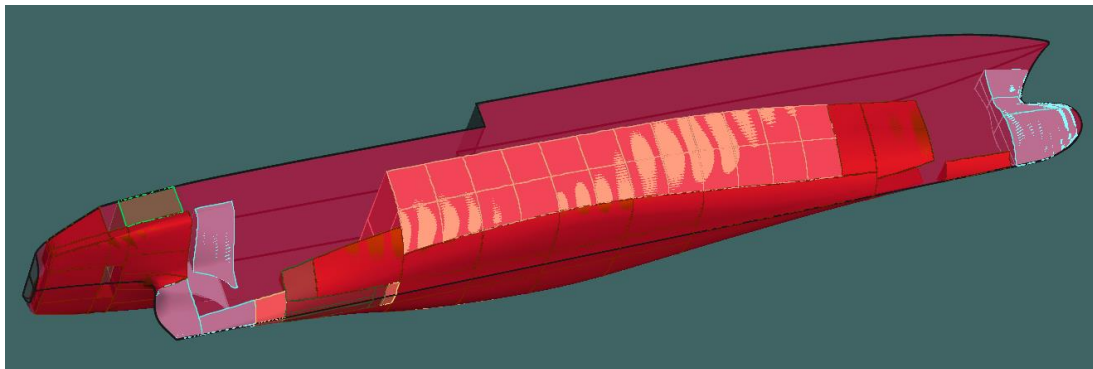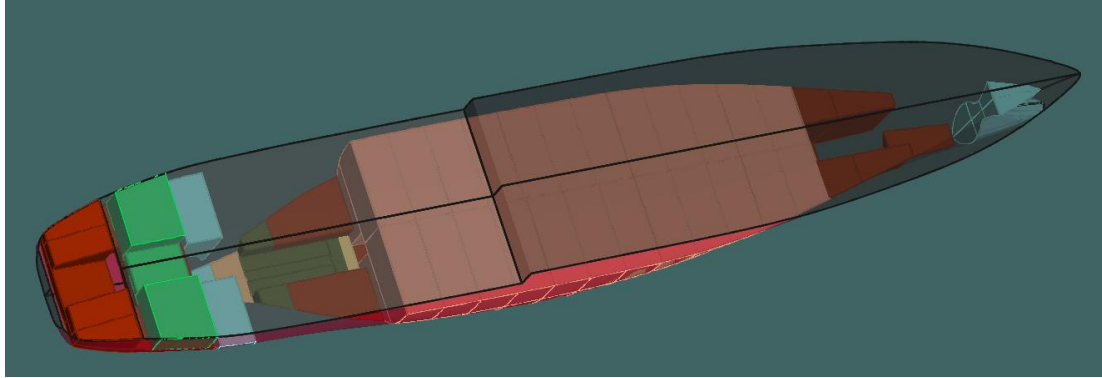
8. TABLAS HIDROSTÁTICAS

Para la obtención de las tablas hidrostáticas se ha utilizado un rango de calados comprendidos entre 4,00 m (calado aproximado correspondiente al peso en rosca del Buque Proyecto) y los 7,50 m de calado de diseño del mismo con variaciones de 0,5 m como se adjunta en el ANEXO IV.

Además, se obtendrán estas tablas hidrostáticas para tres condiciones de trimado:

- Trimado = 0
- Trimado = +1
- Trimado = -1

8.1. TRIMADO = 0

Damage Case - Intact

Fixed Trim = 0 m

Specific gravity = 1,025; (Density = 1,025 Tn/m³)

Draft Amidships m	4,00	4,50	5,00	5,50	6,00	6,50	7,00	7,50
Displacement t	3461,00	4028,00	4614,00	5219,00	5844,00	6495,00	7184,00	7917,00
Heel deg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Draft at FP m	4,00	4,50	5,00	5,50	6,00	6,50	7,00	7,50
Draft at AP m	4,00	4,50	5,00	5,50	6,00	6,50	7,00	7,50
Draft at LCF m	4,00	4,50	5,00	5,50	6,00	6,50	7,00	7,50
Trim (+ve by stern) m	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
WL Length m	97,82	97,74	97,65	97,62	98,06	100,26	102,96	103,82
Beam max extents on WL m	17,75	17,86	17,92	17,96	17,98	18,00	18,00	18,00
Wetted Area m^2	1480,63	1588,55	1698,19	1813,11	1939,60	2085,02	2260,13	2427,73
Waterpl. Area m^2	1087,26	1124,43	1160,71	1198,48	1244,07	1301,95	1386,33	1462,71
Prismatic coeff. (Cp)	0,54	0,55	0,57	0,58	0,58	0,58	0,58	0,59
Block coeff. (Cb)	0,41	0,43	0,45	0,47	0,48	0,49	0,49	0,50
Max Sect. area coeff. (Cm)	0,88	0,88	0,89	0,90	0,91	0,91	0,92	0,92
Waterpl. area coeff. (Cwp)	0,63	0,64	0,66	0,68	0,71	0,72	0,75	0,78
LCB from zero pt. (+ve fwd) m	45,86	46,10	46,24	46,28	46,20	46,00	45,59	45,00
LCF from zero pt. (+ve fwd) m	47,72	47,42	46,91	46,15	44,93	43,12	40,45	38,28
KB m	2,26	2,54	2,82	3,10	3,38	3,67	3,97	4,27
KG m	7,50	7,50	7,50	7,50	7,50	7,50	7,50	7,50
BMt m	5,79	5,33	4,94	4,63	4,39	4,24	4,22	4,12
BML m	146,35	133,33	123,44	116,14	112,20	111,40	116,46	120,85
GMt m	0,54	0,36	0,26	0,23	0,27	0,41	0,69	0,90
GML m	141,11	128,37	118,76	111,74	108,09	107,57	112,92	117,62
KMt m	8,04	7,86	7,76	7,73	7,77	7,91	8,19	8,40
KML m	148,61	135,87	126,26	119,24	115,59	115,07	120,42	125,12
Immersion (TPc) tonne/cm	11,14	11,53	11,90	12,28	12,75	13,35	14,21	14,99
MTc tonne.m	50,51	53,48	56,67	60,31	65,32	72,25	83,89	96,30
RM at 1deg = GMt.Disp.sin(1) tonne.m	32,87	25,49	20,91	20,92	27,97	46,73	86,54	123,60
Max deck inclination deg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Trim angle (+ve by stern) deg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

8.2. TRIMADO = +1

Damage Case - Intact

Fixed Trim = +1 m

Specific gravity = 1,025; (Density = 1,025 Tn/m³)

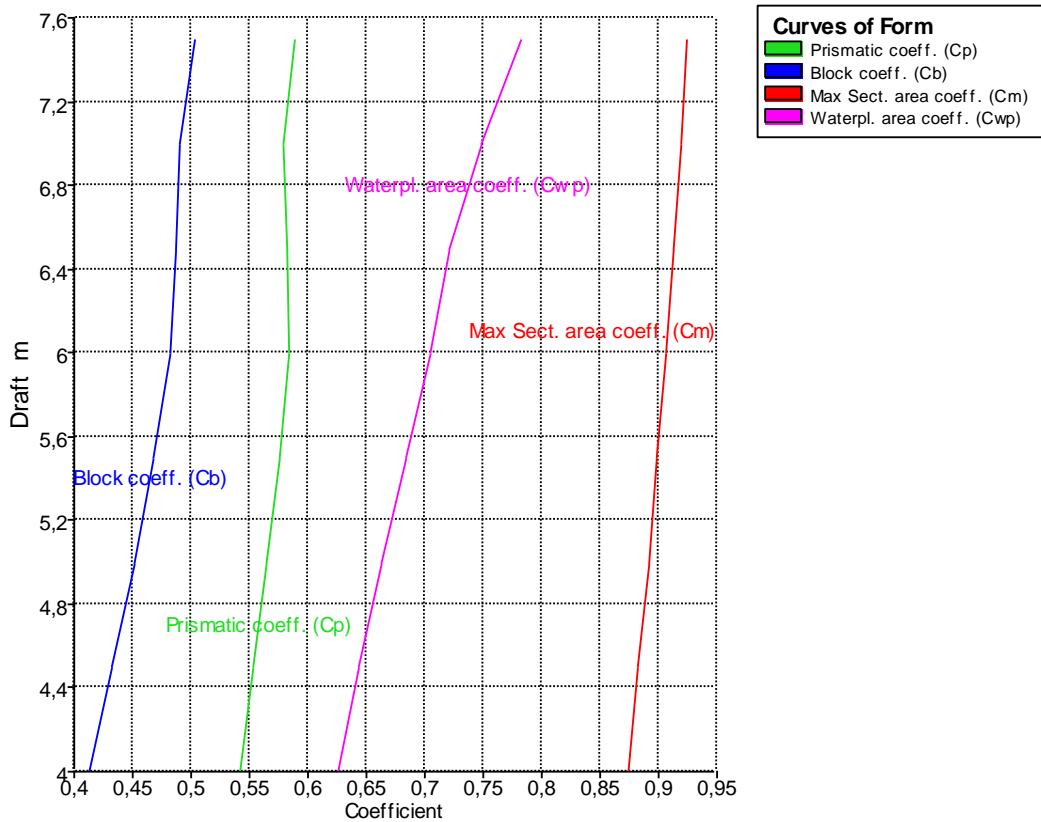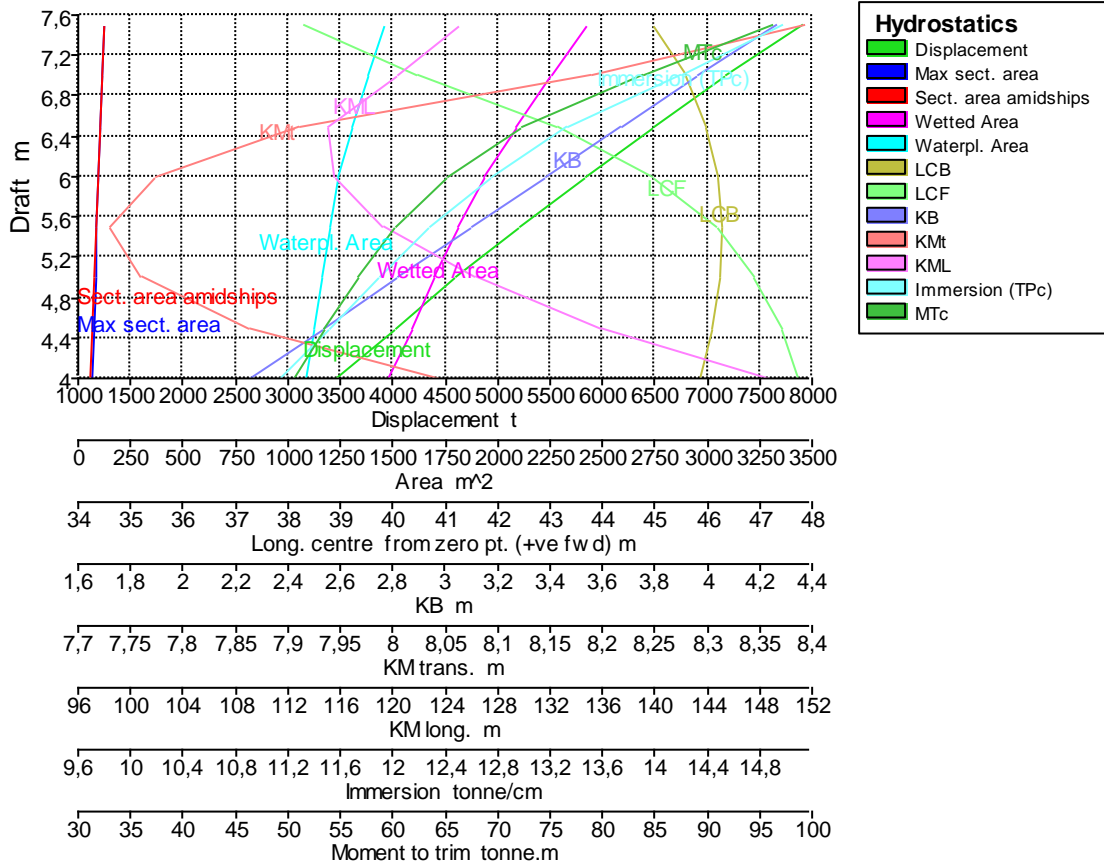| Draft Amidships m	4,00	4,50	5,00	5,50	6,00	6,50	7,00	7,50
Displacement t	3472,00	4043,00	4636,00	5252,00	5898,00	6585,00	7322,00	8074,00
Heel deg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Draft at FP m	3,50	4,00	4,50	5,00	5,50	6,00	6,50	7,00
Draft at AP m	4,50	5,00	5,50	6,00	6,50	7,00	7,50	8,00
Draft at LCF m	4,01	4,52	5,02	5,53	6,05	6,58	7,10	7,60
Trim (+ve by stern) m	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
WL Length m	97,40	97,55	97,73	98,37	101,26	105,95	107,88	106,16
Beam max extents on WL m	17,76	17,87	17,93	17,96	17,99	18,00	18,00	18,00
Wetted Area m^2	1475,12	1585,24	1699,81	1824,97	1969,64	2150,41	2321,53	2435,54
Waterpl. Area m^2	1092,83	1135,32	1178,44	1229,05	1294,04	1390,43	1465,43	1468,22
Prismatic coeff. (Cp)	0,53	0,55	0,56	0,57	0,56	0,55	0,56	0,58
Block coeff. (Cb)	0,38	0,40	0,42	0,44	0,44	0,44	0,45	0,48
Max Sect. area coeff. (Cm)	0,87	0,88	0,89	0,89	0,90	0,91	0,91	0,92
Waterpl. area coeff. (Cwp)	0,63	0,65	0,67	0,70	0,71	0,73	0,76	0,77
LCB from zero pt. (+ve fwd) m	44,35	44,71	44,94	45,04	44,97	44,69	44,16	43,63
LCF from zero pt. (+ve fwd) m	47,10	46,77	46,19	45,18	43,56	40,85	38,58	38,31
KB m	2,27	2,55	2,84	3,12	3,42	3,72	4,03	4,34
KG m	7,50	7,50	7,50	7,50	7,50	7,50	7,50	7,50
BMt m	5,85	5,40	5,02	4,73	4,54	4,50	4,39	4,06
BML m	146,88	135,74	127,76	123,91	124,70	133,23	135,40	120,62
GMt m	0,58	0,41	0,32	0,32	0,42	0,68	0,88	0,85
GML m	141,61	130,76	123,06	119,50	120,58	129,41	131,89	117,41
KMt m	8,12	7,95	7,86	7,85	7,95	8,22	8,42	8,40
KML m	149,14	138,29	130,59	127,03	128,11	136,94	139,43	124,95
Immersion (TPc) tonne/cm	11,20	11,64	12,08	12,60	13,26	14,25	15,02	15,05
MTc tonne.m	50,85	54,67	59,00	64,91	73,54	88,12	99,86	98,03
RM at 1deg = GMt.Disp.sin(1) tonne.m	35,08	29,03	26,22	29,24	42,78	78,27	112,37	119,40
Max deck inclination deg	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
Trim angle (+ve by stern) deg	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
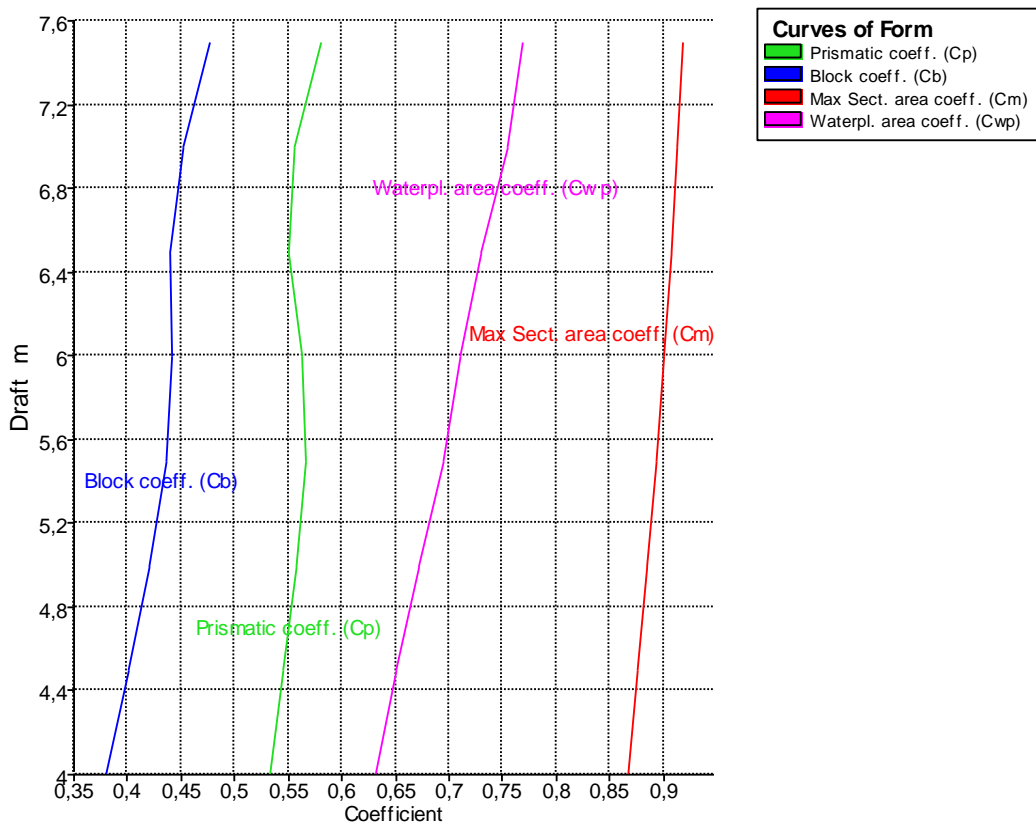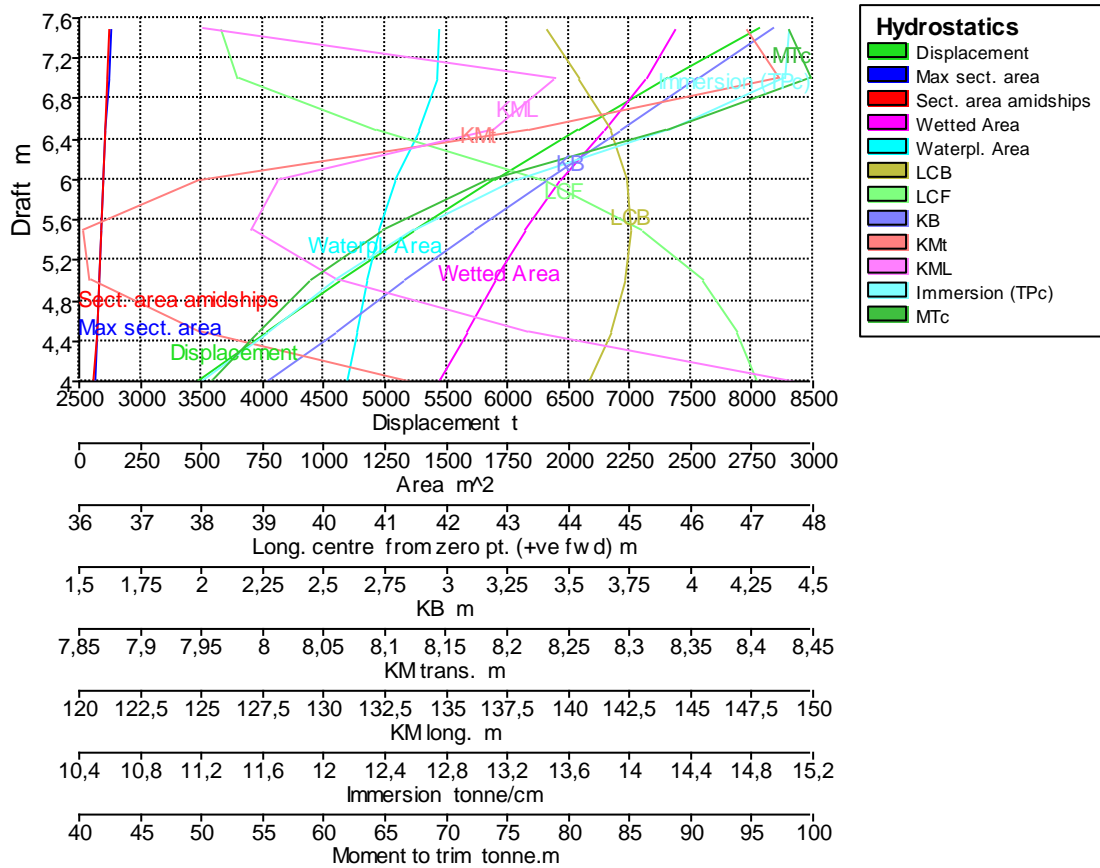
8.3. TRIMADO = -1

Damage Case - Intact

Fixed Trim = -1 m

Specific gravity = 1,025; (Density = 1,025 Tn/m³)

Draft Amidships m	4,00	4,50	5,00	5,50	6,00	6,50	7,00	7,50
Displacement t	3457,00	4020,00	4600,00	5195,00	5806,00	6434,00	7087,00	7778,00
Heel deg	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Draft at FP m	4,50	5,00	5,50	6,00	6,50	7,00	7,50	8,00
Draft at AP m	3,50	4,00	4,50	5,00	5,50	6,00	6,50	7,00
Draft at LCF m	4,00	4,50	4,99	5,48	5,97	6,46	6,94	7,42
Trim (+ve by stern) m	-1,00	-1,00	-1,00	-1,00	-1,00	-1,00	-1,00	-1,00
WL Length m	98,12	97,89	97,58	97,18	96,54	95,62	96,34	100,25
Beam max extents on WL m	17,73	17,85	17,92	17,96	17,98	17,99	18,00	18,00
Wetted Area m^2	1485,59	1593,42	1700,87	1811,06	1927,36	2055,19	2197,26	2361,19
Waterpl. Area m^2	1082,24	1114,81	1145,65	1175,83	1207,01	1247,44	1306,36	1393,76
Prismatic coeff. (Cp)	0,55	0,56	0,57	0,58	0,60	0,61	0,62	0,60
Block coeff. (Cb)	0,46	0,47	0,49	0,51	0,52	0,54	0,55	0,54
Max Sect. area coeff. (Cm)	0,88	0,89	0,90	0,90	0,91	0,92	0,92	0,93
Waterpl. area coeff. (Cwp)	0,62	0,64	0,66	0,67	0,70	0,73	0,75	0,77
LCB from zero pt. (+ve fwd) m	47,36	47,47	47,49	47,45	47,32	47,10	46,77	46,30
LCF from zero pt. (+ve fwd) m	48,22	47,92	47,43	46,71	45,70	44,28	42,58	40,45
KB m	2,26	2,54	2,82	3,10	3,37	3,65	3,93	4,22
KG m	7,50	7,50	7,50	7,50	7,50	7,50	7,50	7,50
BMt m	5,72	5,26	4,87	4,55	4,30	4,11	4,00	3,99
BML m	145,41	130,84	119,44	110,20	102,52	98,19	99,12	106,84
GMt m	0,50	0,31	0,20	0,15	0,18	0,27	0,45	0,73
GML m	140,18	125,89	114,77	105,80	98,41	94,35	95,57	103,59
KMt m	7,99	7,80	7,69	7,64	7,67	7,76	7,93	8,21
KML m	147,66	133,37	122,25	113,29	105,89	101,83	103,05	111,06
Immersion (TPc) tonne/cm	11,09	11,43	11,74	12,05	12,37	12,79	13,39	14,29
MTc tonne.m	50,12	52,34	54,59	56,84	59,08	62,78	70,04	83,32
RM at 1deg = GMt.Disp.sin(1) tonne.m	29,98	21,53	15,72	13,93	18,05	30,17	55,12	99,49
Max deck inclination deg	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
Trim angle (+ve by stern) deg	-0,59	-0,59	-0,59	-0,59	-0,59	-0,59	-0,59	-0,59
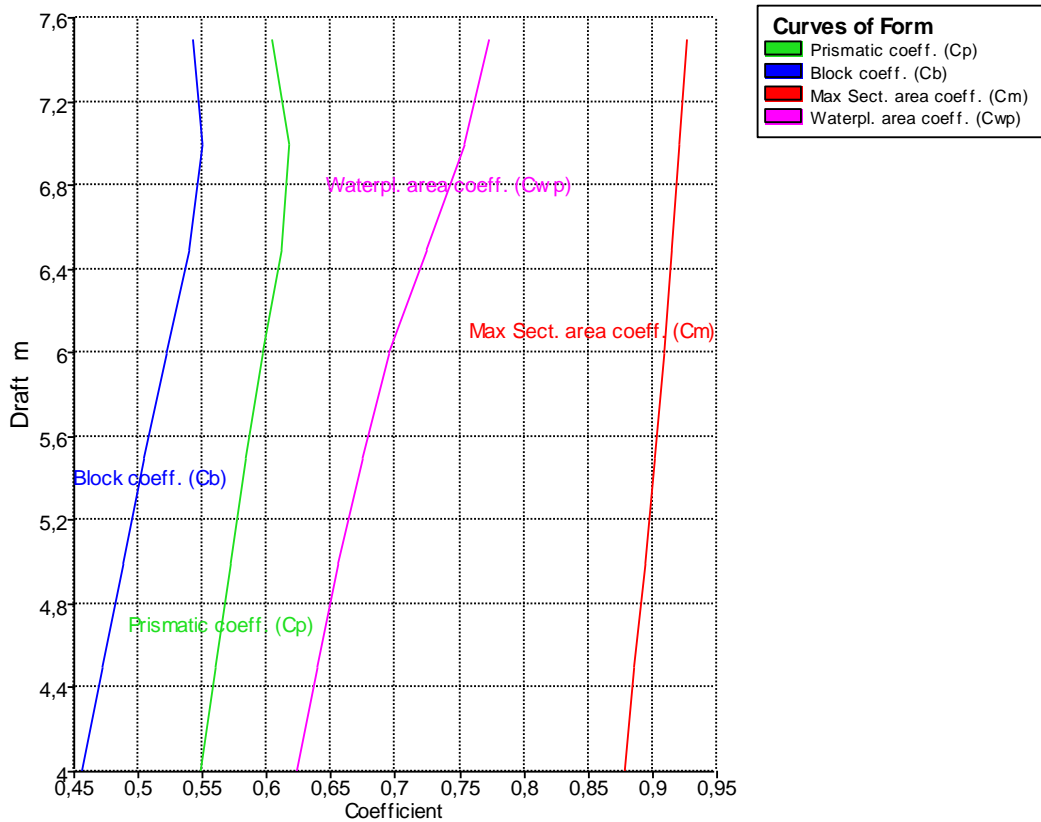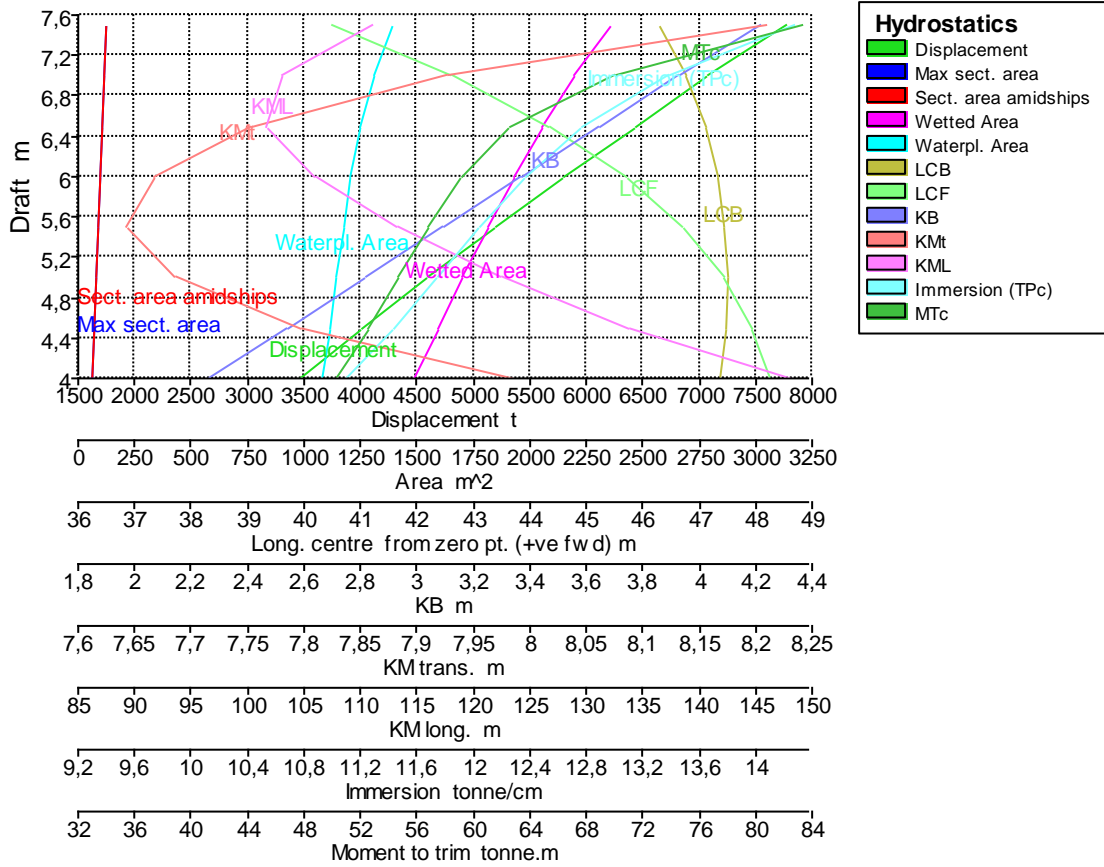
9. TABLAS DE CURVAS KN

Las curvas KN o Carenas Inclinadas, dependen de la condición de carga del buque y por tanto del volumen sumergido para cada ángulo de escora, de tal manera que cuanto más alto sea el PIP (zona estanca) mayor será el valor de KN y consecuentemente mayor estabilidad del buque.

Se obtendrán así las curvas de brazos adrizantes, GZ, de la siguiente manera:

$$GZ = KN - KG \cdot sen\ \alpha\ \geq 0,200\ m\ para\ \alpha \geq 30°$$

Lo que demuestra que a mayor KN mayor estabilidad del Buque Proyecto a grandes ángulos.

Los valores de KN se obtienen en función de:

- Desplazamiento: análogamente al planteamiento para el cálculo de las tablas hidrostáticas, se establece un rango de calados desde el correspondiente al peso en rosca (4,00 m) hasta los 7,50 m de calado de diseño del Buque Proyecto con saltos de 0,25 m.
- Ángulo de escora: de 0 grados a +40 grados.
- Trimado: 0 como se ha indicado.

Displacement (Tn)	Draft Amidships (m)	LCG (m)	TCG (m)	KN 0 deg Starb	KN 5 deg Starb	KN 10 deg Starb	KN 15 deg Starb	KN 25 deg Starb	KN 20 deg Starb	KN 25 deg Starb
3461	4,00	45,855	0,000	0,000	0,702	1,403	2,100	2,789	3,464	4,114
3743	4,25	45,991	0,000	0,000	0,693	1,384	2,075	2,761	3,440	4,097
4028	4,50	46,099	0,000	0,000	0,686	1,370	2,056	2,741	3,423	4,084
4319	4,75	46,181	0,000	0,000	0,681	1,361	2,042	2,728	3,411	4,076
4614	5,00	46,237	0,000	0,000	0,677	1,354	2,034	2,721	3,404	4,071
4914	5,25	46,269	0,000	0,000	0,675	1,351	2,032	2,720	3,402	4,071
5219	5,50	46,275	0,000	0,000	0,675	1,352	2,035	2,722	3,403	4,074
5528	5,75	46,255	0,000	0,000	0,676	1,356	2,042	2,727	3,407	4,081
5844	6,00	46,204	0,000	0,000	0,679	1,364	2,052	2,735	3,416	4,092
6166	6,25	46,120	0,000	0,000	0,685	1,375	2,063	2,747	3,428	4,106
6495	6,50	45,995	0,000	0,000	0,693	1,387	2,076	2,761	3,443	4,123
6834	6,75	45,822	0,000	0,000	0,702	1,400	2,092	2,778	3,462	4,143
7184	7,00	45,594	0,000	0,000	0,712	1,414	2,109	2,798	3,484	4,162
7545	7,25	45,314	0,000	0,000	0,721	1,428	2,126	2,819	3,508	4,179
7917	7,50	44,997	0,000	0,000	0,728	1,441	2,144	2,841	3,532	4,193

Displacement (Tn)	Draft Amidships (m)	KN 30 deg Starb	KN 40 deg Starb	KN 50 deg Starb	KN 60 deg Starb	KN 70 deg Starb	KN 80 deg Starb	KN 90 deg Starb
3461	4,00	5,320	6,448	7,429	7,949	8,016	7,711	5,320
3743	4,25	5,318	6,456	7,408	7,907	7,971	7,671	5,318
4028	4,50	5,321	6,466	7,384	7,861	7,924	7,631	5,321
4319	4,75	5,327	6,476	7,356	7,812	7,876	7,592	5,327
4614	5,00	5,337	6,484	7,325	7,763	7,826	7,553	5,337
4914	5,25	5,347	6,488	7,293	7,712	7,775	7,513	5,347
5219	5,50	5,359	6,487	7,259	7,660	7,724	7,474	5,359
5528	5,75	5,371	6,483	7,223	7,608	7,673	7,435	5,371
5844	6,00	5,384	6,475	7,185	7,555	7,621	7,397	5,384
6166	6,25	5,397	6,463	7,147	7,502	7,569	7,358	5,397
6495	6,50	5,410	6,446	7,107	7,449	7,516	7,318	5,410
6834	6,75	5,421	6,426	7,066	7,397	7,461	7,278	5,421
7184	7,00	5,427	6,401	7,023	7,345	7,407	7,235	5,427
7545	7,25	5,425	6,370	6,978	7,294	7,355	7,192	5,425
7917	7,50	5,414	6,333	6,930	7,244	7,307	7,149	5,414
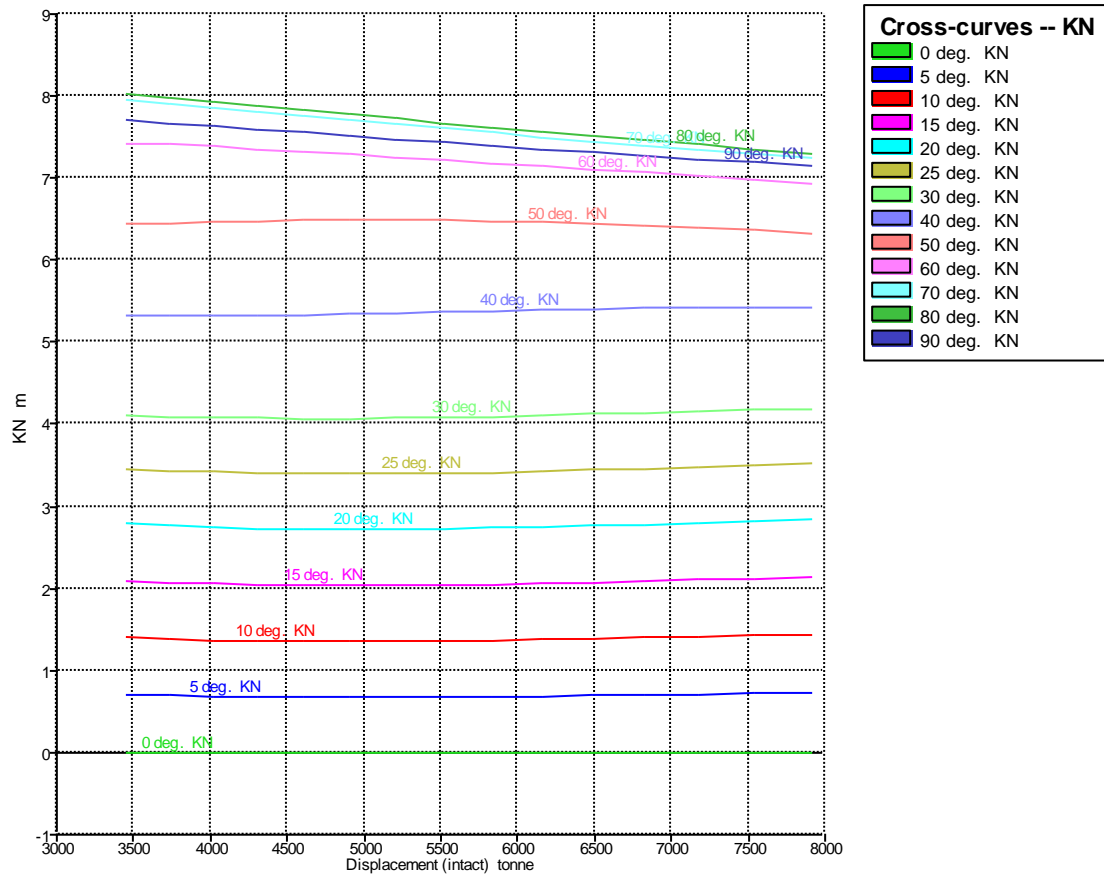
ANEXO I_REGLA 12ª MARPOL Y RESULTADOS

ANNEX 2

RESOLUTION MEPC.141(54)

Adopted on 24 March 2006

AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1978 RELATING TO
THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF
POLLUTION FROM SHIPS, 1973

(Amendments to regulation 1, addition to regulation 12A, consequential amendments
to the IOPP Certificate and amendments to regulation 21 of the revised
Annex I of MARPOL 73/78)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL 73/78),

NOTING ALSO that the revised Annex I to MARPOL 73/78 was adopted by resolution MEPC.117(52) and is expected to enter into force on 1 January 2007,

HAVING CONSIDERED proposed amendments to regulation 1, proposed new regulation 12A, consequential amendments to the Supplement (Forms A and B) of the IOPP Certificate, and proposed amendments to regulation 21 of the revised Annex I to MARPOL 73/78,

1.   ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, the amendments to the revised Annex I of MARPOL 73/78, the text of which is set out at Annex to the present resolution;

2.   DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 February 2007, unless prior to that date, not less than one-third of the Parties or Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3.   INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 August 2007 upon their acceptance in accordance with paragraph 2 above;

4.   REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL 73/78 certified copies of the present resolution and the text of the amendments contained in the Annex; and

5.   REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to MARPOL 73/78 copies of the present resolution and its Annex.

ANNEX

AMENDMENTS TO THE REVISED MARPOL ANNEX I

1   Addition of paragraph 28.9 to regulation 1

The following new paragraph 28.9 is added after the existing paragraph 28.8 of regulation 1:

"28.9   ship delivered on or after 1 August 2010 means a ship:

.1   for which the building contract is placed on or after 1 August 2007; or

.2   in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 February 2008; or

.3   the delivery of which is on or after 1 August 2010; or

.4   which have undergone a major conversion:

.1   for which the contract is placed after 1 August 2007; or

.2   in the absence of contract, the construction work of which is begun after 1 February 2008; or

.3   which is completed after 1 August 2010."

2   Addition of new regulation 12A on oil fuel tank protection

The following new regulation 12A is added after the existing regulation 12:

"Regulation 12A – Oil fuel tank protection

1   This regulation shall apply to all ships with an aggregate oil fuel capacity of 600 m^3 and above which are delivered on or after 1 August 2010, as defined in regulation 1.28.9 of this Annex.

2   The application of this regulation in determining the location of tanks used to carry oil fuel does not govern over the provisions of regulation 19 of this Annex.

3   For the purpose of this regulation, the following definitions shall apply:

.1   "Oil fuel" means any oil used as fuel oil in connection with the propulsion and auxiliary machinery of the ship in which such oil is carried.

.2   "Load line draught (d_S)" is the vertical distance, in metres, from the moulded baseline at mid-length to the waterline corresponding to the summer freeboard draught to be assigned to the ship.

.3 "Light ship draught" is the moulded draught amidships corresponding to the lightweight.

.4 "Partial load line draught (d_P)" is the light ship draught plus 60% of the difference between the light ship draught and the load line draught d_S. The partial load line draught (d_p) shall be measured in metres.

.5 "Waterline (d_B)" is the vertical distance, in metres, from the moulded baseline at mid-length to the waterline corresponding to 30% of the depth D_S.

.6 "Breadth (B_S)" is the greatest moulded breadth of the ship, in metres, at or below the deepest load line draught (d_S).

.7 "Breadth (B_B)" is the greatest moulded breadth of the ship, in metres, at or below the waterline (d_B).

.8 "Depth (D_S)" is the moulded depth, in metres, measured at mid-length to the upper deck at side. For the purpose of the application, "upper deck" means the highest deck to which the watertight transverse bulkheads except aft peak bulkheads extend.

.9 "Length (L)" means 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In ships designed with a rake of keel the waterline on which this length is measured shall be parallel to the designed waterline. The length (L) shall be measured in metres.

.10 "Breadth (B)" means the maximum breadth of the ship, in metres, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material.

.11 "Oil fuel tank" means a tank in which oil fuel is carried, but excludes those tanks which would not contain oil fuel in normal operation, such as overflow tanks.

.12 "Small oil fuel tank" is an oil fuel tank with a maximum individual capacity not greater than 30 m^3.

.13 "C" is the ship's total volume of oil fuel, including that of the small oil fuel tanks, in m^3, at 98% tank filling.

.14 "Oil fuel capacity" means the volume of a tank in m^3, at 98% filling.

4   The provisions of this regulation shall apply to all oil fuel tanks except small oil fuel tanks, as defined in 3.12, provided that the aggregate capacity of such excluded tanks is not greater than 600 m^3.

5   Individual oil fuel tanks shall not have a capacity of over 2,500 m^3.

6   For ships, other than self-elevating drilling units, having an aggregate oil fuel capacity of 600 m^3 and above, oil fuel tanks shall be located above the moulded line of the bottom shell plating nowhere less than the distance h as specified below:

h   =   B/20 m or,

h   =   2.0 m, whichever is the lesser.

The minimum value of h = 0.76 m

In the turn of the bilge area and at locations without a clearly defined turn of the bilge, the oil fuel tank boundary line shall run parallel to the line of the midship flat bottom as shown in Figure 1.
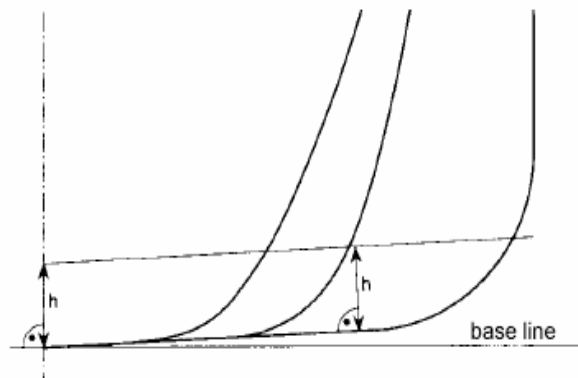
Figure 1 – Oil fuel tank boundary lines for the purpose of paragraph 6

7   For ships having an aggregate oil fuel capacity of 600 m^3 or more but less than 5,000 m^3, oil fuel tanks shall be located inboard of the moulded line of the side shell plating, nowhere less than the distance w which, as shown in Figure 2, is measured at any cross-section at right angles to the side shell, as specified below:

w   =   0.4 + 2.4 C/20,000 m

The minimum value of w = 1.0 m, however for individual tanks with an oil fuel capacity of less than 500 m^3 the minimum value is 0.76 m.

8   For ships having an aggregate oil fuel capacity of 5,000 m^3 and over, oil fuel tanks shall be located inboard of the moulded line of the side shell plating, nowhere less than the distance w which, as shown in Figure 2, is measured at any cross-section at right angles to the side shell, as specified below:

w   =   0.5 + C/20,000 m or

w   =   2.0 m, whichever is the lesser.

The minimum value of w = 1.0 m
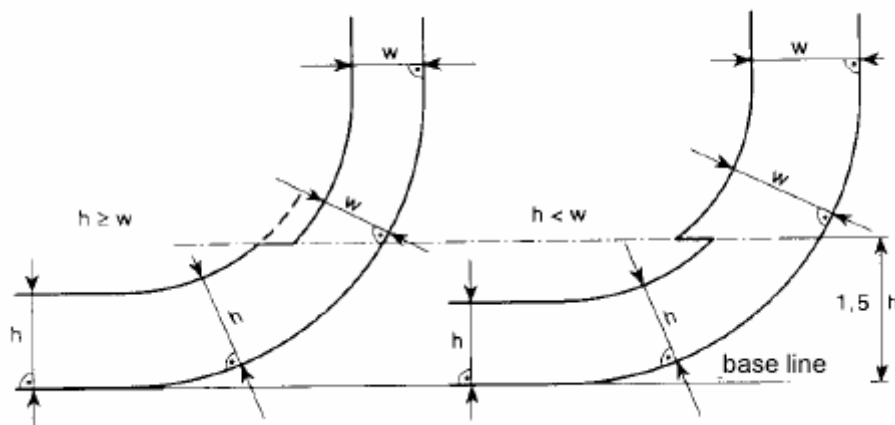
Figure 2 – Oil fuel tank boundary lines for the purpose of paragraphs 7 and 8

9   Lines of oil fuel piping located at a distance from the ship's bottom of less than h, as defined in paragraph 6, or from the ship's side less than w, as defined in paragraphs 7 and 8 shall be fitted with valves or similar closing devices within or immediately adjacent to the oil fuel tank. These valves shall be capable of being brought into operation from a readily accessible enclosed space the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. The valves shall close in case of remote control system failure (fail in a closed position) and shall be kept closed at sea at any time when the tank contains oil fuel except that they may be opened during oil fuel transfer operations.

10   Suction wells in oil fuel tanks may protrude into the double bottom below the boundary line defined by the distance h provided that such wells are as small as practicable and the distance between the well bottom and the bottom shell plating is not less than 0.5 h.

11   Alternatively to paragraphs 6 and either 7 or 8, ships shall comply with the accidental oil fuel outflow performance standard specified below:

     .1   The level of protection against oil fuel pollution in the event of collision or grounding shall be assessed on the basis of the mean oil outflow parameter as follows:

$$O_M < 0.0157\text{-}1.14\text{E-}6\cdot C \qquad\qquad 600 \text{ m}^3 = C < 5{,}000 \text{ m}^3$$

$$O_M < 0.010 \qquad\qquad\qquad\qquad C = 5{,}000 \text{ m}^3$$

       Where O_M = mean oil outflow parameter;
                   C = total oil fuel volume.

     .2   The following general assumption shall apply when calculating the mean oil outflow parameter:

          .1   the ship shall be assumed loaded to the partial load line draught d_P without trim or heel;

.2 all oil fuel tanks shall be assumed loaded to 98% of their volumetric capacity;

.3 the nominal density of the oil fuel ($?_n$) shall generally be taken as 1,000 kg/m^3. If the density of the oil fuel is specifically restricted to a lesser value, the lesser value may be applied; and

.4 for the purpose of these outflow calculations, the permeability of each oil fuel tank shall be taken as 0.99, unless proven otherwise.

.3 The following assumptions shall be used when combining the oil outflow parameters:

.1 The mean oil outflow shall be calculated independently for side damage and for bottom damage and then combined into a non-dimensional oil outflow parameter O_M, as follows:

$$O_M = (0.4\ O_{MS} + 0.6\ O_{MB})\ /\ C$$

where:

O_{MS} = mean outflow for side damage, in m^3
O_{MB} = mean outflow for bottom damage, in m^3
C = total oil fuel volume.

.2 For bottom damage, independent calculations for mean outflow shall be done for 0 m and 2.5 m tide conditions, and then combined as follows:

$$O_{MB} = 0.7\ O_{MB(0)} + 0.3\ O_{MB(2.5)}$$

where:

$O_{MB(0)}$ = mean outflow for 0 m tide condition, and
$O_{MB(2.5)}$ = mean outflow for minus 2.5 m tide condition, in m^3.

.4 The mean outflow for side damage O_{MS} shall be calculated as follows:

$$O_{MS} = \sum_{1}^{n} P_{S(i)}\ O_{S(i)}\quad [\text{m}^3]$$

where:

i	=	represents each oil fuel tank under consideration;
n	=	total number of oil fuel tanks;
$P_{S(i)}$	=	the probability of penetrating oil fuel tank i from side damage, calculated in accordance with paragraph 11.6 of this regulation;
$O_{S(i)}$	=	the outflow, in m^3, from side damage to oil fuel tank i, which is assumed equal to the total volume in oil fuel tank i at 98% filling.

.5 The mean outflow for bottom damage shall be calculated for each tidal condition as follows:

.1 $\quad O_{MB(0)} = \displaystyle\sum_{1}^{n} P_{B(i)} \, O_{B(i)} \, C_{DB(i)} \; [m^3]$

where:

i = represents each oil fuel tank under consideration;

n = total number of oil fuel tanks;

$P_{B(i)}$ = the probability of penetrating oil fuel tank i from bottom damage, calculated in accordance with paragraph 11.7 of this regulation;

$O_{B(i)}$ = the outflow from oil fuel tank i, in m^3, calculated in accordance with paragraph 11.5.3 of this regulation; and

$C_{DB(i)}$ = factor to account for oil capture as defined in paragraph 11.5.4.

.2 $\quad O_{MB(2.5)} = \displaystyle\sum_{1}^{n} P_{B(i)} \, O_{B(i)} \, C_{DB(i)} \qquad [m^3]$

where:

$i, n, \; P_{B(i)}$ and $C_{DB(i)}$ = as defined in subparagraph .1 above

$O_{B(i)}$ = the outflow from oil fuel tank i, in m^3, after tidal change.

.3 The oil outflow $O_{B(i)}$ for each oil fuel tank shall be calculated based on pressure balance principles, in accordance with the following assumptions:

.1 The ship shall be assumed stranded with zero trim and heel, with the stranded draught prior to tidal change equal to the partial load line draught d_P.

.2 The oil fuel level after damage shall be calculated as follows:

$h_F = \{ (d_P + t_C - Z_l)(\rho_S) \} / \rho_n$

where: h_F = the height of the oil fuel surface above Z_l, in m;

t_C = the tidal change, in m. Reductions in tide shall be expressed as negative values;

Z_l = the height of the lowest point in the oil fuel tank above the baseline, in m;

ρ_S = density of seawater, to be taken as 1,025 kg/m^3; and,

ρ_n = nominal density of the oil fuel, as defined in 11.2.3.

.3 The oil outflow $O_{B(i)}$ for any tank bounding the bottom shell plating shall be taken not less than the following formula, but no more than the tank capacity:

$O_{B(i)} = H_W \cdot A$

where:

$H_W = 1.0$ m, when $Y_B = 0$

$H_W = B_B/50$ but not greater than 0.4 m, when Y_B is greater than $B_B/5$ or 11.5 m, whichever is less

"H_W" is to be measured upwards from the midship flat bottom line. In the turn of the bilge area and at locations without a clearly defined turn of the bilge, H_W is to be measured from a line parallel to the midship flat bottom, as shown for distance "h" in Figure 1.

For Y_B values outboard $B_B/5$ or 11.5 m, whichever is less, H_W is to be linearly interpolated.

$Y_B = $ the minimum value of Y_B over the length of the oil fuel tank, where at any given location, Y_B is the transverse distance between the side shell at waterline d_B and the tank at or below waterline d_B.

$A = $ the maximum horizontal projected area of the oil fuel tank up to the level of H_W from the bottom of the tank.
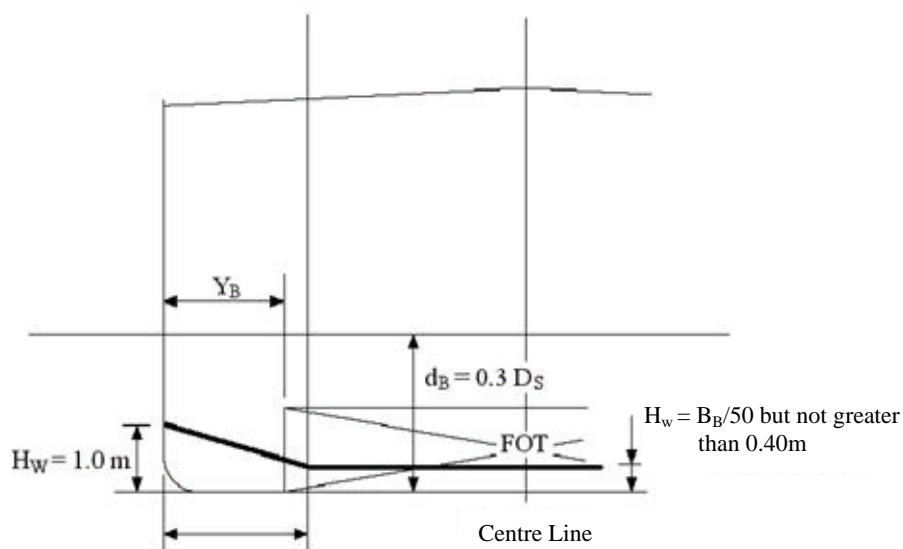
Figure 3 – Dimensions for calculation of the minimum oil outflow for the purpose of subparagraph 11.5.3.3

.4 In the case of bottom damage, a portion from the outflow from an oil fuel tank may be captured by non-oil compartments. This effect is approximated by application of the factor $C_{DB(i)}$ for each tank, which shall be taken as follows:

$C_{DB(i)}$ = 0.6 for oil fuel tanks bounded from below by non-oil compartments;

$C_{DB(i)}$ = 1 otherwise.

.6 The probability P_S of breaching a compartment from side damage shall be calculated as follows:

.1 $P_S = P_{SL} \cdot P_{SV} \cdot P_{ST}$

where: P_{SL} = $(1 - P_{Sf} - P_{Sa})$ = probability the damage will extend into the longitudinal zone bounded by X_a and X_f;
P_{SV} = $(1 - P_{Su} - P_{Sl})$ = probability the damage will extend into the vertical zone bounded by Z_l and Z_u;
P_{ST} = $(1 - P_{Sy})$ = probability the damage will extend transversely beyond the boundary defined by y;

.2 P_{Sa}, P_{Sf}, P_{Su} and P_{Sl} shall be determined by linear interpolation from the table of probabilities for side damage provided in 11.6.3, and P_{Sy} shall be calculated from the formulas provided in 11.6.3, where:

P_{Sa} = the probability the damage will lie entirely aft of location X_a/L;
P_{Sf} = the probability the damage will lie entirely forward of location X_f/L;
P_{Sl} = probability the damage will lie entirely below the tank;
P_{Su} = probability the damage will lie entirely above the tank; and
P_{Sy} = probability the damage will lie entirely outboard the tank.

Compartment boundaries X_a, X_f, Z_l, Z_u and y shall be developed as follows:

X_a = the longitudinal distance from aft terminal of L to the aft most point on the compartment being considered, in m;
X_f = the longitudinal distance from aft terminal of L to the foremost point on the compartment being considered, in m;
Z_l = the vertical distance from the moulded baseline to the lowest point on the compartment being considered, in m. Where Z_l is greater than D_S, Z_l shall be taken as D_S;
Z_u = the vertical distance from the moulded baseline to the highest point on the compartment being considered, in m. Where Z_u is greater than D_S, Z_u shall be taken as D_S; and,

y = the minimum horizontal distance measured at right angles to the centreline between the compartment under consideration and the side shell, in m[1].

In way of the turn of the bilge, y need not to be considered below a distance h above baseline, where h is lesser of B/10, 3 m or the top of the tank.

.3 Table of Probabilities for side damage

X_a/L	P_{Sa}		X_f/L	P_{Sf}		Z_l/D_S	P_{Sl}		Z_u/D_S	P_{Su}
0,00	0,000		0,00	0,967		0,00	0,000		0,00	0,968
0,05	0,023		0,05	0,917		0,05	0,000		0,05	0,952
0,10	0,068		0,10	0,867		0,10	0,001		0,10	0,931
0,15	0,117		0,15	0,817		0,15	0,003		0,15	0,905
0,20	0,167		0,20	0,767		0,20	0,007		0,20	0,873
0,25	0,217		0,25	0,717		0,25	0,013		0,25	0,836
0,30	0,267		0,30	0,667		0,30	0,021		0,30	0,789
0,35	0,317		0,35	0,617		0,35	0,034		0,35	0,733
0,40	0,367		0,40	0,567		0,40	0,055		0,40	0,670
0,45	0,417		0,45	0,517		0,45	0,085		0,45	0,599
0,50	0,467		0,50	0,467		0,50	0,123		0,50	0,525
0,55	0,517		0,55	0,417		0,55	0,172		0,55	0,452
0,60	0,567		0,60	0,367		0,60	0,226		0,60	0,383
0,65	0,617		0,65	0,317		0,65	0,285		0,65	0,317
0,70	0,667		0,70	0,267		0,70	0,347		0,70	0,255
0,75	0,717		0,75	0,217		0,75	0,413		0,75	0,197
0,80	0,767		0,80	0,167		0,80	0,482		0,80	0,143
0,85	0,817		0,85	0,117		0,85	0,553		0,85	0,092
0,90	0,867		0,90	0,068		0,90	0,626		0,90	0,046
0,95	0,917		0,95	0,023		0,95	0,700		0,95	0,013
1,00	0,967		1,00	0,000		1,00	0,775		1,00	0,000

P_{Sy} shall be calculated as follows:

$P_{Sy} = (24.96 - 199.6 \, y/B_S) \, (y/B_S)$ for $y/B_S = 0.05$

$P_{Sy} = 0.749 + \{5 - 44.4 \, (y/B_S - 0.05)\} \, \{(y/B_S) - 0.05\}$ for $0.05 < y/B_S < 0.1$

$P_{Sy} = 0.888 + 0.56 \, (y/B_S - 0.1)$ for $y/B_S = 0.1$

P_{Sy} is not to be taken greater than 1.

.7 The probability P_B of breaching a compartment from bottom damage shall be calculated as follows:

---

[1] For symmetrical tank arrangements, damages are considered for one side of the ship only, in which case all "y" dimensions are to be measured from that side. For asymmetrical arrangements reference is made to the Explanatory Notes on matters related to the accidental oil outflow performance, adopted by the Organization by resolution MEPC.122(52).

.1 $P_B = P_{BL} \cdot P_{BT} \cdot P_{BV}$

where: $P_{BL} = (1 - P_{Bf} - P_{Ba})$ = probability the damage will extend into the longitudinal zone bounded by X_a and X_f;

$P_{BT} = (1 - P_{Bp} - P_{Bs})$ = probability the damage will extend into transverse zone bounded by Y_p and Y_s; and

$P_{BV} = (1 - P_{Bz})$ = probability the damage will extend vertically above the boundary defined by z;

.2 P_{Ba}, P_{Bf}, P_{Bp} and P_{Bs} shall be determined by linear interpolation from the table of probabilities for bottom damage provided in 11.7.3, and P_{Bz} shall be calculated from the formulas provided in 11.7.3, where:

P_{Ba} = the probability the damage will lie entirely aft of location X_a/L;

P_{Bf} = the probability the damage will lie entirely forward of location X_f/L;

P_{Bp} = probability the damage will lie entirely to port of the tank;

P_{Bs} = probability the damage will lie entirely to starboard the tank; and

P_{Bz} = probability the damage will lie entirely below the tank.

Compartment boundaries X_a, X_f, Y_p, Y_s and z shall be developed as follows:

X_a and X_f as defined in 11.6.2;

Y_p = the transverse distance from the port-most point on the compartment located at or below the waterline d_B, to a vertical plane located $B_B/2$ to starboard of the ship's centreline;

Y_s = the transverse distance from the starboard-most point on the compartment located at or below the waterline d_B, to a vertical plane located $B_B/2$ to starboard of the ship's centreline; and

z = the minimum value of z over the length of the compartment, where, at any given longitudinal location, z is the vertical distance from the lower point of the bottom shell at that longitudinal location to the lower point of the compartment at that longitudinal location.

.3 Table of probabilities for bottom damage

X_a/L	P_{Ba}		X_f/L	P_{Bf}		Y_p/B_B	P_{Bp}		Y_s/B_B	P_{Bs}
0,00	0,000		0,00	0,969		0,00	0,844		0,00	0,000
0,05	0,002		0,05	0,953		0,05	0,794		0,05	0,009
0,10	0,008		0,10	0,936		0,10	0,744		0,10	0,032
0,15	0,017		0,15	0,916		0,15	0,694		0,15	0,063
0,20	0,029		0,20	0,894		0,20	0,644		0,20	0,097
0,25	0,042		0,25	0,870		0,25	0,594		0,25	0,133
0,30	0,058		0,30	0,842		0,30	0,544		0,30	0,171
0,35	0,076		0,35	0,810		0,35	0,494		0,35	0,211
0,40	0,096		0,40	0,775		0,40	0,444		0,40	0,253
0,45	0,119		0,45	0,734		0,45	0,394		0,45	0,297
0,50	0,143		0,50	0,687		0,50	0,344		0,50	0,344
0,55	0,171		0,55	0,630		0,55	0,297		0,55	0,394
0,60	0,203		0,60	0,563		0,60	0,253		0,60	0,444
0,65	0,242		0,65	0,489		0,65	0,211		0,65	0,494
0,70	0,289		0,70	0,413		0,70	0,171		0,70	0,544
0,75	0,344		0,75	0,333		0,75	0,133		0,75	0,594
0,80	0,409		0,80	0,252		0,80	0,097		0,80	0,644
0,85	0,482		0,85	0,170		0,85	0,063		0,85	0,694
0,90	0,565		0,90	0,089		0,90	0,032		0,90	0,744
0,95	0,658		0,95	0,026		0,95	0,009		0,95	0,794
1,00	0,761		1,00	0,000		1,00	0,000		1,00	0,844

P_{Bz} shall be calculated as follows:

$$P_{Bz} = (14.5 – 67 \, z/D_S) \, (z/D_S) \quad \text{for } z/D_S = 0.1$$
$$P_{Bz} = 0.78 + 1.1 \, \{(z/D_S - 0.1)\} \quad \text{for } z/D_S > 0.1$$

P_{Bz} is not to be taken greater than 1.

.8 For the purpose of maintenance and inspection, any oil fuel tanks that do not border the outer shell plating shall be located no closer to the bottom shell plating than the minimum value of *h* in paragraph 6 and no closer to the side shell plating than the applicable minimum value of *w* in paragraph 7 or 8.

12 In approving the design and construction of ships to be built in accordance with this regulation, Administrations shall have due regard to the general safety aspects, including the need for maintenance and inspection of wing and double bottom tanks or spaces."

3 Consequential amendments to the Supplement of the IOPP Certificate (Forms A and B)

The following new paragraph 2A is added to the Supplement of the IOPP Certificate (Forms A and B):

"2A.1 The ship is required to be constructed according to regulation 12A and complies with the requirements of:

        paragraphs 6 and either 7 or 8 (double hull construction)   ?

        paragraph 11 (accidental oil fuel outflow performance).   ?

2A.2   The ship is not required to comply with the requirements of
        regulation 12A.   ? ”

4   Amendments to regulation 21

The text of existing paragraph 2.2 of regulation 21 on Prevention of oil pollution from oil tankers carrying heavy grade oil as cargo is replaced by the following:

"oils, other than crude oils, having either a density at 15ºC higher than 900 kg/m^3 or a kinematic viscosity at 50ºC higher than 180 mm^2/s; or"

***

REGLA 12A MARPOL

Main parameters: Reg.12A			
Length (L)	112,40	m	
Aft terminus of Length (L)	-7,00	m	
Deepest loadline draft (d_S)	7,50	m	
Lightship draft (d_L)	4,00	m	
Partial loadline draft (d_P)	6,10	m	
Draft B (d_B)	4,08	m	
Depth amidships to upper deck (D_S)	13,60	m	
Breadth at or below d_S (B_S)	18,00	m	
Breadth at or below d_B (B_B)	17,57	m	
Ignore small tanks: max. capacity not greater than	30,00	m^3	Aggregate capacity of small tanks: 144,648
Total volume of fuel oil at 98% filling (C)	1275,00	m^3	
Nominal seawater density (rho_S)	1,03	tonne/m^3	
Nominal oil fuel density (rho_n)	0,84	tonne/m^3	
Tidal change (t_C)	-2,50	m^3	
Calculations			
Mean outflow for side damage (O_MS)	2,035	m^3	
Mean outflow for bottom damage (O_MB)	13,578	m^3	
Mean outflow parameter (O_M)	0,0070		
Maximum allowable mean outflow parameter (O_M_max)	0,0157		
Satus Reg.12A	**Pass**		

Side damage

	Permeability	Loading %	Loading vol.	Oil density	Xa	Xf	Yp	Ys	YB	Zl	Zu	y	z	P(Sa)	P(Sf)	P(SI)	P(Su)	P(Sy)	P(SL)	P(SV)	P(ST)	P(S)			OS	OS.P(S)
	%	% full	m^3	tonne/m^3	m	m	m	m	m	m	m	m	m												m^3	m^3
Tanque GO 01 DF	99	98	13,986	0,84	92,5	99,65	10,571	7,107	1,115	0,616	1,923	0	0	0,79	0,0812	0	0,9095	0	0,1289	0,0905	1	0,0117			13,986	Small tank (14,272)
Tanque GO 02 BR	99	98	62,748	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			62,748	0,066
Tanque GO 03 ER	99	98	61,624	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			61,624	0,065
Tanque GO 04 DF ER	99	98	67,053	0,84	65,2	83,4	8,839	2,795	2,117	0,168	1,667	0	0	0,5471	0,225	0	0,9192	0	0,2279	0,0808	1	0,0184			67,053	1,234
Tanque GO 05 DF ER	99	98	29,038	0,84	49,6	65,2	5,839	0,976	1,991	0,019	1,373	0	0,106	0,4083	0,3869	0	0,9305	0	0,2048	0,0695	1	0,0142			29,038	Small tank (29,630)
Tanque GO 06 DF ER	99	98	36,753	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			36,753	0,039
Tanque GO 07 DF ER	99	98	34,685	0,84	34	49,6	8,839	5,839	5,921	-0,344	1,121	0	0	0,2695	0,5257	0	0,9384	0	0,2048	0,0616	1	0,0126			34,685	0,438
Tanque GO 08 DF ER	99	98	24,267	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			24,267	Small tank (24,762)
Tanque GO 09 USO DIARIO ER	99	98	36,529	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011				
Tanque GO 09 USO DIARIO CR	99	98	45,59	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011				
Tanque GO 10 SED ER	99	98	28,569	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			28,569	Small tank (29,152)
Tanque GO 11_2 ER_t	99	98	19,478	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			19,478	Small tank (19,875)
Tanque GO 11 ER_b	99	98	26,418	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			26,418	Small tank (26,958)
Tanque GO 11 CR_b	99	98	38,086	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			38,086	0,04
Tanque REBOSES DF ER	99	98	62,741	0,84	0	0	0	0	0	0	0	0	0	0	0,967	0	0,968	0	0,033	0,032	1	0,0011			62,741	0,066
Mean outflow for side damage (O_MS)			594,34																							**2,042**

Bottom damage

	Permeability	Loading	Loading	Oil density	Xa	Xf	Yp	Ys	YB	Zl	Zu	y	z	P(Ba)	P(Bf)	P(BP)	P(BS)	P(BZ)	P(BL)	P(BV)	P(BT)	P(B)	CBD	HW	Area	OB min	hC1	vol(hC1)	OB1	hC2	vol(hC2)	OB2	OB	OB.P(B).CBD
	%	% full	m^3	tonne/m^3	m	m	m	m	m	m	m	m	m											m	m^2	m^3	m	m^3	m^3	m	m^3	m^3	m^3	m^3
Tanque GO 01 DF	99	98	13,986	0,84	92,5	99,65	10,571	7,107	1,115	0,616	1,923	0	0	0,4425	0,1108	0,2517	0,2569	0	0,4467	1	0,4914	0,2195	1	0,796	3,699	2,945	6,691	14,272	2,945	3,641	14,272	2,945	2,945	Small tank (14,272)
Tanque GO 02 BR	99	98	62,748	0,84	0	0	0	0	0	0	0	0	0	0	0,969	0,844	0	0	0,031	1	0,156	0,0048	1	0	0	0	7,443	53,808	8,94	4,393	18,178	44,57	19,629	0,095
Tanque GO 04 DF ER	99	98	67,053	0,84	65,2	83,4	8,839	2,795	2,117	0,168	1,667	0	0	0,1902	0,3458	0,3412	0,0691	0	0,4639	1	0,5897	0,2736	0,613	44,621	27,35	7,238	68,422	27,35	4,187	68,422	27,349	27,349	7,482
Tanque GO 05 DF ER	99	98	29,038	0,84	49,6	65,2	5,839	0,976	1,991	0,019	1,373	0	0,106	0,115	0,5897	0,5117	0,0115	0,1091	0,2953	0,8909	0,4767	0,1254	1	0,636	49,407	29,04	7,421	29,63	29,04	4,37	29,63	29,038	29,038	Small tank (29,630)
Tanque GO 05 DF CR	99	98	34,762	0,84	49,6	65,2	8,839	5,839	5,921	-0,088	1,373	0	0	0,115	0,5897	0,3412	0,1968	0	0,2953	1	0,462	0,1364	1	0,354	46,794	16,55	7,55	35,471	16,55	4,5	35,471	16,545	16,545	2,257
Tanque GO 06 DF ER	99	98	36,753	0,84	0	0	0	0	0	0	0	0	0	0	0,969	0,844	0	0	0,031	1	0,156	0,0048	1	0	0	0	7,443	37,503	0	4,393	37,503	0	0	0
Tanque GO 06 DF CR	99	98	35,036	0,84	0	0	0	0	0	0	0	0	0	0	0,969	0,844	0	0	0,031	1	0,156	0,0048	1	0	0	0	7,443	35,751	0	4,393	35,751	0	0	0
Tanque GO 07 DF ER	99	98	34,685	0,84	34	49,6	8,839	5,839	5,921	-0,344	1,121	0	0	0,0589	0,7411	0,3412	0,1968	0	0,2	1	0,462	0,0924	1	0,354	46,8	16,55	7,863	35,393	16,55	4,812	35,393	16,547	16,547	1,529
Tanque GO 07 DF CR	99	98	34,804	0,84	34	49,6	5,839	1,024	2,928	-0,055	1,121	0	0,106	0,0589	0,7411	0,5117	0,0128	0,1092	0,2	0,8908	0,4755	0,0847	1	0,465	45,503	21,14	7,511	35,514	21,14	4,46	35,514	21,14	21,14	1,79
Tanque GO 08 DF ER	99	98	24,267	0,84	0	0	0	0	0	0	0	0	0	0	0,969	0,844	0	0	0,031	1	0,156	0,0048	1	0	0	0	7,443	24,762	0	4,393	24,762	0	0	Small tank (24,762)
Tanque GO 08 DF CR	99	98	34,159	0,84	0	0	0	0	0	0	0	0	0	0	0,969	0,844	0	0	0,031	1	0,156	0,0048	1	0	0	0	7,443	34,856	0	4,393	34,856	0	0	0
Tanque REBOSES DF ER	99	98	62,741	0,84	29,2	34	6,839	1,357	1,547	-0,162	2,809	0	0,204	0,0451	0,8404	0,4548	0,0215	0,2021	0,1145	0,7979	0,5236	0,0478	1	0,717	12,393	8,887	7,641	64,021	8,887	4,591	64,021	8,887	8,887	0,425
Mean outflow for bottom damage (O_MB)			470,031																															**13,578**

ANEXO II_VOLÚMEN DE TANQUES

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Cuba 1 ER	Tank	80	0,72	Atún	69,90	73,80	0,00	10,00	8,200	4,910	1,625	Prismatic	Prismatic	4,846	4,846
Cuba 1 ER	Linked Tank	80	0,72	Atún	69,90	73,80	1,00	10,00	4,910	1,625	Prismatic	Prismatic	4,846	1,562
Cuba 1 BR	Tank	80	0,72	Atún	69,90	73,80	-10,00	0,00	8,200	4,910	1,625	Prismatic	Prismatic	4,846	4,846
Cuba 1 BR	Linked Tank	80	0,72	Atún	69,90	73,80	-10,00	-1,00	4,910	1,625	Prismatic	Prismatic	4,846	1,562
Cuba 2 ER	Tank	80	0,72	Atún	66,00	69,90	0,00	10,00	8,200	4,846	1,562	Prismatic	Prismatic	4,782	4,782
Cuba 2 ER	Linked Tank	80	0,72	Atún	66,00	69,90	1,00	10,00	4,846	1,562	Prismatic	Prismatic	4,782	1,499
Cuba 2 BR	Tank	80	0,72	Atún	66,00	69,90	-10,00	0,00	8,200	4,846	1,562	Prismatic	Prismatic	4,782	4,782
Cuba 2 BR	Linked Tank	80	0,72	Atún	66,00	69,90	-10,00	-1,00	4,846	1,562	Prismatic	Prismatic	4,782	1,499
Cuba 3 ER	Tank	80	0,72	Atún	62,10	66,00	0,00	10,00	8,200	4,782	1,499	Prismatic	Prismatic	4,718	4,718
Cuba 3 ER	Linked Tank	80	0,72	Atún	62,10	66,00	1,00	10,00	4,782	1,499	Prismatic	Prismatic	4,718	1,436
Cuba 3 BR	Tank	80	0,72	Atún	62,10	66,00	-10,00	0,00	8,200	4,782	1,499	Prismatic	Prismatic	4,718	4,718
Cuba 3 BR	Linked Tank	80	0,72	Atún	62,10	66,00	-10,00	-1,00	4,782	1,499	Prismatic	Prismatic	4,718	1,436
Cuba 4 ER	Tank	80	0,72	Atún	58,20	62,10	0,00	10,00	8,200	4,718	1,436	Prismatic	Prismatic	4,654	4,654
Cuba 4 ER	Linked Tank	80	0,72	Atún	58,20	62,10	1,00	10,00	4,718	1,436	Prismatic	Prismatic	4,654	1,373
Cuba 4 BR	Tank	80	0,72	Atún	58,20	62,10	-10,00	0,00	8,200	4,718	1,436	Prismatic	Prismatic	4,654	4,654
Cuba 4 BR	Linked Tank	80	0,72	Atún	58,20	62,10	-10,00	-1,00	4,718	1,436	Prismatic	Prismatic	4,654	1,373
Cuba 5 ER	Tank	80	0,72	Atún	54,30	58,20	0,00	10,00	8,200	4,654	1,373	Prismatic	Prismatic	4,59	4,59
Cuba 5 ER	Linked Tank	80	0,72	Atún	54,30	58,20	1,00	10,00	4,654	1,373	Prismatic	Prismatic	4,59	1,31
Cuba 5 BR	Tank	80	0,72	Atún	54,30	58,20	-10,00	0,00	8,200	4,654	1,373	Prismatic	Prismatic	4,59	4,59
Cuba 5 BR	Linked Tank	80	0,72	Atún	54,30	58,20	-10,00	-1,00	4,654	1,373	Prismatic	Prismatic	4,59	1,31
Cuba 6 ER	Tank	80	0,72	Atún	50,40	54,30	0,00	10,00	8,200	4,590	1,310	Prismatic	Prismatic	4,526	4,526
Cuba 6 ER	Linked Tank	80	0,72	Atún	50,40	54,30	1,00	10,00	4,590	1,310	Prismatic	Prismatic	4,526	1,247
Cuba 6 BR	Tank	80	0,72	Atún	50,40	54,30	-10,00	0,00	8,200	4,590	1,310	Prismatic	Prismatic	4,526	4,526
Cuba 6 BR	Linked Tank	80	0,72	Atún	50,40	54,30	-10,00	-1,00	4,590	1,310	Prismatic	Prismatic	4,526	1,247
Cuba 7 ER	Tank	80	0,72	Atún	46,50	50,40	0,00	10,00	8,200	4,526	1,247	Prismatic	Prismatic	4,452	4,452
Cuba 7 ER	Linked Tank	80	0,72	Atún	46,50	50,40	1,00	10,00	4,526	1,247	Prismatic	Prismatic	4,452	1,184
Cuba 7 BR	Tank	80	0,72	Atún	46,50	50,40	-10,00	0,00	8,200	4,526	1,247	Prismatic	Prismatic	4,452	4,452
Cuba 7 BR	Linked Tank	80	0,72	Atún	46,50	50,40	-10,00	-1,00	4,526	1,247	Prismatic	Prismatic	4,452	1,184
Cuba 8 ER	Tank	80	0,72	Atún	42,60	46,50	0,00	10,00	8,200	4,452	1,184	Prismatic	Prismatic	4,398	4,398
Cuba 8 ER	Linked Tank	80	0,72	Atún	42,60	46,50	1,00	10,00	4,452	1,184	Prismatic	Prismatic	4,398	1,121
Cuba 8 BR	Tank	80	0,72	Atún	42,60	46,50	-10,00	0,00	8,200	4,452	1,184	Prismatic	Prismatic	4,398	4,398
Cuba 8 BR	Linked Tank	80	0,72	Atún	42,60	46,50	-10,00	-1,00	4,452	1,184	Prismatic	Prismatic	4,398	1,121
Cuba 9 ER	Tank	80	0,72	Atún	38,70	42,60	0,00	10,00	8,200	4,398	1,121	Prismatic	Prismatic	4,334	4,334
Cuba 9 ER	Linked Tank	80	0,72	Atún	38,70	42,60	1,00	10,00	4,398	1,121	Prismatic	Prismatic	4,334	1,058
Cuba 9 BR	Tank	80	0,72	Atún	38,70	42,60	-10,00	0,00	8,200	4,398	1,121	Prismatic	Prismatic	4,334	4,334
Cuba 9 BR	Linked Tank	80	0,72	Atún	38,70	42,60	-10,00	-1,00	4,398	1,121	Prismatic	Prismatic	4,334	1,058
Cuba 10 ER	Tank	80	0,72	Atún	34,80	38,70	0,00	10,00	8,200	4,334	1,058	Prismatic	Prismatic	4,27	4,27
Cuba 10 ER	Linked Tank	80	0,72	Atún	34,80	38,70	1,00	10,00	4,334	1,058	Prismatic	Prismatic	4,27	0,995
Cuba 10 BR	Tank	80	0,72	Atún	34,80	38,70	-10,00	0,00	8,200	4,334	1,058	Prismatic	Prismatic	4,27	4,27
Cuba 10 BR	Linked Tank	80	0,72	Atún	34,80	38,70	-10,00	-1,00	4,334	1,058	Prismatic	Prismatic	4,27	0,995
Cuba 11 ER	Tank	80	0,72	Atún	30,90	34,80	0,00	10,00	8,200	4,270	0,995	Prismatic	Prismatic	4,206	4,206
Cuba 11 ER	Linked Tank	80	0,72	Atún	30,90	34,80	1,00	10,00	4,270	0,995	Prismatic	Prismatic	4,206	0,932
Cuba 11 BR	Tank	80	0,72	Atún	30,90	34,80	-10,00	0,00	8,200	4,270	0,995	Prismatic	Prismatic	4,206	4,206
Cuba 11 BR	Linked Tank	80	0,72	Atún	30,90	34,80	-10,00	-1,00	4,270	0,995	Prismatic	Prismatic	4,206	0,932
Cuba 12 ER	Tank	80	0,72	Atún	27,00	30,90	0,00	10,00	8,200	4,206	0,932	Prismatic	Prismatic	4,142	4,142
Cuba 12 ER	Linked Tank	80	0,72	Atún	27,00	30,90	1,00	10,00	4,206	0,932	Prismatic	Prismatic	4,142	0,869
Cuba 12 BR	Tank	80	0,72	Atún	27,00	30,90	-10,00	0,00	8,200	4,206	0,932	Prismatic	Prismatic	4,142	4,142
Cuba 12 BR	Linked Tank	80	0,72	Atún	27,00	30,90	-10,00	-1,00	4,206	0,932	Prismatic	Prismatic	4,142	0,869

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque GO 01 DF	Tank	98	0,84	Diesel	85,50	92,65	-10,00	10,00	1,923	-2,000	Prismatic	Prismatic	1,816	Prismatic
Tanque GO 02 ER	Tank	98	0,84	Diesel	77,70	84,20	2,00	10,00	8,200	-2,000	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 02 BR	Tank	98	0,84	Diesel	77,70	84,20	-10,00	-2,00	8,200	-2,000	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 03 ER	Tank	98	0,84	Diesel	73,80	77,70	2,00	10,00	8,200	1,688	Prismatic	Prismatic	Prismatic	1,625
Tanque GO 03 BR	Tank	98	0,84	Diesel	73,80	77,70	-10,00	-2,00	8,200	1,688	Prismatic	Prismatic	Prismatic	1,625
Tanque GO 04 DF ER	Tank	98	0,84	Diesel	58,20	77,70	0,00	10,00	1,688	-2,000	Prismatic	Prismatic	1,373	Prismatic
Tanque GO 04 DF BR	Tank	98	0,84	Diesel	58,20	77,70	-10,00	0,00	1,688	-2,000	Prismatic	Prismatic	1,373	Prismatic
Tanque GO 05 DF ER	Tank	98	0,84	Diesel	50,40	58,20	2,00	10,00	1,373	-2,000	Prismatic	Prismatic	1,247	Prismatic
Tanque GO 05 DF CR	Tank	98	0,84	Diesel	50,40	58,20	-2,00	2,00	1,373	-2,000	Prismatic	Prismatic	1,247	Prismatic
Tanque GO 05 DF BR	Tank	98	0,84	Diesel	50,40	58,20	-10,00	-2,00	1,373	-2,000	Prismatic	Prismatic	1,247	Prismatic
Tanque GO 06 DF ER	Tank	98	0,84	Diesel	42,60	50,40	2,00	10,00	1,247	-2,000	Prismatic	Prismatic	1,121	Prismatic
Tanque GO 06 DF CR	Tank	98	0,84	Diesel	42,60	50,40	-2,00	2,00	1,247	-2,000	Prismatic	Prismatic	1,121	Prismatic
Tanque GO 06 DF BR	Tank	98	0,84	Diesel	42,60	50,40	-10,00	-2,00	1,247	-2,000	Prismatic	Prismatic	1,121	Prismatic
Tanque GO 07 DF ER	Tank	98	0,84	Diesel	34,80	42,60	2,00	10,00	1,121	-2,000	Prismatic	Prismatic	0,995	Prismatic
Tanque GO 07 DF CR	Tank	98	0,84	Diesel	34,80	42,60	-2,00	2,00	1,121	-2,000	Prismatic	Prismatic	0,995	Prismatic
Tanque GO 07 DF BR	Tank	98	0,84	Diesel	34,80	42,60	-10,00	-2,00	1,121	-2,000	Prismatic	Prismatic	0,995	Prismatic
Tanque GO 08 DF ER	Tank	98	0,84	Diesel	27,00	34,80	2,00	10,00	0,995	-2,000	Prismatic	Prismatic	0,869	Prismatic
Tanque GO 08 DF CR	Tank	98	0,84	Diesel	27,00	34,80	-2,00	2,00	0,995	-2,000	Prismatic	Prismatic	0,869	Prismatic
Tanque GO 08 DF BR	Tank	98	0,84	Diesel	27,00	34,80	-10,00	-2,00	0,995	-2,000	Prismatic	Prismatic	0,869	Prismatic
Tanque GO 09 USO DIARIO ER	Tank	98	0,84	Diesel	1,20	7,20	1,50	4,50	8,200	4,750	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 09 USO DIARIO CR	Tank	98	0,84	Diesel	1,20	7,20	-1,50	1,50	8,200	4,750	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 09 USO DIARIO BR	Tank	98	0,84	Diesel	1,20	7,20	-4,50	-1,50	8,200	4,750	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 10 SED ER	Tank	98	0,84	Diesel	1,20	7,20	4,50	10,00	8,200	4,750	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 10 SED BR	Tank	98	0,84	Diesel	1,20	7,20	-10,00	-4,50	8,200	4,750	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_1 ER_t	Tank	98	0,84	Diesel	-6,00	-0,60	2,00	4,50	11,000	8,200	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_2 ER_t	Tank	98	0,84	Diesel	-6,00	-0,60	4,50	10,00	11,000	8,200	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_1 BR_t	Tank	98	0,84	Diesel	-6,00	-0,60	-4,50	-2,00	11,000	8,200	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11_2 BR_t	Tank	98	0,84	Diesel	-6,00	-0,60	-10,00	-4,50	11,000	8,200	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 ER_b	Tank	98	0,84	Diesel	-6,00	-0,60	3,00	10,00	8,200	0,000	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 ER_b	Linked Tank	98	0,84	Diesel	-0,60	1,20	3,00	10,00	8,200	0,000	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 CR_b	Tank	98	0,84	Diesel	-6,00	-0,60	-3,00	3,00	8,200	0,000	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 BR_b	Tank	98	0,84	Diesel	-6,00	-0,60	-10,00	-3,00	8,200	0,000	Prismatic	Prismatic	Prismatic	Prismatic
Tanque GO 11 BR_b	Linked Tank	98	0,84	Diesel	-0,60	1,20	-10,00	-3,00	8,200	0,000	Prismatic	Prismatic	Prismatic	Prismatic
Tanque REBOSES DF ER	Tank	98	0,84	Diesel	18,60	27,00	2,00	10,00	2,809	-2,000	Prismatic	Prismatic	2,647	Prismatic
Tanque REBOSES DF BR	Tank	98	0,84	Diesel	18,60	27,00	-10,00	-2,00	2,809	-2,000	Prismatic	Prismatic	2,647	Prismatic

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque Estabilizador	Tank	98	1,025	Sea Water	1,20	6,60	2,00	10,00	11,00	8,20	Prismatic	Prismatic	Prismatic	Prismatic
Tanque Estabilizador	Linked Tank	98	1,025	Sea Water	1,20	6,60	-2,00	2,00	9,00	8,20	Prismatic	Prismatic	Prismatic	Prismatic
Tanque Estabilizador	Linked Tank	98	1,025	Sea Water	1,20	6,60	-10,00	-2,00	11,00	8,20	Prismatic	Prismatic	Prismatic	Prismatic

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque AD 01 ER	Tank	98	1	Fresh Water	7,80	11,40	2,00	10,00	8,20	2,52	Prismatic	Prismatic	Prismatic	2,461
Tanque AD 01 BR	Tank	98	1	Fresh Water	7,80	11,40	-10,00	-2,00	8,20	2,52	Prismatic	Prismatic	Prismatic	2,461

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque AT 01_1_pique proa_t	Tank	98	1	Fresh Water	93,30	99,30	0,00	10,00	11,00	8,20	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 01_1_pique proa_t	Linked Tank	98	1	Fresh Water	93,30	99,30	-10,00	0,00	11,00	8,20	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 01_1_pique proa_t	Linked Tank	98	1	Fresh Water	93,30	98,10	0,00	10,00	8,20	5,70	Prismatic	Prismatic	Prismatic	5,627
Tanque AT 01_1_pique proa_t	Linked Tank	98	1	Fresh Water	93,30	98,10	-10,00	0,00	8,20	5,70	Prismatic	Prismatic	Prismatic	5,627
Tanque AT 01_2_pique proa_b	Tank	98	1	Fresh Water	98,10	102,30	0,00	10,00	8,20	5,75	Prismatic	Prismatic	Prismatic	5,7
Tanque AT 01_2_pique proa_b	Linked Tank	98	1	Fresh Water	98,10	102,30	-10,00	0,00	8,20	5,75	Prismatic	Prismatic	Prismatic	5,7
Tanque AT 01_2_pique proa_b	Linked Tank	98	1	Fresh Water	93,30	102,30	0,00	10,00	5,75	0,00	Prismatic	Prismatic	Prismatic	5,627
Tanque AT 01_2_pique proa_b	Linked Tank	98	1	Fresh Water	93,30	102,30	-10,00	0,00	5,75	0,00	Prismatic	Prismatic	Prismatic	5,627
Tanque AT 02	Tank	98	1	Fresh Water	3,00	7,20	0,00	10,00	4,75	-2,00	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 02	Linked Tank	98	1	Fresh Water	7,20	12,60	0,00	10,00	0,82	-2,00	Prismatic	Prismatic	Prismatic	0,732
Tanque AT 02	Linked Tank	98	1	Fresh Water	3,00	7,20	-10,00	0,00	4,75	-2,00	Prismatic	Prismatic	Prismatic	Prismatic
Tanque AT 02	Linked Tank	98	1	Fresh Water	7,20	12,60	-10,00	0,00	0,82	-2,00	Prismatic	Prismatic	Prismatic	0,732

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque AGUAS SUCIAS	Tank	98	1	Aguas Sucias	25,80	27,00	-2,00	2,00	1,09	-2,00	Prismatic	Prismatic	1,066	Prismatic

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque LODOS	Tank	98	1	Lodos	12,60	15,60	0,00	10,00	0,87	-2,00	Prismatic	Prismatic	0,82	Prismatic
Tanque LODOS	Linked Tank	98	1	Lodos	12,60	15,60	-10,00	0,00	0,87	-2,00	Prismatic	Prismatic	0,82	Prismatic

Name	Type	Intact Perm. %	Specific gravity	Fluid Type	Aft (m)	Fore (m)	F. Port (m)	F. Stbd. (m)	F. Stbd. (m)	F. Top (m)	F. Bott (m)	A. Port (m)	A. Top (m)	A. Bott (m)
Tanque ACEITE CIRCUITO	Tank	98	0,89	Lube Oil	15,60	18,60	-10,00	-2,00	2,65	-2,00	Prismatic	Prismatic	2,589	Prismatic
Tanque ACEITE HIDRÁULICO ER	Tank	98	0,89	Lube Oil	15,60	18,60	2,00	10,00	2,65	-2,00	Prismatic	Prismatic	2,589	Prismatic
Tanque ACEITE SUCIO	Tank	98	0,89	Lube Oil	24,60	25,80	-2,00	2,00	1,07	-2,00	Prismatic	Prismatic	1,043	Prismatic
Tanque ACEITE M.P	Tank	98	0,89	Lube Oil	15,60	24,60	-0,50	0,50	1,04	-2,00	Prismatic	Prismatic	0,869	Prismatic
Tanque ACEITE MMAA ER	Tank	98	0,89	Lube Oil	15,60	24,60	0,50	2,00	1,04	-2,00	Prismatic	Prismatic	0,869	Prismatic
Tanque ACEITE REDUCTORA + HÉLIC	Tank	98	0,89	Lube Oil	15,60	24,60	-2,00	-0,50	1,04	-2,00	Prismatic	Prismatic	0,869	Prismatic

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Cuba 1 ER	6,535	0,103	97,9	96,556	69,52	71,791	2,926	5,313	61,991
Cuba 1 BR	6,535	0,103	97,9	96,556	69,52	71,791	-2,926	5,313	61,991
Cuba 2 ER	6,593	0,108	97,9	114,367	82,344	67,899	3,338	5,233	90,435
Cuba 2 BR	6,593	0,108	97,9	114,367	82,344	67,899	-3,338	5,233	90,435
Cuba 3 ER	6,65	0,114	97,9	131,979	95,025	64,008	3,728	5,143	119,12
Cuba 3 BR	6,65	0,114	97,9	131,979	95,025	64,008	-3,728	5,143	119,12
Cuba 4 ER	6,707	0,12	97,9	147,824	106,433	60,118	4,063	5,05	143,145
Cuba 4 BR	6,707	0,12	97,9	147,824	106,433	60,118	-4,063	5,05	143,145
Cuba 5 ER	6,765	0,125	97,9	160,519	115,574	56,228	4,317	4,962	158,832
Cuba 5 BR	6,765	0,125	97,9	160,519	115,574	56,228	-4,317	4,962	158,832
Cuba 6 ER	6,822	0,131	97,9	169,672	122,164	52,335	4,485	4,882	166,445
Cuba 6 BR	6,822	0,131	97,9	169,672	122,164	52,335	-4,485	4,882	166,445
Cuba 7 ER	6,881	0,135	97,9	175,828	126,596	48,441	4,583	4,814	169,419
Cuba 7 BR	6,881	0,135	97,9	175,828	126,596	48,441	-4,583	4,814	169,419
Cuba 8 ER	6,942	0,137	97,9	179,3	129,096	44,546	4,621	4,768	170,434
Cuba 8 BR	6,942	0,137	97,9	179,3	129,096	44,546	-4,621	4,768	170,434
Cuba 9 ER	7,004	0,138	97,9	180,564	130,006	40,649	4,611	4,745	170,573
Cuba 9 BR	7,004	0,138	97,9	180,564	130,006	40,649	-4,611	4,745	170,573
Cuba 10 ER	7,067	0,138	97,9	180,506	129,965	36,751	4,572	4,737	170,336
Cuba 10 BR	7,131	0,137	97,9	178,562	128,565	32,856	4,497	4,749	169,273
Cuba 11 BR	7,131	0,137	97,9	178,562	128,565	32,856	4,497	4,749	169,273
Cuba 11 BR	7,131	0,137	97,9	178,566	128,568	32,856	-4,497	4,749	169,273
Cuba 12 ER	7,197	0,134	97,9	173,595	124,988	28,963	4,367	4,795	167,045
Cuba 12 BR	7,197	0,134	97,9	173,595	124,988	28,963	-4,367	4,795	167,045
Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Tanque GO 01 DF	1,307	0	100	14,127	11,867	88,774	0	1,43	0
Tanque GO 02 BR	6,999	0	100	63,382	53,241	80,533	-2,879	5,513	0
Tanque GO 02_1 ER	6,999	0	100	63,382	53,241	80,533	2,879	5,513	0
Tanque GO 03_1 ER	6,575	0	100	62,247	52,287	75,647	3,343	5,421	0
Tanque GO 03_1 BR	6,575	0	100	62,247	52,287	75,647	-3,343	5,421	0
Tanque GO 04 DF ER	1,499	0	100	65,071	54,66	65,941	1,816	1,012	0
Tanque GO 04 DF BR	1,499	0	100	65,071	54,66	65,941	-1,816	1,012	0
Tanque GO 05 DF ER	1,238	0	100	29,331	24,638	54,055	3,952	0,853	0
Tanque GO 05 DF CR	1,333	0	100	35,113	29,495	54,293	0	0,735	0
Tanque GO 05 DF BR	1,238	0	100	29,327	24,635	54,056	-3,952	0,853	0
Tanque GO 06 DF ER	1,245	0	100	37,124	31,185	46,441	4,38	0,716	0
Tanque GO 06 DF CR	1,335	0	100	35,39	29,728	46,499	0	0,605	0
Tanque GO 06 DF ER	1,245	0	100	37,124	31,185	46,441	-4,38	0,716	0
Tanque GO 07 DF ER	1,21	0	100	35,036	29,43	38,828	4,252	0,594	0
Tanque GO 07 DF CR	1,337	0	100	35,155	29,53	38,708	0	0,483	0
Tanque GO 07 DF BR	1,21	0	100	35,031	29,426	38,829	-4,252	0,594	0
Tanque GO 08 DF ER	1,135	0	100	24,512	20,59	31,265	3,749	0,514	0
Tanque GO 08 DF CR	1,339	0	100	34,504	28,983	30,916	0	0,367	0
Tanque GO 08 DF BR	1,135	0	100	24,512	20,59	31,265	-3,749	0,514	0
Tanque GO 09 USO DIARIO ER	3,352	0	100	36,898	30,994	4,432	2,934	7,128	0
Tanque GO 09 USO DIARIO CR	3,45	0	100	46,051	38,682	4,589	0	6,821	0
Tanque GO 09 USO DIARIO BR	3,352	0	100	36,898	30,994	4,432	-2,934	7,128	0
Tanque GO 10 SED ER	2,192	0	100	28,857	24,24	4,456	6,033	7,446	0
Tanque GO 10 SED BR	2,192	0	100	28,857	24,24	4,456	-6,033	7,446	0
Tanque GO 11_1 ER_t	2,786	0	100	25,743	21,624	-2,91	3,25	9,234	0
Tanque GO 11_2 ER_t	2,786	0	100	19,675	16,527	-2,578	5,501	9,286	0
Tanque GO 11_1 BR_t	2,786	0	100	25,743	21,624	-2,91	-3,25	9,234	0
Tanque GO 11_2 BR_t	2,786	0	100	19,675	16,527	-2,578	-5,501	9,286	0
Tanque GO 11 ER_b	1,64	0	100	26,685	22,416	-1,749	4,714	7,64	0
Tanque GO 11 CR_b	1,563	0	100	38,471	32,315	-3,105	0	7,584	0
Tanque GO 11 BR_b	1,64	0	100	26,685	22,416	-1,749	-4,714	7,64	0
Tanque REBOSES DF ER	2,971	0	100	63,374	53,234	23,452	3,636	1,616	0
Tanque REBOSES DF BR	2,971	0	100	63,374	53,234	23,452	-3,636	1,616	0
Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Tanque Estabilizador	2,8	0	100	190,456	195,218	3,962	0	9,511	0
Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Tanque AD 01 ER	5,684	0	100	54,939	54,939	9,699	4,613	6,847	0
Tanque AD 01 BR	5,684	0	100	54,939	54,939	9,699	-4,613	6,847	0

Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Tanque AT 02	5,453	0	100	35,569	35,569	7,928	0	1,395	0
Tanque AT 01 _pique proa_t	5,373	0	100	39,236	39,236	95,144	0	8,115	0
Tanque AT 01 _pique proa_b	6,392	0	100	81,928	81,928	96,78	0	3,936	0
Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Tanque LODOS	1,449	0	100	13,753	13,753	14,162	0	0,276	0
Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Tanque ACEITE CIRCUITO	2,766	0	100	8,991	8,002	17,272	-2,713	1,632	0
Tanque ACEITE HIDRÁULICO ER	2,766	0	100	8,991	8,002	17,272	2,713	1,632	0
Tanque ACEITE SUCIO	1,449	0	100	6,221	5,537	25,201	0	0,392	0
Tanque ACEITE M.P	1,574	0	100	12,225	10,88	20,119	0	0,263	0
Tanque ACEITE MMAA ER	1,501	0	100	16,348	14,55	20,193	1,222	0,336	0
Tanque ACEITE REDUCTORA + HÉLIC	1,501	0	100	16,348	14,55	20,193	-1,222	0,336	0
Tank	Sounding (m)	Ullage (m)	% Full	Capacity (m3)	Capacity (Tn)	LCG (m)	TCG (m)	VCG (m)	FSM (Tn·m)
Tanque AGUAS SUCIAS	1,453	0	100	6,258	6,258	26,401	0	0,411	0

ANEXO III_DISPOSICIÓN DE TANQUES

Side elevation labels:

BP

CUBIERTA CASTILLO
CUBIERTA SUPERIOR
CUBIERTA PRINCIPAL

GAS-OIL 11
TANQUE ESTAB.
GAS-OIL SED. 10
AGUA DULCE
AGUA TÉCNICA
AGUA TÉCNICA

CUBA 12 · CUBA 11 · CUBA 10 · CUBA 9 · CUBA 8 · CUBA 7 · CUBA 6 · CUBA 5 · CUBA 4 · CUBA 3 · CUBA 2 · CUBA 1

GAS-OIL 03 · GAS-OIL 02

ACEITE HIDRÁULICA
REBOSES
LODOS
ACEITE
SUCIAS

GAS-OIL 09 · GAS-OIL 07 · GAS-OIL 06 · GAS-OIL 05 · GAS-OIL 01

Separación entre Cuadernas 600 mm   De C45 a C147 650 mm

Plan view (CUBIERTA PRINCIPAL):

GAS-OIL 10 SED BR
GAS-OIL 09 UD BR
GAS-OIL 11 BR_b
GAS-OIL 11 CR_b
GAS-OIL 09 UD CR 10
AGUA DULCE BR

CUBA 12 BR · CUBA 11 BR · CUBA 10 BR · CUBA 9 BR · CUBA 8 BR · CUBA 7 BR · CUBA 6 BR · CUBA 5 BR · CUBA 4 BR · CUBA 3 BR · CUBA 2 BR · CUBA 1 BR

GAS-OIL 03 BR · GAS-OIL 02 BR

GAS-OIL 09 UD ER
GAS-OIL 11 ER_b
GAS-OIL 10 SED-ER
AGUA DULCE ER

CUBA 12 ER · CUBA 11 ER · CUBA 10 ER · CUBA 9 ER · CUBA 8 ER · CUBA 7 ER · CUBA 6 ER · CUBA 5 ER · CUBA 4 ER · CUBA 3 ER · CUBA 2 ER · CUBA 1 ER

GAS-OIL 03 ER · GAS-OIL 02 ER

CUBIERTA PRINCIPAL

Plan view (BAJO CUBIERTA):

ACEITE CIRCUITO
REBOSES BR
AGUA TÉCNICA
LODOS
ACEITE REDUCT.+HÉLICE
ACEITE MP
ACEITE MMAA
ACEITE HIDR.

GAS-OIL 08 BR · GAS-OIL 07 BR · GAS-OIL 06 BR · GAS-OIL 05 BR · GAS-OIL 04 BR · GAS-OIL 03 BR · GAS-OIL 02 BR · GAS-OIL 01

GAS-OIL 08 ER · GAS-OIL 07 ER · GAS-OIL 06 ER · GAS-OIL 05 ER · GAS-OIL 04 ER · GAS-OIL 03 ER · GAS-OIL 02 ER

AGUA TÉCNICA

BAJO CUBIERTA

DIMENSIONES PRINCIPALES

ESLORA TOTAL .... 96,70 m
ESLORA ENTRE PERPENDICULARES .... 112,40 m
MANGA .... 18,00 m
PUNTAL A LA CUBIERTA PRINCIPAL .... 8,20 m
PUNTAL A LA CUBIERTA SUPERIOR .... 11,00 m
CALADO DE TRAZADO .... 7,50 m
Coeficiente de Bloque... 0,592
Coeficiente de la Maestra 0,937
Coeficiente Prismático 0,631
DESPLAZAMIENTO .... 7.917 Tn
VELOCIDAD.. 19 nudos

CLASIFICACION BUREAU VERITAS

✠ HULL, ✠ MACH, Fishing vessel, Unrestricted navigation,
● REF - CARGO - QUICKFREEZE, ✠ MON-SHAFT, ✠ INWATERSURVEY

UNIVERSIDADE DA CORUÑA

ALUMNA
Eva Luz Villar Chouciño

ATUNERO CONGELADOR 3.700 m3
PLANO
DISPOSICIÓN DE TANQUES

SOCIEDAD CLASIFICADORA	PROYECTO Nº	ESCALA	
BUREAU VERITAS		1/400	
FECHA	18 - 05	FORMATO	HOJA
Junio 2,018		A3	1/1

ANEXO IV_CALIBRACIÓN DE TANQUES

ANEXO IV_CALIBRACIÓN DE TANQUES

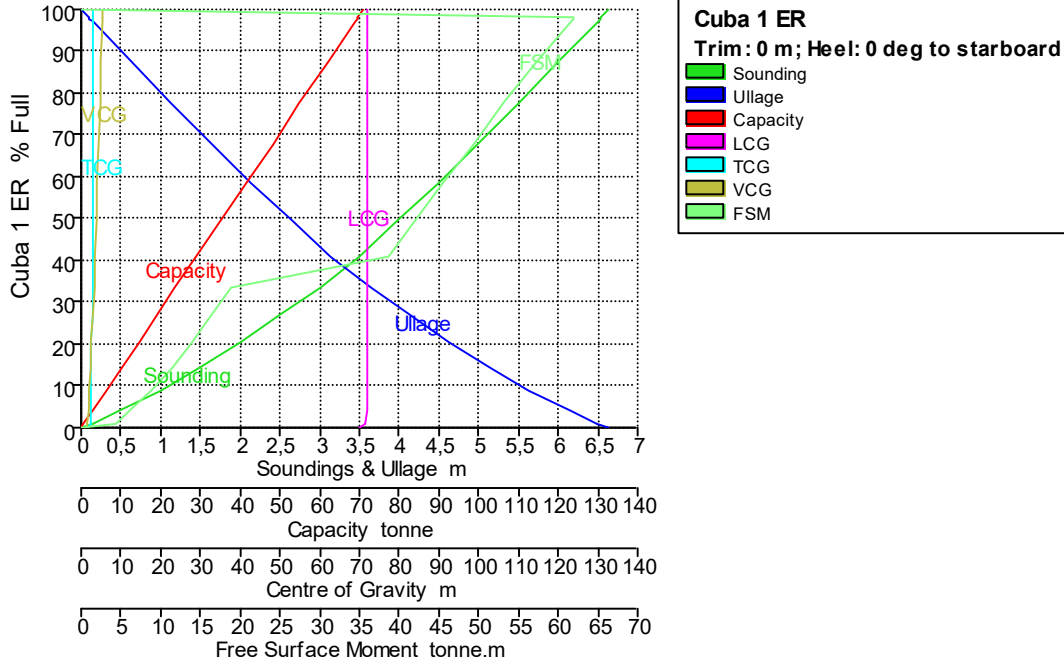# Tank Calibrations - PROYECTO EVA_Compartimentado

Stability 21.11.00.84, build: 84

Tank Calibrations - Cuba 1 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

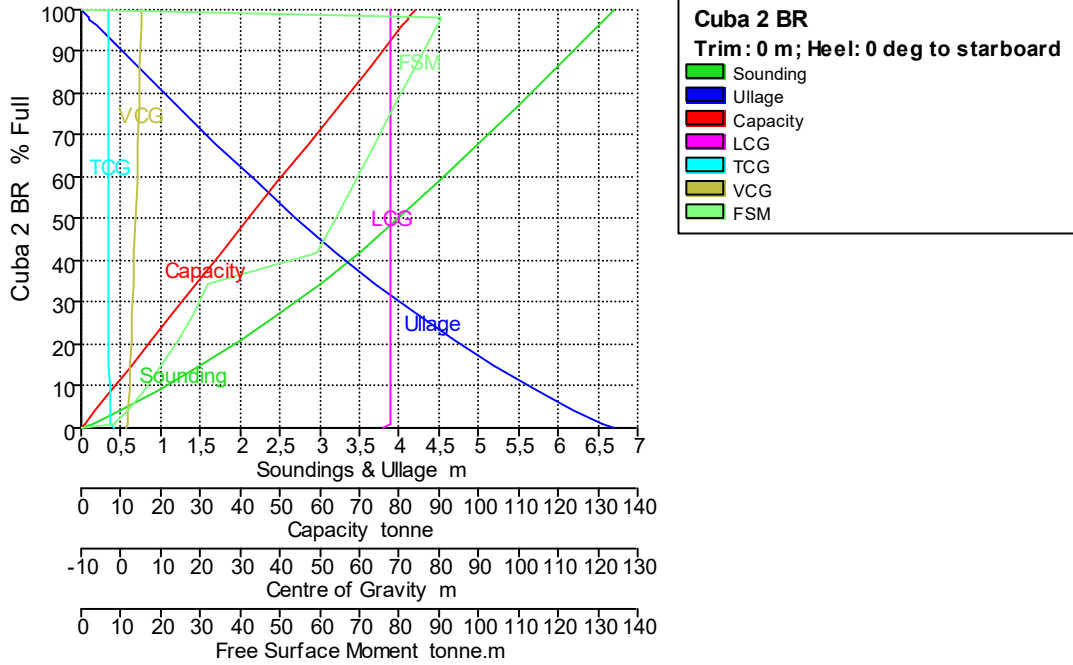| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 1 ER	6,638	0,000	100,000	98,627	71,012	71,791	2,932	5,373	0,000
	6,539	0,099	98,000	96,655	69,591	71,791	2,926	5,316	62,036
	6,535	0,103	97,900	96,556	69,520	71,791	2,926	5,313	61,991
	6,500	0,138	97,201	95,867	69,024	71,791	2,924	5,293	61,676
	6,000	0,638	87,220	86,023	61,936	71,789	2,897	5,005	57,313
	5,500	1,138	77,481	76,418	55,021	71,788	2,873	4,715	53,226
	5,000	1,638	67,984	67,051	48,277	71,786	2,854	4,422	49,332
	4,500	2,138	58,729	57,923	41,704	71,784	2,842	4,124	45,623
	4,000	2,638	49,716	49,033	35,304	71,781	2,840	3,817	42,088
	3,500	3,138	40,946	40,383	29,076	71,777	2,853	3,497	38,696
	3,000	3,638	33,431	32,972	23,740	71,776	2,823	3,198	18,890
	2,500	4,138	26,789	26,421	19,023	71,773	2,752	2,921	16,443
	2,000	4,638	20,473	20,192	14,538	71,769	2,675	2,646	13,971
	1,500	5,138	14,524	14,325	10,314	71,763	2,588	2,372	11,471
	1,000	5,638	9,010	8,886	6,398	71,753	2,488	2,100	8,840
	0,500	6,138	4,039	3,983	2,868	71,725	2,373	1,834	6,141
	0,155	6,483	1,000	0,986	0,710	71,599	2,293	1,654	4,313
	0,000	6,638	0,000	0,000	0,000	69,922	1,599	1,562	0,000

Tank Calibrations - Cuba 1 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
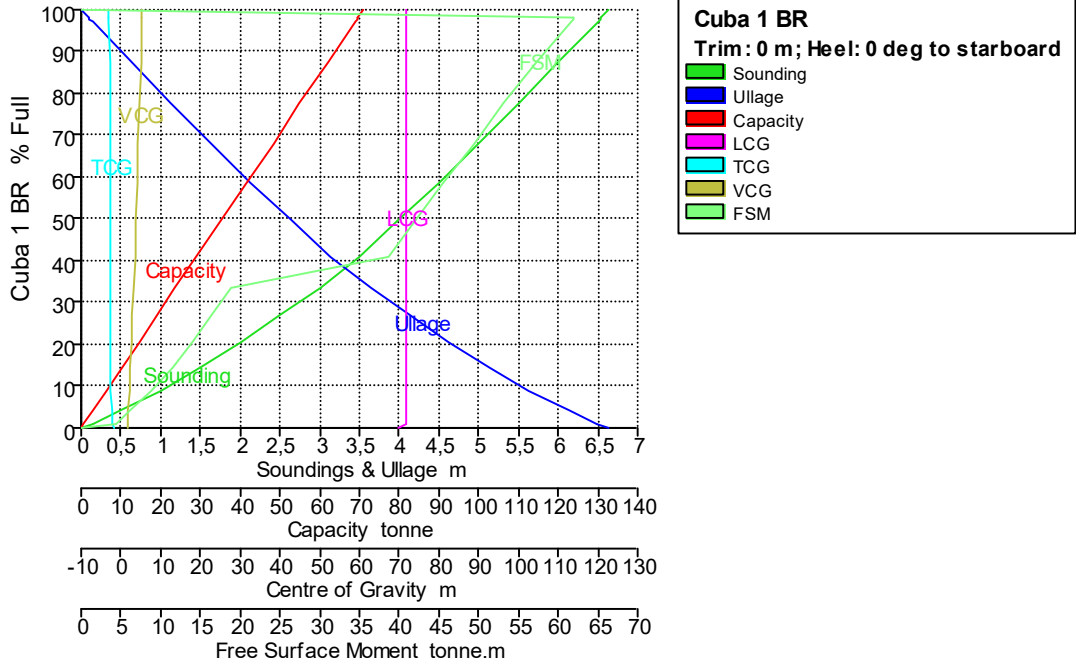
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 1 BR	6,638	0,000	100,000	98,627	71,012	71,791	-2,932	5,373	0,000
	6,539	0,099	98,000	96,655	69,591	71,791	-2,926	5,316	62,036
	6,535	0,103	97,900	96,556	69,520	71,791	-2,926	5,313	61,991
	6,500	0,138	97,201	95,867	69,024	71,791	-2,924	5,293	61,676
	6,000	0,638	87,220	86,023	61,936	71,789	-2,897	5,005	57,313
	5,500	1,138	77,481	76,418	55,021	71,788	-2,873	4,715	53,226
	5,000	1,638	67,984	67,051	48,277	71,786	-2,854	4,422	49,332
	4,500	2,138	58,729	57,923	41,704	71,784	-2,842	4,124	45,623
	4,000	2,638	49,716	49,033	35,304	71,781	-2,840	3,817	42,088
	3,500	3,138	40,946	40,383	29,076	71,777	-2,853	3,497	38,696
	3,000	3,638	33,431	32,972	23,740	71,776	-2,823	3,198	18,890
	2,500	4,138	26,789	26,421	19,023	71,773	-2,752	2,921	16,443
	2,000	4,638	20,473	20,192	14,538	71,769	-2,675	2,646	13,971
	1,500	5,138	14,524	14,325	10,314	71,763	-2,588	2,372	11,471
	1,000	5,638	9,010	8,886	6,398	71,753	-2,488	2,100	8,840
	0,500	6,138	4,039	3,983	2,868	71,725	-2,373	1,834	6,141
	0,155	6,483	1,000	0,986	0,710	71,599	-2,293	1,654	4,313
	0,000	6,638	0,000	0,000	0,000	69,922	-1,599	1,562	0,000

## Tank Calibrations - Cuba 2 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
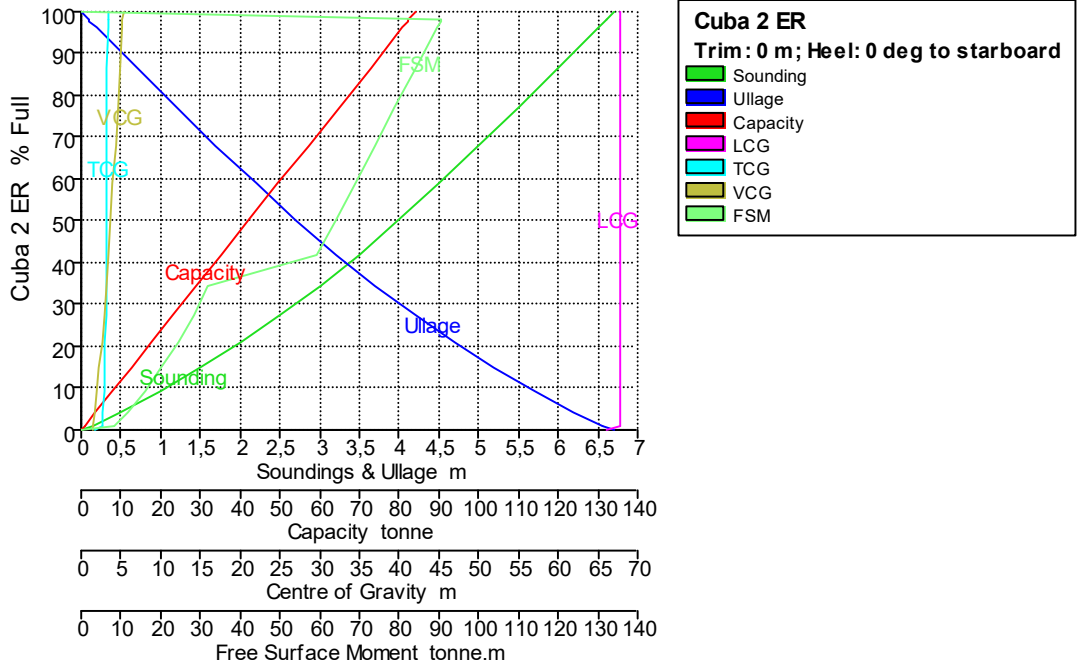
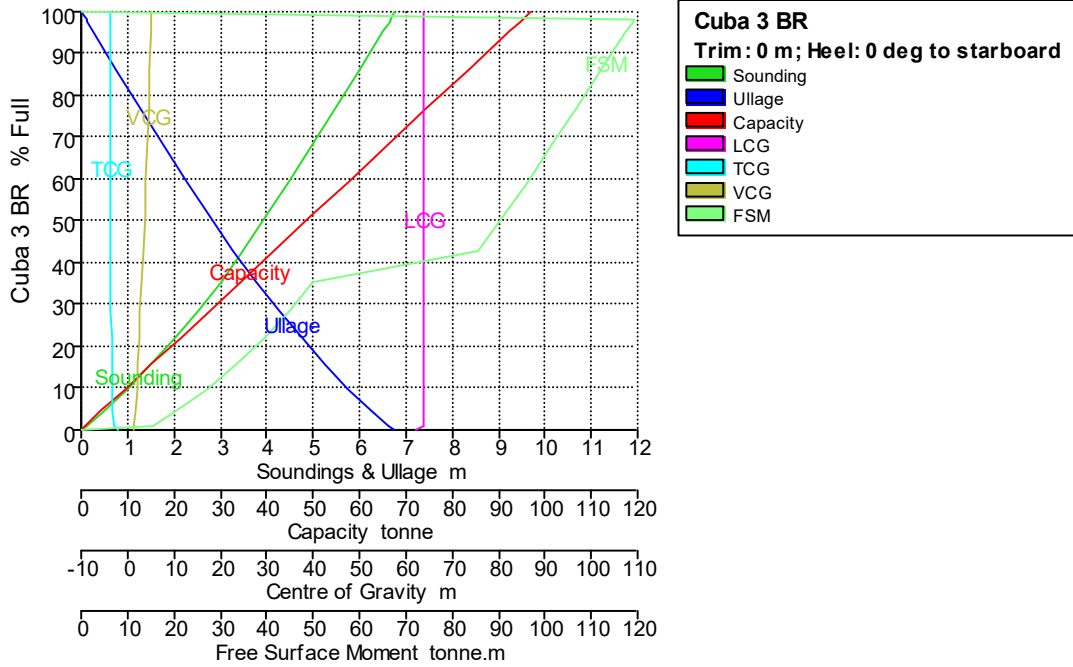| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 2 ER	6,701	0,000	100,000	116,820	84,111	67,899	3,344	5,294	0,000
	6,598	0,103	98,000	114,484	82,429	67,899	3,338	5,236	90,491
	6,593	0,108	97,900	114,367	82,344	67,899	3,338	5,233	90,435
	6,500	0,201	96,097	112,260	80,828	67,898	3,332	5,180	89,427
	6,000	0,701	86,525	101,078	72,776	67,897	3,304	4,896	84,118
	5,500	1,201	77,150	90,127	64,892	67,895	3,278	4,610	78,979
	5,000	1,701	67,976	79,410	57,175	67,893	3,257	4,321	73,974
	4,500	2,201	59,006	68,932	49,631	67,890	3,241	4,028	69,063
	4,000	2,701	50,247	58,699	42,263	67,887	3,233	3,728	64,211
	3,500	3,201	41,708	48,723	35,081	67,884	3,239	3,416	59,353
	3,000	3,701	34,244	40,005	28,803	67,882	3,202	3,123	31,966
	2,500	4,201	27,539	32,171	23,163	67,879	3,125	2,849	28,197
	2,000	4,701	21,136	24,691	17,777	67,876	3,041	2,576	24,282
	1,500	5,201	15,074	17,610	12,679	67,870	2,946	2,304	20,291
	1,000	5,701	9,416	11,000	7,920	67,861	2,837	2,034	16,022
	0,500	6,201	4,263	4,980	3,585	67,835	2,714	1,770	11,550
	0,147	6,554	1,000	1,168	0,841	67,700	2,628	1,587	8,454
	0,000	6,701	0,000	0,000	0,000	66,022	1,830	1,499	0,000

Tank Calibrations - Cuba 2 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

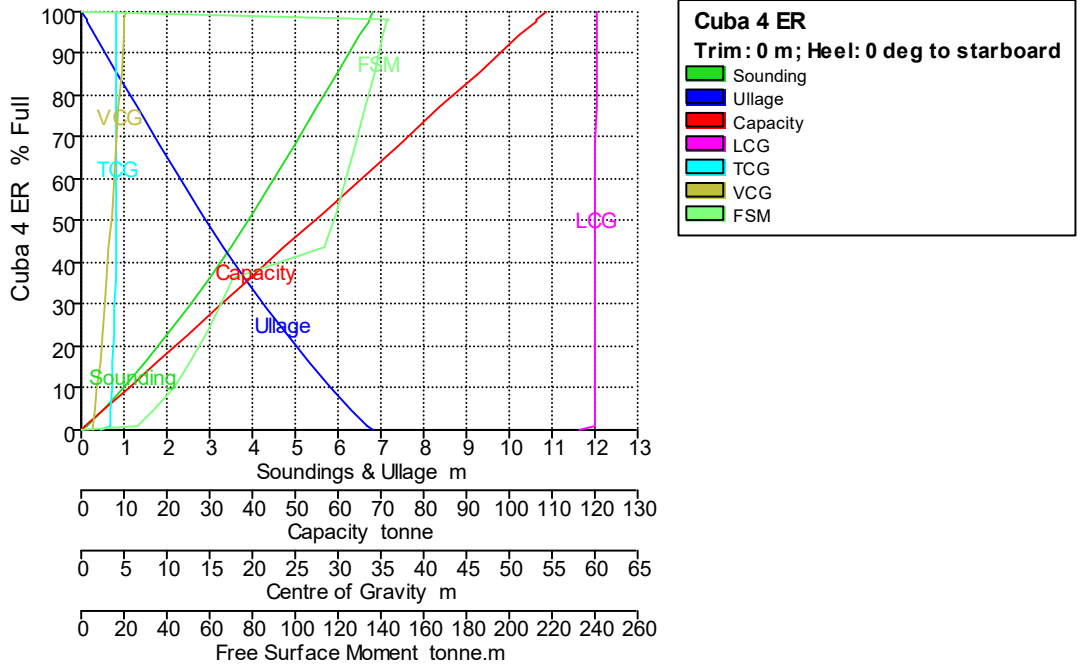| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 2 BR	6,701	0,000	100,000	116,820	84,111	67,899	-3,344	5,294	0,000
	6,598	0,103	98,000	114,484	82,429	67,899	-3,338	5,236	90,491
	6,593	0,108	97,900	114,367	82,344	67,899	-3,338	5,233	90,435
	6,500	0,201	96,097	112,260	80,828	67,898	-3,332	5,180	89,427
	6,000	0,701	86,525	101,078	72,776	67,897	-3,304	4,896	84,118
	5,500	1,201	77,150	90,127	64,892	67,895	-3,278	4,610	78,979
	5,000	1,701	67,976	79,410	57,175	67,893	-3,257	4,321	73,974
	4,500	2,201	59,006	68,932	49,631	67,890	-3,241	4,028	69,063
	4,000	2,701	50,247	58,699	42,263	67,887	-3,233	3,728	64,211
	3,500	3,201	41,708	48,723	35,081	67,884	-3,239	3,416	59,353
	3,000	3,701	34,244	40,005	28,803	67,882	-3,202	3,123	31,966
	2,500	4,201	27,539	32,171	23,163	67,879	-3,125	2,849	28,197
	2,000	4,701	21,136	24,691	17,777	67,876	-3,041	2,576	24,282
	1,500	5,201	15,074	17,610	12,679	67,870	-2,946	2,304	20,291
	1,000	5,701	9,416	11,000	7,920	67,861	-2,837	2,034	16,022
	0,500	6,201	4,263	4,980	3,585	67,835	-2,714	1,770	11,550
	0,147	6,554	1,000	1,168	0,841	67,700	-2,628	1,587	8,454
	0,000	6,701	0,000	0,000	0,000	66,022	-1,830	1,499	0,000

Tank Calibrations - Cuba 3 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
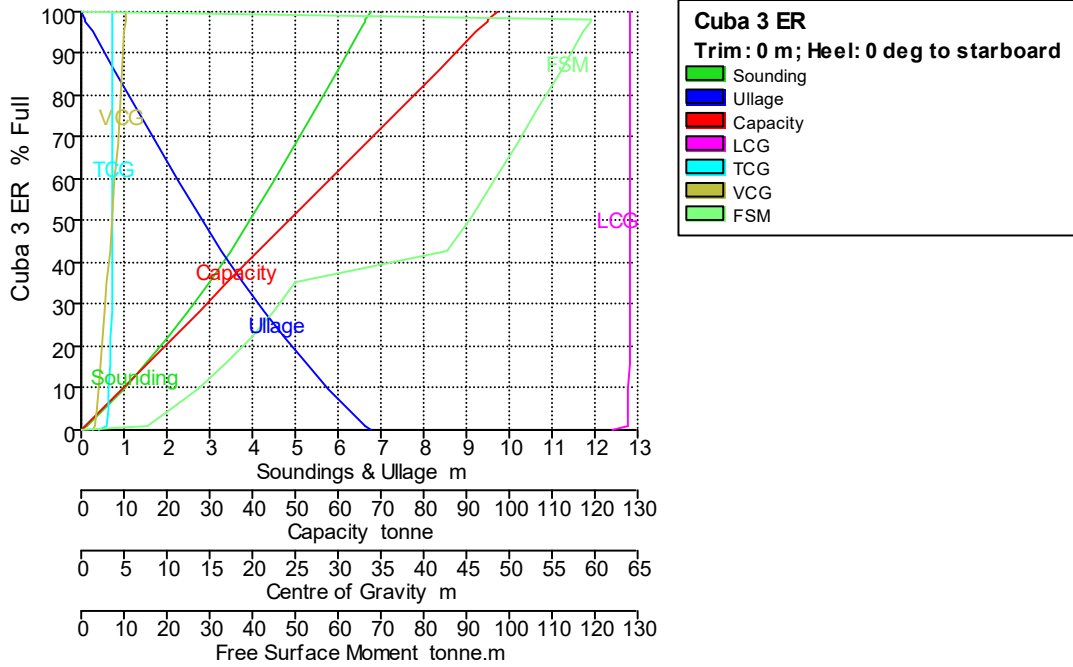
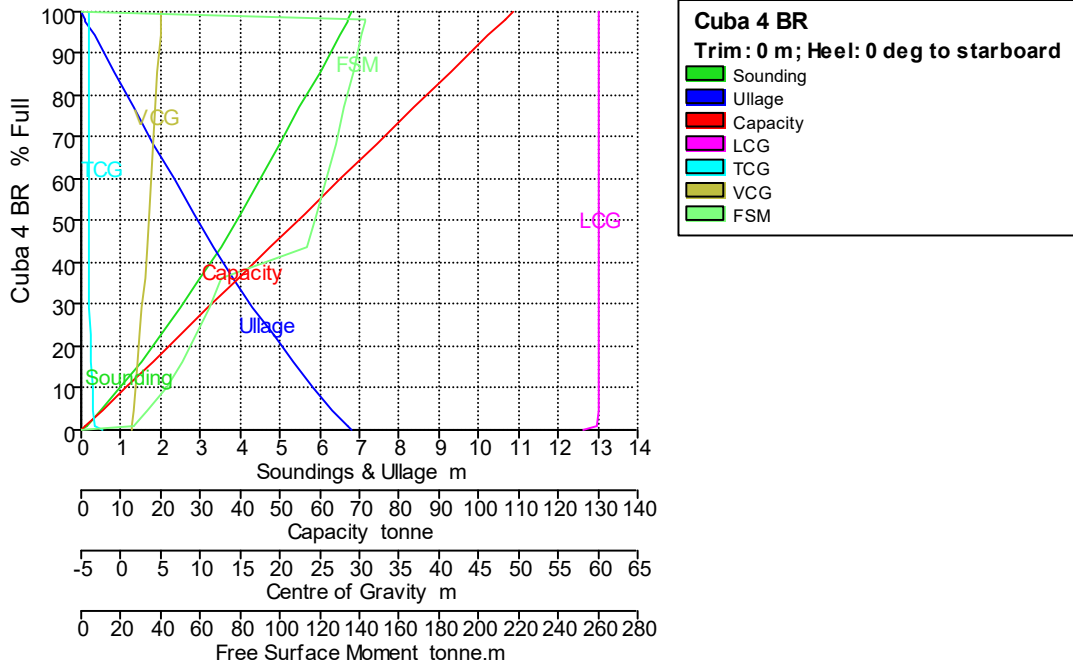| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 3 ER	6,764	0,000	100,000	134,810	97,063	64,008	3,734	5,206	0,000
	6,656	0,108	98,000	132,114	95,122	64,008	3,728	5,146	119,178
	6,650	0,114	97,900	131,979	95,025	64,008	3,728	5,143	119,120
	6,500	0,264	95,129	128,243	92,335	64,007	3,721	5,060	117,497
	6,000	0,764	86,012	115,953	83,486	64,005	3,697	4,781	112,148
	5,500	1,264	77,040	103,857	74,777	64,004	3,676	4,501	106,888
	5,000	1,764	68,213	91,958	66,210	64,001	3,658	4,218	101,689
	4,500	2,264	59,538	80,263	57,789	63,999	3,644	3,931	96,473
	4,000	2,764	51,021	68,781	49,522	63,996	3,638	3,638	91,137
	3,500	3,264	42,674	57,528	41,420	63,992	3,643	3,335	85,568
	3,000	3,764	35,241	47,508	34,206	63,990	3,604	3,048	50,076
	2,500	4,264	28,459	38,365	27,623	63,987	3,525	2,777	45,047
	2,000	4,764	21,941	29,579	21,297	63,983	3,437	2,506	39,543
	1,500	5,264	15,731	21,207	15,269	63,977	3,337	2,237	33,739
	1,000	5,764	9,885	13,326	9,594	63,968	3,221	1,970	27,462
	0,500	6,264	4,504	6,072	4,372	63,942	3,087	1,706	20,468
	0,140	6,624	1,000	1,348	0,971	63,797	2,992	1,520	15,330
	0,000	6,764	0,000	0,000	0,000	62,122	2,082	1,436	0,000

Tank Calibrations - Cuba 3 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

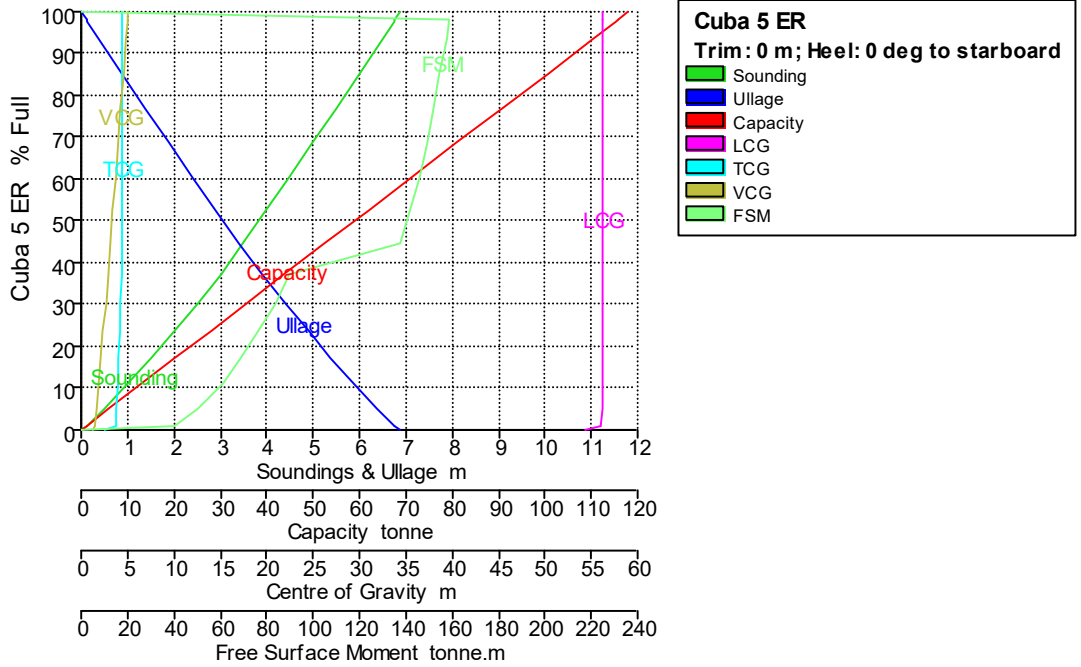| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 3 BR	6,764	0,000	100,000	134,810	97,063	64,008	-3,734	5,206	0,000
	6,656	0,108	98,000	132,114	95,122	64,008	-3,728	5,146	119,178
	6,650	0,114	97,900	131,979	95,025	64,008	-3,728	5,143	119,120
	6,500	0,264	95,129	128,243	92,335	64,007	-3,721	5,060	117,497
	6,000	0,764	86,012	115,953	83,486	64,005	-3,697	4,781	112,148
	5,500	1,264	77,040	103,857	74,777	64,004	-3,676	4,501	106,888
	5,000	1,764	68,213	91,958	66,210	64,001	-3,658	4,218	101,689
	4,500	2,264	59,538	80,263	57,789	63,999	-3,644	3,931	96,473
	4,000	2,764	51,021	68,781	49,522	63,996	-3,638	3,638	91,137
	3,500	3,264	42,674	57,528	41,420	63,992	-3,643	3,335	85,568
	3,000	3,764	35,241	47,508	34,206	63,990	-3,604	3,048	50,076
	2,500	4,264	28,459	38,365	27,623	63,987	-3,525	2,777	45,047
	2,000	4,764	21,941	29,579	21,297	63,983	-3,437	2,506	39,543
	1,500	5,264	15,731	21,207	15,269	63,977	-3,337	2,237	33,739
	1,000	5,764	9,885	13,326	9,594	63,968	-3,221	1,970	27,462
	0,500	6,264	4,504	6,072	4,372	63,942	-3,087	1,706	20,468
	0,140	6,624	1,000	1,348	0,971	63,797	-2,992	1,520	15,330
	0,000	6,764	0,000	0,000	0,000	62,122	-2,082	1,436	0,000

Tank Calibrations - Cuba 4 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

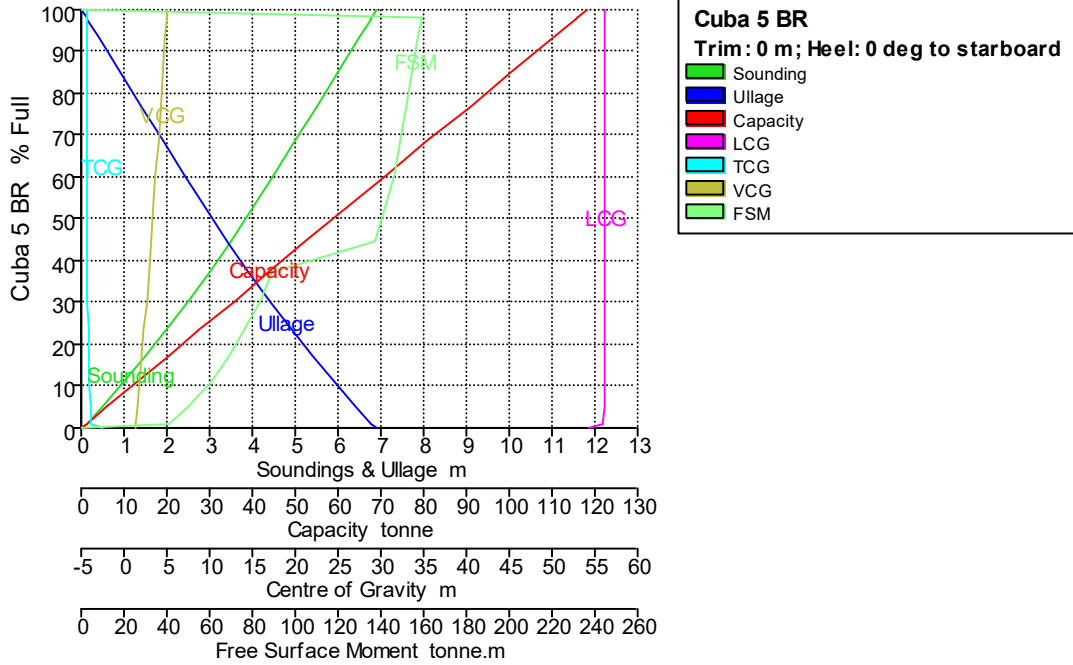| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 4 ER	6,827	0,000	100,000	150,995	108,716	60,118	4,067	5,115	0,000
	6,713	0,114	98,000	147,975	106,542	60,118	4,063	5,053	143,195
	6,707	0,120	97,900	147,824	106,433	60,118	4,063	5,050	143,145
	6,500	0,327	94,272	142,345	102,489	60,117	4,056	4,937	141,308
	6,000	0,827	85,589	129,235	93,049	60,116	4,041	4,665	136,898
	5,500	1,327	76,999	116,265	83,710	60,114	4,028	4,391	132,560
	5,000	1,827	68,503	103,436	74,474	60,112	4,018	4,114	128,244
	4,500	2,327	60,104	90,754	65,343	60,110	4,011	3,833	123,724
	4,000	2,827	51,813	78,234	56,329	60,107	4,011	3,546	118,835
	3,500	3,327	43,640	65,894	47,444	60,104	4,021	3,251	113,446
	3,000	3,827	36,254	54,741	39,414	60,102	3,987	2,969	70,687
	2,500	4,327	29,428	44,435	31,993	60,098	3,912	2,702	64,869
	2,000	4,827	22,821	34,459	24,811	60,094	3,829	2,434	58,229
	1,500	5,327	16,476	24,877	17,912	60,088	3,734	2,169	51,043
	1,000	5,827	10,436	15,758	11,345	60,077	3,622	1,904	43,194
	0,500	6,327	4,795	7,241	5,213	60,051	3,486	1,643	33,758
	0,133	6,694	1,000	1,510	1,087	59,892	3,385	1,454	26,041
	0,000	6,827	0,000	0,000	0,000	58,222	2,348	1,373	0,000

Tank Calibrations - Cuba 4 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

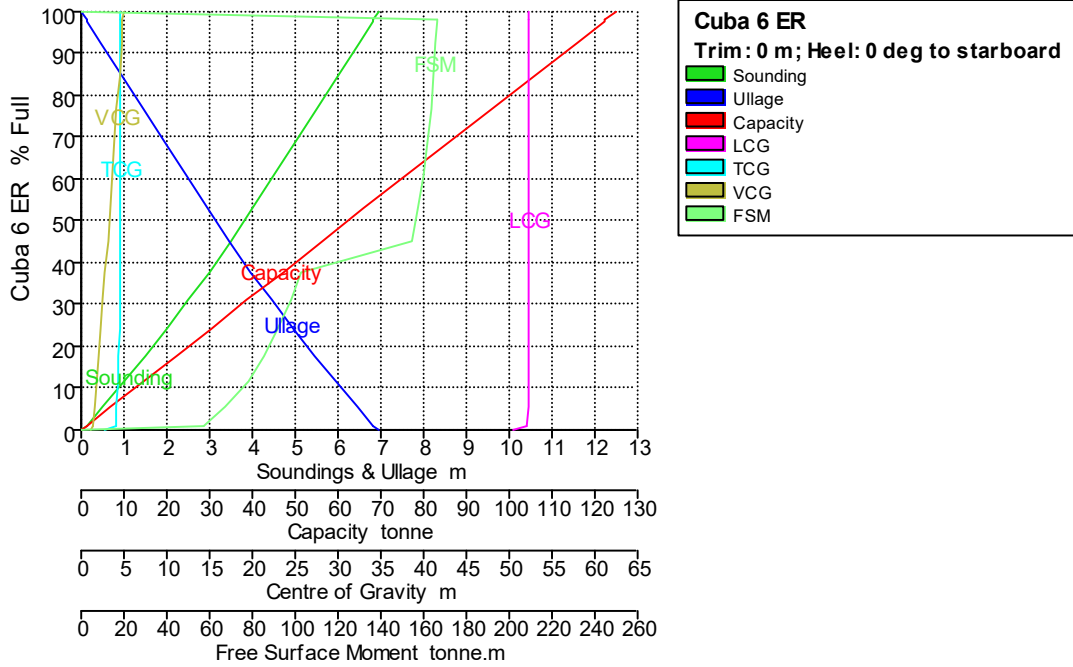| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 4 BR	6,827	0,000	100,000	150,995	108,716	60,118	-4,067	5,115	0,000
	6,713	0,114	98,000	147,975	106,542	60,118	-4,063	5,053	143,195
	6,707	0,120	97,900	147,824	106,433	60,118	-4,063	5,050	143,145
	6,500	0,327	94,272	142,345	102,489	60,117	-4,056	4,937	141,308
	6,000	0,827	85,589	129,235	93,049	60,116	-4,041	4,665	136,898
	5,500	1,327	76,999	116,265	83,710	60,114	-4,028	4,391	132,560
	5,000	1,827	68,503	103,436	74,474	60,112	-4,018	4,114	128,244
	4,500	2,327	60,104	90,754	65,343	60,110	-4,011	3,833	123,724
	4,000	2,827	51,813	78,234	56,329	60,107	-4,011	3,546	118,835
	3,500	3,327	43,640	65,894	47,444	60,104	-4,021	3,251	113,446
	3,000	3,827	36,254	54,741	39,414	60,102	-3,987	2,969	70,687
	2,500	4,327	29,428	44,435	31,993	60,098	-3,912	2,702	64,869
	2,000	4,827	22,821	34,459	24,811	60,094	-3,829	2,434	58,229
	1,500	5,327	16,476	24,877	17,912	60,088	-3,734	2,169	51,043
	1,000	5,827	10,436	15,758	11,345	60,077	-3,622	1,904	43,194
	0,500	6,327	4,795	7,241	5,213	60,051	-3,486	1,643	33,758
	0,133	6,694	1,000	1,510	1,087	59,892	-3,385	1,454	26,041
	0,000	6,827	0,000	0,000	0,000	58,222	-2,348	1,373	0,000

Tank Calibrations - Cuba 5 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

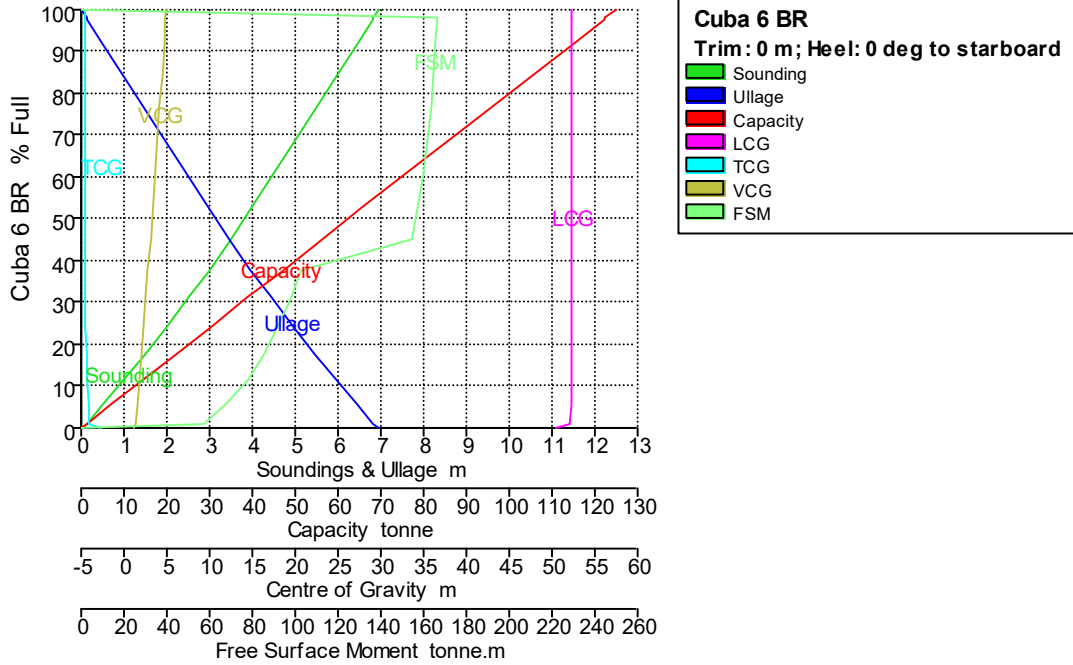| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 5 ER	6,890	0,000	100,000	163,962	118,053	56,228	4,318	5,028	0,000
	6,770	0,120	98,000	160,683	115,692	56,228	4,317	4,965	158,865
	6,765	0,125	97,900	160,519	115,574	56,228	4,317	4,962	158,832
	6,500	0,390	93,484	153,278	110,360	56,227	4,313	4,821	157,372
	6,000	0,890	85,173	139,652	100,550	56,226	4,308	4,554	154,632
	5,500	1,390	76,912	126,106	90,797	56,224	4,304	4,284	151,957
	5,000	1,890	68,699	112,640	81,101	56,223	4,303	4,012	149,199
	4,500	2,390	60,541	99,265	71,470	56,221	4,305	3,736	145,990
	4,000	2,890	52,449	85,996	61,917	56,218	4,313	3,455	142,184
	3,500	3,390	44,436	72,858	52,458	56,216	4,331	3,166	137,601
	3,000	3,890	37,117	60,857	43,817	56,214	4,307	2,889	89,480
	2,500	4,390	30,291	49,667	35,760	56,210	4,243	2,625	83,554
	2,000	4,890	23,641	38,762	27,909	56,206	4,172	2,361	76,693
	1,500	5,390	17,197	28,197	20,302	56,200	4,090	2,099	69,213
	1,000	5,890	10,993	18,025	12,978	56,189	3,993	1,838	60,968
	0,500	6,390	5,106	8,372	6,028	56,163	3,871	1,579	50,344
	0,126	6,764	1,000	1,640	1,181	55,988	3,775	1,387	40,621
	0,000	6,890	0,000	0,000	0,000	54,322	2,603	1,310	0,000

Tank Calibrations - Cuba 5 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

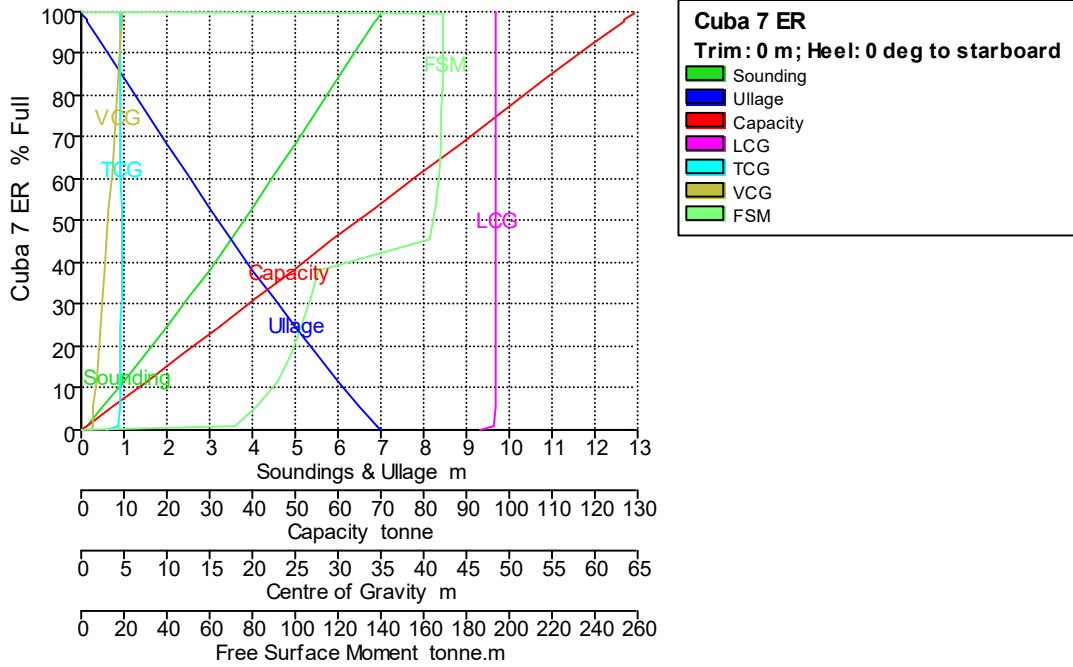| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 5 BR	6,890	0,000	100,000	163,962	118,053	56,228	-4,318	5,028	0,000
	6,770	0,120	98,000	160,683	115,692	56,228	-4,317	4,965	158,865
	6,765	0,125	97,900	160,519	115,574	56,228	-4,317	4,962	158,832
	6,500	0,390	93,484	153,278	110,360	56,227	-4,313	4,821	157,372
	6,000	0,890	85,173	139,652	100,550	56,226	-4,308	4,554	154,632
	5,500	1,390	76,912	126,106	90,797	56,224	-4,304	4,284	151,957
	5,000	1,890	68,699	112,640	81,101	56,223	-4,303	4,012	149,199
	4,500	2,390	60,541	99,265	71,470	56,221	-4,305	3,736	145,990
	4,000	2,890	52,449	85,996	61,917	56,218	-4,313	3,455	142,184
	3,500	3,390	44,436	72,858	52,458	56,216	-4,331	3,166	137,601
	3,000	3,890	37,117	60,857	43,817	56,214	-4,307	2,889	89,480
	2,500	4,390	30,291	49,667	35,760	56,210	-4,243	2,625	83,554
	2,000	4,890	23,641	38,762	27,909	56,206	-4,172	2,361	76,693
	1,500	5,390	17,197	28,197	20,302	56,200	-4,090	2,099	69,213
	1,000	5,890	10,993	18,025	12,978	56,189	-3,993	1,838	60,968
	0,500	6,390	5,106	8,372	6,028	56,163	-3,871	1,579	50,344
	0,126	6,764	1,000	1,640	1,181	55,988	-3,775	1,387	40,621
	0,000	6,890	0,000	0,000	0,000	54,322	-2,603	1,310	0,000

Tank Calibrations - Cuba 6 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

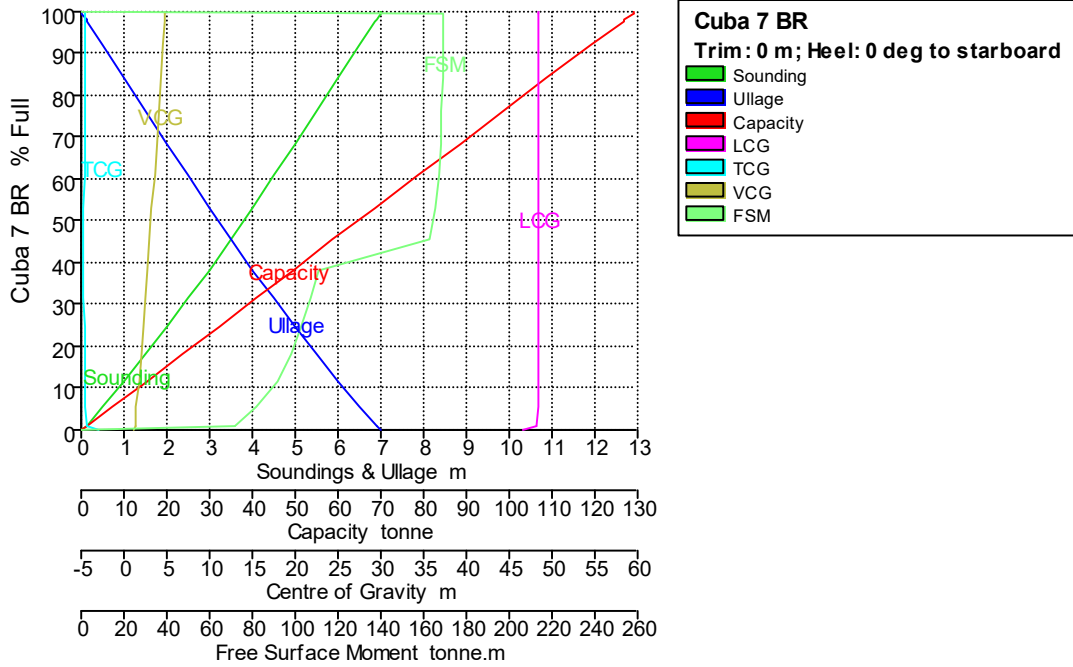| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 6 ER	6,953	0,000	100,000	173,312	124,784	52,336	4,485	4,950	0,000
	6,829	0,124	98,000	169,846	122,289	52,335	4,485	4,885	166,460
	6,822	0,131	97,900	169,672	122,164	52,335	4,485	4,882	166,445
	6,500	0,453	92,724	160,701	115,705	52,335	4,486	4,713	165,660
	6,000	0,953	84,711	146,815	105,707	52,334	4,490	4,449	164,483
	5,500	1,453	76,718	132,961	95,732	52,332	4,495	4,184	163,368
	5,000	1,953	68,743	119,140	85,781	52,331	4,502	3,916	162,053
	4,500	2,453	60,795	105,364	75,862	52,329	4,514	3,644	160,156
	4,000	2,953	52,883	91,652	65,990	52,327	4,532	3,366	157,591
	3,500	3,453	45,021	78,027	56,180	52,325	4,560	3,081	154,149
	3,000	3,953	37,790	65,494	47,156	52,323	4,548	2,809	102,983
	2,500	4,453	31,001	53,728	38,684	52,320	4,499	2,549	97,812
	2,000	4,953	24,341	42,186	30,374	52,316	4,444	2,289	91,872
	1,500	5,453	17,831	30,903	22,250	52,310	4,380	2,030	85,415
	1,000	5,953	11,493	19,919	14,342	52,300	4,302	1,772	77,999
	0,500	6,453	5,392	9,346	6,729	52,274	4,201	1,515	67,710
	0,121	6,832	1,000	1,733	1,248	52,086	4,119	1,321	57,271
	0,000	6,953	0,000	0,000	0,000	50,422	2,816	1,247	0,000

Tank Calibrations - Cuba 6 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

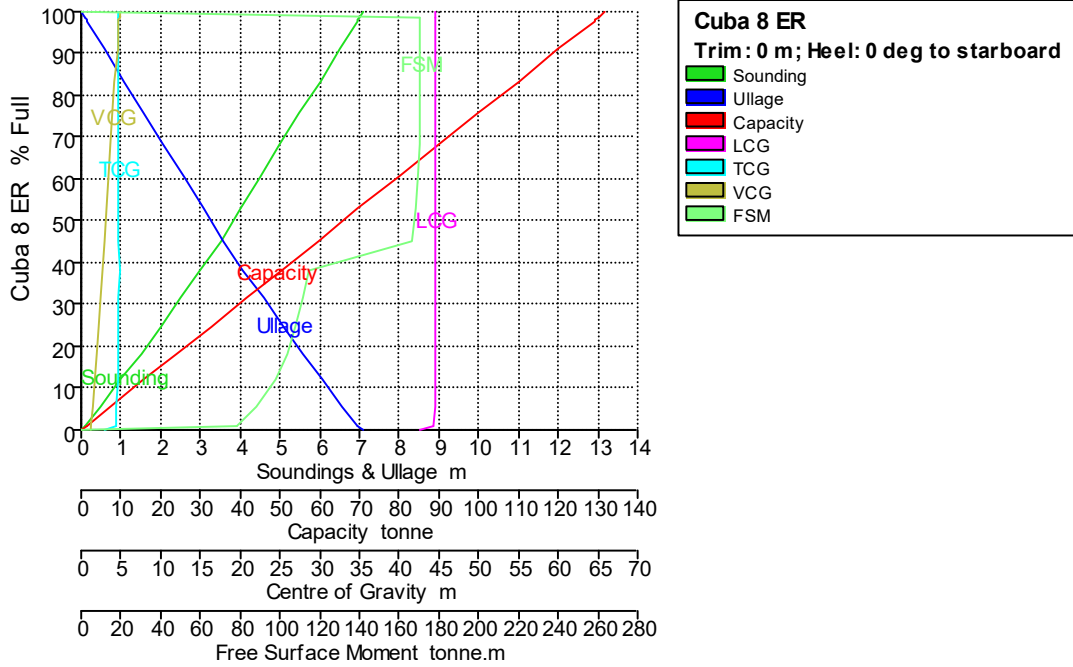| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 6 BR	6,953	0,000	100,000	173,312	124,784	52,336	-4,485	4,950	0,000
	6,829	0,124	98,000	169,846	122,289	52,335	-4,485	4,885	166,460
	6,822	0,131	97,900	169,672	122,164	52,335	-4,485	4,882	166,445
	6,500	0,453	92,724	160,701	115,705	52,335	-4,486	4,713	165,660
	6,000	0,953	84,711	146,815	105,707	52,334	-4,490	4,449	164,483
	5,500	1,453	76,718	132,961	95,732	52,332	-4,495	4,184	163,368
	5,000	1,953	68,743	119,140	85,781	52,331	-4,502	3,916	162,053
	4,500	2,453	60,795	105,364	75,862	52,329	-4,514	3,644	160,156
	4,000	2,953	52,883	91,652	65,990	52,327	-4,532	3,366	157,591
	3,500	3,453	45,021	78,027	56,180	52,325	-4,560	3,081	154,149
	3,000	3,953	37,790	65,494	47,156	52,323	-4,548	2,809	102,983
	2,500	4,453	31,001	53,728	38,684	52,320	-4,499	2,549	97,812
	2,000	4,953	24,341	42,186	30,374	52,316	-4,444	2,289	91,872
	1,500	5,453	17,831	30,903	22,250	52,310	-4,380	2,030	85,415
	1,000	5,953	11,493	19,919	14,342	52,300	-4,302	1,772	77,999
	0,500	6,453	5,392	9,346	6,729	52,274	-4,201	1,515	67,710
	0,121	6,832	1,000	1,733	1,248	52,086	-4,119	1,321	57,271
	0,000	6,953	0,000	0,000	0,000	50,422	-2,816	1,247	0,000

Tank Calibrations - Cuba 7 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

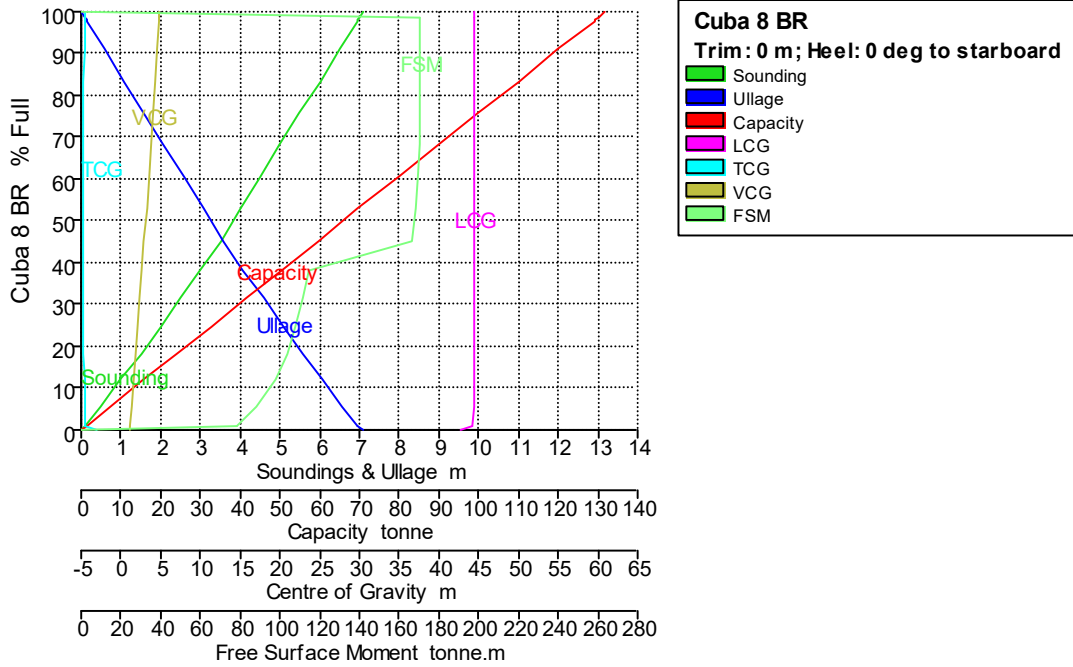| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 7 ER	7,016	0,000	100,000	179,599	129,311	48,441	4,581	4,884	0,000
	7,000	0,016	99,750	179,151	128,989	48,441	4,581	4,875	169,510
	6,888	0,128	98,000	176,007	126,725	48,441	4,583	4,817	169,424
	6,881	0,135	97,900	175,828	126,596	48,441	4,583	4,814	169,419
	6,500	0,516	91,952	165,146	118,905	48,440	4,589	4,616	169,137
	6,000	1,016	84,160	151,150	108,828	48,440	4,599	4,355	168,791
	5,500	1,516	76,372	137,164	98,758	48,439	4,611	4,092	168,472
	5,000	2,016	68,591	123,189	88,696	48,438	4,625	3,826	167,929
	4,500	2,516	60,822	109,236	78,650	48,437	4,645	3,557	166,908
	4,000	3,016	53,073	95,319	68,629	48,435	4,672	3,283	165,337
	3,500	3,516	45,354	81,455	58,648	48,433	4,711	3,002	163,001
	3,000	4,016	38,212	68,628	49,412	48,432	4,711	2,733	110,886
	2,500	4,516	31,478	56,535	40,705	48,429	4,676	2,476	107,084
	2,000	5,016	24,831	44,595	32,109	48,426	4,636	2,219	102,736
	1,500	5,516	18,281	32,832	23,639	48,421	4,588	1,963	97,987
	1,000	6,016	11,849	21,280	15,322	48,413	4,525	1,707	91,843
	0,500	6,516	5,597	10,052	7,238	48,389	4,441	1,451	82,255
	0,117	6,899	1,000	1,796	1,293	48,192	4,368	1,256	72,120
	0,000	7,016	0,000	0,000	0,000	46,522	2,942	1,184	0,000

Tank Calibrations - Cuba 7 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

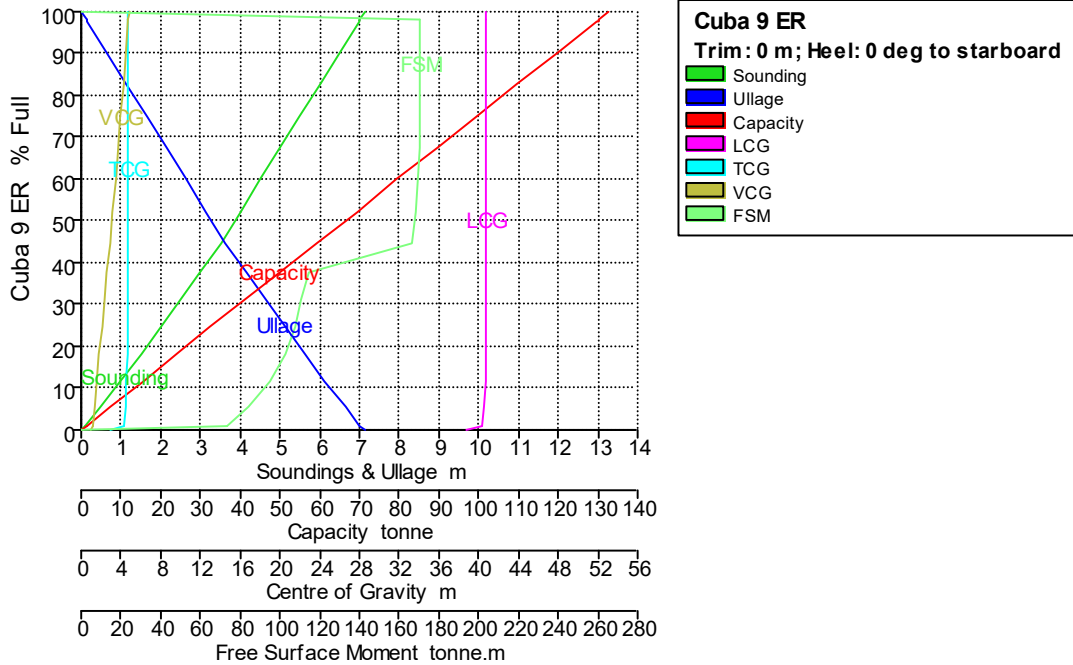| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 7 BR	7,016	0,000	100,000	179,599	129,311	48,441	-4,581	4,884	0,000
	7,000	0,016	99,750	179,151	128,989	48,441	-4,581	4,875	169,510
	6,888	0,128	98,000	176,007	126,725	48,441	-4,583	4,817	169,424
	6,881	0,135	97,900	175,828	126,596	48,441	-4,583	4,814	169,419
	6,500	0,516	91,952	165,146	118,905	48,440	-4,589	4,616	169,137
	6,000	1,016	84,160	151,150	108,828	48,440	-4,599	4,355	168,791
	5,500	1,516	76,372	137,164	98,758	48,439	-4,611	4,092	168,472
	5,000	2,016	68,591	123,189	88,696	48,438	-4,625	3,826	167,929
	4,500	2,516	60,822	109,236	78,650	48,437	-4,645	3,557	166,908
	4,000	3,016	53,073	95,319	68,629	48,435	-4,672	3,283	165,337
	3,500	3,516	45,354	81,455	58,648	48,433	-4,711	3,002	163,001
	3,000	4,016	38,212	68,628	49,412	48,432	-4,711	2,733	110,886
	2,500	4,516	31,478	56,535	40,705	48,429	-4,676	2,476	107,084
	2,000	5,016	24,831	44,595	32,109	48,426	-4,636	2,219	102,736
	1,500	5,516	18,281	32,832	23,639	48,421	-4,588	1,963	97,987
	1,000	6,016	11,849	21,280	15,322	48,413	-4,525	1,707	91,843
	0,500	6,516	5,597	10,052	7,238	48,389	-4,441	1,451	82,255
	0,117	6,899	1,000	1,796	1,293	48,192	-4,368	1,256	72,120
	0,000	7,016	0,000	0,000	0,000	46,522	-2,942	1,184	0,000

Tank Calibrations - Cuba 8 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

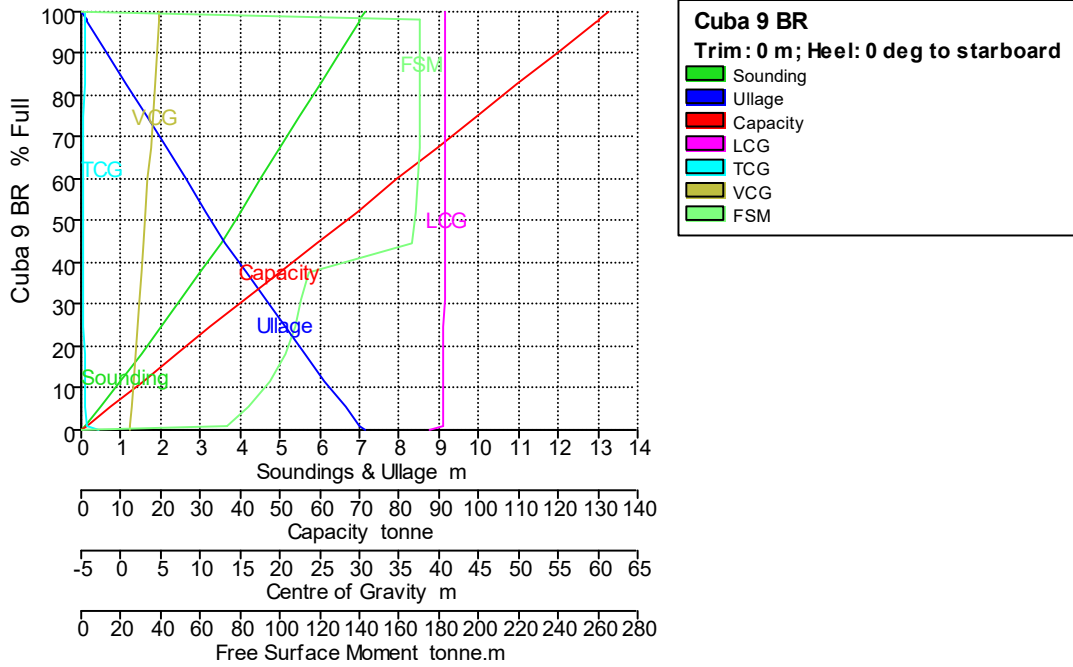| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 8 ER	7,079	0,000	100,000	183,146	131,865	44,546	4,619	4,839	0,000
	7,000	0,079	98,789	180,929	130,269	44,546	4,620	4,798	170,441
	6,949	0,130	98,000	179,483	129,228	44,546	4,621	4,772	170,435
	6,942	0,137	97,900	179,300	129,096	44,546	4,621	4,768	170,434
	6,500	0,579	91,126	166,893	120,163	44,546	4,630	4,540	170,385
	6,000	1,079	83,463	152,860	110,059	44,545	4,643	4,280	170,327
	5,500	1,579	75,801	138,828	99,956	44,545	4,657	4,018	170,258
	5,000	2,079	68,142	124,800	89,856	44,544	4,675	3,754	169,985
	4,500	2,579	60,489	110,784	79,764	44,544	4,699	3,486	169,348
	4,000	3,079	52,849	96,792	69,690	44,543	4,729	3,213	168,279
	3,500	3,579	45,230	82,837	59,643	44,542	4,773	2,934	166,542
	3,000	4,079	38,164	69,895	50,325	44,542	4,778	2,666	114,306
	2,500	4,579	31,484	57,662	41,517	44,540	4,748	2,411	111,301
	2,000	5,079	24,869	45,547	32,794	44,538	4,712	2,155	107,840
	1,500	5,579	18,329	33,568	24,169	44,535	4,667	1,899	103,888
	1,000	6,079	11,889	21,775	15,678	44,528	4,606	1,644	97,798
	0,500	6,579	5,622	10,297	7,414	44,505	4,524	1,388	87,977
	0,117	6,962	1,000	1,831	1,319	44,309	4,445	1,193	77,866
	0,000	7,079	0,000	0,000	0,000	42,622	2,938	1,121	0,000

Tank Calibrations - Cuba 8 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

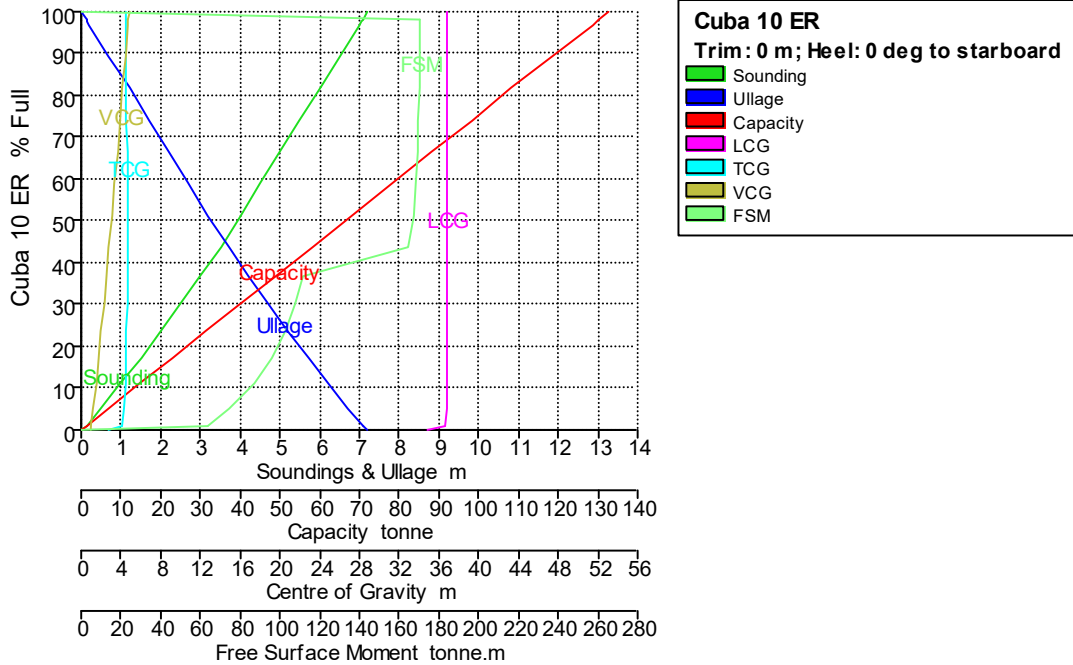| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 8 BR	7,079	0,000	100,000	183,146	131,865	44,546	-4,619	4,839	0,000
	7,000	0,079	98,789	180,929	130,269	44,546	-4,620	4,798	170,441
	6,949	0,130	98,000	179,483	129,228	44,546	-4,621	4,772	170,435
	6,942	0,137	97,900	179,300	129,096	44,546	-4,621	4,768	170,434
	6,500	0,579	91,126	166,893	120,163	44,546	-4,630	4,540	170,385
	6,000	1,079	83,463	152,860	110,059	44,545	-4,643	4,280	170,327
	5,500	1,579	75,801	138,828	99,956	44,545	-4,657	4,018	170,258
	5,000	2,079	68,142	124,800	89,856	44,544	-4,675	3,754	169,985
	4,500	2,579	60,489	110,784	79,764	44,544	-4,699	3,486	169,348
	4,000	3,079	52,849	96,792	69,690	44,543	-4,729	3,213	168,279
	3,500	3,579	45,230	82,837	59,643	44,542	-4,773	2,934	166,542
	3,000	4,079	38,164	69,895	50,325	44,542	-4,778	2,666	114,306
	2,500	4,579	31,484	57,662	41,517	44,540	-4,748	2,411	111,301
	2,000	5,079	24,869	45,547	32,794	44,538	-4,712	2,155	107,840
	1,500	5,579	18,329	33,568	24,169	44,535	-4,667	1,899	103,888
	1,000	6,079	11,889	21,775	15,678	44,528	-4,606	1,644	97,798
	0,500	6,579	5,622	10,297	7,414	44,505	-4,524	1,388	87,977
	0,117	6,962	1,000	1,831	1,319	44,309	-4,445	1,193	77,866
	0,000	7,079	0,000	0,000	0,000	42,622	-2,938	1,121	0,000

Tank Calibrations - Cuba 9 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

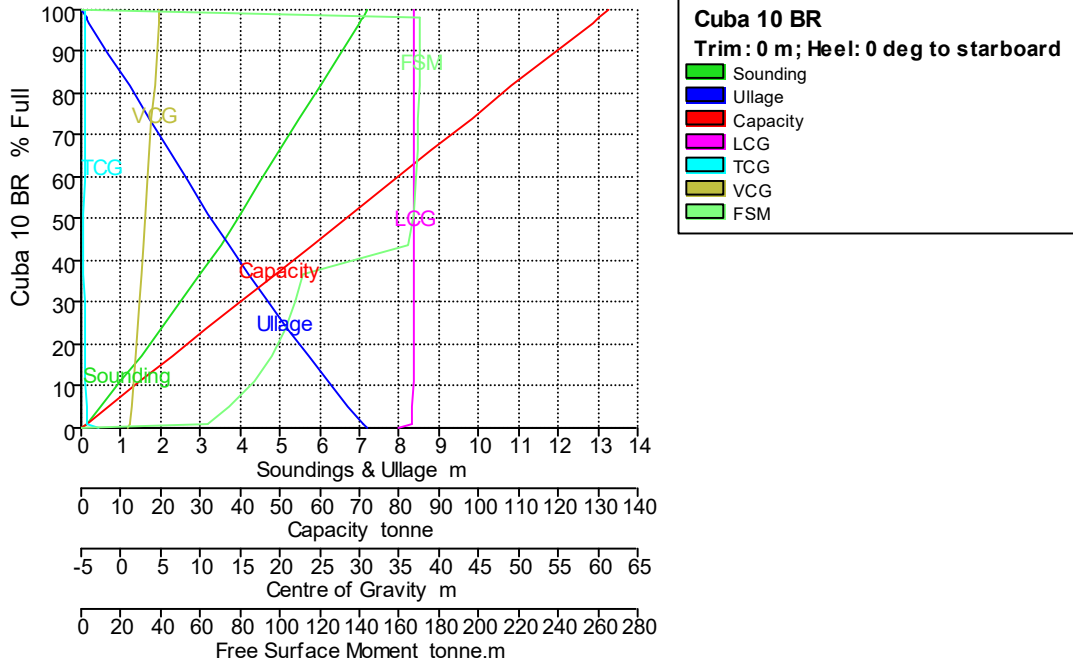| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 9 ER	7,142	0,000	100,000	184,438	132,795	40,649	4,609	4,816	0,000
	7,011	0,131	98,000	180,749	130,139	40,649	4,611	4,749	170,573
	7,004	0,138	97,900	180,564	130,006	40,649	4,611	4,745	170,573
	7,000	0,142	97,838	180,450	129,924	40,649	4,611	4,743	170,573
	6,500	0,642	90,226	166,411	119,816	40,649	4,621	4,485	170,536
	6,000	1,142	82,615	152,373	109,709	40,649	4,632	4,225	170,459
	5,500	1,642	75,006	138,339	99,604	40,649	4,645	3,962	170,327
	5,000	2,142	67,399	124,309	89,503	40,648	4,662	3,698	169,998
	4,500	2,642	59,800	110,294	79,411	40,648	4,684	3,430	169,363
	4,000	3,142	52,213	96,300	69,336	40,648	4,712	3,157	168,346
	3,500	3,642	44,645	82,343	59,287	40,647	4,753	2,877	166,649
	3,000	4,142	37,635	69,414	49,978	40,648	4,754	2,609	114,222
	2,500	4,642	31,007	57,188	41,175	40,647	4,719	2,352	110,984
	2,000	5,142	24,447	45,090	32,465	40,646	4,677	2,096	107,215
	1,500	5,642	17,971	33,146	23,865	40,643	4,622	1,839	102,550
	1,000	6,142	11,621	21,434	15,433	40,637	4,550	1,582	94,953
	0,500	6,642	5,479	10,104	7,275	40,616	4,458	1,326	83,907
	0,119	7,023	1,000	1,844	1,328	40,427	4,366	1,132	73,327
	0,000	7,142	0,000	0,000	0,000	38,722	2,851	1,058	0,000

Tank Calibrations - Cuba 9 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

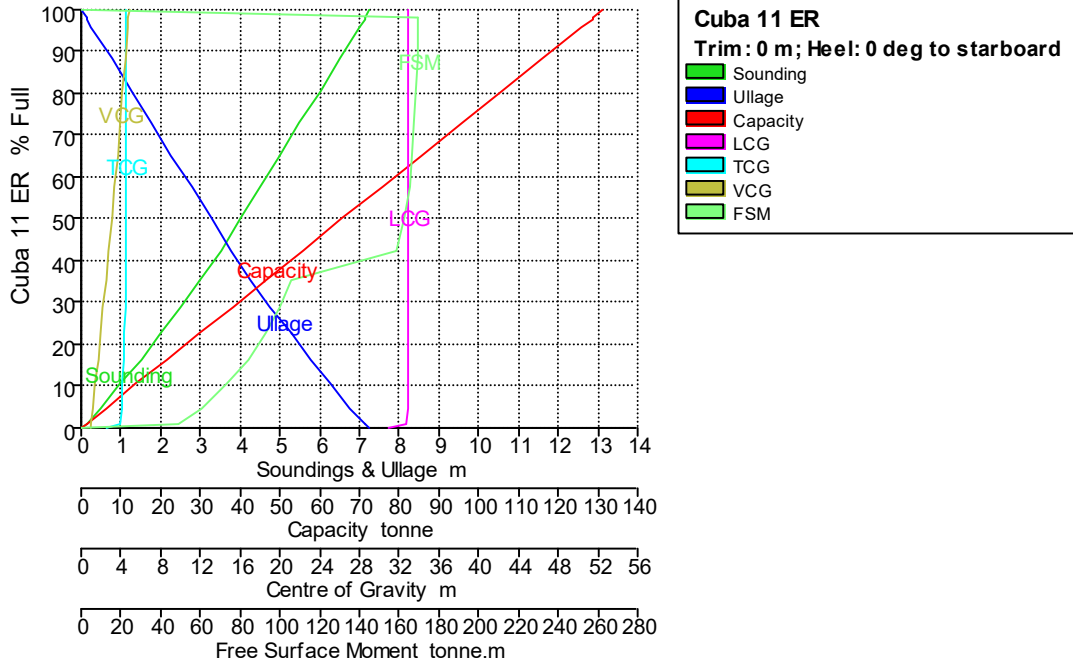| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 9 BR	7,142	0,000	100,000	184,438	132,795	40,649	-4,609	4,816	0,000
	7,011	0,131	98,000	180,749	130,139	40,649	-4,611	4,749	170,573
	7,004	0,138	97,900	180,564	130,006	40,649	-4,611	4,745	170,573
	7,000	0,142	97,838	180,450	129,924	40,649	-4,611	4,743	170,573
	6,500	0,642	90,226	166,411	119,816	40,649	-4,621	4,485	170,536
	6,000	1,142	82,615	152,373	109,709	40,649	-4,632	4,225	170,459
	5,500	1,642	75,006	138,339	99,604	40,649	-4,645	3,962	170,327
	5,000	2,142	67,399	124,309	89,503	40,648	-4,662	3,698	169,998
	4,500	2,642	59,800	110,294	79,411	40,648	-4,684	3,430	169,363
	4,000	3,142	52,213	96,300	69,336	40,648	-4,712	3,157	168,346
	3,500	3,642	44,645	82,343	59,287	40,647	-4,753	2,877	166,649
	3,000	4,142	37,635	69,414	49,978	40,648	-4,754	2,609	114,222
	2,500	4,642	31,007	57,188	41,175	40,647	-4,719	2,352	110,984
	2,000	5,142	24,447	45,090	32,465	40,646	-4,677	2,096	107,215
	1,500	5,642	17,971	33,146	23,865	40,643	-4,622	1,839	102,550
	1,000	6,142	11,621	21,434	15,433	40,637	-4,550	1,582	94,953
	0,500	6,642	5,479	10,104	7,275	40,616	-4,458	1,326	83,907
	0,119	7,023	1,000	1,844	1,328	40,427	-4,366	1,132	73,327
	0,000	7,142	0,000	0,000	0,000	38,722	-2,851	1,058	0,000

Tank Calibrations - Cuba 10 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 10 ER	7,205	0,000	100,000	184,378	132,752	36,751	4,571	4,808	0,000
	7,074	0,131	98,000	180,691	130,097	36,751	4,572	4,741	170,336
	7,067	0,138	97,900	180,506	129,965	36,751	4,572	4,737	170,336
	7,000	0,205	96,879	178,625	128,610	36,751	4,573	4,702	170,328
	6,500	0,705	89,269	164,593	118,507	36,752	4,580	4,443	170,212
	6,000	1,205	81,662	150,566	108,408	36,752	4,587	4,182	169,964
	5,500	1,705	74,059	136,548	98,315	36,752	4,597	3,919	169,584
	5,000	2,205	66,463	122,543	88,231	36,752	4,610	3,653	168,999
	4,500	2,705	58,878	108,558	78,162	36,752	4,626	3,384	168,151
	4,000	3,205	51,308	94,601	68,113	36,752	4,648	3,109	166,943
	3,500	3,705	43,763	80,689	58,096	36,752	4,681	2,827	164,649
	3,000	4,205	36,787	67,827	48,836	36,753	4,673	2,556	111,859
	2,500	4,705	30,212	55,704	40,107	36,753	4,627	2,298	107,678
	2,000	5,205	23,729	43,750	31,500	36,752	4,571	2,039	102,840
	1,500	5,705	17,361	32,009	23,047	36,750	4,501	1,779	96,296
	1,000	6,205	11,169	20,594	14,827	36,745	4,413	1,520	86,748
	0,500	6,705	5,235	9,653	6,950	36,724	4,305	1,263	74,597
	0,124	7,081	1,000	1,844	1,328	36,548	4,194	1,071	63,344
	0,000	7,205	0,000	0,000	0,000	34,822	2,705	0,995	0,000

Tank Calibrations - Cuba 10 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 10 BR	7,205	0,000	100,000	184,379	132,753	36,751	-4,571	4,808	0,000
	7,074	0,131	98,000	180,691	130,098	36,751	-4,572	4,741	170,336
	7,067	0,138	97,900	180,507	129,965	36,751	-4,572	4,737	170,336
	7,000	0,205	96,879	178,625	128,610	36,751	-4,573	4,702	170,328
	6,500	0,705	89,269	164,594	118,507	36,752	-4,580	4,443	170,212
	6,000	1,205	81,662	150,567	108,408	36,752	-4,587	4,182	169,964
	5,500	1,705	74,059	136,549	98,315	36,752	-4,597	3,919	169,584
	5,000	2,205	66,463	122,544	88,232	36,752	-4,610	3,653	168,999
	4,500	2,705	58,878	108,559	78,162	36,752	-4,626	3,384	168,151
	4,000	3,205	51,308	94,602	68,113	36,752	-4,648	3,109	166,943
	3,500	3,705	43,763	80,689	58,096	36,752	-4,681	2,827	164,649
	3,000	4,205	36,787	67,827	48,836	36,753	-4,673	2,556	111,859
	2,500	4,705	30,212	55,704	40,107	36,753	-4,627	2,298	107,678
	2,000	5,205	23,729	43,750	31,500	36,752	-4,571	2,039	102,840
	1,500	5,705	17,361	32,009	23,047	36,750	-4,501	1,779	96,296
	1,000	6,205	11,169	20,594	14,827	36,745	-4,413	1,520	86,748
	0,500	6,705	5,235	9,653	6,950	36,724	-4,305	1,263	74,597
	0,124	7,081	1,000	1,844	1,328	36,548	-4,194	1,071	63,344
	0,000	7,205	0,000	0,000	0,000	34,822	-2,705	0,995	0,000

## Tank Calibrations - Cuba 11 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 11 ER	7,268	0,000	100,000	182,392	131,323	32,856	4,497	4,820	0,000
	7,138	0,130	98,000	178,745	128,696	32,856	4,497	4,752	169,273
	7,131	0,137	97,900	178,562	128,565	32,856	4,497	4,749	169,273
	7,000	0,268	95,888	174,892	125,922	32,856	4,497	4,681	169,253
	6,500	0,768	88,212	160,892	115,842	32,857	4,498	4,420	169,000
	6,000	1,268	80,542	146,902	105,770	32,857	4,499	4,157	168,460
	5,500	1,768	72,882	132,931	95,710	32,858	4,501	3,891	167,657
	5,000	2,268	65,237	118,987	85,671	32,858	4,505	3,623	166,526
	4,500	2,768	57,612	105,080	75,657	32,859	4,511	3,350	165,001
	4,000	3,268	50,015	91,223	65,681	32,860	4,522	3,072	162,842
	3,500	3,768	42,465	77,453	55,766	32,861	4,541	2,785	158,681
	3,000	4,268	35,522	64,790	46,649	32,863	4,519	2,511	105,706
	2,500	4,768	29,018	52,927	38,108	32,863	4,455	2,248	100,081
	2,000	5,268	22,645	41,304	29,739	32,864	4,379	1,985	93,379
	1,500	5,768	16,451	30,006	21,604	32,863	4,287	1,722	84,261
	1,000	6,268	10,507	19,163	13,797	32,858	4,179	1,460	73,014
	0,500	6,768	4,882	8,905	6,411	32,838	4,051	1,201	60,371
	0,132	7,136	1,000	1,824	1,313	32,679	3,922	1,013	49,297
	0,000	7,268	0,000	0,000	0,000	30,922	2,481	0,932	0,000

## Tank Calibrations - Cuba 11 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
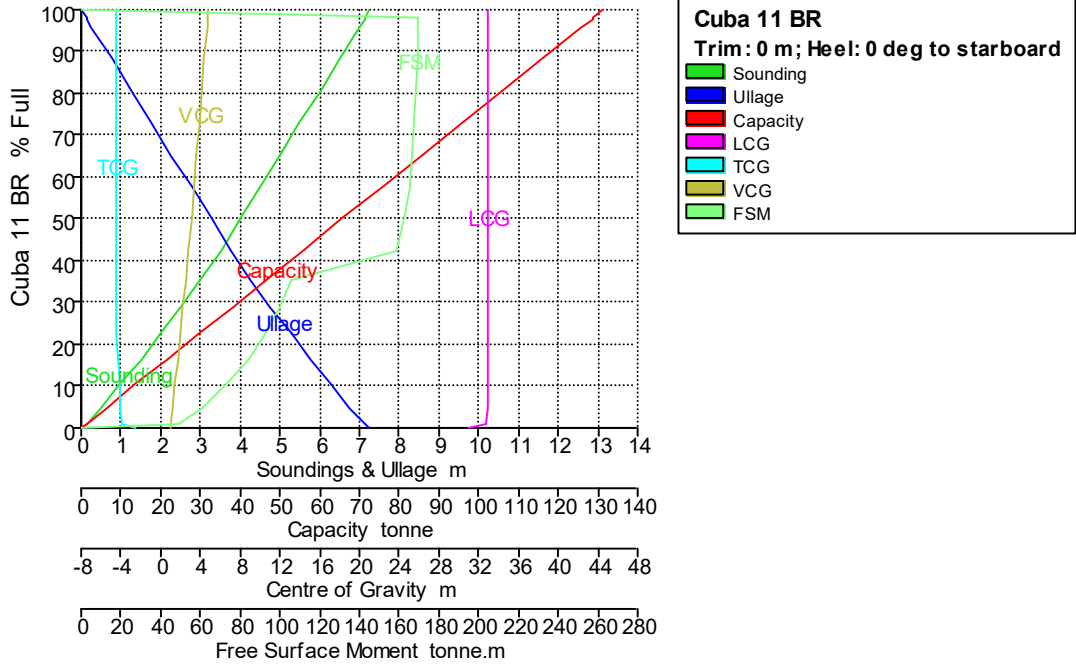
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 11 BR	7,268	0,000	100,000	182,397	131,326	32,856	-4,497	4,820	0,000
	7,138	0,130	98,000	178,749	128,699	32,856	-4,497	4,752	169,273
	7,131	0,137	97,900	178,566	128,568	32,856	-4,497	4,749	169,273
	7,000	0,268	95,888	174,896	125,925	32,856	-4,497	4,681	169,253
	6,500	0,768	88,212	160,896	115,845	32,857	-4,498	4,420	169,000
	6,000	1,268	80,542	146,906	105,772	32,857	-4,499	4,157	168,460
	5,500	1,768	72,883	132,935	95,713	32,858	-4,501	3,891	167,657
	5,000	2,268	65,238	118,991	85,674	32,858	-4,505	3,623	166,526
	4,500	2,768	57,613	105,084	75,660	32,859	-4,511	3,350	165,001
	4,000	3,268	50,016	91,227	65,683	32,860	-4,522	3,072	162,842
	3,500	3,768	42,466	77,457	55,769	32,861	-4,541	2,785	158,681
	3,000	4,268	35,522	64,790	46,649	32,863	-4,519	2,511	105,706
	2,500	4,768	29,018	52,927	38,108	32,863	-4,455	2,248	100,081
	2,000	5,268	22,645	41,304	29,739	32,864	-4,379	1,985	93,379
	1,500	5,768	16,451	30,006	21,604	32,863	-4,287	1,722	84,261
	1,000	6,268	10,506	19,163	13,797	32,858	-4,179	1,460	73,014
	0,500	6,768	4,882	8,905	6,411	32,838	-4,051	1,201	60,371
	0,132	7,136	1,000	1,824	1,313	32,679	-3,922	1,013	49,297
	0,000	7,268	0,000	0,000	0,000	30,922	-2,481	0,932	0,000

## Tank Calibrations - Cuba 12 ER

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
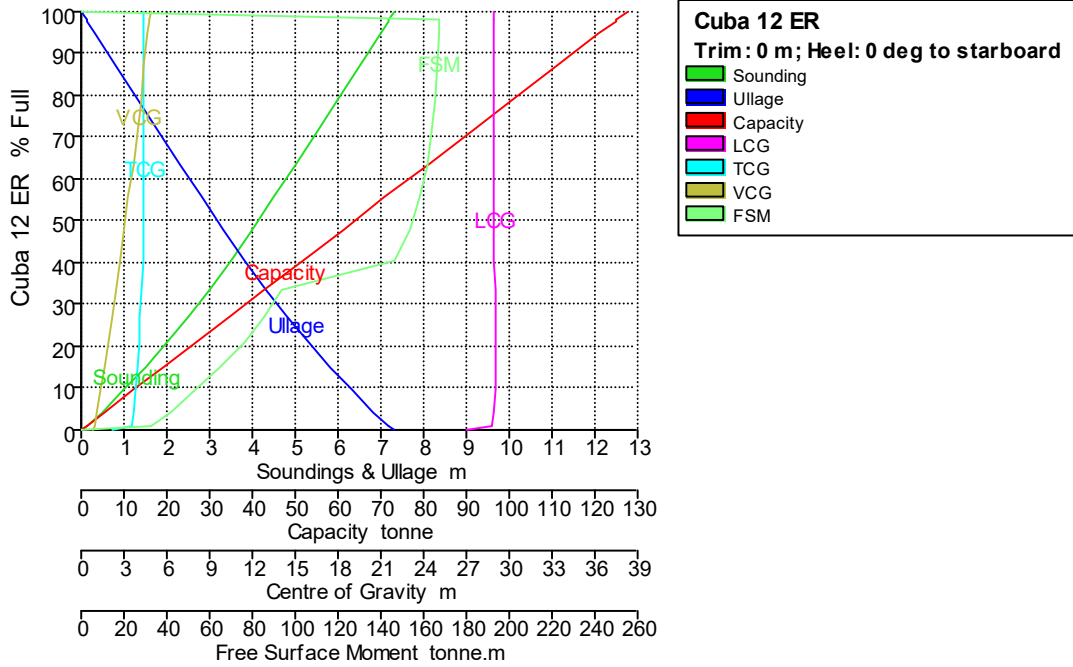
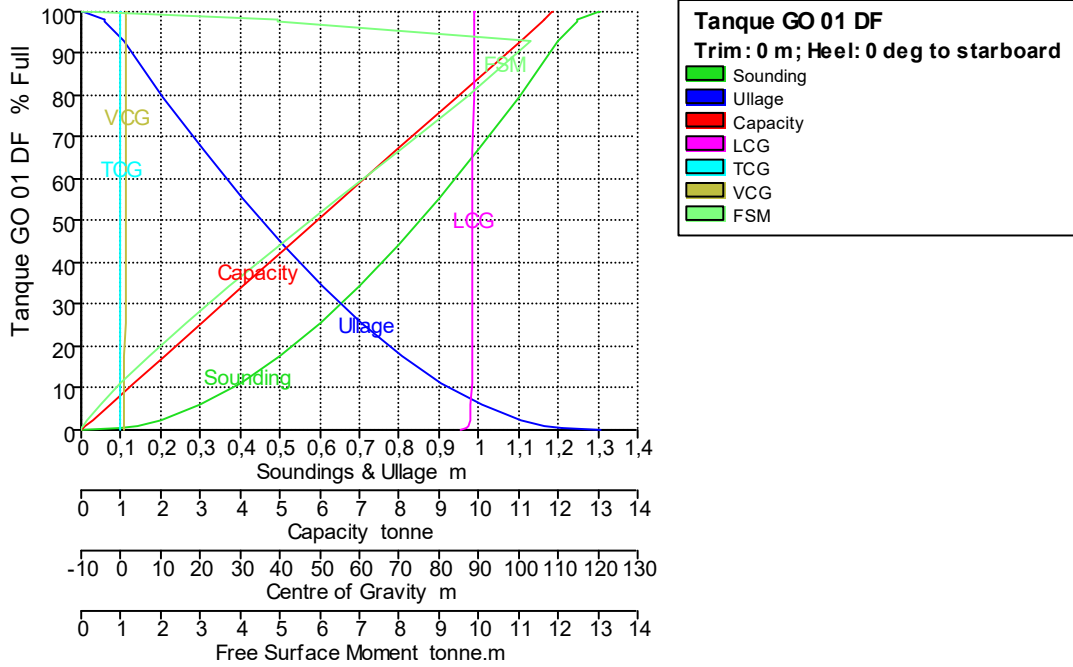| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 12 ER	7,331	0,000	100,000	177,318	127,669	28,963	4,369	4,865	0,000
	7,204	0,127	98,000	173,772	125,116	28,963	4,367	4,798	167,046
	7,197	0,134	97,900	173,595	124,988	28,963	4,367	4,795	167,045
	7,000	0,331	94,798	168,094	121,028	28,963	4,363	4,691	166,993
	6,500	0,831	86,939	154,159	110,995	28,964	4,354	4,426	166,501
	6,000	1,331	79,093	140,246	100,977	28,966	4,343	4,159	165,461
	5,500	1,831	71,266	126,368	90,985	28,967	4,332	3,889	163,890
	5,000	2,331	63,471	112,546	81,033	28,969	4,320	3,615	161,597
	4,500	2,831	55,719	98,800	71,136	28,971	4,308	3,336	158,413
	4,000	3,331	48,031	85,168	61,321	28,973	4,298	3,051	153,513
	3,500	3,831	40,446	71,719	51,638	28,975	4,296	2,756	146,206
	3,000	4,331	33,539	59,471	42,819	28,979	4,249	2,474	93,767
	2,500	4,831	27,148	48,138	34,659	28,981	4,159	2,204	85,793
	2,000	5,331	20,977	37,196	26,781	28,983	4,056	1,934	76,007
	1,500	5,831	15,089	26,755	19,264	28,983	3,941	1,666	64,974
	1,000	6,331	9,537	16,911	12,176	28,979	3,813	1,401	53,579
	0,500	6,831	4,375	7,758	5,586	28,961	3,663	1,140	41,839
	0,144	7,186	1,000	1,773	1,277	28,827	3,523	0,957	32,585
	0,000	7,331	0,000	0,000	0,000	27,022	2,159	0,869	0,000

Tank Calibrations - Cuba 12 BR

Fluid Type = Atún   Specific gravity = 0,72
Permeability = 80 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
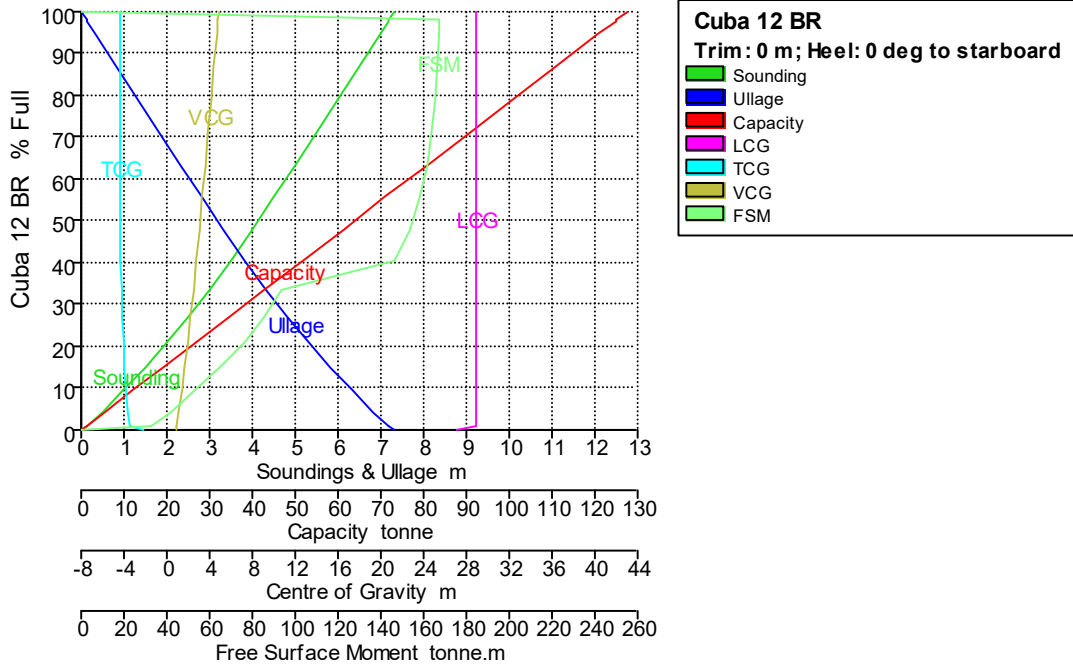
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Cuba 12 BR	7,331	0,000	100,000	177,318	127,669	28,963	-4,369	4,865	0,000
	7,204	0,127	98,000	173,772	125,116	28,963	-4,367	4,798	167,046
	7,197	0,134	97,900	173,595	124,988	28,963	-4,367	4,795	167,045
	7,000	0,331	94,798	168,094	121,028	28,963	-4,363	4,691	166,993
	6,500	0,831	86,939	154,159	110,995	28,964	-4,354	4,426	166,501
	6,000	1,331	79,093	140,246	100,977	28,966	-4,343	4,159	165,461
	5,500	1,831	71,266	126,368	90,985	28,967	-4,332	3,889	163,890
	5,000	2,331	63,471	112,546	81,033	28,969	-4,320	3,615	161,597
	4,500	2,831	55,719	98,800	71,136	28,971	-4,308	3,336	158,413
	4,000	3,331	48,031	85,168	61,321	28,973	-4,298	3,051	153,513
	3,500	3,831	40,446	71,719	51,638	28,975	-4,296	2,756	146,206
	3,000	4,331	33,539	59,471	42,819	28,979	-4,249	2,474	93,767
	2,500	4,831	27,148	48,138	34,659	28,981	-4,159	2,204	85,793
	2,000	5,331	20,977	37,196	26,781	28,983	-4,056	1,934	76,007
	1,500	5,831	15,089	26,755	19,264	28,983	-3,941	1,666	64,974
	1,000	6,331	9,537	16,911	12,176	28,979	-3,813	1,401	53,579
	0,500	6,831	4,375	7,758	5,586	28,961	-3,663	1,140	41,839
	0,144	7,186	1,000	1,773	1,277	28,827	-3,523	0,957	32,585
	0,000	7,331	0,000	0,000	0,000	27,022	-2,159	0,869	0,000

## Tank Calibrations - Tanque GO 01 DF

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 01 DF	1,307	0,000	100,000	14,127	11,867	88,774	0,000	1,430	0,000
	1,300	0,007	99,975	14,124	11,864	88,774	0,000	1,429	0,260
	1,248	0,059	98,000	13,845	11,630	88,724	0,000	1,420	4,944
	1,247	0,060	97,900	13,831	11,618	88,722	0,000	1,420	4,933
	1,200	0,107	93,060	13,147	11,043	88,676	0,000	1,398	11,304
	1,100	0,207	79,596	11,245	9,446	88,656	0,000	1,336	9,701
	1,000	0,307	66,935	9,456	7,943	88,632	0,000	1,273	8,017
	0,900	0,407	55,134	7,789	6,543	88,604	0,000	1,210	6,446
	0,800	0,507	44,253	6,252	5,252	88,570	0,000	1,147	5,012
	0,700	0,607	34,358	4,854	4,077	88,529	0,000	1,084	3,732
	0,600	0,707	25,517	3,605	3,028	88,476	0,000	1,020	2,627
	0,500	0,807	17,803	2,515	2,113	88,406	0,000	0,956	1,710
	0,400	0,907	11,305	1,597	1,342	88,305	0,000	0,892	0,991
	0,300	1,007	6,129	0,866	0,727	88,139	0,000	0,827	0,474
	0,200	1,107	2,421	0,342	0,287	87,805	0,000	0,760	0,155
	0,141	1,166	1,000	0,141	0,119	87,384	0,000	0,719	0,054
	0,100	1,207	0,398	0,056	0,047	86,925	0,000	0,688	0,018
	0,000	1,307	0,000	0,000	0,000	85,541	0,000	0,616	0,000

## Tank Calibrations - Tanque GO 02 ER

Fluid Type = Diesel Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
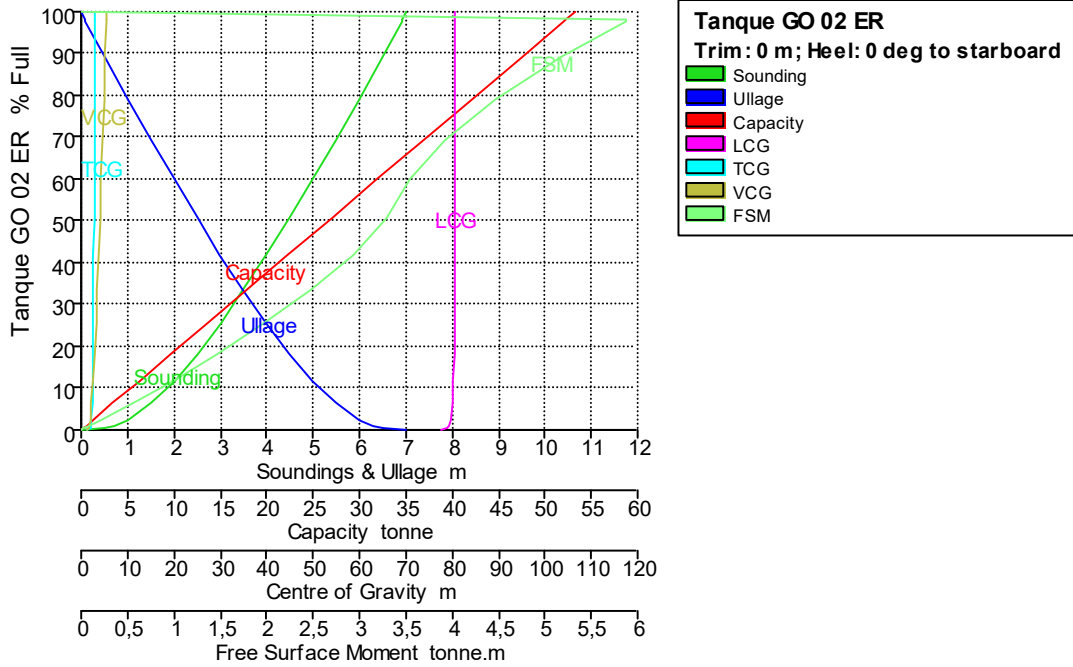
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 02 ER	6,999	0,000	100,000	63,382	53,241	80,533	2,879	5,513	0,000
	6,907	0,091	98,000	62,114	52,176	80,532	2,873	5,459	5,873
	6,902	0,096	97,900	62,051	52,123	80,532	2,873	5,456	5,865
	6,500	0,499	89,337	56,624	47,564	80,531	2,851	5,221	5,181
	6,000	0,999	79,190	50,192	42,161	80,529	2,824	4,935	4,474
	5,500	1,499	69,488	44,043	36,996	80,527	2,798	4,653	3,926
	5,000	1,999	60,085	38,083	31,989	80,520	2,771	4,372	3,552
	4,500	2,499	50,866	32,240	27,081	80,507	2,738	4,085	3,294
	4,000	2,999	41,909	26,563	22,313	80,487	2,698	3,793	2,932
	3,500	3,499	33,379	21,156	17,771	80,459	2,652	3,496	2,468
	3,000	3,999	25,419	16,111	13,534	80,418	2,599	3,196	1,964
	2,500	4,499	18,156	11,508	9,667	80,357	2,538	2,892	1,467
	2,000	4,999	11,731	7,435	6,246	80,255	2,465	2,581	0,993
	1,500	5,499	6,365	4,034	3,389	80,069	2,376	2,261	0,560
	1,000	5,999	2,440	1,547	1,299	79,678	2,271	1,925	0,207
	0,708	6,291	1,000	0,634	0,532	79,250	2,205	1,719	0,075
	0,500	6,499	0,395	0,250	0,210	78,879	2,151	1,565	0,025
	0,000	6,999	0,000	0,000	0,000	77,737	1,334	1,201	0,000

## Tank Calibrations - Tanque GO 02 BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
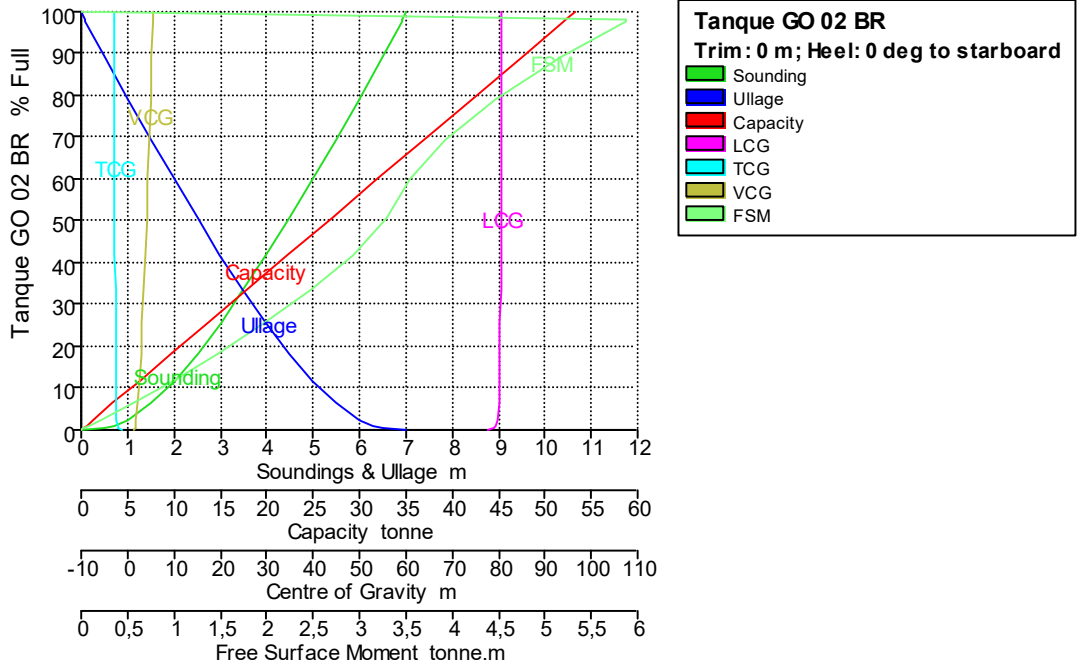
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 02 BR	6,999	0,000	100,000	63,382	53,241	80,533	-2,879	5,513	0,000
	6,907	0,091	98,000	62,114	52,176	80,532	-2,873	5,459	5,873
	6,902	0,096	97,900	62,051	52,123	80,532	-2,873	5,456	5,865
	6,500	0,499	89,337	56,624	47,564	80,531	-2,851	5,221	5,181
	6,000	0,999	79,190	50,192	42,161	80,529	-2,824	4,935	4,474
	5,500	1,499	69,488	44,043	36,996	80,527	-2,798	4,653	3,926
	5,000	1,999	60,085	38,083	31,989	80,520	-2,771	4,372	3,552
	4,500	2,499	50,866	32,240	27,081	80,507	-2,738	4,085	3,294
	4,000	2,999	41,909	26,563	22,313	80,487	-2,698	3,793	2,932
	3,500	3,499	33,379	21,156	17,771	80,459	-2,652	3,496	2,468
	3,000	3,999	25,419	16,111	13,534	80,418	-2,599	3,196	1,964
	2,500	4,499	18,156	11,508	9,667	80,357	-2,538	2,892	1,467
	2,000	4,999	11,731	7,435	6,246	80,255	-2,465	2,581	0,993
	1,500	5,499	6,365	4,034	3,389	80,069	-2,376	2,261	0,560
	1,000	5,999	2,440	1,547	1,299	79,678	-2,271	1,925	0,207
	0,708	6,291	1,000	0,634	0,532	79,250	-2,205	1,719	0,075
	0,500	6,499	0,395	0,250	0,210	78,879	-2,151	1,565	0,025
	0,000	6,999	0,000	0,000	0,000	77,737	-1,334	1,201	0,000

## Tank Calibrations - Tanque GO 03 ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
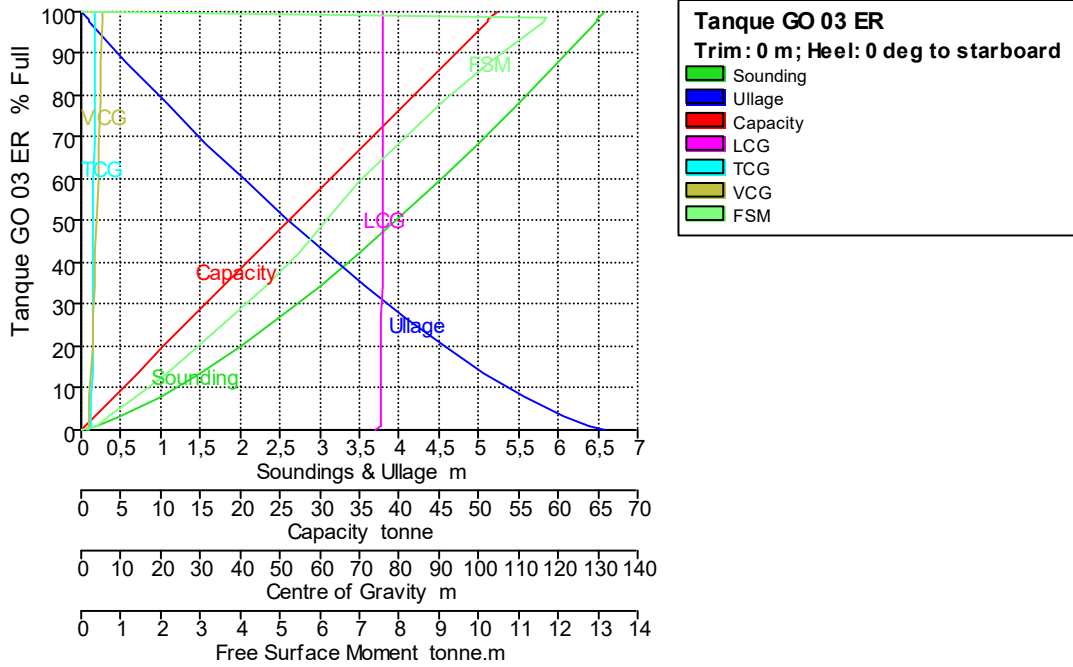
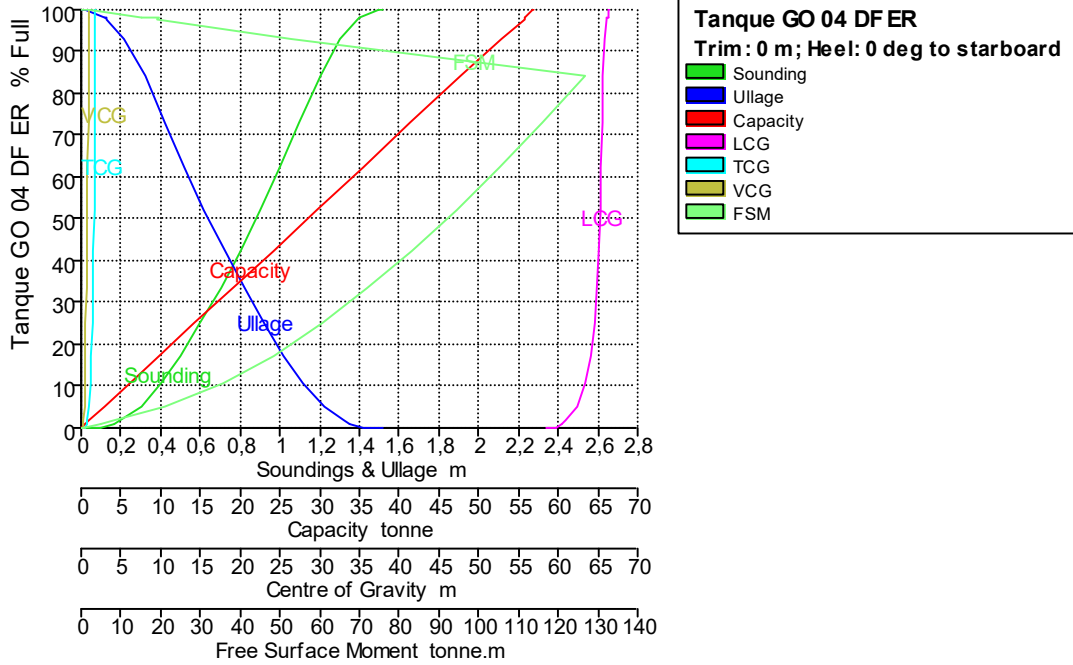| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 03 ER	6,575	0,000	100,000	62,247	52,287	75,647	3,343	5,421	0,000
	6,500	0,075	98,404	61,253	51,453	75,647	3,337	5,377	11,701
	6,481	0,094	98,000	61,002	51,241	75,647	3,335	5,366	11,644
	6,476	0,099	97,900	60,939	51,189	75,647	3,335	5,363	11,630
	6,000	0,575	88,026	54,793	46,026	75,646	3,294	5,082	10,304
	5,500	1,075	78,085	48,605	40,828	75,644	3,251	4,790	9,067
	5,000	1,575	68,566	42,680	35,851	75,643	3,208	4,500	7,971
	4,500	2,075	59,447	37,004	31,083	75,642	3,164	4,213	7,016
	4,000	2,575	50,697	31,557	26,508	75,639	3,117	3,925	6,210
	3,500	3,075	42,290	26,324	22,112	75,636	3,065	3,637	5,463
	3,000	3,575	34,282	21,339	17,925	75,631	3,006	3,347	4,638
	2,500	4,075	26,752	16,652	13,988	75,624	2,942	3,057	3,785
	2,000	4,575	19,774	12,309	10,339	75,615	2,870	2,767	2,955
	1,500	5,075	13,424	8,356	7,019	75,602	2,787	2,477	2,155
	1,000	5,575	7,831	4,874	4,094	75,579	2,691	2,189	1,391
	0,500	6,075	3,198	1,991	1,672	75,531	2,577	1,905	0,701
	0,198	6,377	1,000	0,622	0,523	75,431	2,505	1,740	0,369
	0,000	6,575	0,000	0,000	0,000	73,822	1,719	1,625	0,000

Tank Calibrations - Tanque GO 03 BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
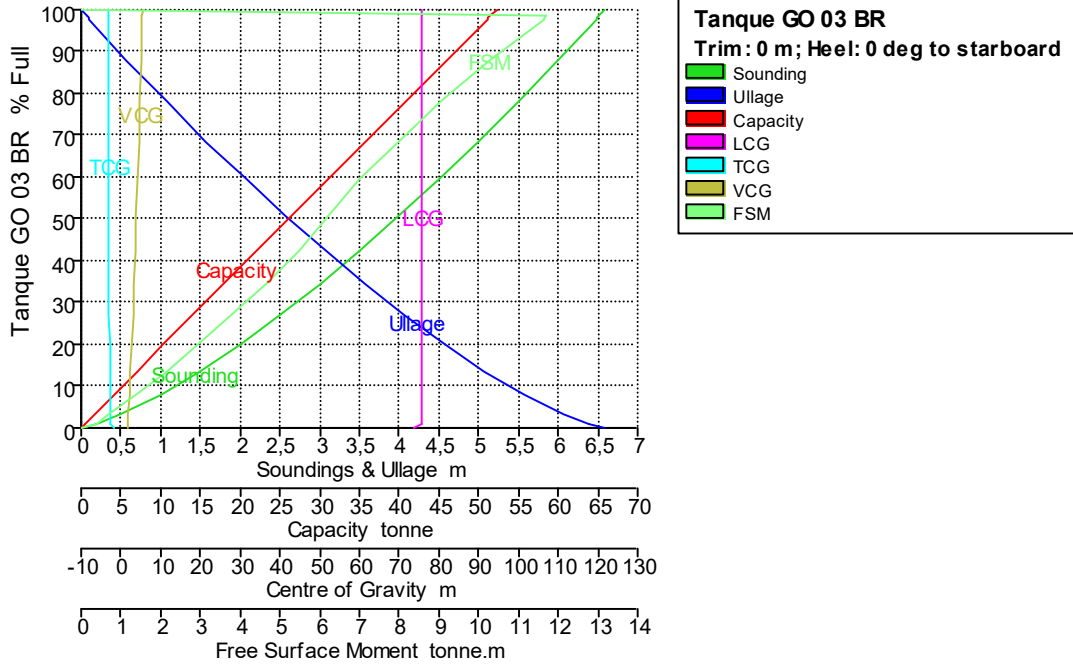
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 03 BR	6,575	0,000	100,000	62,247	52,287	75,647	-3,343	5,421	0,000
	6,500	0,075	98,404	61,253	51,453	75,647	-3,337	5,377	11,701
	6,481	0,094	98,000	61,002	51,241	75,647	-3,335	5,366	11,644
	6,476	0,099	97,900	60,939	51,189	75,647	-3,335	5,363	11,630
	6,000	0,575	88,026	54,793	46,026	75,646	-3,294	5,082	10,304
	5,500	1,075	78,085	48,605	40,828	75,644	-3,251	4,790	9,067
	5,000	1,575	68,566	42,680	35,851	75,643	-3,208	4,500	7,971
	4,500	2,075	59,447	37,004	31,083	75,642	-3,164	4,213	7,016
	4,000	2,575	50,697	31,557	26,508	75,639	-3,117	3,925	6,210
	3,500	3,075	42,290	26,324	22,112	75,636	-3,065	3,637	5,463
	3,000	3,575	34,282	21,339	17,925	75,631	-3,006	3,347	4,638
	2,500	4,075	26,752	16,652	13,988	75,624	-2,942	3,057	3,785
	2,000	4,575	19,774	12,309	10,339	75,615	-2,870	2,767	2,955
	1,500	5,075	13,424	8,356	7,019	75,602	-2,787	2,477	2,155
	1,000	5,575	7,831	4,874	4,094	75,579	-2,691	2,189	1,391
	0,500	6,075	3,198	1,991	1,672	75,531	-2,577	1,905	0,701
	0,198	6,377	1,000	0,622	0,523	75,431	-2,505	1,740	0,369
	0,000	6,575	0,000	0,000	0,000	73,822	-1,719	1,625	0,000

## Tank Calibrations - Tanque GO 04 DF ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 04 DF ER	1,520	0,000	100,000	67,731	56,894	66,378	1,784	1,020	0,000
	1,500	0,020	99,949	67,696	56,865	66,373	1,784	1,020	2,131
	1,400	0,120	98,133	66,466	55,831	66,213	1,790	1,009	14,983
	1,396	0,124	98,000	66,376	55,756	66,203	1,790	1,008	19,382
	1,393	0,127	97,900	66,308	55,699	66,196	1,791	1,008	19,325
	1,300	0,220	93,087	63,048	52,960	65,916	1,794	0,982	52,989
	1,200	0,320	83,968	56,872	47,773	65,687	1,771	0,935	126,906
	1,100	0,420	72,906	49,380	41,479	65,585	1,718	0,876	116,186
	1,000	0,520	62,267	42,174	35,426	65,462	1,662	0,818	105,364
	0,900	0,620	52,092	35,282	29,637	65,314	1,601	0,759	94,452
	0,800	0,720	42,430	28,738	24,140	65,128	1,534	0,700	83,410
	0,700	0,820	33,346	22,586	18,972	64,888	1,461	0,640	72,157
	0,600	0,920	24,927	16,883	14,182	64,565	1,379	0,580	60,628
	0,500	1,020	17,298	11,716	9,841	64,106	1,287	0,518	48,609
	0,400	1,120	10,656	7,217	6,062	63,409	1,179	0,454	35,739
	0,300	1,220	5,338	3,616	3,037	62,341	1,047	0,388	21,217
	0,200	1,320	1,797	1,217	1,022	61,034	0,831	0,319	8,273
	0,164	1,356	1,000	0,677	0,569	60,527	0,704	0,293	4,771
	0,100	1,420	0,211	0,143	0,120	59,660	0,387	0,240	0,674
	0,000	1,520	0,000	0,000	0,000	58,488	0,000	0,168	0,000

Tank Calibrations - Tanque GO 04 DF BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tanque GO 04 DF BR
Trim: 0 m; Heel: 0 deg to starboard
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM
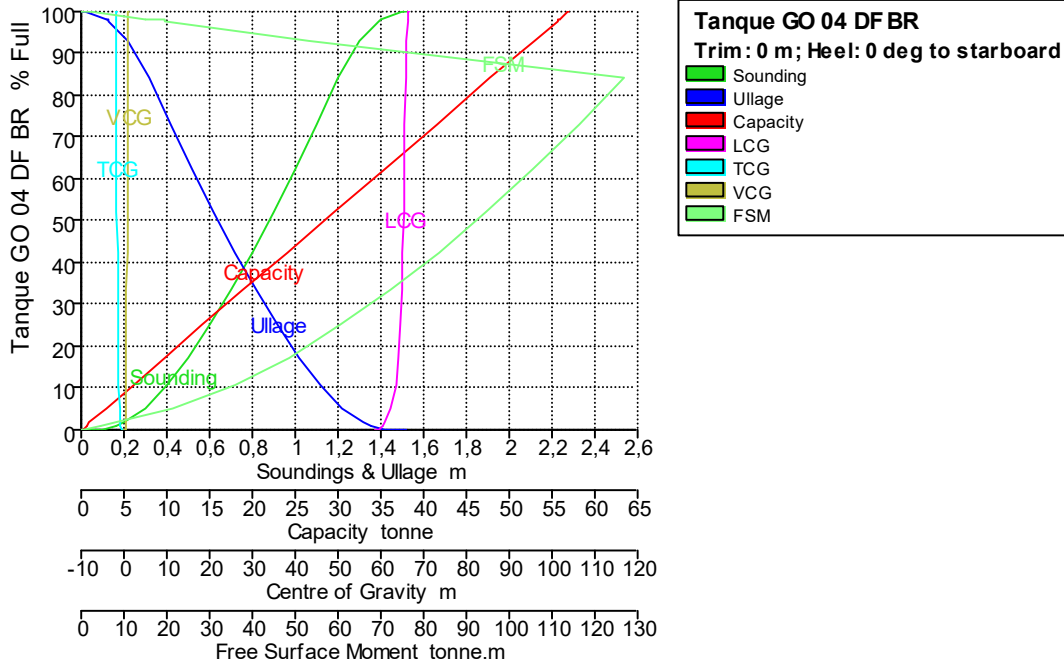
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 04 DF BR	1,520	0,000	100,000	67,731	56,894	66,378	-1,784	1,020	0,000
	1,500	0,020	99,949	67,696	56,865	66,373	-1,784	1,020	2,131
	1,400	0,120	98,133	66,466	55,831	66,213	-1,790	1,009	14,983
	1,396	0,124	98,000	66,376	55,756	66,203	-1,790	1,008	19,382
	1,393	0,127	97,900	66,308	55,699	66,196	-1,791	1,008	19,325
	1,300	0,220	93,087	63,048	52,960	65,916	-1,794	0,982	52,989
	1,200	0,320	83,968	56,872	47,773	65,687	-1,771	0,935	126,906
	1,100	0,420	72,906	49,380	41,479	65,585	-1,718	0,876	116,186
	1,000	0,520	62,267	42,174	35,426	65,462	-1,662	0,818	105,364
	0,900	0,620	52,092	35,282	29,637	65,314	-1,601	0,759	94,452
	0,800	0,720	42,430	28,738	24,140	65,128	-1,534	0,700	83,410
	0,700	0,820	33,346	22,586	18,972	64,888	-1,461	0,640	72,157
	0,600	0,920	24,927	16,883	14,182	64,565	-1,379	0,580	60,628
	0,500	1,020	17,298	11,716	9,841	64,106	-1,287	0,518	48,609
	0,400	1,120	10,656	7,217	6,062	63,409	-1,179	0,454	35,739
	0,300	1,220	5,338	3,616	3,037	62,341	-1,047	0,388	21,217
	0,200	1,320	1,797	1,217	1,022	61,034	-0,831	0,319	8,273
	0,164	1,356	1,000	0,677	0,569	60,527	-0,704	0,293	4,771
	0,100	1,420	0,211	0,143	0,120	59,660	-0,387	0,240	0,674
	0,000	1,520	0,000	0,000	0,000	58,488	0,000	0,168	0,000

Tank Calibrations - Tanque GO 05 DF ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
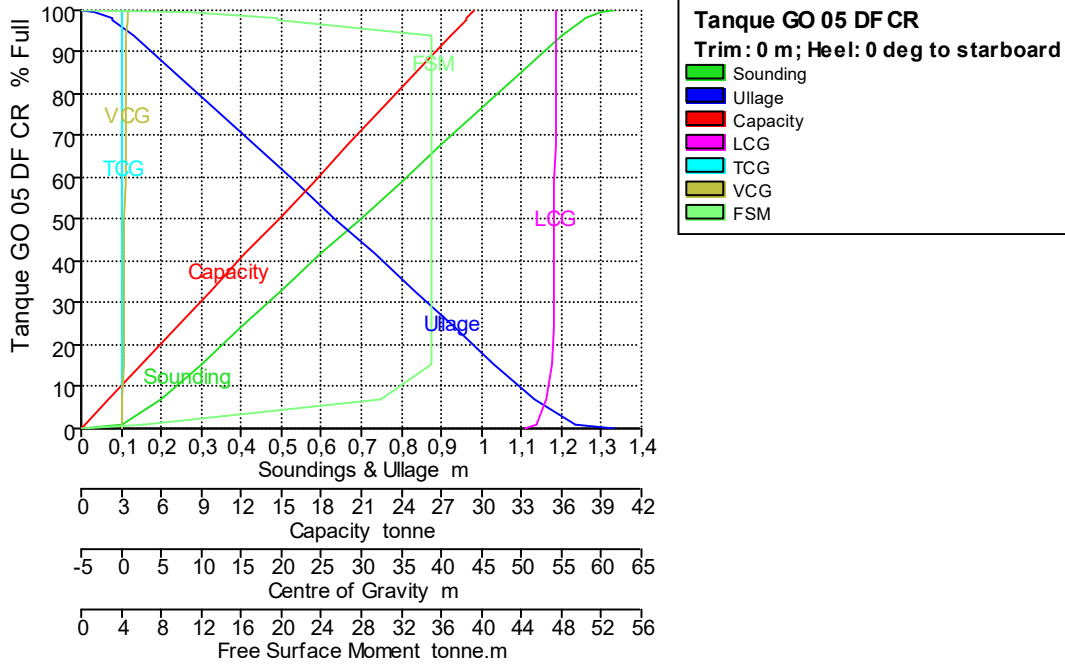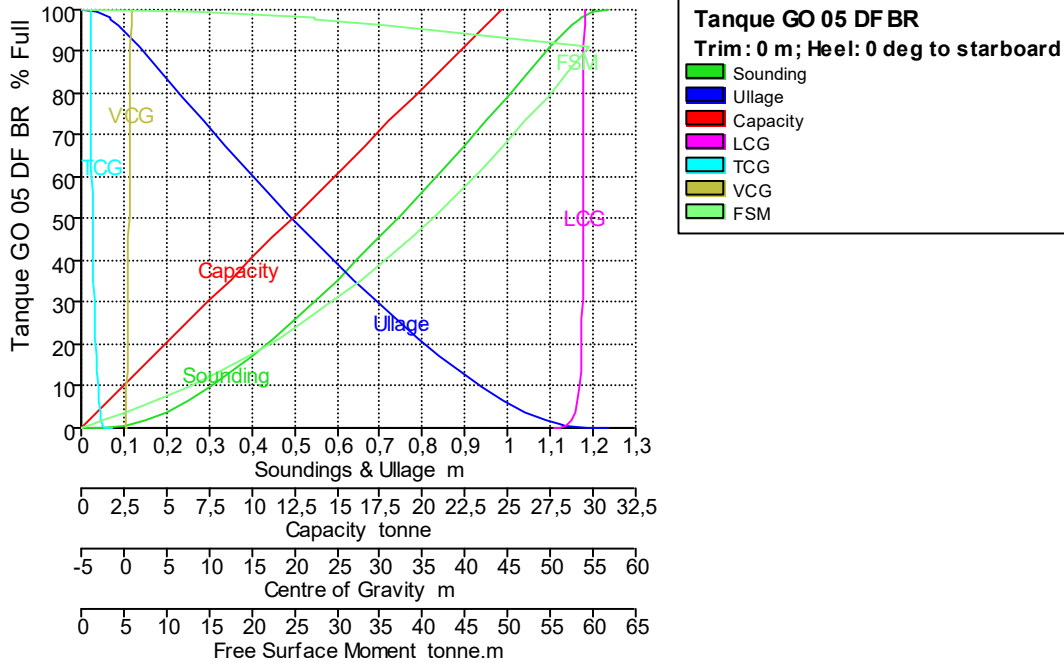Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
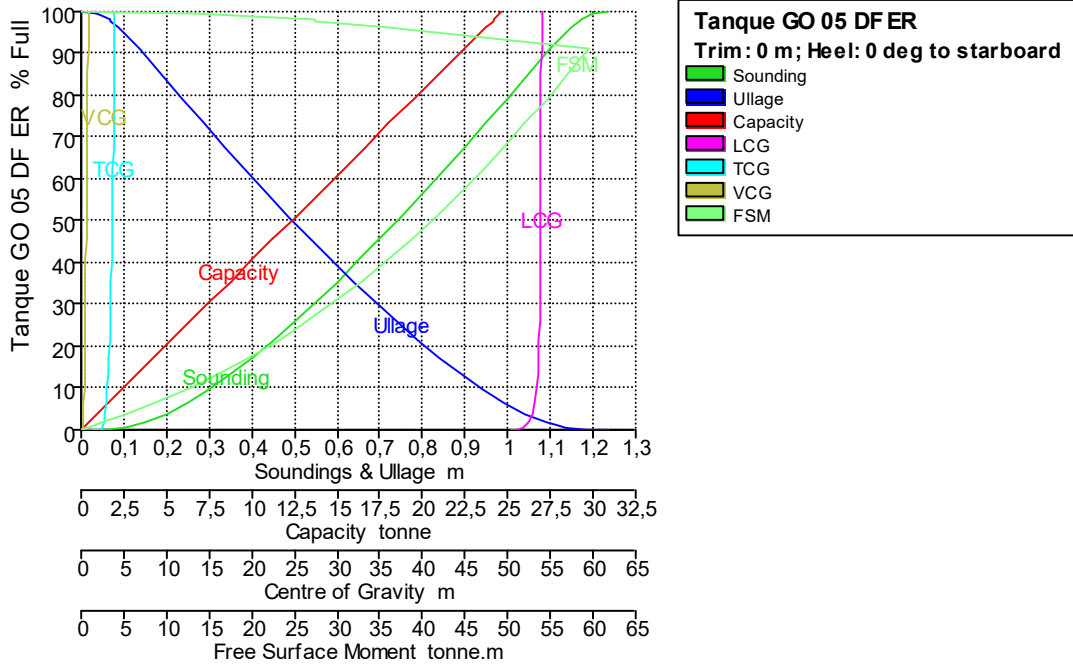
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 05 DF ER	1,238	0,000	100,000	29,331	24,638	54,055	3,952	0,853	0,000
	1,200	0,038	99,350	29,141	24,478	54,034	3,951	0,850	13,128
	1,171	0,067	98,000	28,744	24,145	54,001	3,948	0,844	27,452
	1,170	0,068	97,900	28,715	24,121	53,999	3,948	0,843	27,413
	1,150	0,088	96,482	28,299	23,771	53,974	3,943	0,837	35,592
	1,100	0,138	91,165	26,740	22,461	53,942	3,921	0,812	59,419
	1,050	0,188	85,107	24,963	20,969	53,933	3,890	0,784	57,030
	1,000	0,238	79,141	23,213	19,499	53,923	3,858	0,755	54,651
	0,950	0,288	73,271	21,491	18,053	53,912	3,824	0,727	52,087
	0,900	0,338	67,504	19,800	16,632	53,900	3,789	0,698	49,580
	0,850	0,388	61,841	18,139	15,237	53,887	3,751	0,670	47,021
	0,800	0,438	56,295	16,512	13,870	53,872	3,711	0,641	44,264
	0,750	0,488	50,869	14,921	12,533	53,856	3,668	0,612	41,573
	0,700	0,538	45,574	13,367	11,229	53,837	3,622	0,583	38,688
	0,650	0,588	40,420	11,856	9,959	53,815	3,573	0,554	35,793
	0,600	0,638	35,417	10,388	8,726	53,790	3,519	0,525	32,776
	0,550	0,688	30,582	8,970	7,535	53,759	3,460	0,496	29,658
	0,500	0,738	25,930	7,605	6,389	53,721	3,394	0,467	26,474
	0,450	0,788	21,483	6,301	5,293	53,674	3,321	0,437	23,174
	0,400	0,838	17,269	5,065	4,255	53,611	3,238	0,407	19,722
	0,350	0,888	13,328	3,909	3,284	53,526	3,143	0,376	16,230
	0,300	0,938	9,722	2,852	2,395	53,406	3,032	0,345	12,491
	0,250	0,988	6,542	1,919	1,612	53,228	2,907	0,312	8,649
	0,200	1,038	3,895	1,143	0,960	52,942	2,772	0,279	5,175
	0,150	1,088	1,887	0,553	0,465	52,441	2,636	0,244	2,538
	0,118	1,120	1,000	0,293	0,246	52,023	2,544	0,220	1,279
	0,100	1,138	0,646	0,189	0,159	51,786	2,487	0,206	0,795

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,050	1,188	0,099	0,029	0,024	51,119	2,273	0,132	0,098
	0,000	1,238	0,000	0,000	0,000	50,444	1,335	0,135	0,000

Tank Calibrations - Tanque GO 05 DF CR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 05 DF CR	1,333	0,000	100,000	35,113	29,495	54,293	0,000	0,735	0,000
	1,300	0,033	99,626	34,982	29,385	54,281	0,000	0,733	10,843
	1,257	0,076	98,000	34,411	28,905	54,246	0,000	0,723	19,733
	1,255	0,078	97,900	34,375	28,875	54,244	0,000	0,723	19,733
	1,200	0,133	93,936	32,983	27,706	54,217	0,000	0,700	34,944
	1,100	0,233	85,228	29,926	25,138	54,208	0,000	0,650	34,944
	1,000	0,333	76,520	26,868	22,569	54,198	0,000	0,600	34,944
	0,900	0,433	67,812	23,811	20,001	54,185	0,000	0,549	34,944
	0,800	0,533	59,104	20,753	17,433	54,168	0,000	0,499	34,944
	0,700	0,633	50,396	17,695	14,864	54,145	0,000	0,449	34,944
	0,600	0,733	41,688	14,638	12,296	54,112	0,000	0,398	34,944
	0,500	0,833	32,980	11,580	9,727	54,063	0,000	0,348	34,944
	0,400	0,933	24,272	8,523	7,159	53,978	0,000	0,297	34,944
	0,300	1,033	15,564	5,465	4,591	53,797	0,000	0,244	34,944
	0,200	1,133	6,929	2,433	2,044	53,205	0,000	0,186	30,022
	0,100	1,233	1,008	0,354	0,297	51,860	0,000	0,116	6,261
	0,100	1,233	1,000	0,351	0,295	51,857	0,000	0,115	6,203
	0,000	1,333	0,000	0,000	0,000	50,444	0,000	0,040	0,000

Tank Calibrations - Tanque GO 05 DF BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
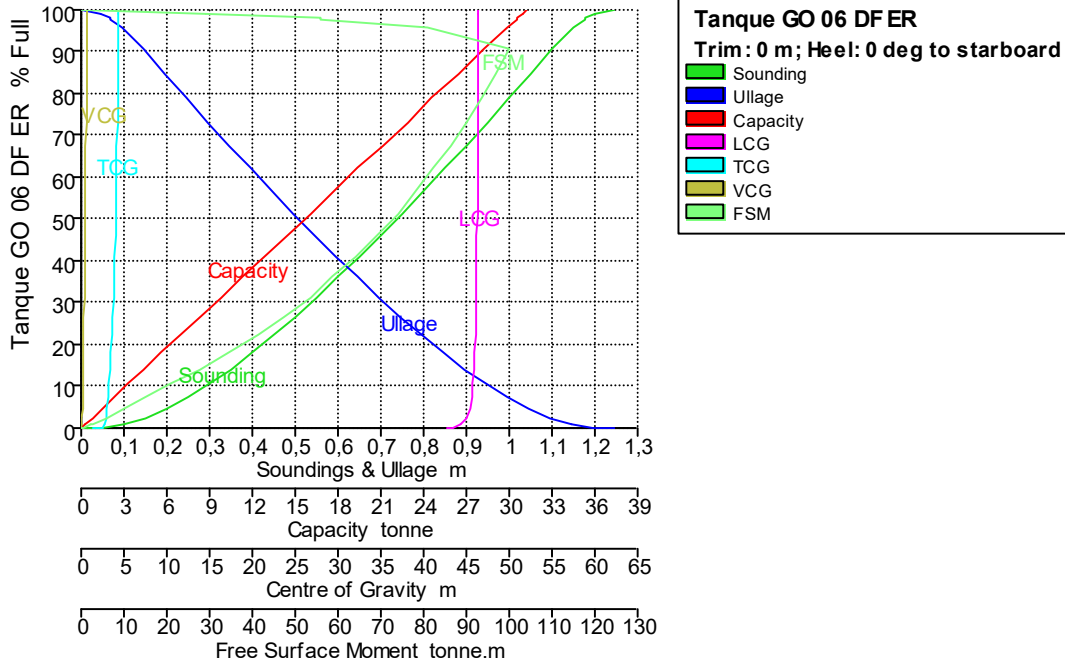Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 05 DF BR	1,238	0,000	100,000	29,327	24,635	54,056	-3,952	0,853	0,000
	1,200	0,038	99,351	29,137	24,475	54,034	-3,951	0,850	13,128
	1,171	0,067	98,000	28,741	24,142	54,001	-3,948	0,844	27,451
	1,170	0,068	97,900	28,711	24,118	53,999	-3,948	0,843	27,412
	1,150	0,088	96,487	28,297	23,770	53,975	-3,943	0,836	35,592
	1,100	0,138	91,177	26,740	22,461	53,942	-3,921	0,812	59,419
	1,050	0,188	85,118	24,963	20,969	53,933	-3,890	0,784	57,030
	1,000	0,238	79,151	23,213	19,499	53,923	-3,858	0,755	54,651
	0,950	0,288	73,281	21,491	18,053	53,912	-3,824	0,727	52,087
	0,900	0,338	67,512	19,800	16,632	53,900	-3,789	0,698	49,580
	0,850	0,388	61,850	18,139	15,237	53,887	-3,751	0,670	47,021
	0,800	0,438	56,302	16,512	13,870	53,872	-3,711	0,641	44,264
	0,750	0,488	50,876	14,921	12,533	53,856	-3,668	0,612	41,573
	0,700	0,538	45,580	13,367	11,229	53,837	-3,622	0,583	38,688
	0,650	0,588	40,425	11,856	9,959	53,815	-3,573	0,554	35,793
	0,600	0,638	35,422	10,388	8,726	53,790	-3,519	0,525	32,776
	0,550	0,688	30,586	8,970	7,535	53,759	-3,460	0,496	29,658
	0,500	0,738	25,933	7,605	6,389	53,721	-3,394	0,467	26,474
	0,450	0,788	21,486	6,301	5,293	53,674	-3,321	0,437	23,174
	0,400	0,838	17,271	5,065	4,255	53,611	-3,238	0,407	19,722
	0,350	0,888	13,330	3,909	3,284	53,526	-3,143	0,376	16,230
	0,300	0,938	9,723	2,852	2,395	53,406	-3,032	0,345	12,491
	0,250	0,988	6,543	1,919	1,612	53,228	-2,907	0,312	8,649
	0,200	1,038	3,896	1,143	0,960	52,942	-2,772	0,279	5,175
	0,150	1,088	1,887	0,553	0,465	52,441	-2,636	0,244	2,538
	0,118	1,120	1,000	0,293	0,246	52,023	-2,544	0,220	1,279
	0,100	1,138	0,646	0,189	0,159	51,786	-2,487	0,206	0,795
	0,050	1,188	0,099	0,029	0,024	51,119	-2,273	0,132	0,098

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,000	1,238	0,000	0,000	0,000	50,444	-1,335	0,135	0,000

Tank Calibrations - Tanque GO 06 DF ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
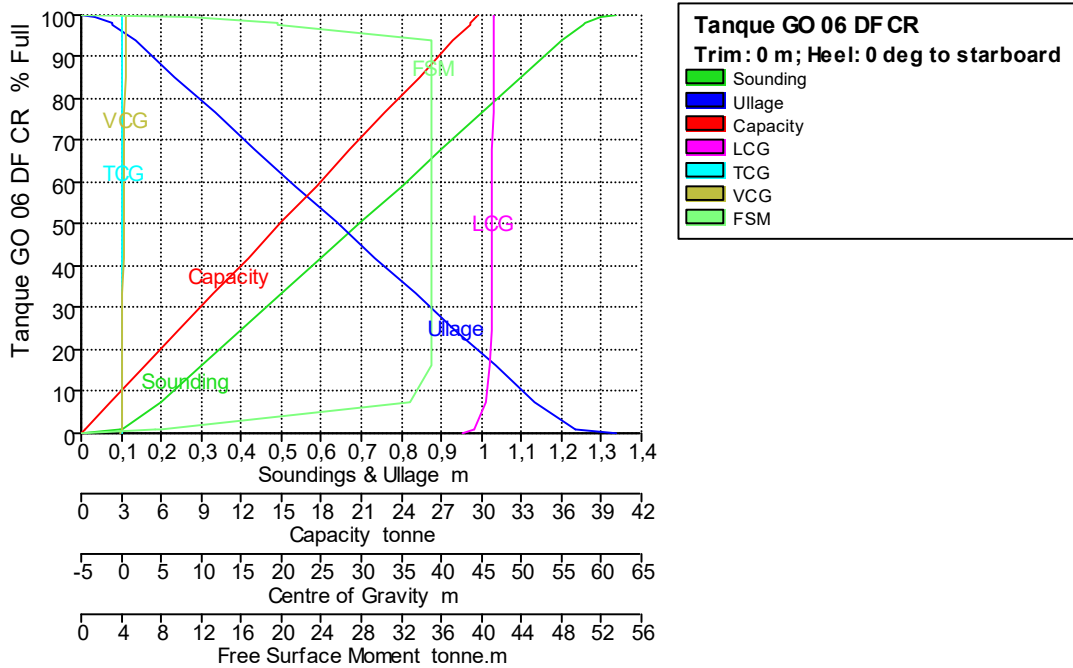Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 06 DF ER	1,245	0,000	100,000	37,124	31,185	46,441	4,380	0,716	0,000
	1,200	0,045	99,079	36,782	30,897	46,413	4,376	0,711	29,243
	1,179	0,066	98,000	36,382	30,561	46,388	4,371	0,706	55,891
	1,177	0,067	97,900	36,345	30,530	46,387	4,371	0,706	55,848
	1,150	0,095	95,867	35,590	29,896	46,356	4,361	0,696	81,012
	1,100	0,145	90,470	33,586	28,213	46,334	4,332	0,670	99,897
	1,050	0,195	84,664	31,431	26,402	46,327	4,299	0,642	96,925
	1,000	0,245	78,920	29,299	24,611	46,319	4,263	0,614	93,659
	0,950	0,295	73,246	27,192	22,842	46,309	4,225	0,586	90,094
	0,900	0,345	67,648	25,114	21,096	46,299	4,183	0,558	86,497
	0,850	0,395	62,132	23,066	19,376	46,287	4,139	0,530	82,443
	0,800	0,445	56,710	21,053	17,685	46,274	4,092	0,501	78,261
	0,750	0,495	51,385	19,076	16,024	46,258	4,040	0,473	73,912
	0,700	0,545	46,173	17,141	14,399	46,240	3,984	0,444	69,017
	0,650	0,595	41,082	15,251	12,811	46,218	3,923	0,415	64,266
	0,600	0,645	36,128	13,412	11,266	46,191	3,856	0,386	58,737
	0,550	0,695	31,327	11,630	9,769	46,159	3,783	0,356	53,457
	0,500	0,745	26,700	9,912	8,326	46,119	3,701	0,327	47,304
	0,450	0,795	22,270	8,267	6,945	46,068	3,610	0,297	41,309
	0,400	0,845	18,074	6,710	5,636	46,002	3,508	0,266	34,704
	0,350	0,895	14,156	5,255	4,415	45,913	3,395	0,236	27,832
	0,300	0,945	10,581	3,928	3,299	45,794	3,272	0,204	21,088
	0,250	0,995	7,404	2,749	2,309	45,623	3,143	0,173	14,908

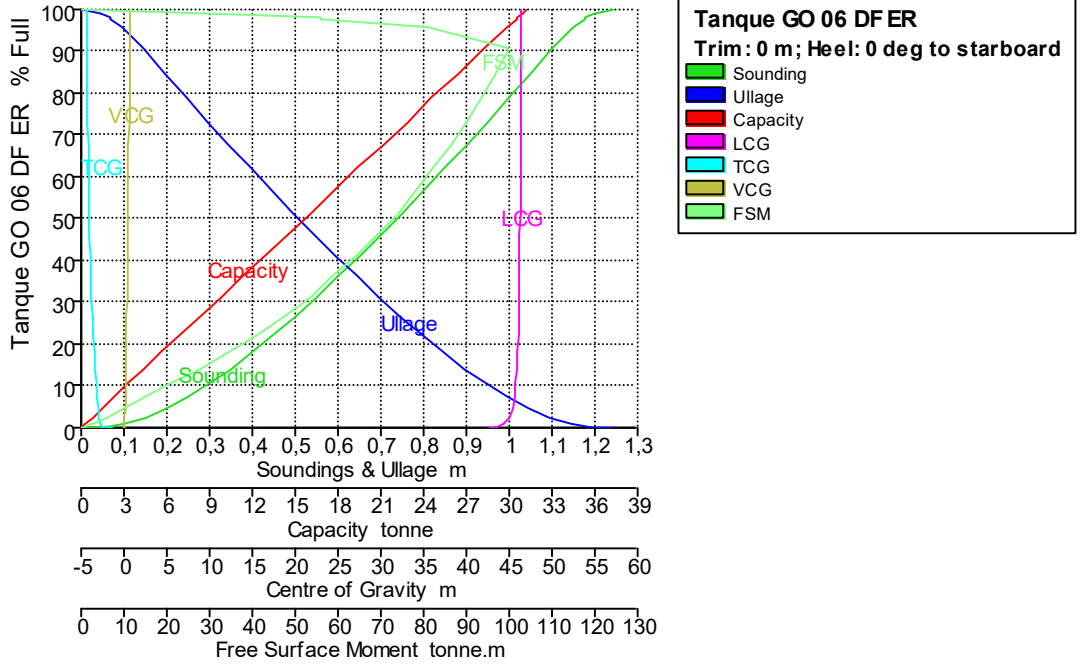| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,200	1,045	4,679	1,737	1,459	45,356	3,008	0,141	9,797
	0,150	1,095	2,480	0,921	0,773	44,896	2,873	0,108	5,753
	0,102	1,143	1,000	0,371	0,312	44,250	2,740	0,074	2,525
	0,100	1,145	0,965	0,358	0,301	44,229	2,735	0,073	2,437
	0,050	1,195	0,180	0,067	0,056	43,481	2,537	0,034	0,554
	0,000	1,245	0,000	0,000	0,000	42,644	1,334	0,002	0,000

Tank Calibrations - Tanque GO 06 DF CR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 06 DF CR	1,335	0,000	100,000	35,390	29,728	46,499	0,000	0,605	0,000
	1,300	0,035	99,576	35,240	29,602	46,486	0,000	0,602	10,843
	1,259	0,076	98,000	34,682	29,133	46,452	0,000	0,593	19,733
	1,256	0,078	97,900	34,647	29,103	46,450	0,000	0,592	19,733
	1,200	0,135	93,813	33,200	27,888	46,424	0,000	0,569	34,944
	1,100	0,235	85,173	30,143	25,320	46,416	0,000	0,518	34,944
	1,000	0,335	76,533	27,085	22,752	46,406	0,000	0,468	34,944
	0,900	0,435	67,893	24,028	20,183	46,395	0,000	0,418	34,944
	0,800	0,535	59,254	20,970	17,615	46,379	0,000	0,368	34,944
	0,700	0,635	50,614	17,912	15,046	46,358	0,000	0,318	34,944
	0,600	0,735	41,974	14,855	12,478	46,329	0,000	0,267	34,944
	0,500	0,835	33,335	11,797	9,910	46,285	0,000	0,217	34,944
	0,400	0,935	24,695	8,740	7,341	46,210	0,000	0,166	34,944
	0,300	1,035	16,055	5,682	4,773	46,054	0,000	0,114	34,944
	0,200	1,135	7,433	2,630	2,210	45,545	0,000	0,058	32,848
	0,100	1,235	1,053	0,373	0,313	44,113	0,000	-0,012	7,887
	0,098	1,236	1,000	0,354	0,297	44,090	0,000	-0,013	7,461
	0,000	1,335	0,000	0,000	0,000	42,644	0,000	-0,088	0,000

Tank Calibrations - Tanque GO 06 DF ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
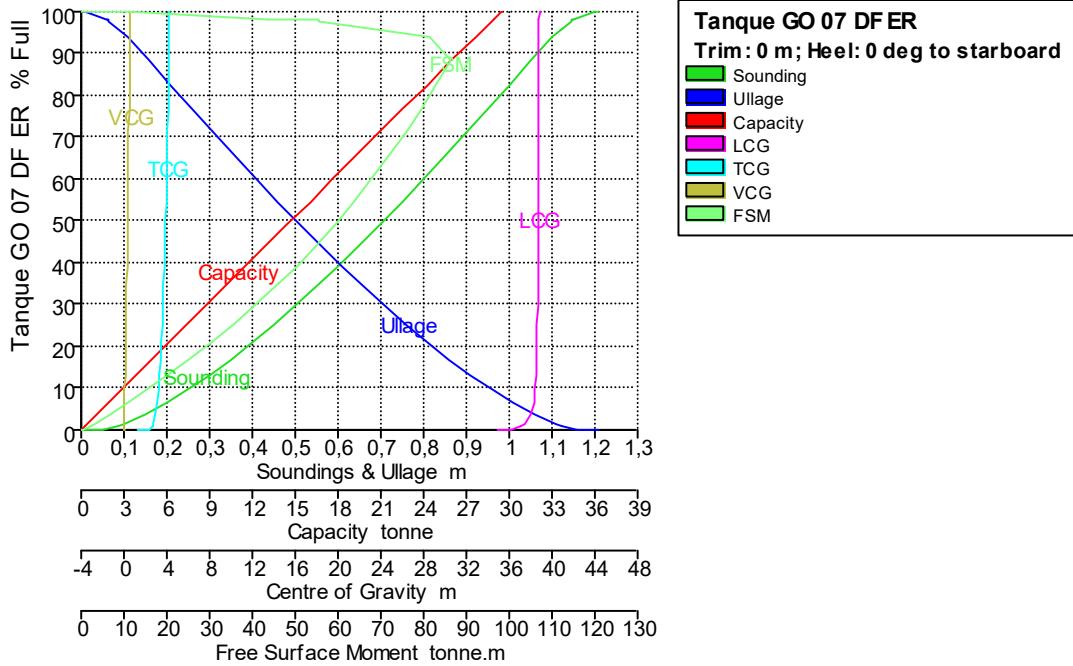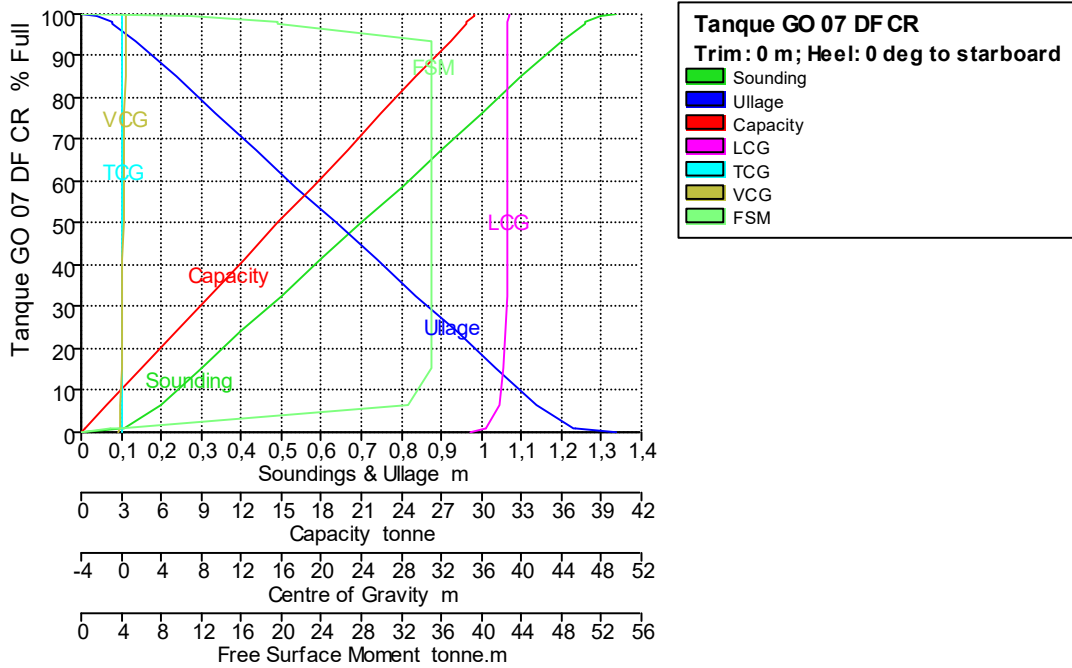Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 06 DF ER	1,245	0,000	100,000	37,124	31,185	46,441	-4,380	0,716	0,000
	1,200	0,045	99,079	36,782	30,897	46,413	-4,376	0,711	29,243
	1,179	0,066	98,000	36,382	30,561	46,388	-4,371	0,706	55,891
	1,177	0,067	97,900	36,345	30,530	46,387	-4,371	0,706	55,848
	1,150	0,095	95,867	35,590	29,896	46,356	-4,361	0,696	81,012
	1,100	0,145	90,470	33,586	28,213	46,334	-4,332	0,670	99,897
	1,050	0,195	84,664	31,431	26,402	46,327	-4,299	0,642	96,925
	1,000	0,245	78,920	29,299	24,611	46,319	-4,263	0,614	93,659
	0,950	0,295	73,246	27,192	22,842	46,309	-4,225	0,586	90,094
	0,900	0,345	67,648	25,114	21,096	46,299	-4,183	0,558	86,497
	0,850	0,395	62,132	23,066	19,376	46,287	-4,139	0,530	82,443
	0,800	0,445	56,710	21,053	17,685	46,274	-4,092	0,501	78,261
	0,750	0,495	51,385	19,076	16,024	46,258	-4,040	0,473	73,912
	0,700	0,545	46,173	17,141	14,399	46,240	-3,984	0,444	69,017
	0,650	0,595	41,082	15,251	12,811	46,218	-3,923	0,415	64,266
	0,600	0,645	36,128	13,412	11,266	46,191	-3,856	0,386	58,737
	0,550	0,695	31,327	11,630	9,769	46,159	-3,783	0,356	53,457
	0,500	0,745	26,700	9,912	8,326	46,119	-3,701	0,327	47,304
	0,450	0,795	22,270	8,267	6,945	46,068	-3,610	0,297	41,309
	0,400	0,845	18,074	6,710	5,636	46,002	-3,508	0,266	34,704
	0,350	0,895	14,156	5,255	4,415	45,913	-3,395	0,236	27,832
	0,300	0,945	10,581	3,928	3,299	45,794	-3,272	0,204	21,088
	0,250	0,995	7,404	2,749	2,309	45,623	-3,143	0,173	14,908
	0,200	1,045	4,679	1,737	1,459	45,356	-3,008	0,141	9,797
	0,150	1,095	2,480	0,921	0,773	44,896	-2,873	0,108	5,753
	0,102	1,143	1,000	0,371	0,312	44,250	-2,740	0,074	2,525

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,100	1,145	0,965	0,358	0,301	44,229	-2,735	0,073	2,437
	0,050	1,195	0,180	0,067	0,056	43,481	-2,537	0,034	0,554
	0,000	1,245	0,000	0,000	0,000	42,644	-1,334	0,002	0,000

Tank Calibrations - Tanque GO 07 DF ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 07 DF ER	1,210	0,000	100,000	35,036	29,430	38,828	4,252	0,594	0,000
	1,200	0,010	99,938	35,014	29,412	38,826	4,252	0,594	11,340
	1,150	0,060	98,177	34,397	28,893	38,782	4,241	0,585	43,530
	1,147	0,063	98,000	34,335	28,841	38,778	4,240	0,584	55,558
	1,145	0,065	97,900	34,300	28,812	38,777	4,240	0,584	55,508
	1,100	0,110	94,059	32,954	27,682	38,733	4,217	0,565	81,432
	1,050	0,160	88,252	30,919	25,972	38,726	4,184	0,538	86,367
	1,000	0,210	82,402	28,870	24,251	38,723	4,149	0,509	82,914
	0,950	0,260	76,635	26,849	22,554	38,719	4,111	0,481	79,384
	0,900	0,310	70,954	24,859	20,882	38,715	4,071	0,453	75,714
	0,850	0,360	65,368	22,902	19,238	38,710	4,029	0,424	71,819
	0,800	0,410	59,883	20,980	17,623	38,705	3,985	0,396	67,882
	0,750	0,460	54,505	19,096	16,041	38,698	3,937	0,367	63,704
	0,700	0,510	49,247	17,254	14,493	38,690	3,886	0,338	59,397
	0,650	0,560	44,116	15,456	12,983	38,681	3,832	0,310	54,975
	0,600	0,610	39,124	13,707	11,514	38,669	3,773	0,281	50,322
	0,550	0,660	34,284	12,012	10,090	38,655	3,710	0,252	45,607
	0,500	0,710	29,614	10,375	8,715	38,637	3,642	0,223	40,637
	0,450	0,760	25,129	8,804	7,395	38,615	3,568	0,194	35,576
	0,400	0,810	20,855	7,307	6,138	38,586	3,487	0,164	30,414
	0,350	0,860	16,816	5,892	4,949	38,549	3,400	0,135	25,223

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,300	0,910	13,040	4,569	3,838	38,499	3,303	0,106	20,224
	0,250	0,960	9,555	3,348	2,812	38,426	3,195	0,076	15,516
	0,200	1,010	6,403	2,243	1,885	38,309	3,071	0,047	11,101
	0,150	1,060	3,647	1,278	1,073	38,082	2,921	0,017	6,992
	0,100	1,110	1,412	0,495	0,415	37,451	2,725	-0,015	3,322
	0,088	1,122	1,000	0,350	0,294	37,167	2,668	-0,023	2,499
	0,050	1,160	0,178	0,062	0,052	36,134	2,376	-0,062	0,424
	0,000	1,210	0,000	0,000	0,000	34,844	1,334	-0,089	0,000

Tank Calibrations - Tanque GO 07 DF CR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
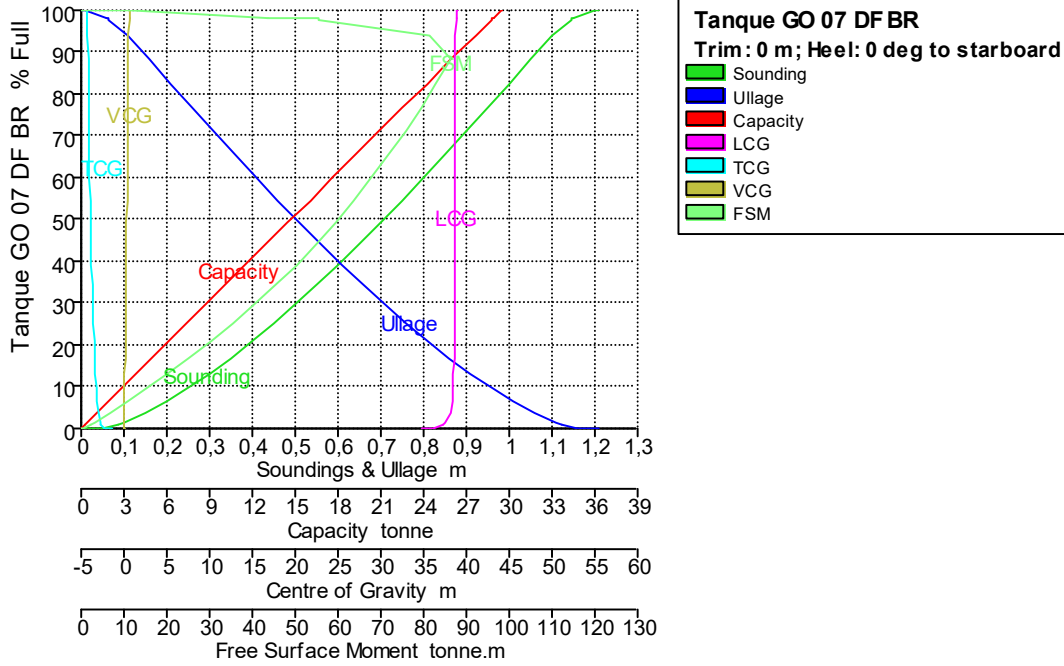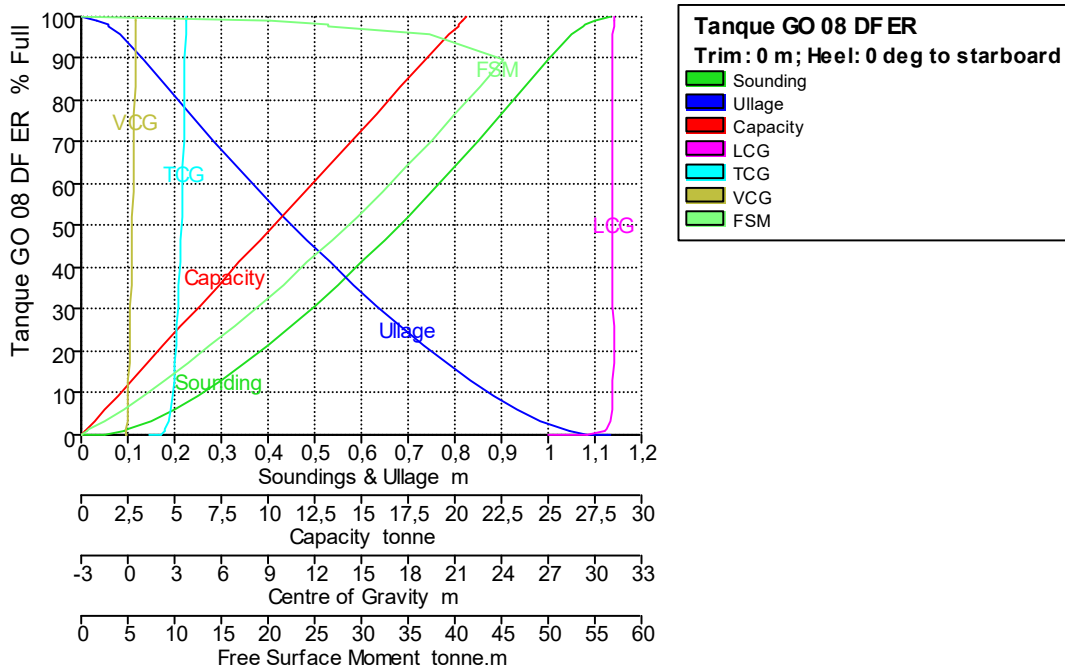Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 07 DF CR	1,337	0,000	100,000	35,155	29,530	38,708	0,000	0,483	0,000
	1,300	0,037	99,520	34,987	29,389	38,693	0,000	0,480	10,843
	1,261	0,076	98,000	34,452	28,940	38,661	0,000	0,471	19,733
	1,259	0,078	97,900	34,417	28,910	38,659	0,000	0,470	19,733
	1,200	0,137	93,600	32,905	27,640	38,633	0,000	0,445	34,944
	1,100	0,237	84,902	29,848	25,072	38,626	0,000	0,395	34,944
	1,000	0,337	76,205	26,790	22,504	38,617	0,000	0,345	34,944
	0,900	0,437	67,507	23,732	19,935	38,607	0,000	0,295	34,944
	0,800	0,537	58,810	20,675	17,367	38,593	0,000	0,245	34,944
	0,700	0,637	50,112	17,617	14,798	38,574	0,000	0,195	34,944
	0,600	0,737	41,415	14,560	12,230	38,548	0,000	0,144	34,944
	0,500	0,837	32,718	11,502	9,662	38,507	0,000	0,094	34,944
	0,400	0,937	24,020	8,444	7,093	38,438	0,000	0,043	34,944
	0,300	1,037	15,323	5,387	4,525	38,289	0,000	-0,009	34,944
	0,200	1,137	6,640	2,334	1,961	37,759	0,000	-0,067	32,593
	0,107	1,229	1,000	0,352	0,295	36,462	0,000	-0,136	3,947

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,100	1,237	0,804	0,283	0,237	36,353	0,000	-0,140	2,840
	0,000	1,337	0,000	0,000	0,000	34,844	0,000	-0,216	0,000

Tank Calibrations - Tanque GO 07 DF BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 07 DF BR	1,210	0,000	100,000	35,031	29,426	38,829	-4,252	0,594	0,000
	1,200	0,010	99,939	35,010	29,408	38,826	-4,252	0,594	11,340
	1,150	0,060	98,179	34,394	28,891	38,782	-4,241	0,585	43,530
	1,147	0,064	98,000	34,331	28,838	38,778	-4,240	0,584	55,556
	1,145	0,065	97,900	34,296	28,808	38,777	-4,239	0,584	55,506
	1,100	0,110	94,068	32,953	27,681	38,733	-4,217	0,565	81,432
	1,050	0,160	88,262	30,919	25,972	38,726	-4,184	0,538	86,367
	1,000	0,210	82,412	28,870	24,251	38,723	-4,149	0,509	82,914
	0,950	0,260	76,644	26,849	22,554	38,719	-4,111	0,481	79,384
	0,900	0,310	70,962	24,859	20,882	38,715	-4,071	0,453	75,714
	0,850	0,360	65,376	22,902	19,238	38,710	-4,029	0,424	71,819
	0,800	0,410	59,890	20,980	17,623	38,705	-3,985	0,396	67,882
	0,750	0,460	54,512	19,096	16,041	38,698	-3,937	0,367	63,704
	0,700	0,510	49,253	17,254	14,493	38,690	-3,886	0,338	59,397
	0,650	0,560	44,121	15,456	12,983	38,681	-3,832	0,310	54,975
	0,600	0,610	39,129	13,707	11,514	38,669	-3,773	0,281	50,322
	0,550	0,660	34,288	12,012	10,090	38,655	-3,710	0,252	45,607
	0,500	0,710	29,617	10,375	8,715	38,637	-3,642	0,223	40,637
	0,450	0,760	25,132	8,804	7,395	38,615	-3,568	0,194	35,576
	0,400	0,810	20,858	7,307	6,138	38,586	-3,487	0,164	30,414
	0,350	0,860	16,818	5,892	4,949	38,549	-3,400	0,135	25,223
	0,300	0,910	13,041	4,569	3,838	38,499	-3,303	0,106	20,224

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,250	0,960	9,556	3,348	2,812	38,426	-3,195	0,076	15,516
	0,200	1,010	6,404	2,243	1,885	38,309	-3,071	0,047	11,101
	0,150	1,060	3,647	1,278	1,073	38,082	-2,921	0,017	6,992
	0,100	1,110	1,412	0,495	0,415	37,451	-2,725	-0,015	3,322
	0,088	1,122	1,000	0,350	0,294	37,167	-2,668	-0,023	2,498
	0,050	1,160	0,178	0,062	0,052	36,134	-2,376	-0,062	0,424
	0,000	1,210	0,000	0,000	0,000	34,844	-1,334	-0,089	0,000

Tank Calibrations - Tanque GO 08 DF ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
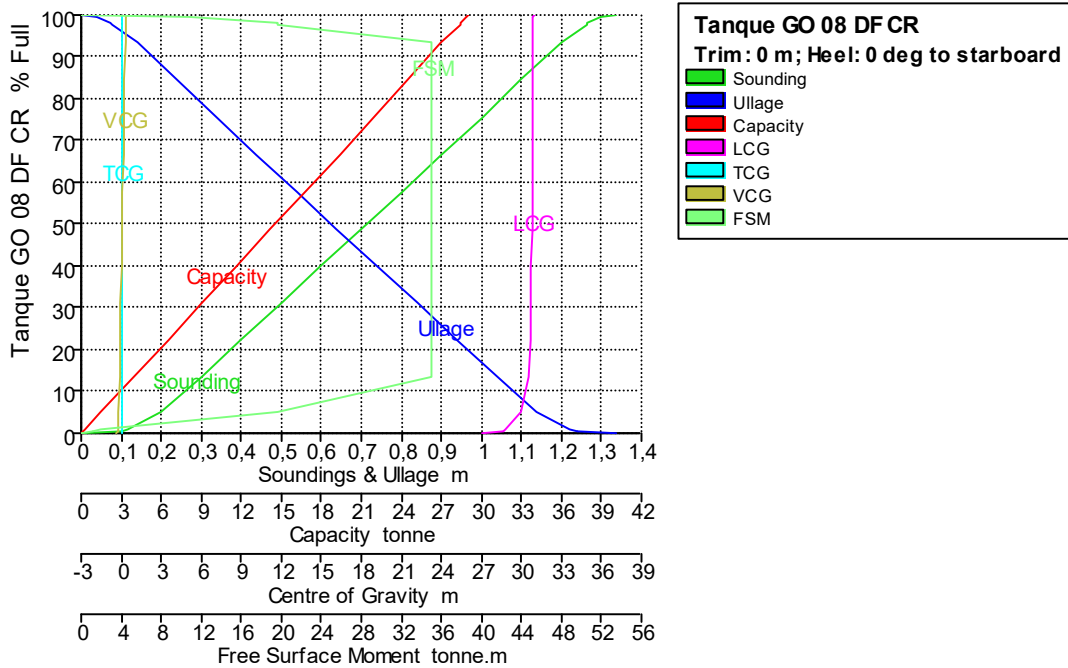Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 08 DF ER	1,135	0,000	100,000	24,512	20,590	31,265	3,749	0,514	0,000
	1,100	0,035	99,220	24,320	20,429	31,243	3,743	0,510	20,114
	1,078	0,057	98,000	24,022	20,178	31,217	3,735	0,505	26,526
	1,077	0,058	97,900	23,997	20,157	31,215	3,734	0,504	26,489
	1,050	0,085	95,688	23,455	19,702	31,183	3,720	0,495	37,243
	1,000	0,135	89,755	22,000	18,480	31,159	3,687	0,469	45,206
	0,950	0,185	83,150	20,382	17,120	31,162	3,651	0,440	42,652
	0,900	0,235	76,681	18,796	15,788	31,165	3,614	0,411	40,099
	0,850	0,285	70,354	17,245	14,486	31,168	3,575	0,381	37,492
	0,800	0,335	64,179	15,731	13,214	31,171	3,533	0,352	34,870
	0,750	0,385	58,162	14,257	11,976	31,174	3,490	0,323	32,235
	0,700	0,435	52,315	12,823	10,772	31,177	3,444	0,294	29,560
	0,650	0,485	46,647	11,434	9,605	31,180	3,396	0,264	26,909
	0,600	0,535	41,170	10,091	8,477	31,183	3,345	0,235	24,227
	0,550	0,585	35,896	8,799	7,391	31,185	3,291	0,205	21,584
	0,500	0,635	30,840	7,559	6,350	31,187	3,233	0,176	18,944
	0,450	0,685	26,018	6,377	5,357	31,189	3,170	0,146	16,369

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,400	0,735	21,448	5,257	4,416	31,189	3,102	0,117	13,825
	0,350	0,785	17,154	4,205	3,532	31,188	3,027	0,087	11,376
	0,300	0,835	13,164	3,227	2,711	31,182	2,943	0,057	8,996
	0,250	0,885	9,516	2,332	1,959	31,169	2,847	0,028	6,709
	0,200	0,935	6,260	1,534	1,289	31,138	2,732	-0,003	4,561
	0,150	0,985	3,477	0,852	0,716	31,055	2,586	-0,033	2,586
	0,100	1,035	1,320	0,323	0,272	30,752	2,374	-0,066	0,840
	0,090	1,045	1,000	0,245	0,206	30,618	2,323	-0,073	0,554
	0,050	1,085	0,174	0,043	0,036	29,465	2,139	-0,102	0,034
	0,000	1,135	0,000	0,000	0,000	27,044	1,334	-0,140	0,000

Tank Calibrations - Tanque GO 08 DF CR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
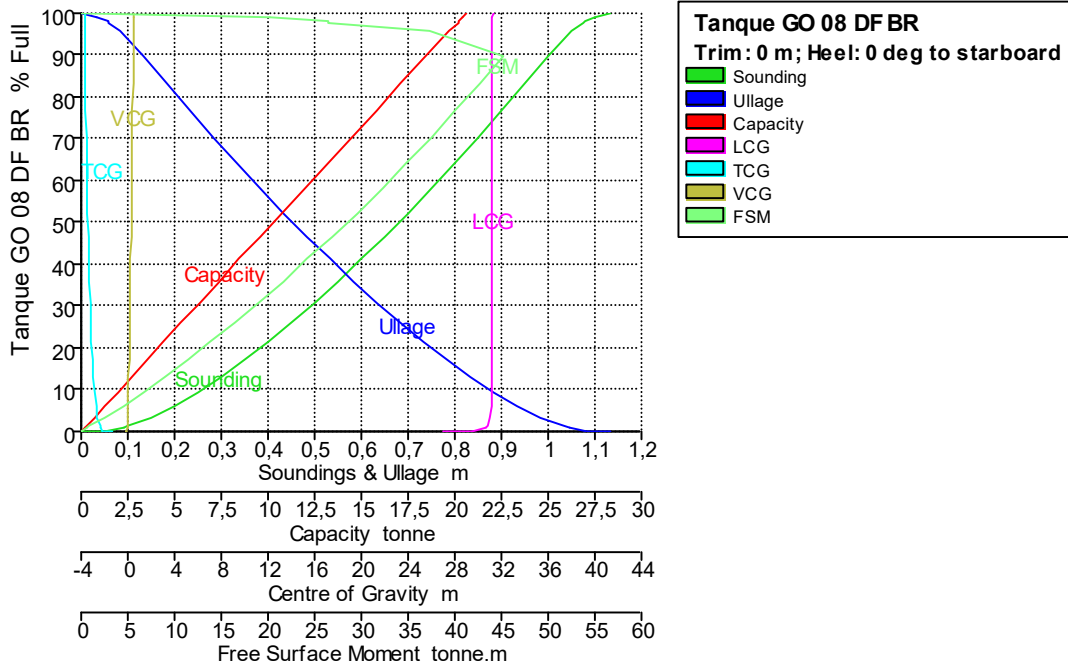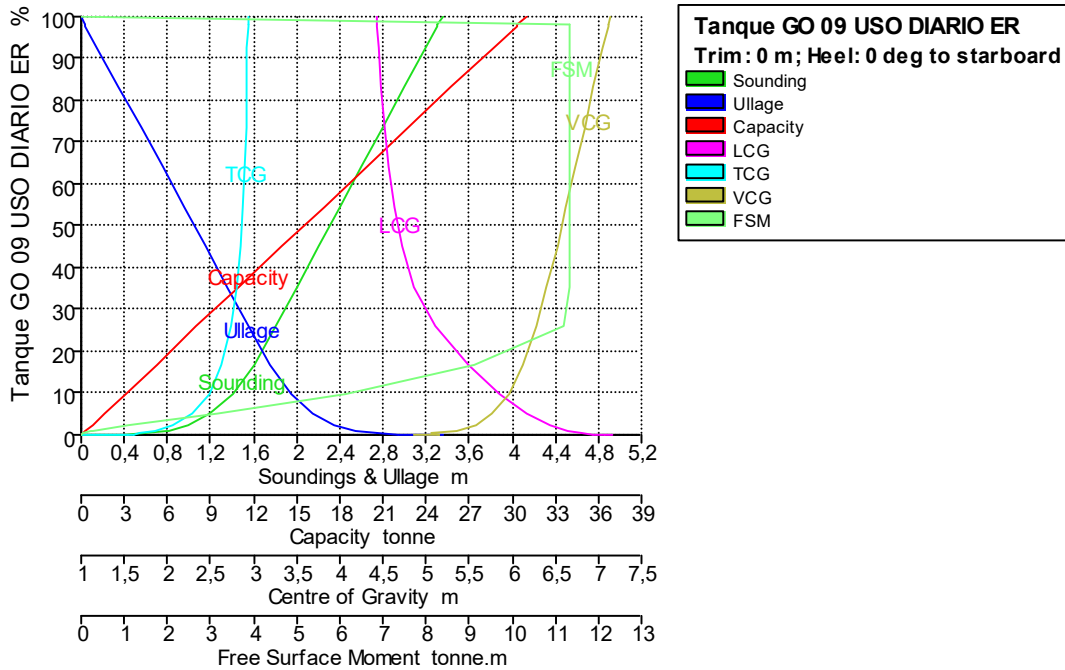Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 08 DF CR	1,339	0,000	100,000	34,504	28,983	30,916	0,000	0,367	0,000
	1,300	0,039	99,457	34,317	28,826	30,900	0,000	0,364	10,843
	1,263	0,075	98,000	33,814	28,404	30,869	0,000	0,355	19,733
	1,261	0,077	97,900	33,779	28,375	30,867	0,000	0,355	19,733
	1,200	0,139	93,304	32,194	27,043	30,840	0,000	0,329	34,944
	1,100	0,239	84,442	29,136	24,474	30,833	0,000	0,278	34,944
	1,000	0,339	75,581	26,078	21,906	30,826	0,000	0,228	34,944
	0,900	0,439	66,719	23,021	19,337	30,816	0,000	0,178	34,944
	0,800	0,539	57,858	19,963	16,769	30,803	0,000	0,128	34,944
	0,700	0,639	48,996	16,906	14,201	30,785	0,000	0,077	34,944
	0,600	0,739	40,134	13,848	11,632	30,760	0,000	0,027	34,944
	0,500	0,839	31,273	10,790	9,064	30,720	0,000	-0,024	34,944
	0,400	0,939	22,411	7,733	6,496	30,649	0,000	-0,076	34,944
	0,300	1,039	13,550	4,675	3,927	30,485	0,000	-0,130	34,944

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,200	1,139	5,018	1,731	1,454	29,923	0,000	-0,194	19,641
	0,116	1,222	1,000	0,345	0,290	28,842	0,000	-0,257	1,989
	0,100	1,239	0,634	0,219	0,184	28,583	0,000	-0,269	1,075
	0,000	1,339	0,000	0,000	0,000	27,044	0,000	-0,344	0,000

Tank Calibrations - Tanque GO 08 DF BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 08 DF BR	1,135	0,000	100,000	24,512	20,590	31,265	-3,749	0,514	0,000
	1,100	0,035	99,220	24,320	20,429	31,243	-3,743	0,510	20,114
	1,078	0,057	98,000	24,022	20,178	31,217	-3,735	0,505	26,526
	1,077	0,058	97,900	23,997	20,157	31,215	-3,734	0,504	26,489
	1,050	0,085	95,688	23,455	19,702	31,183	-3,720	0,495	37,243
	1,000	0,135	89,755	22,000	18,480	31,159	-3,687	0,469	45,206
	0,950	0,185	83,150	20,382	17,120	31,162	-3,651	0,440	42,652
	0,900	0,235	76,681	18,796	15,788	31,165	-3,614	0,411	40,099
	0,850	0,285	70,354	17,245	14,486	31,168	-3,575	0,381	37,492
	0,800	0,335	64,179	15,731	13,214	31,171	-3,533	0,352	34,870
	0,750	0,385	58,162	14,257	11,976	31,174	-3,490	0,323	32,235
	0,700	0,435	52,315	12,823	10,772	31,177	-3,444	0,294	29,560
	0,650	0,485	46,647	11,434	9,605	31,180	-3,396	0,264	26,909
	0,600	0,535	41,170	10,091	8,477	31,183	-3,345	0,235	24,227
	0,550	0,585	35,896	8,799	7,391	31,185	-3,291	0,205	21,584
	0,500	0,635	30,840	7,559	6,350	31,187	-3,233	0,176	18,944
	0,450	0,685	26,018	6,377	5,357	31,189	-3,170	0,146	16,369
	0,400	0,735	21,448	5,257	4,416	31,189	-3,102	0,117	13,825
	0,350	0,785	17,154	4,205	3,532	31,188	-3,027	0,087	11,376
	0,300	0,835	13,164	3,227	2,711	31,182	-2,943	0,057	8,996

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,250	0,885	9,516	2,332	1,959	31,169	-2,847	0,028	6,709
	0,200	0,935	6,260	1,534	1,289	31,138	-2,732	-0,003	4,561
	0,150	0,985	3,477	0,852	0,716	31,055	-2,586	-0,033	2,586
	0,100	1,035	1,320	0,323	0,272	30,752	-2,374	-0,066	0,840
	0,090	1,045	1,000	0,245	0,206	30,618	-2,323	-0,073	0,554
	0,050	1,085	0,174	0,043	0,036	29,465	-2,139	-0,102	0,034
	0,000	1,135	0,000	0,000	0,000	27,044	-1,334	-0,140	0,000

Tank Calibrations - Tanque GO 09 USO DIARIO ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
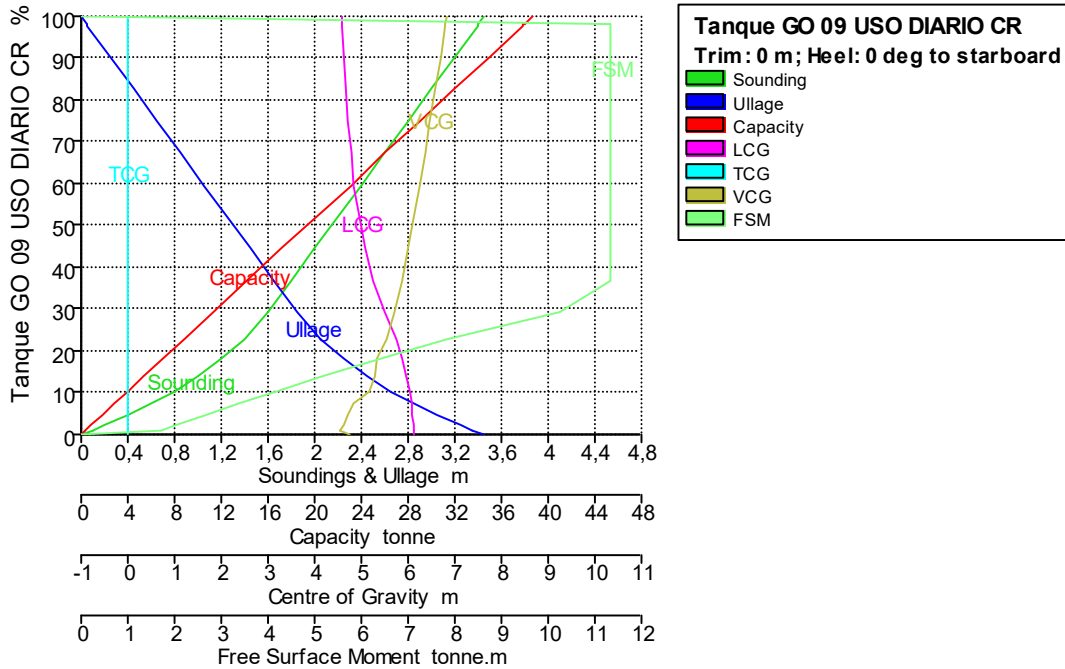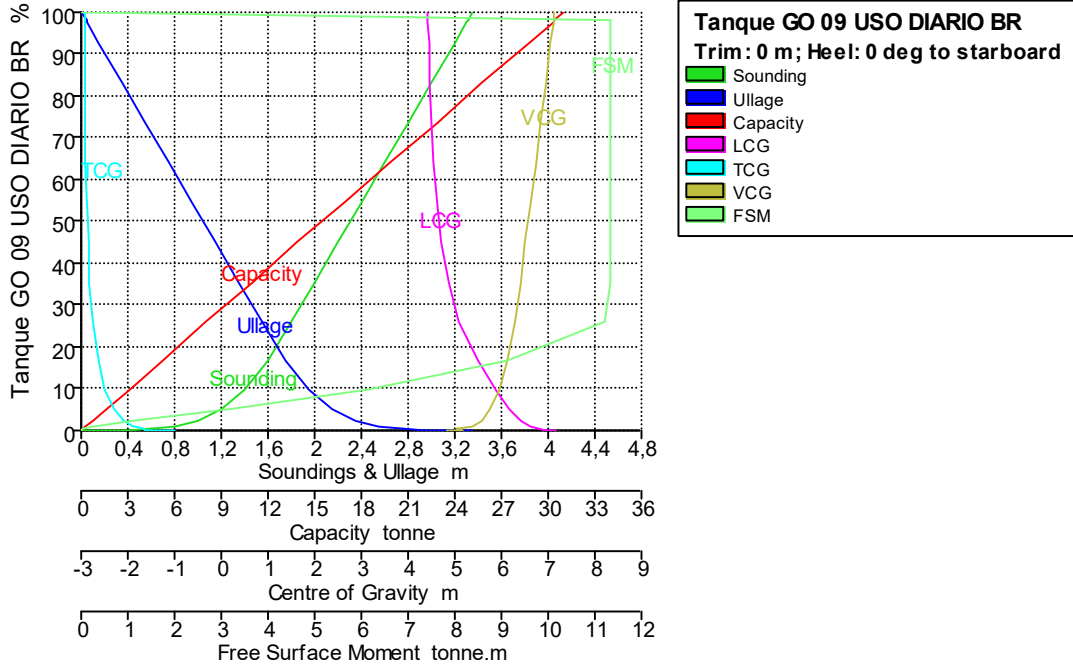Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 09 USO DIARIO ER	3,352	0,000	100,000	36,898	30,994	4,432	2,934	7,128	0,000
	3,310	0,042	98,000	36,160	30,374	4,437	2,933	7,107	11,340
	3,308	0,044	97,900	36,123	30,343	4,437	2,932	7,106	11,340
	3,200	0,152	92,741	34,220	28,744	4,450	2,929	7,050	11,340
	3,000	0,352	83,180	30,692	25,781	4,479	2,921	6,947	11,340
	2,800	0,552	73,618	27,164	22,817	4,515	2,910	6,843	11,340
	2,600	0,752	64,057	23,636	19,854	4,562	2,897	6,738	11,340
	2,400	0,952	54,495	20,108	16,890	4,626	2,879	6,630	11,340
	2,200	1,152	44,934	16,580	13,927	4,716	2,853	6,520	11,340
	2,000	1,352	35,372	13,052	10,963	4,856	2,813	6,405	11,340
	1,800	1,552	25,815	9,525	8,001	5,098	2,743	6,277	11,195
	1,600	1,752	16,869	6,224	5,228	5,486	2,634	6,132	9,137
	1,400	1,952	9,998	3,689	3,099	5,860	2,488	5,974	6,120
	1,200	2,152	5,285	1,950	1,638	6,171	2,286	5,762	3,158
	1,000	2,352	2,439	0,900	0,756	6,430	2,065	5,582	1,069
	0,807	2,545	1,000	0,369	0,310	6,636	1,857	5,366	0,260
	0,800	2,552	0,965	0,356	0,299	6,642	1,851	5,366	0,246

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,600	2,752	0,322	0,119	0,100	6,804	1,669	5,053	0,032
	0,400	2,952	0,080	0,030	0,025	6,943	1,616	5,153	0,003
	0,200	3,152	0,009	0,003	0,003	7,070	1,545	4,992	0,000
	0,000	3,352	0,000	0,000	0,000	7,166	1,000	4,848	0,000

## Tank Calibrations - Tanque GO 09 USO DIARIO CR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 09 USO DIARIO CR	3,450	0,000	100,000	46,051	38,682	4,589	0,000	6,821	0,000
	3,400	0,050	98,069	45,161	37,936	4,596	0,000	6,794	11,340
	3,398	0,052	98,000	45,130	37,909	4,597	0,000	6,794	11,340
	3,396	0,055	97,900	45,083	37,870	4,597	0,000	6,792	11,340
	3,200	0,250	90,408	41,633	34,972	4,630	0,000	6,688	11,340
	3,000	0,450	82,747	38,105	32,009	4,670	0,000	6,581	11,340
	2,800	0,650	75,086	34,577	29,045	4,718	0,000	6,472	11,340
	2,600	0,850	67,425	31,049	26,082	4,777	0,000	6,360	11,340
	2,400	1,050	59,764	27,521	23,118	4,851	0,000	6,246	11,340
	2,200	1,250	52,102	23,993	20,155	4,946	0,000	6,128	11,340
	2,000	1,450	44,441	20,465	17,191	5,075	0,000	6,004	11,340
	1,800	1,650	36,780	16,937	14,227	5,257	0,000	5,870	11,340
	1,600	1,850	29,234	13,462	11,308	5,519	0,000	5,720	10,247
	1,400	2,050	22,918	10,554	8,865	5,742	0,000	5,533	7,821
	1,200	2,250	17,974	8,277	6,953	5,879	0,000	5,344	6,404
	1,000	2,450	13,822	6,365	5,347	5,977	0,000	5,277	5,179
	0,800	2,650	10,266	4,727	3,971	6,052	0,000	5,186	4,160
	0,600	2,850	7,259	3,343	2,808	6,085	0,000	4,816	3,376
	0,400	3,050	4,572	2,105	1,769	6,103	0,000	4,716	2,648
	0,200	3,250	2,163	0,996	0,837	6,110	0,000	4,615	2,026

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,095	3,355	1,000	0,461	0,387	6,110	0,000	4,562	1,723
	0,000	3,450	0,000	0,000	0,000	6,108	0,000	4,750	0,000

Tank Calibrations - Tanque GO 09 USO DIARIO BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

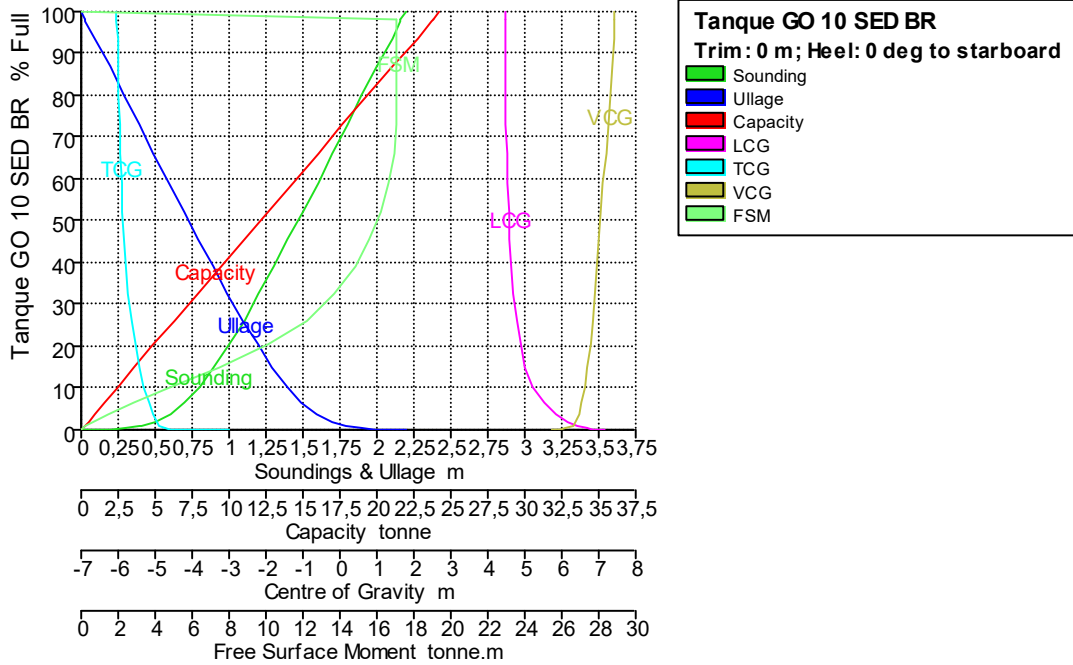| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 09 USO DIARIO BR	3,352	0,000	100,000	36,898	30,994	4,432	-2,934	7,128	0,000
	3,310	0,042	98,000	36,160	30,374	4,437	-2,933	7,107	11,340
	3,308	0,044	97,900	36,123	30,343	4,437	-2,932	7,106	11,340
	3,200	0,152	92,741	34,220	28,744	4,450	-2,929	7,050	11,340
	3,000	0,352	83,180	30,692	25,781	4,479	-2,921	6,947	11,340
	2,800	0,552	73,618	27,164	22,817	4,515	-2,910	6,843	11,340
	2,600	0,752	64,057	23,636	19,854	4,562	-2,897	6,738	11,340
	2,400	0,952	54,495	20,108	16,890	4,626	-2,879	6,630	11,340
	2,200	1,152	44,934	16,580	13,927	4,716	-2,853	6,520	11,340
	2,000	1,352	35,372	13,052	10,963	4,856	-2,813	6,405	11,340
	1,800	1,552	25,815	9,525	8,001	5,098	-2,743	6,277	11,195
	1,600	1,752	16,869	6,224	5,228	5,486	-2,634	6,132	9,137
	1,400	1,952	9,998	3,689	3,099	5,860	-2,488	5,974	6,120
	1,200	2,152	5,285	1,950	1,638	6,171	-2,286	5,762	3,158
	1,000	2,352	2,439	0,900	0,756	6,430	-2,065	5,582	1,069
	0,807	2,545	1,000	0,369	0,310	6,636	-1,857	5,366	0,260
	0,800	2,552	0,965	0,356	0,299	6,642	-1,851	5,366	0,246
	0,600	2,752	0,322	0,119	0,100	6,804	-1,669	5,053	0,032
	0,400	2,952	0,080	0,030	0,025	6,943	-1,616	5,153	0,003
	0,200	3,152	0,009	0,003	0,003	7,070	-1,545	4,992	0,000
	0,000	3,352	0,000	0,000	0,000	7,166	-1,000	4,848	0,000

Tank Calibrations - Tanque GO 10 SED ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
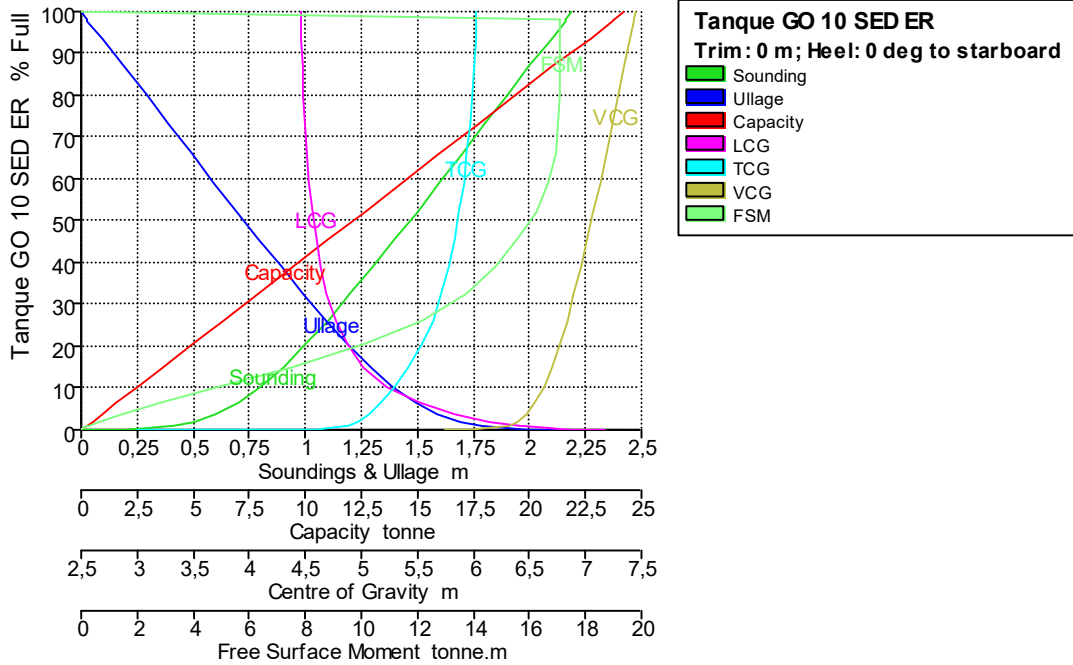
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 10 SED ER	2,192	0,000	100,000	28,857	24,240	4,456	6,033	7,446	0,000
	2,163	0,029	98,000	28,280	23,755	4,459	6,029	7,431	17,087
	2,161	0,030	97,900	28,251	23,731	4,459	6,029	7,430	17,087
	2,100	0,092	93,667	27,030	22,705	4,464	6,021	7,398	17,081
	2,000	0,192	86,751	25,034	21,028	4,474	6,006	7,346	17,073
	1,900	0,292	79,836	23,038	19,352	4,486	5,988	7,292	17,063
	1,800	0,392	72,923	21,043	17,677	4,500	5,967	7,239	17,041
	1,700	0,492	66,016	19,051	16,002	4,516	5,943	7,184	16,925
	1,600	0,592	59,133	17,064	14,334	4,537	5,913	7,129	16,662
	1,500	0,692	52,294	15,091	12,676	4,564	5,877	7,073	16,223
	1,400	0,792	45,537	13,141	11,038	4,597	5,833	7,016	15,589
	1,300	0,892	38,897	11,225	9,429	4,639	5,780	6,957	14,808
	1,200	0,992	32,413	9,354	7,857	4,694	5,715	6,897	13,725
	1,100	1,092	26,159	7,549	6,341	4,767	5,635	6,834	12,163
	1,000	1,192	20,255	5,845	4,910	4,871	5,536	6,769	10,072
	0,900	1,292	14,869	4,291	3,604	5,019	5,421	6,700	7,514
	0,800	1,392	10,229	2,952	2,479	5,233	5,298	6,627	4,865
	0,700	1,492	6,531	1,885	1,583	5,517	5,182	6,551	2,836
	0,600	1,592	3,843	1,109	0,932	5,834	5,073	6,472	1,437
	0,500	1,692	2,053	0,592	0,498	6,148	4,964	6,384	0,642
	0,404	1,788	1,000	0,289	0,242	6,423	4,872	6,315	0,248
	0,400	1,792	0,969	0,280	0,235	6,433	4,869	6,314	0,237
	0,300	1,892	0,385	0,111	0,093	6,659	4,717	6,123	0,067
	0,200	1,992	0,111	0,032	0,027	6,845	4,581	5,965	0,013
	0,100	2,092	0,014	0,004	0,003	7,009	4,419	5,750	0,001
	0,000	2,192	0,000	0,000	0,000	7,166	3,000	6,008	0,000

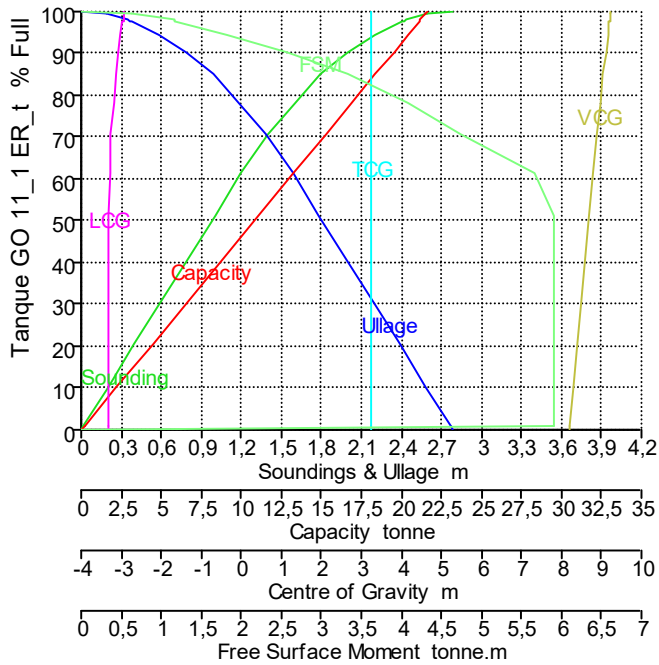# Tank Calibrations - Tanque GO 10 SED BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 10 SED BR	2,192	0,000	100,000	28,857	24,240	4,456	-6,033	7,446	0,000
	2,163	0,029	98,000	28,280	23,755	4,459	-6,029	7,431	17,087
	2,161	0,030	97,900	28,251	23,731	4,459	-6,029	7,430	17,087
	2,100	0,092	93,667	27,030	22,705	4,464	-6,021	7,398	17,081
	2,000	0,192	86,751	25,034	21,028	4,474	-6,006	7,346	17,073
	1,900	0,292	79,836	23,038	19,352	4,486	-5,988	7,292	17,063
	1,800	0,392	72,923	21,043	17,677	4,500	-5,967	7,239	17,041
	1,700	0,492	66,016	19,051	16,002	4,516	-5,943	7,184	16,925
	1,600	0,592	59,133	17,064	14,334	4,537	-5,913	7,129	16,662
	1,500	0,692	52,294	15,091	12,676	4,564	-5,877	7,073	16,223
	1,400	0,792	45,537	13,141	11,038	4,597	-5,833	7,016	15,589
	1,300	0,892	38,897	11,225	9,429	4,639	-5,780	6,957	14,808
	1,200	0,992	32,413	9,354	7,857	4,694	-5,715	6,897	13,725
	1,100	1,092	26,159	7,549	6,341	4,767	-5,635	6,834	12,163
	1,000	1,192	20,255	5,845	4,910	4,871	-5,536	6,769	10,072
	0,900	1,292	14,869	4,291	3,604	5,019	-5,421	6,700	7,514
	0,800	1,392	10,229	2,952	2,479	5,233	-5,298	6,627	4,865
	0,700	1,492	6,531	1,885	1,583	5,517	-5,182	6,551	2,836
	0,600	1,592	3,843	1,109	0,932	5,834	-5,073	6,472	1,437
	0,500	1,692	2,053	0,592	0,498	6,148	-4,964	6,384	0,642
	0,404	1,788	1,000	0,289	0,242	6,423	-4,872	6,315	0,248
	0,400	1,792	0,969	0,280	0,235	6,433	-4,869	6,314	0,237
	0,300	1,892	0,385	0,111	0,093	6,659	-4,717	6,123	0,067
	0,200	1,992	0,111	0,032	0,027	6,845	-4,581	5,965	0,013
	0,100	2,092	0,014	0,004	0,003	7,009	-4,419	5,750	0,001
	0,000	2,192	0,000	0,000	0,000	7,166	-3,000	6,008	0,000

Tank Calibrations - Tanque GO 11_1 ER_t

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
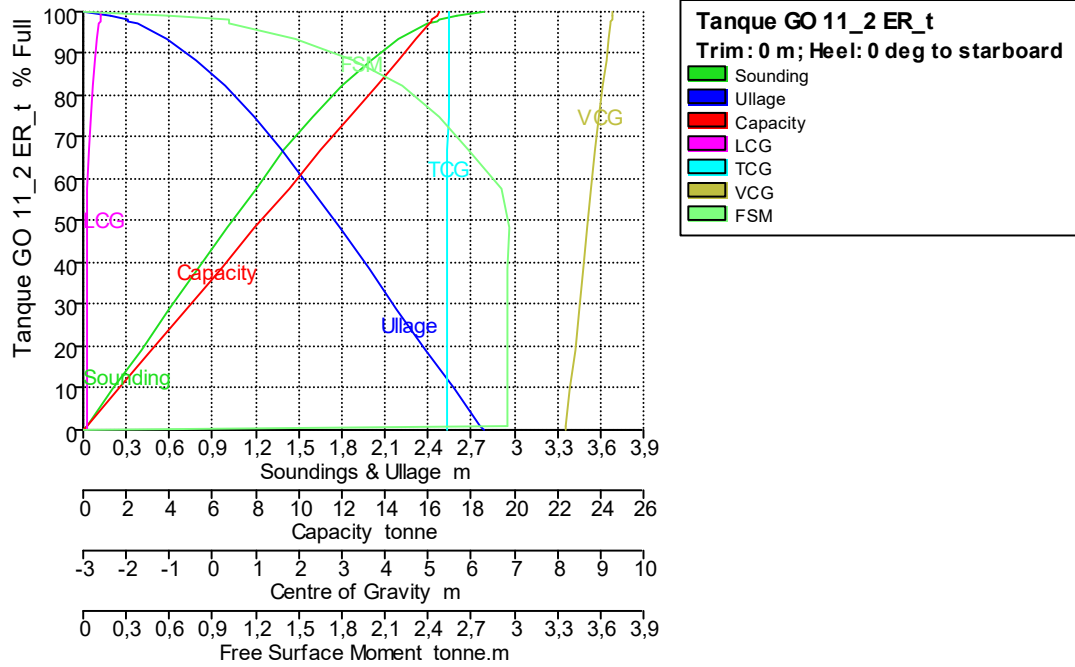Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 11_1 ER_t	2,786	0,000	100,000	25,743	21,624	-2,910	3,250	9,234	0,000
	2,600	0,186	99,406	25,590	21,496	-2,922	3,250	9,224	0,630
	2,437	0,349	98,000	25,228	21,192	-2,949	3,250	9,203	1,171
	2,427	0,359	97,900	25,202	21,170	-2,951	3,250	9,201	1,171
	2,400	0,386	97,627	25,132	21,111	-2,956	3,250	9,198	1,171
	2,200	0,586	94,593	24,351	20,455	-3,005	3,250	9,156	1,833
	2,000	0,786	90,335	23,255	19,534	-3,064	3,250	9,103	2,571
	1,800	0,986	84,938	21,865	18,367	-3,129	3,250	9,040	3,335
	1,600	1,186	78,338	20,167	16,940	-3,194	3,250	8,968	4,074
	1,400	1,386	70,538	18,159	15,253	-3,253	3,250	8,888	4,735
	1,200	1,586	61,521	15,837	13,303	-3,294	3,250	8,799	5,658
	1,000	1,786	51,393	13,230	11,113	-3,300	3,250	8,700	5,906
	0,800	1,986	41,114	10,584	8,891	-3,300	3,250	8,600	5,906
	0,600	2,186	30,836	7,938	6,668	-3,300	3,250	8,500	5,906
	0,400	2,386	20,557	5,292	4,445	-3,300	3,250	8,400	5,906
	0,200	2,586	10,279	2,646	2,223	-3,300	3,250	8,300	5,906
	0,019	2,766	1,000	0,257	0,216	-3,300	3,250	8,210	5,906
	0,000	2,786	0,000	0,000	0,000	-3,300	3,250	8,200	0,000

# Tank Calibrations - Tanque GO 11_2 ER_t

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

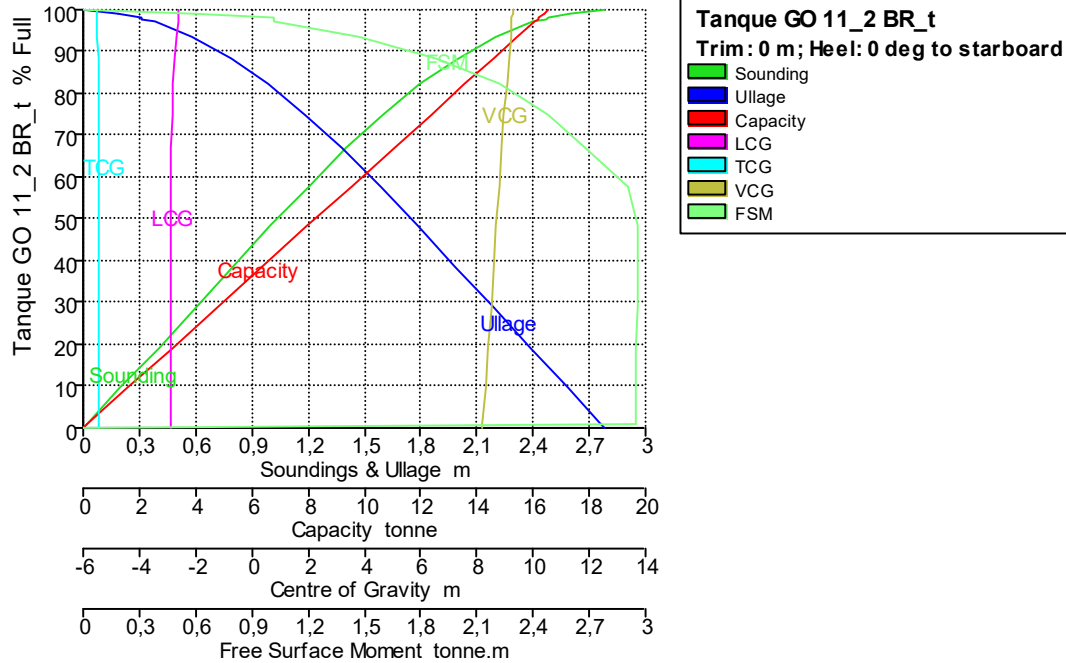| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 11_2 ER_t	2,786	0,000	100,000	19,675	16,527	-2,578	5,501	9,286	0,000
	2,600	0,186	99,236	19,524	16,400	-2,592	5,499	9,274	0,589
	2,478	0,308	98,000	19,281	16,196	-2,611	5,497	9,256	1,022
	2,470	0,315	97,900	19,261	16,180	-2,613	5,496	9,255	1,022
	2,400	0,386	97,006	19,085	16,032	-2,626	5,495	9,242	1,022
	2,200	0,586	93,322	18,361	15,423	-2,675	5,488	9,193	1,471
	2,000	0,786	88,331	17,379	14,598	-2,730	5,481	9,131	1,880
	1,800	0,986	82,220	16,176	13,588	-2,787	5,473	9,060	2,220
	1,600	1,186	75,032	14,762	12,400	-2,840	5,465	8,980	2,483
	1,400	1,386	66,882	13,159	11,053	-2,884	5,458	8,893	2,678
	1,200	1,586	57,896	11,391	9,568	-2,911	5,454	8,800	2,906
	1,000	1,786	48,292	9,501	7,981	-2,914	5,453	8,700	2,960
	0,800	1,986	38,623	7,599	6,383	-2,914	5,453	8,600	2,958
	0,600	2,186	28,959	5,698	4,786	-2,914	5,453	8,500	2,955
	0,400	2,386	19,301	3,797	3,190	-2,913	5,453	8,400	2,953
	0,200	2,586	9,648	1,898	1,594	-2,913	5,453	8,300	2,950
	0,021	2,765	1,000	0,197	0,165	-2,913	5,452	8,210	2,948
	0,000	2,786	0,000	0,000	0,000	-2,913	5,452	8,200	0,000

Tank Calibrations - Tanque GO 11_1 BR_t

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
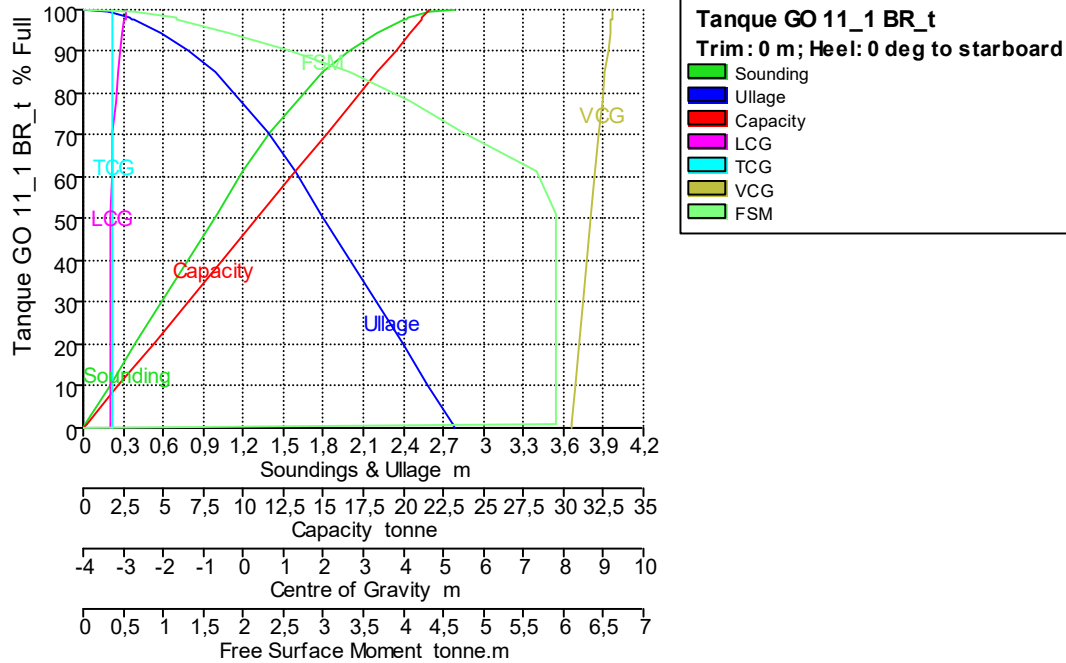
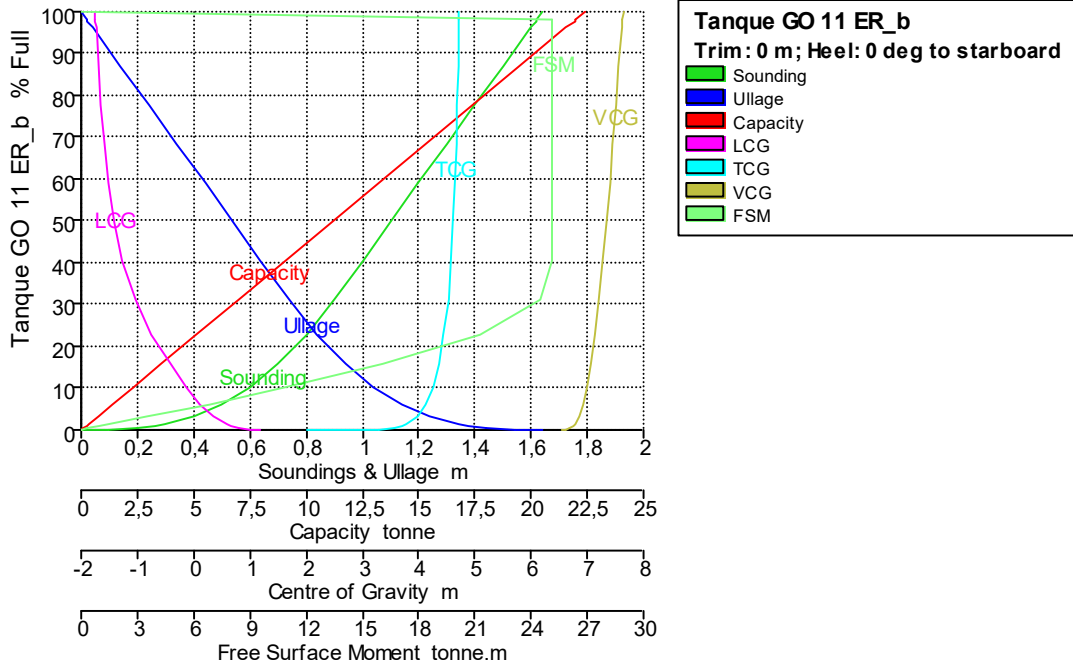| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 11_1 BR_t	2,786	0,000	100,000	25,743	21,624	-2,910	-3,250	9,234	0,000
	2,600	0,186	99,406	25,590	21,496	-2,922	-3,250	9,224	0,630
	2,437	0,349	98,000	25,228	21,192	-2,949	-3,250	9,203	1,171
	2,427	0,359	97,900	25,202	21,170	-2,951	-3,250	9,201	1,171
	2,400	0,386	97,627	25,132	21,111	-2,956	-3,250	9,198	1,171
	2,200	0,586	94,593	24,351	20,455	-3,005	-3,250	9,156	1,833
	2,000	0,786	90,335	23,255	19,534	-3,064	-3,250	9,103	2,571
	1,800	0,986	84,938	21,865	18,367	-3,129	-3,250	9,040	3,335
	1,600	1,186	78,338	20,167	16,940	-3,194	-3,250	8,968	4,074
	1,400	1,386	70,538	18,159	15,253	-3,253	-3,250	8,888	4,735
	1,200	1,586	61,521	15,837	13,303	-3,294	-3,250	8,799	5,658
	1,000	1,786	51,393	13,230	11,113	-3,300	-3,250	8,700	5,906
	0,800	1,986	41,114	10,584	8,891	-3,300	-3,250	8,600	5,906
	0,600	2,186	30,836	7,938	6,668	-3,300	-3,250	8,500	5,906
	0,400	2,386	20,557	5,292	4,445	-3,300	-3,250	8,400	5,906
	0,200	2,586	10,279	2,646	2,223	-3,300	-3,250	8,300	5,906
	0,019	2,766	1,000	0,257	0,216	-3,300	-3,250	8,210	5,906
	0,000	2,786	0,000	0,000	0,000	-3,300	-3,250	8,200	0,000

Tank Calibrations - Tanque GO 11_2 BR_t

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 11_2 BR_t	2,786	0,000	100,000	19,675	16,527	-2,578	-5,501	9,286	0,000
	2,600	0,186	99,236	19,524	16,400	-2,592	-5,499	9,274	0,589
	2,478	0,308	98,000	19,281	16,196	-2,611	-5,497	9,256	1,022
	2,470	0,315	97,900	19,261	16,180	-2,613	-5,496	9,255	1,022
	2,400	0,386	97,006	19,085	16,032	-2,626	-5,495	9,242	1,022
	2,200	0,586	93,322	18,361	15,423	-2,675	-5,488	9,193	1,471
	2,000	0,786	88,331	17,379	14,598	-2,730	-5,481	9,131	1,880
	1,800	0,986	82,220	16,176	13,588	-2,787	-5,473	9,060	2,220
	1,600	1,186	75,032	14,762	12,400	-2,840	-5,465	8,980	2,483
	1,400	1,386	66,882	13,159	11,053	-2,884	-5,458	8,893	2,678
	1,200	1,586	57,896	11,391	9,568	-2,911	-5,454	8,800	2,906
	1,000	1,786	48,292	9,501	7,981	-2,914	-5,453	8,700	2,960
	0,800	1,986	38,623	7,599	6,383	-2,914	-5,453	8,600	2,958
	0,600	2,186	28,959	5,698	4,786	-2,914	-5,453	8,500	2,955
	0,400	2,386	19,301	3,797	3,190	-2,913	-5,453	8,400	2,953
	0,200	2,586	9,648	1,898	1,594	-2,913	-5,453	8,300	2,950
	0,021	2,765	1,000	0,197	0,165	-2,913	-5,452	8,210	2,948
	0,000	2,786	0,000	0,000	0,000	-2,913	-5,452	8,200	0,000

## Tank Calibrations - Tanque GO 11 ER_b

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

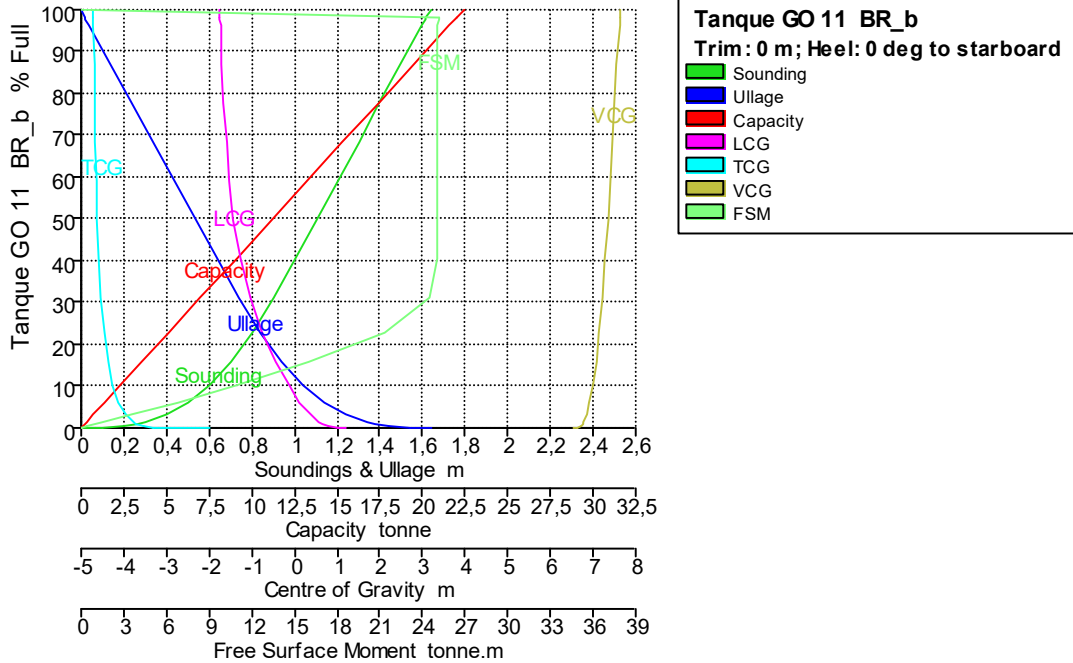| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 11 ER_b	1,640	0,000	100,000	26,685	22,416	-1,749	4,714	7,640	0,000
	1,618	0,021	98,000	26,152	21,967	-1,742	4,713	7,629	25,111
	1,617	0,023	97,900	26,125	21,945	-1,742	4,712	7,628	25,111
	1,600	0,040	96,283	25,693	21,582	-1,736	4,711	7,619	25,110
	1,500	0,140	86,980	23,211	19,497	-1,700	4,701	7,566	25,106
	1,400	0,240	77,678	20,729	17,412	-1,655	4,689	7,513	25,101
	1,300	0,340	68,378	18,247	15,327	-1,598	4,674	7,459	25,096
	1,200	0,440	59,078	15,765	13,243	-1,523	4,653	7,404	25,091
	1,100	0,540	49,780	13,284	11,158	-1,420	4,625	7,347	25,086
	1,000	0,640	40,482	10,803	9,074	-1,270	4,585	7,286	25,080
	0,900	0,740	31,283	8,348	7,012	-1,044	4,523	7,220	24,532
	0,800	0,840	22,827	6,091	5,117	-0,752	4,446	7,149	21,325
	0,700	0,940	15,746	4,202	3,530	-0,424	4,367	7,075	16,042
	0,600	1,040	10,259	2,738	2,300	-0,131	4,267	7,003	10,926
	0,500	1,140	6,175	1,648	1,384	0,124	4,134	6,925	6,857
	0,400	1,240	3,290	0,878	0,737	0,361	3,973	6,857	3,553
	0,300	1,340	1,446	0,386	0,324	0,587	3,780	6,778	1,447
	0,264	1,376	1,000	0,267	0,224	0,666	3,705	6,753	0,935
	0,200	1,440	0,453	0,121	0,102	0,798	3,560	6,700	0,361
	0,100	1,540	0,062	0,016	0,014	1,000	3,305	6,617	0,033
	0,000	1,640	0,000	0,000	0,000	1,190	2,001	6,560	0,000

Tank Calibrations - Tanque GO 11 CR_b

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
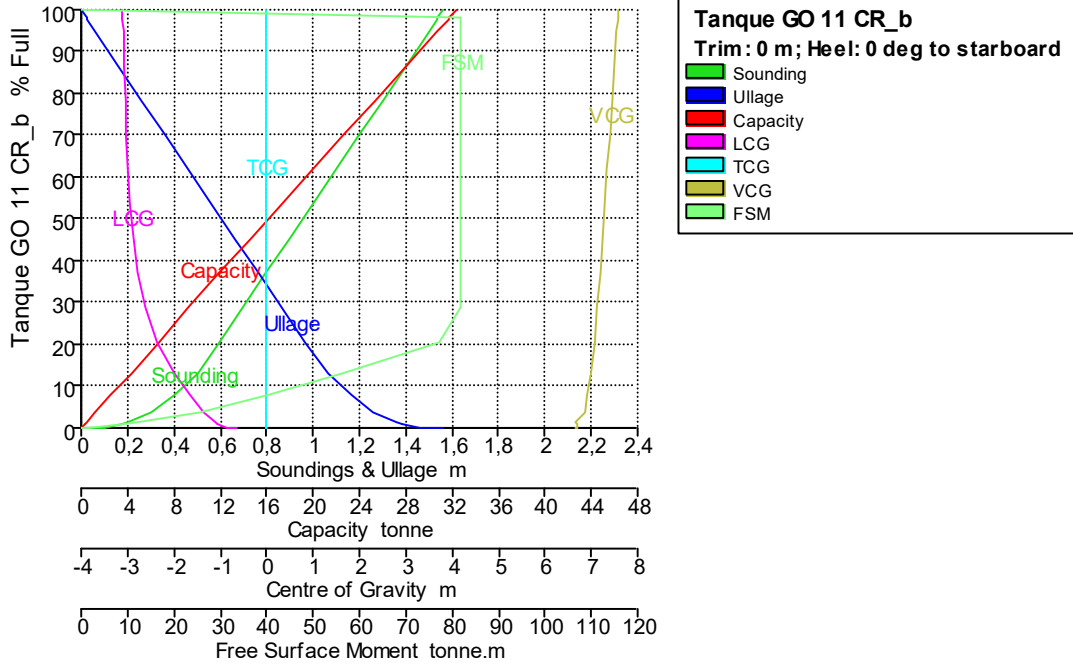
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 11 CR_b	1,563	0,000	100,000	38,471	32,315	-3,105	0,000	7,584	0,000
	1,538	0,024	98,000	37,701	31,669	-3,101	0,000	7,572	81,648
	1,537	0,025	97,900	37,663	31,637	-3,101	0,000	7,571	81,648
	1,500	0,063	94,828	36,481	30,644	-3,095	0,000	7,552	81,648
	1,400	0,163	86,575	33,306	27,977	-3,075	0,000	7,501	81,648
	1,300	0,263	78,321	30,131	25,310	-3,051	0,000	7,450	81,648
	1,200	0,363	70,068	26,955	22,643	-3,022	0,000	7,398	81,648
	1,100	0,463	61,814	23,780	19,975	-2,985	0,000	7,346	81,648
	1,000	0,563	53,561	20,605	17,308	-2,937	0,000	7,294	81,648
	0,900	0,663	45,307	17,430	14,641	-2,870	0,000	7,240	81,648
	0,800	0,763	37,053	14,255	11,974	-2,775	0,000	7,185	81,648
	0,700	0,863	28,800	11,079	9,307	-2,624	0,000	7,127	81,648
	0,600	0,963	20,584	7,919	6,652	-2,359	0,000	7,063	77,301
	0,500	1,063	13,255	5,099	4,284	-1,986	0,000	6,991	56,094
	0,400	1,163	7,780	2,993	2,514	-1,663	0,000	6,914	40,205
	0,300	1,263	3,857	1,484	1,246	-1,368	0,000	6,855	25,390
	0,200	1,363	1,374	0,529	0,444	-1,106	0,000	6,653	12,209
	0,178	1,385	1,000	0,385	0,323	-1,045	0,000	6,714	9,024
	0,100	1,463	0,217	0,083	0,070	-0,853	0,000	6,682	1,551
	0,000	1,563	0,000	0,000	0,000	-0,631	0,000	6,637	0,000

## Tank Calibrations - Tanque GO 11 BR_b

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque GO 11 BR_b	1,640	0,000	100,000	26,685	22,416	-1,749	-4,714	7,640	0,000
	1,618	0,021	98,000	26,152	21,967	-1,742	-4,713	7,629	25,111
	1,617	0,023	97,900	26,125	21,945	-1,742	-4,712	7,628	25,111
	1,600	0,040	96,283	25,693	21,582	-1,736	-4,711	7,619	25,110
	1,500	0,140	86,980	23,211	19,497	-1,700	-4,701	7,566	25,106
	1,400	0,240	77,678	20,729	17,412	-1,655	-4,689	7,513	25,101
	1,300	0,340	68,378	18,247	15,327	-1,598	-4,674	7,459	25,096
	1,200	0,440	59,078	15,765	13,243	-1,523	-4,653	7,404	25,091
	1,100	0,540	49,780	13,284	11,158	-1,420	-4,625	7,347	25,086
	1,000	0,640	40,482	10,803	9,074	-1,270	-4,585	7,286	25,080
	0,900	0,740	31,283	8,348	7,012	-1,044	-4,523	7,220	24,532
	0,800	0,840	22,827	6,091	5,117	-0,752	-4,446	7,149	21,325
	0,700	0,940	15,746	4,202	3,530	-0,424	-4,367	7,075	16,042
	0,600	1,040	10,259	2,738	2,300	-0,131	-4,267	7,003	10,926
	0,500	1,140	6,175	1,648	1,384	0,124	-4,134	6,925	6,857
	0,400	1,240	3,290	0,878	0,737	0,361	-3,973	6,857	3,553
	0,300	1,340	1,446	0,386	0,324	0,587	-3,780	6,778	1,447
	0,264	1,376	1,000	0,267	0,224	0,666	-3,705	6,753	0,935
	0,200	1,440	0,453	0,121	0,102	0,798	-3,560	6,700	0,361
	0,100	1,540	0,062	0,016	0,014	1,000	-3,305	6,617	0,033
	0,000	1,640	0,000	0,000	0,000	1,190	-2,001	6,560	0,000

## Tank Calibrations - Tanque REBOSES DF ER

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
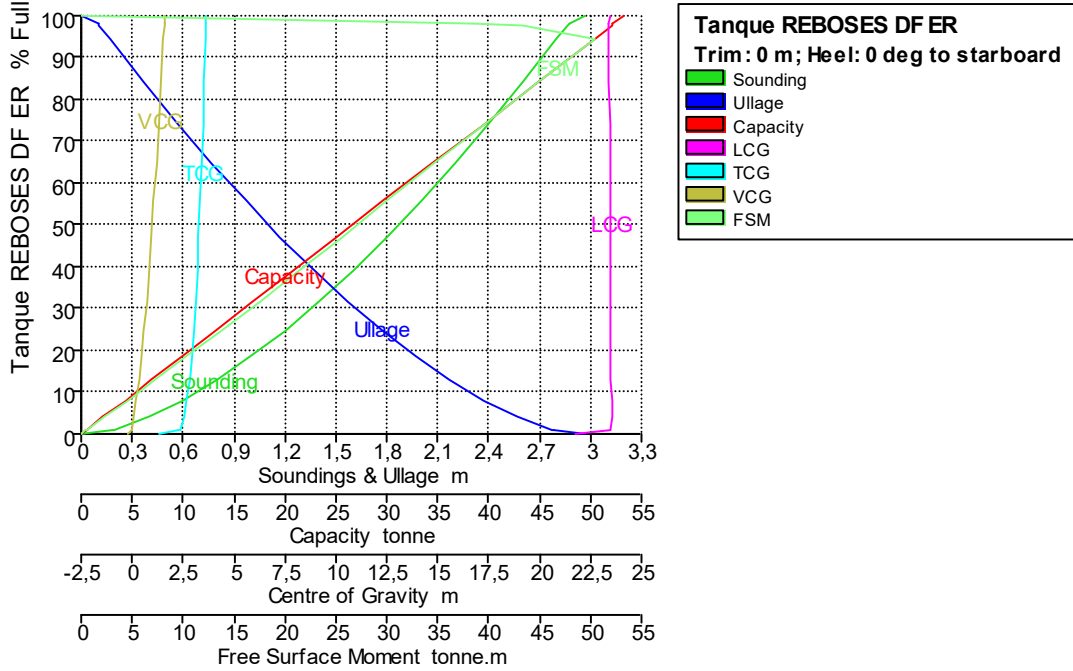
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque REBOSES DF ER	2,971	0,000	100,000	63,374	53,234	23,452	3,636	1,616	0,000
	2,872	0,099	98,000	62,107	52,170	23,413	3,618	1,593	38,402
	2,869	0,102	97,900	62,043	52,116	23,412	3,617	1,592	43,357
	2,800	0,171	94,614	59,961	50,367	23,401	3,595	1,554	50,464
	2,600	0,371	84,131	53,317	44,786	23,416	3,533	1,432	44,841
	2,400	0,571	74,137	46,984	39,467	23,430	3,468	1,309	39,573
	2,200	0,771	64,637	40,963	34,409	23,443	3,402	1,187	34,642
	2,000	0,971	55,636	35,259	29,618	23,456	3,333	1,066	30,008
	1,800	1,171	47,143	29,876	25,096	23,467	3,261	0,944	25,613
	1,600	1,371	39,170	24,824	20,852	23,477	3,185	0,823	21,449
	1,400	1,571	31,735	20,112	16,894	23,486	3,104	0,702	17,514
	1,200	1,771	24,862	15,756	13,235	23,495	3,017	0,581	13,824
	1,000	1,971	18,587	11,779	9,895	23,503	2,921	0,461	10,397
	0,800	2,171	12,966	8,217	6,902	23,513	2,814	0,339	7,280
	0,600	2,371	8,083	5,123	4,303	23,522	2,690	0,218	4,526
	0,400	2,571	4,070	2,579	2,167	23,530	2,538	0,096	2,228
	0,200	2,771	1,162	0,736	0,618	23,514	2,329	-0,028	0,561
	0,185	2,786	1,000	0,634	0,532	23,509	2,308	-0,038	0,468
	0,000	2,971	0,000	0,000	0,000	21,738	1,333	-0,162	0,000

## Tank Calibrations - Tanque REBOSES DF BR

Fluid Type = Diesel   Specific gravity = 0,84
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
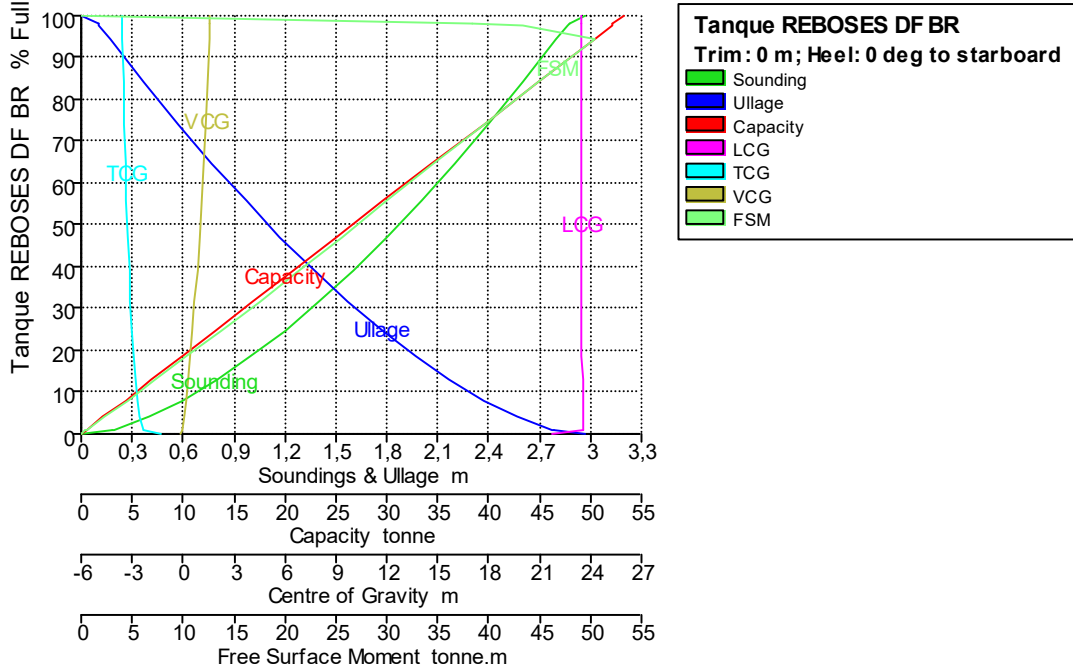
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque REBOSES DF BR	2,971	0,000	100,000	63,374	53,234	23,452	-3,636	1,616	0,000
	2,872	0,099	98,000	62,107	52,170	23,413	-3,618	1,593	38,402
	2,869	0,102	97,900	62,043	52,116	23,412	-3,617	1,592	43,357
	2,800	0,171	94,614	59,961	50,367	23,401	-3,595	1,554	50,464
	2,600	0,371	84,131	53,317	44,786	23,416	-3,533	1,432	44,841
	2,400	0,571	74,137	46,984	39,467	23,430	-3,468	1,309	39,573
	2,200	0,771	64,637	40,963	34,409	23,443	-3,402	1,187	34,642
	2,000	0,971	55,636	35,259	29,618	23,456	-3,333	1,066	30,008
	1,800	1,171	47,143	29,876	25,096	23,467	-3,261	0,944	25,613
	1,600	1,371	39,170	24,824	20,852	23,477	-3,185	0,823	21,449
	1,400	1,571	31,735	20,112	16,894	23,486	-3,104	0,702	17,514
	1,200	1,771	24,862	15,756	13,235	23,495	-3,017	0,581	13,824
	1,000	1,971	18,587	11,779	9,895	23,503	-2,921	0,461	10,397
	0,800	2,171	12,966	8,217	6,902	23,513	-2,814	0,339	7,280
	0,600	2,371	8,083	5,123	4,303	23,522	-2,690	0,218	4,526
	0,400	2,571	4,070	2,579	2,167	23,530	-2,538	0,096	2,228
	0,200	2,771	1,162	0,736	0,618	23,514	-2,329	-0,028	0,561
	0,185	2,786	1,000	0,634	0,532	23,509	-2,308	-0,038	0,468
	0,000	2,971	0,000	0,000	0,000	21,738	-1,333	-0,162	0,000

Tank Calibrations - Tanque Estabilizador

Fluid Type = Sea Water   Specific gravity = 1,025
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
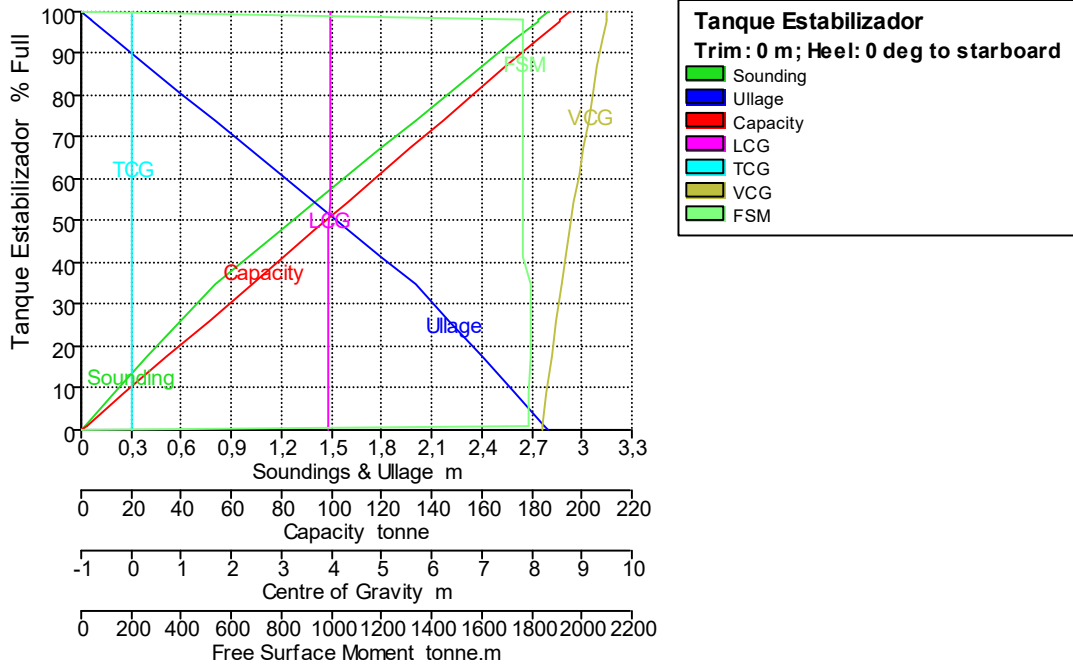
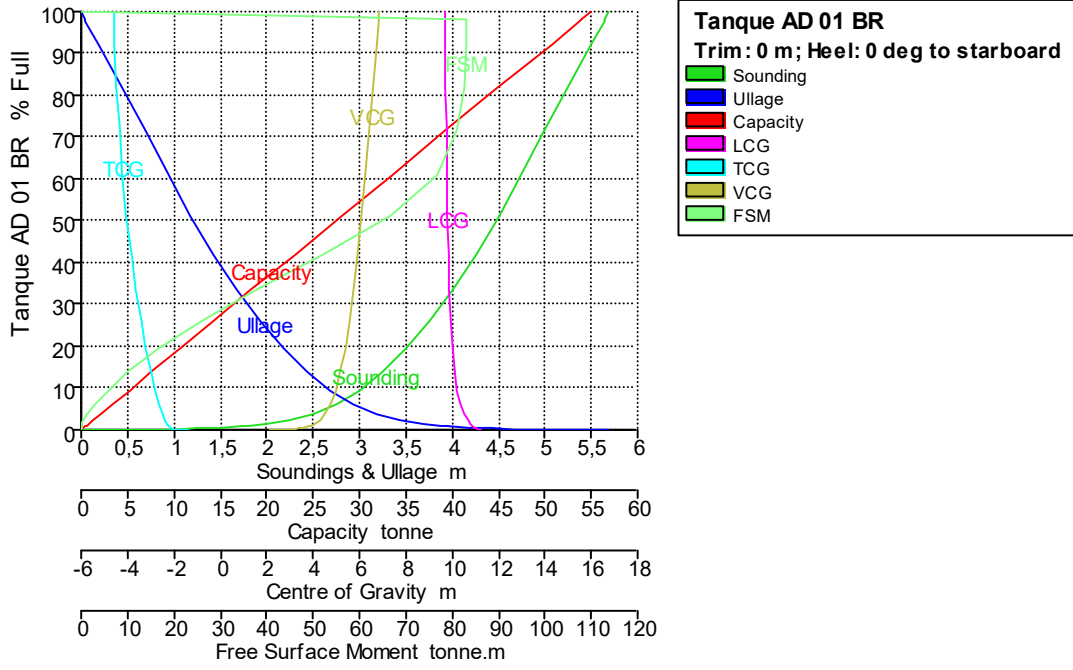| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque Estabilizador	2,800	0,000	100,000	190,456	195,218	3,962	0,000	9,511	0,000
	2,800	0,000	100,000	190,456	195,218	3,962	0,000	9,511	0,000
	2,739	0,061	98,000	186,647	191,313	3,962	0,000	9,482	1767,926
	2,736	0,064	97,900	186,457	191,118	3,962	0,000	9,480	1767,919
	2,600	0,200	93,487	178,053	182,504	3,961	0,000	9,415	1767,616
	2,400	0,400	86,976	165,650	169,792	3,961	0,000	9,318	1767,168
	2,200	0,600	80,465	153,250	157,081	3,960	0,000	9,223	1766,720
	2,000	0,800	73,954	140,850	144,372	3,960	0,000	9,128	1766,263
	1,800	1,000	67,445	128,452	131,664	3,959	0,000	9,034	1765,808
	1,600	1,200	60,936	116,056	118,957	3,958	0,000	8,942	1765,354
	1,400	1,400	54,427	103,660	106,252	3,957	0,000	8,851	1764,895
	1,200	1,600	47,920	91,267	93,548	3,955	0,000	8,763	1764,426
	1,000	1,800	41,413	78,874	80,846	3,953	0,000	8,679	1763,959
	0,800	2,000	34,907	66,483	68,145	3,950	0,000	8,600	1793,007
	0,600	2,200	26,179	49,860	51,106	3,950	0,000	8,500	1792,508
	0,400	2,400	17,452	33,238	34,069	3,950	0,000	8,400	1792,002
	0,200	2,600	8,726	16,618	17,034	3,950	0,000	8,300	1791,455
	0,023	2,777	1,000	1,905	1,952	3,950	0,000	8,211	1790,937
	0,000	2,800	0,000	0,000	0,000	3,950	0,000	8,200	0,000

Tank Calibrations - Tanque AD 01 ER

Fluid Type = Fresh Water   Specific gravity = 1
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
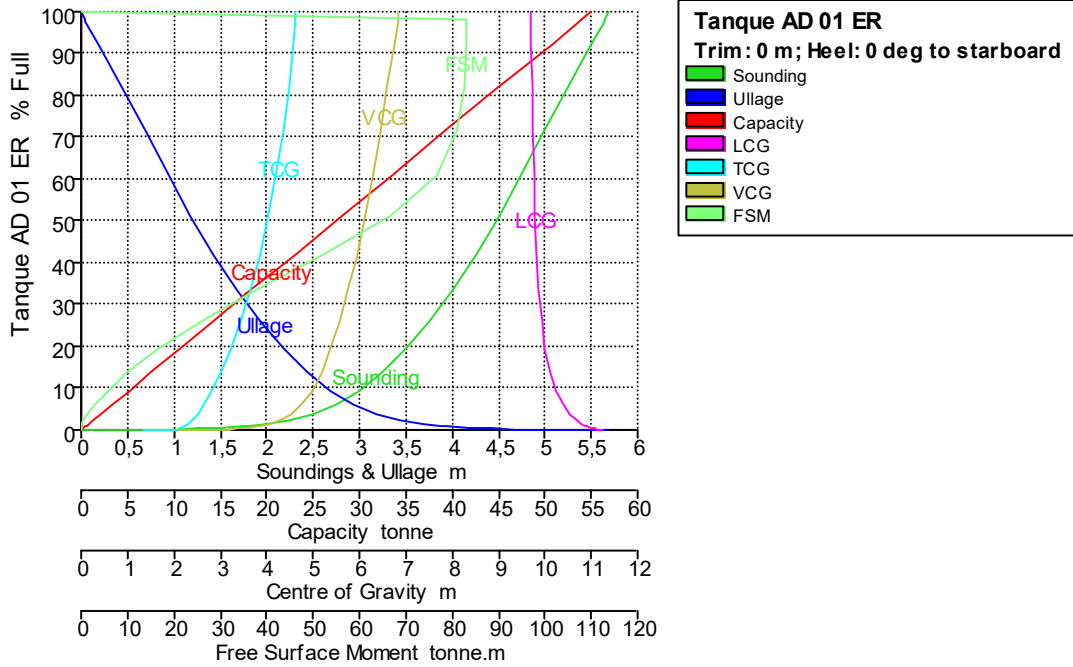
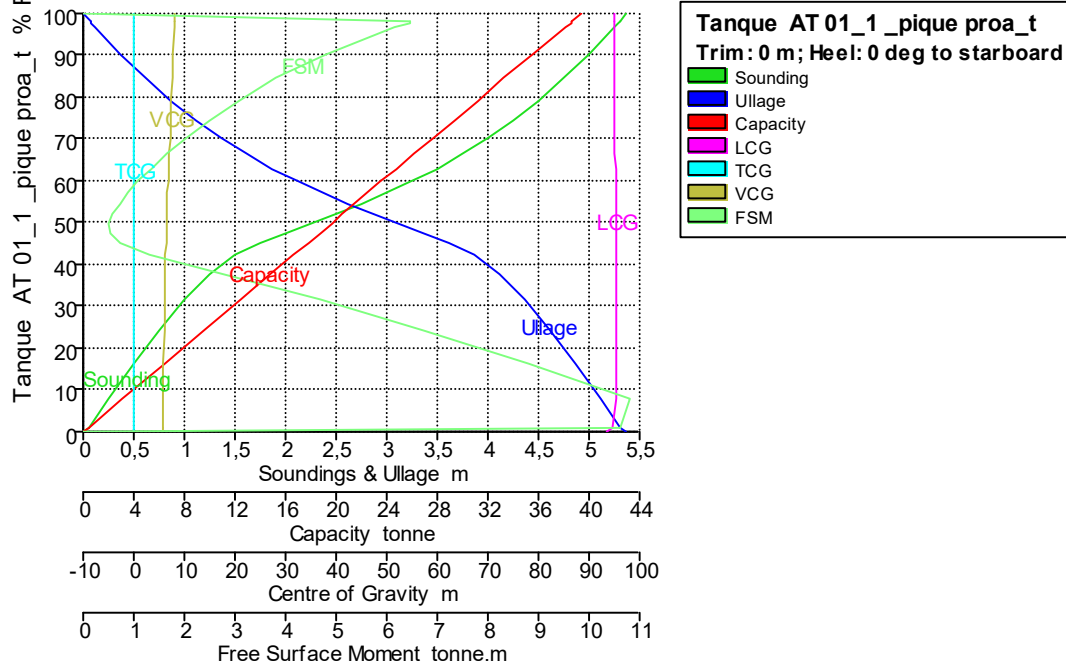| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque AD 01 ER	5,684	0,000	100,000	54,939	54,939	9,699	4,613	6,847	0,000
	5,636	0,048	98,000	53,841	53,841	9,701	4,599	6,820	83,048
	5,634	0,050	97,900	53,786	53,786	9,701	4,599	6,819	83,047
	5,500	0,184	92,303	50,711	50,711	9,706	4,559	6,742	82,963
	5,250	0,434	81,850	44,968	44,968	9,719	4,470	6,595	82,713
	5,000	0,684	71,433	39,245	39,245	9,735	4,357	6,443	80,900
	4,750	0,934	61,142	33,591	33,591	9,756	4,214	6,283	76,611
	4,500	1,184	51,163	28,109	28,109	9,784	4,039	6,116	66,594
	4,250	1,434	41,820	22,976	22,976	9,821	3,844	5,942	51,863
	4,000	1,684	33,348	18,321	18,321	9,867	3,640	5,764	37,715
	3,750	1,934	25,834	14,193	14,193	9,926	3,433	5,581	25,953
	3,500	2,184	19,327	10,618	10,618	10,003	3,225	5,391	16,860
	3,250	2,434	13,860	7,615	7,615	10,103	3,021	5,192	10,271
	3,000	2,684	9,461	5,198	5,198	10,235	2,825	4,981	5,802
	2,750	2,934	6,154	3,381	3,381	10,392	2,648	4,756	2,960
	2,500	3,184	3,876	2,130	2,130	10,549	2,499	4,524	1,275
	2,250	3,434	2,408	1,323	1,323	10,686	2,381	4,289	0,474
	2,000	3,684	1,478	0,812	0,812	10,802	2,291	4,062	0,174
	1,805	3,878	1,000	0,549	0,549	10,879	2,232	3,876	0,079
	1,750	3,934	0,892	0,490	0,490	10,900	2,220	3,832	0,063
	1,500	4,184	0,526	0,289	0,289	10,984	2,160	3,590	0,022
	1,250	4,434	0,301	0,165	0,165	11,056	2,126	3,404	0,007
	1,000	4,684	0,167	0,092	0,092	11,115	2,086	3,168	0,002
	0,750	4,934	0,089	0,049	0,049	11,158	2,010	2,809	0,001
	0,500	5,184	0,043	0,024	0,024	11,194	2,027	2,734	0,000
	0,250	5,434	0,016	0,009	0,009	11,228	1,858	2,119	0,000
	0,000	5,684	0,000	0,000	0,000	11,123	1,351	2,516	0,000

Tank Calibrations - Tanque AD 01 BR

Fluid Type = Fresh Water   Specific gravity = 1
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque AD 01 BR	5,684	0,000	100,000	54,939	54,939	9,699	-4,613	6,847	0,000
	5,636	0,048	98,000	53,841	53,841	9,701	-4,599	6,820	83,048
	5,634	0,050	97,900	53,786	53,786	9,701	-4,599	6,819	83,047
	5,500	0,184	92,303	50,711	50,711	9,706	-4,559	6,742	82,963
	5,250	0,434	81,850	44,968	44,968	9,719	-4,470	6,595	82,713
	5,000	0,684	71,433	39,245	39,245	9,735	-4,357	6,443	80,900
	4,750	0,934	61,142	33,591	33,591	9,756	-4,214	6,283	76,611
	4,500	1,184	51,163	28,109	28,109	9,784	-4,039	6,116	66,594
	4,250	1,434	41,820	22,976	22,976	9,821	-3,844	5,942	51,863
	4,000	1,684	33,348	18,321	18,321	9,867	-3,640	5,764	37,715
	3,750	1,934	25,834	14,193	14,193	9,926	-3,433	5,581	25,953
	3,500	2,184	19,327	10,618	10,618	10,003	-3,225	5,391	16,860
	3,250	2,434	13,860	7,615	7,615	10,103	-3,021	5,192	10,271
	3,000	2,684	9,461	5,198	5,198	10,235	-2,825	4,981	5,802
	2,750	2,934	6,154	3,381	3,381	10,392	-2,648	4,756	2,960
	2,500	3,184	3,876	2,130	2,130	10,549	-2,499	4,524	1,275
	2,250	3,434	2,408	1,323	1,323	10,686	-2,381	4,289	0,474
	2,000	3,684	1,478	0,812	0,812	10,802	-2,291	4,062	0,174
	1,805	3,878	1,000	0,549	0,549	10,879	-2,232	3,876	0,079
	1,750	3,934	0,892	0,490	0,490	10,900	-2,220	3,832	0,063
	1,500	4,184	0,526	0,289	0,289	10,984	-2,160	3,590	0,022
	1,250	4,434	0,301	0,165	0,165	11,056	-2,126	3,404	0,007
	1,000	4,684	0,167	0,092	0,092	11,115	-2,086	3,168	0,002
	0,750	4,934	0,089	0,049	0,049	11,158	-2,010	2,809	0,001
	0,500	5,184	0,043	0,024	0,024	11,194	-2,027	2,734	0,000
	0,250	5,434	0,016	0,009	0,009	11,228	-1,858	2,119	0,000
	0,000	5,684	0,000	0,000	0,000	11,123	-1,351	2,516	0,000

# Tank Calibrations - Tanque AT 01_1 _pique proa_t

Fluid Type = Fresh Water   Specific gravity = 1
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque AT 01_1 _pique proa_t	5,373	0,000	100,000	39,414	39,414	95,158	0,000	8,127	0,000
	5,301	0,072	98,000	38,626	38,626	95,156	0,000	8,069	6,479
	5,298	0,076	97,900	38,587	38,587	95,156	0,000	8,066	6,455
	5,250	0,123	96,610	38,078	38,078	95,155	0,000	7,978	6,151
	5,000	0,373	90,255	35,574	35,574	95,150	0,000	7,800	4,799
	4,750	0,623	84,493	33,302	33,302	95,149	0,000	7,629	3,800
	4,500	0,873	79,263	31,241	31,241	95,151	0,000	7,467	3,068
	4,250	1,123	74,524	29,373	29,373	95,157	0,000	7,315	2,499
	4,000	1,373	70,275	27,699	27,699	95,170	0,000	7,171	2,041
	3,750	1,623	66,474	26,200	26,200	95,189	0,000	7,023	1,661
	3,500	1,873	63,001	24,831	24,831	95,211	0,000	6,907	1,345
	3,250	2,123	59,843	23,587	23,587	95,235	0,000	6,802	1,087
	3,000	2,373	57,002	22,467	22,467	95,263	0,000	6,707	0,881
	2,750	2,623	54,450	21,461	21,461	95,294	0,000	6,622	0,721
	2,500	2,873	52,106	20,537	20,537	95,327	0,000	6,549	0,573
	2,250	3,123	49,877	19,659	19,659	95,361	0,000	6,485	0,515
	2,000	3,373	47,657	18,784	18,784	95,398	0,000	6,426	0,552
	1,750	3,623	45,248	17,834	17,834	95,440	0,000	6,369	0,734
	1,500	3,873	42,182	16,626	16,626	95,484	0,000	6,306	1,310
	1,250	4,123	37,503	14,782	14,782	95,508	0,000	6,220	2,773
	1,000	4,373	31,436	12,390	12,390	95,518	0,000	6,118	4,687
	0,750	4,623	24,333	9,591	9,591	95,518	0,000	6,007	6,742
	0,500	4,873	16,410	6,468	6,468	95,503	0,000	5,889	8,824
	0,250	5,123	7,821	3,083	3,083	95,436	0,000	5,767	10,813
	0,061	5,313	1,000	0,394	0,394	94,584	0,000	5,637	10,618
	0,000	5,373	0,000	0,000	0,000	93,327	0,000	5,627	0,000

Tank Calibrations - Tanque AT 01_2 _pique proa_b

Fluid Type = Fresh Water   Specific gravity = 1
Permeability = 98 %
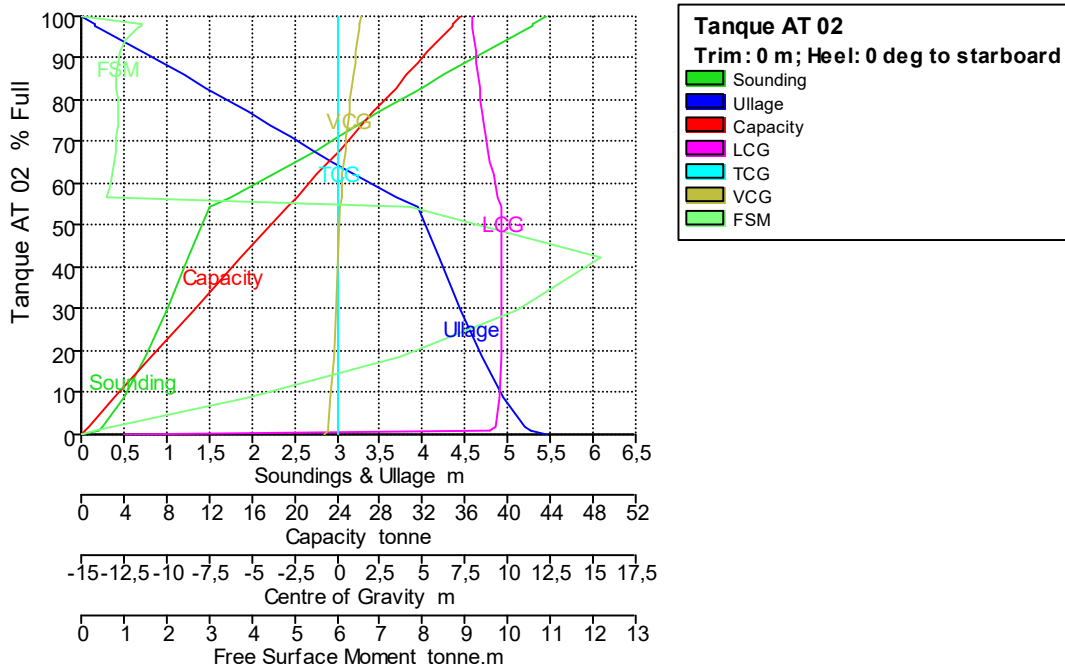Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
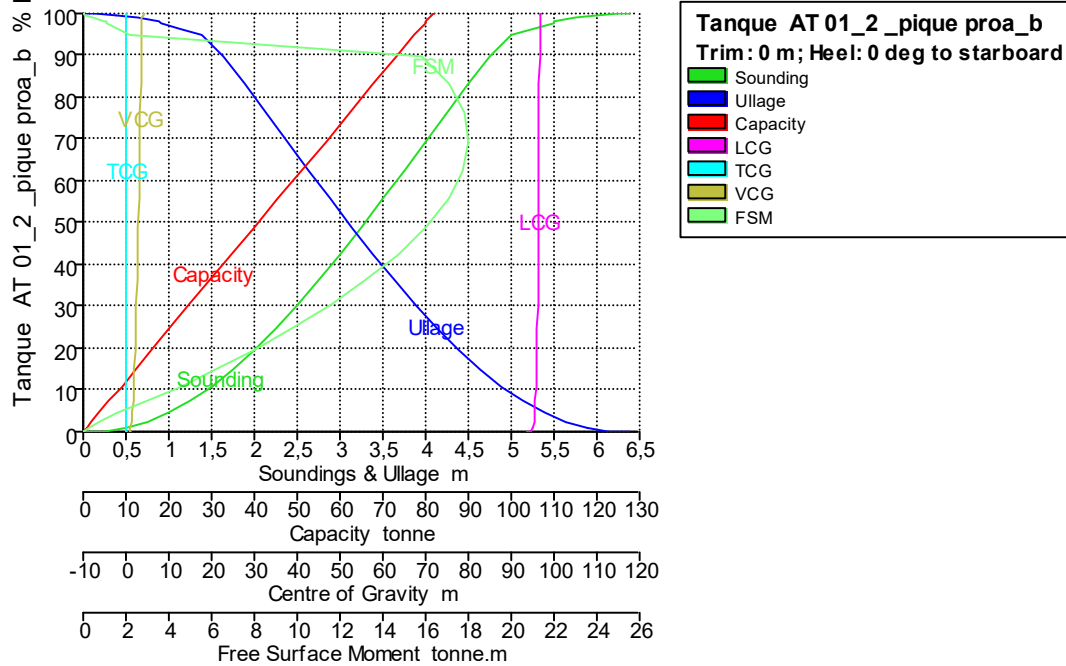
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque AT 01_2 _pique proa_b	6,392	0,000	100,000	81,742	81,742	96,773	0,000	3,889	0,000
	6,250	0,142	99,979	81,724	81,724	96,772	0,000	3,888	0,006
	6,000	0,392	99,725	81,517	81,517	96,768	0,000	3,881	0,117
	5,750	0,642	99,068	80,980	80,980	96,753	0,000	3,863	0,479
	5,508	0,884	98,000	80,107	80,107	96,726	0,000	3,836	1,027
	5,500	0,892	97,958	80,073	80,073	96,725	0,000	3,835	1,046
	5,489	0,903	97,900	80,025	80,025	96,723	0,000	3,833	1,072
	5,250	1,142	96,477	78,862	78,862	96,684	0,000	3,800	1,636
	5,000	1,392	94,714	77,421	77,421	96,632	0,000	3,763	2,142
	4,750	1,642	89,799	73,404	73,404	96,598	0,000	3,670	15,800
	4,500	1,892	83,090	67,920	67,920	96,580	0,000	3,541	17,092
	4,250	2,142	76,236	62,317	62,317	96,557	0,000	3,408	17,808
	4,000	2,392	69,321	56,664	56,664	96,530	0,000	3,273	18,005
	3,750	2,642	62,416	51,020	51,020	96,497	0,000	3,134	17,739
	3,500	2,892	55,582	45,434	45,434	96,457	0,000	2,994	17,058
	3,250	3,142	48,878	39,954	39,954	96,409	0,000	2,851	16,029
	3,000	3,392	42,361	34,627	34,627	96,351	0,000	2,706	14,711
	2,750	3,642	36,095	29,504	29,504	96,281	0,000	2,559	13,177
	2,500	3,892	30,146	24,642	24,642	96,199	0,000	2,410	11,502
	2,250	4,142	24,593	20,103	20,103	96,107	0,000	2,256	9,757
	2,000	4,392	19,509	15,947	15,947	96,010	0,000	2,099	7,979
	1,750	4,642	14,926	12,201	12,201	95,909	0,000	1,914	6,207
	1,500	4,892	10,857	8,875	8,875	95,788	0,000	1,762	4,512
	1,250	5,142	7,388	6,039	6,039	95,654	0,000	1,603	2,967
	1,000	5,392	4,581	3,744	3,744	95,514	0,000	1,409	1,656
	0,750	5,642	2,440	1,995	1,995	95,327	0,000	1,263	0,739

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,500	5,891	1,000	0,817	0,817	95,123	0,000	1,058	0,229
	0,500	5,892	0,998	0,816	0,816	95,122	0,000	1,058	0,229
	0,250	6,142	0,201	0,164	0,164	94,744	0,000	0,904	0,027
	0,000	6,392	0,000	0,000	0,000	93,633	0,000	0,744	0,000

Tank Calibrations - Tanque AT 02

Fluid Type = Fresh Water   Specific gravity = 1
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque AT 02	5,453	0,000	100,000	35,569	35,569	7,928	0,000	1,395	0,000
	5,298	0,155	98,000	34,858	34,858	7,966	0,000	1,329	1,409
	5,290	0,163	97,900	34,822	34,822	7,967	0,000	1,325	1,395
	5,250	0,203	97,398	34,644	34,644	7,977	0,000	1,309	1,332
	5,000	0,453	94,404	33,579	33,579	8,038	0,000	1,211	1,058
	4,750	0,703	91,549	32,563	32,563	8,100	0,000	1,119	0,915
	4,500	0,953	88,727	31,560	31,560	8,167	0,000	1,030	0,848
	4,250	1,203	85,877	30,546	30,546	8,240	0,000	0,943	0,834
	4,000	1,453	82,980	29,516	29,516	8,321	0,000	0,856	0,839
	3,750	1,703	80,035	28,468	28,468	8,410	0,000	0,771	0,852
	3,500	1,953	77,055	27,408	27,408	8,508	0,000	0,688	0,856
	3,250	2,203	74,057	26,341	26,341	8,615	0,000	0,608	0,852
	3,000	2,453	71,056	25,274	25,274	8,731	0,000	0,531	0,838
	2,750	2,703	68,077	24,214	24,214	8,856	0,000	0,459	0,813
	2,500	2,953	65,146	23,172	23,172	8,991	0,000	0,393	0,778
	2,250	3,203	62,295	22,158	22,158	9,133	0,000	0,334	0,730
	2,000	3,453	59,549	21,181	21,181	9,281	0,000	0,282	0,670
	1,750	3,703	56,937	20,252	20,252	9,434	0,000	0,242	0,600
	1,500	3,953	54,326	19,323	19,323	9,580	0,000	0,210	7,687
	1,250	4,203	42,151	14,993	14,993	9,583	0,000	0,078	12,171

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	1,000	4,453	29,835	10,612	10,612	9,594	0,000	-0,067	10,223
	0,750	4,703	18,542	6,595	6,595	9,590	0,000	-0,213	7,470
	0,500	4,953	8,895	3,164	3,164	9,541	0,000	-0,362	3,920
	0,250	5,203	1,975	0,703	0,703	9,233	0,000	-0,517	0,737
	0,194	5,259	1,000	0,356	0,356	8,958	0,000	-0,559	0,300
	0,000	5,453	0,000	0,000	0,000	-12,500	0,000	-0,703	0,000

Tank Calibrations - Tanque AGUAS SUCIAS

Fluid Type = Aguas Sucias   Specific gravity = 1
Permeability = 98 %
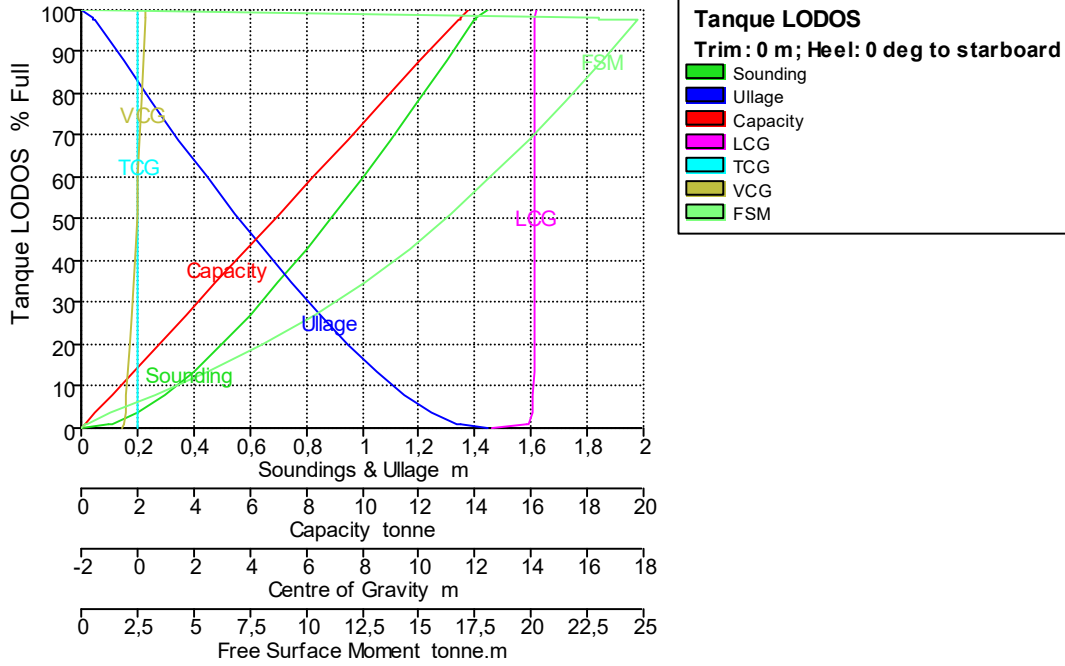Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
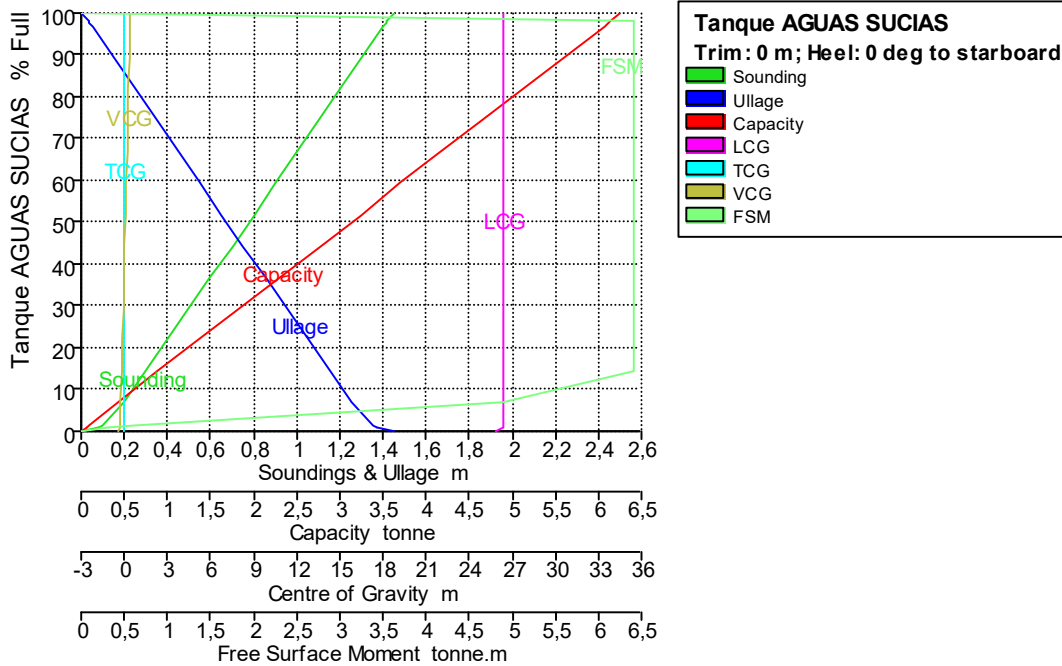
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque AGUAS SUCIAS	1,453	0,000	100,000	6,258	6,258	26,401	0,000	0,411	0,000
	1,415	0,039	98,000	6,133	6,133	26,399	0,000	0,398	6,400
	1,413	0,040	97,900	6,127	6,127	26,399	0,000	0,397	6,400
	1,400	0,053	96,899	6,064	6,064	26,399	0,000	0,391	6,400
	1,300	0,153	89,382	5,594	5,594	26,399	0,000	0,341	6,400
	1,200	0,253	81,866	5,123	5,123	26,399	0,000	0,291	6,400
	1,100	0,353	74,349	4,653	4,653	26,398	0,000	0,240	6,400
	1,000	0,453	66,832	4,182	4,182	26,398	0,000	0,190	6,400
	0,900	0,553	59,315	3,712	3,712	26,398	0,000	0,140	6,400
	0,800	0,653	51,798	3,242	3,242	26,398	0,000	0,090	6,400
	0,700	0,753	44,282	2,771	2,771	26,397	0,000	0,039	6,400
	0,600	0,853	36,765	2,301	2,301	26,397	0,000	-0,012	6,400
	0,500	0,953	29,248	1,830	1,830	26,396	0,000	-0,063	6,400
	0,400	1,053	21,731	1,360	1,360	26,395	0,000	-0,114	6,400
	0,300	1,153	14,214	0,890	0,890	26,392	0,000	-0,168	6,400
	0,200	1,253	6,764	0,423	0,423	26,384	0,000	-0,228	4,891
	0,100	1,353	1,578	0,099	0,099	26,360	0,000	-0,294	0,615
	0,081	1,372	1,000	0,063	0,063	26,348	0,000	-0,306	0,319

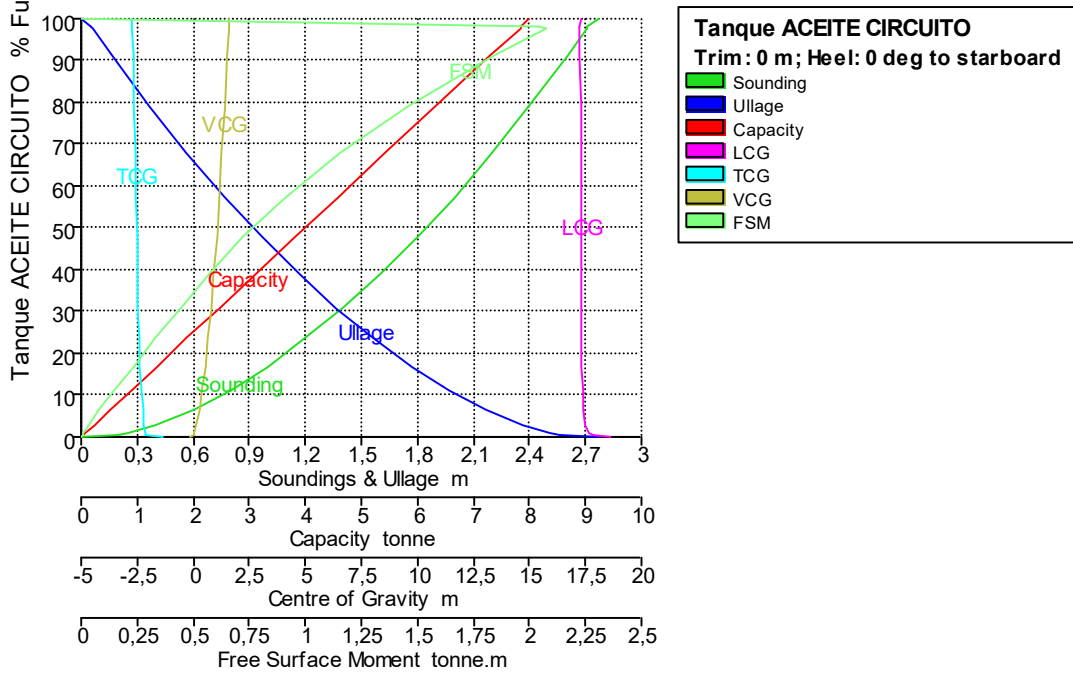| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
	0,000	1,453	0,000	0,000	0,000	25,809	0,000	-0,363	0,000

Tank Calibrations - Tanque LODOS

Fluid Type = Lodos   Specific gravity = 1
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque LODOS	1,449	0,000	100,000	13,753	13,753	14,162	0,000	0,276	0,000
	1,406	0,043	98,000	13,478	13,478	14,151	0,000	0,264	23,001
	1,404	0,044	97,900	13,464	13,464	14,151	0,000	0,264	22,985
	1,400	0,049	97,487	13,407	13,407	14,150	0,000	0,261	24,733
	1,300	0,149	87,757	12,069	12,069	14,149	0,000	0,205	23,145
	1,200	0,249	78,247	10,761	10,761	14,147	0,000	0,148	21,540
	1,100	0,349	68,973	9,486	9,486	14,146	0,000	0,092	19,884
	1,000	0,449	59,953	8,245	8,245	14,144	0,000	0,035	18,200
	0,900	0,549	51,212	7,043	7,043	14,141	0,000	-0,023	16,447
	0,800	0,649	42,781	5,883	5,883	14,139	0,000	-0,080	14,602
	0,700	0,749	34,710	4,774	4,774	14,135	0,000	-0,139	12,621
	0,600	0,849	27,078	3,724	3,724	14,129	0,000	-0,198	10,399
	0,500	0,949	19,993	2,750	2,750	14,121	0,000	-0,258	8,016
	0,400	1,049	13,596	1,870	1,870	14,109	0,000	-0,318	5,580
	0,300	1,149	8,070	1,110	1,110	14,086	0,000	-0,380	3,266
	0,200	1,249	3,668	0,504	0,504	14,036	0,000	-0,442	1,324
	0,111	1,338	1,000	0,138	0,138	13,894	0,000	-0,500	0,257
	0,100	1,349	0,784	0,108	0,108	13,855	0,000	-0,507	0,187
	0,000	1,449	0,000	0,000	0,000	12,617	0,000	-0,580	0,000

## Tank Calibrations - Tanque ACEITE CIRCUITO

Fluid Type = Lube Oil   Specific gravity = 0,89
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque ACEITE CIRCUITO	2,766	0,000	100,000	8,991	8,002	17,272	-2,713	1,632	0,000
	2,709	0,056	98,000	8,811	7,842	17,264	-2,705	1,612	2,040
	2,708	0,058	97,900	8,802	7,834	17,264	-2,704	1,611	2,072
	2,600	0,166	90,982	8,180	7,280	17,265	-2,681	1,541	1,837
	2,400	0,366	78,893	7,093	6,313	17,269	-2,640	1,412	1,456
	2,200	0,566	67,724	6,089	5,419	17,273	-2,601	1,285	1,154
	2,000	0,766	57,399	5,161	4,593	17,278	-2,563	1,160	0,913
	1,800	0,966	47,847	4,302	3,828	17,284	-2,525	1,035	0,723
	1,600	1,166	39,017	3,508	3,122	17,292	-2,487	0,911	0,570
	1,400	1,366	30,898	2,778	2,472	17,303	-2,447	0,787	0,442
	1,200	1,566	23,516	2,114	1,882	17,318	-2,404	0,663	0,329
	1,000	1,766	16,928	1,522	1,355	17,339	-2,358	0,539	0,231
	0,800	1,966	11,209	1,008	0,897	17,369	-2,307	0,413	0,148
	0,600	2,166	6,461	0,581	0,517	17,419	-2,251	0,287	0,082
	0,400	2,366	2,834	0,255	0,227	17,520	-2,187	0,158	0,034
	0,250	2,515	1,000	0,090	0,080	17,699	-2,132	0,059	0,011
	0,200	2,566	0,584	0,053	0,047	17,807	-2,112	0,025	0,006
	0,000	2,766	0,000	0,000	0,000	18,583	-1,334	-0,119	0,000

## Tank Calibrations - Tanque ACEITE HIDRÁULICO ER

Fluid Type = Lube Oil   Specific gravity = 0,89
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
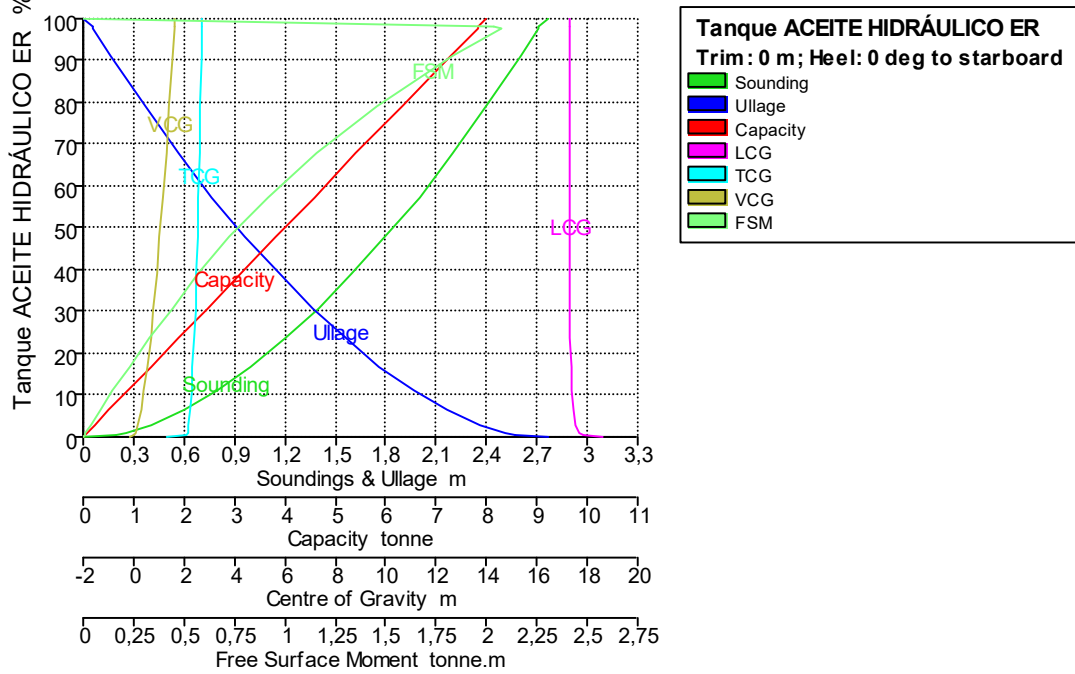
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque ACEITE HIDRÁULICO ER	2,766	0,000	100,000	8,991	8,002	17,272	2,713	1,632	0,000
	2,709	0,056	98,000	8,811	7,842	17,264	2,705	1,612	2,040
	2,708	0,058	97,900	8,802	7,834	17,264	2,704	1,611	2,072
	2,600	0,166	90,982	8,180	7,280	17,265	2,681	1,541	1,837
	2,400	0,366	78,893	7,093	6,313	17,269	2,640	1,412	1,456
	2,200	0,566	67,724	6,089	5,419	17,273	2,601	1,285	1,154
	2,000	0,766	57,399	5,161	4,593	17,278	2,563	1,160	0,913
	1,800	0,966	47,847	4,302	3,828	17,284	2,525	1,035	0,723
	1,600	1,166	39,017	3,508	3,122	17,292	2,487	0,911	0,570
	1,400	1,366	30,898	2,778	2,472	17,303	2,447	0,787	0,442
	1,200	1,566	23,516	2,114	1,882	17,318	2,404	0,663	0,329
	1,000	1,766	16,928	1,522	1,355	17,339	2,358	0,539	0,231
	0,800	1,966	11,209	1,008	0,897	17,369	2,307	0,413	0,148
	0,600	2,166	6,461	0,581	0,517	17,419	2,251	0,287	0,082
	0,400	2,366	2,834	0,255	0,227	17,520	2,187	0,158	0,034
	0,250	2,515	1,000	0,090	0,080	17,699	2,132	0,059	0,011
	0,200	2,566	0,584	0,053	0,047	17,807	2,112	0,025	0,006
	0,000	2,766	0,000	0,000	0,000	18,583	1,334	-0,119	0,000

## Tank Calibrations - Tanque ACEITE SUCIO

Fluid Type = Lube Oil   Specific gravity = 0,89
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
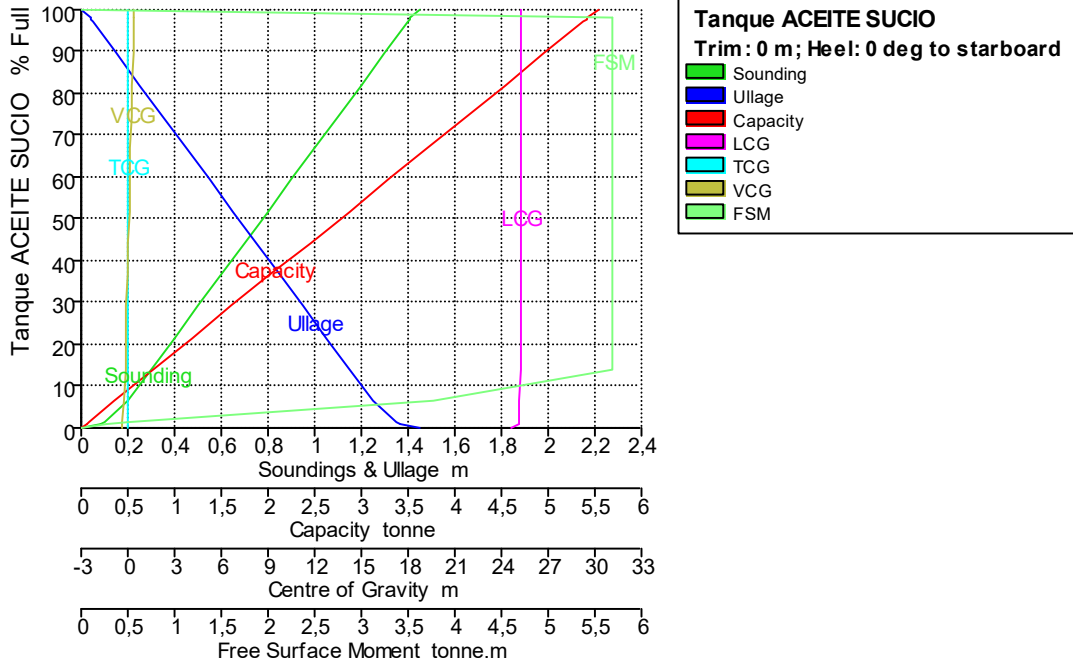
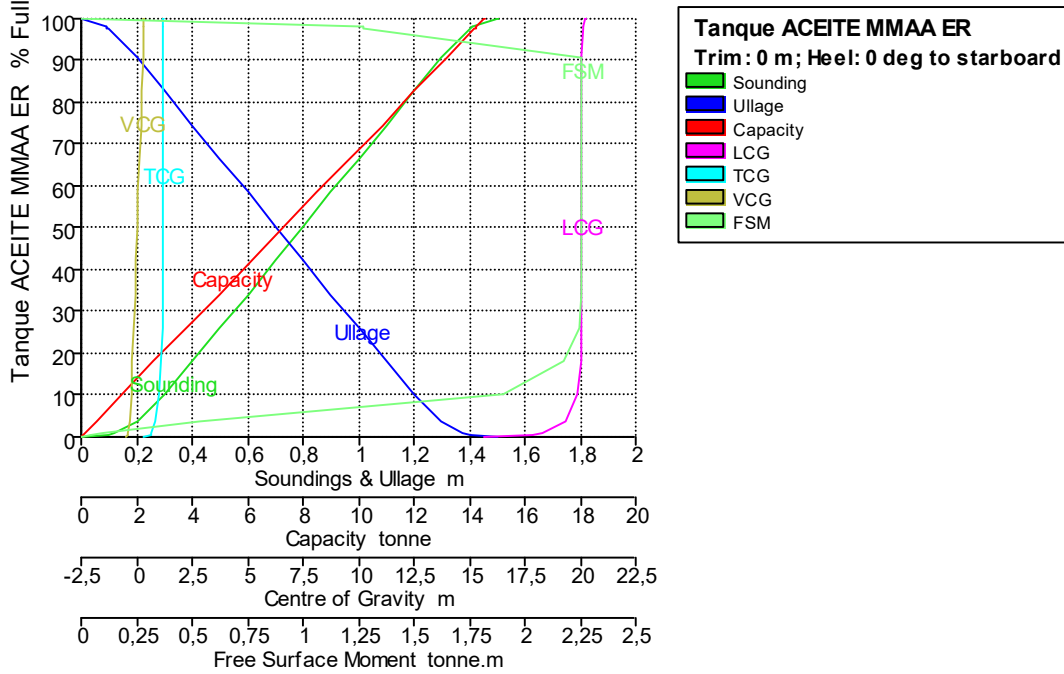| Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque ACEITE SUCIO	1,449	0,000	100,000	6,221	5,537	25,201	0,000	0,392	0,000
	1,411	0,038	98,000	6,097	5,426	25,199	0,000	0,379	5,696
	1,410	0,039	97,900	6,091	5,421	25,199	0,000	0,378	5,696
	1,400	0,049	97,139	6,043	5,379	25,199	0,000	0,373	5,696
	1,300	0,149	89,578	5,573	4,960	25,199	0,000	0,323	5,696
	1,200	0,249	82,017	5,103	4,541	25,199	0,000	0,273	5,696
	1,100	0,349	74,456	4,632	4,123	25,198	0,000	0,223	5,696
	1,000	0,449	66,895	4,162	3,704	25,198	0,000	0,172	5,696
	0,900	0,549	59,334	3,691	3,285	25,198	0,000	0,122	5,696
	0,800	0,649	51,773	3,221	2,867	25,198	0,000	0,072	5,696
	0,700	0,749	44,212	2,751	2,448	25,197	0,000	0,021	5,696
	0,600	0,849	36,651	2,280	2,029	25,197	0,000	-0,030	5,696
	0,500	0,949	29,090	1,810	1,611	25,196	0,000	-0,081	5,696
	0,400	1,049	21,529	1,339	1,192	25,195	0,000	-0,133	5,696
	0,300	1,149	13,968	0,869	0,773	25,192	0,000	-0,187	5,696
	0,200	1,249	6,570	0,409	0,364	25,183	0,000	-0,248	3,771
	0,100	1,349	1,553	0,097	0,086	25,159	0,000	-0,314	0,504
	0,082	1,368	1,000	0,062	0,055	25,148	0,000	-0,326	0,270
	0,000	1,449	0,000	0,000	0,000	24,609	0,000	-0,383	0,000

Tank Calibrations - Tanque ACEITE M.P

Fluid Type = Lube Oil   Specific gravity = 0,89
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
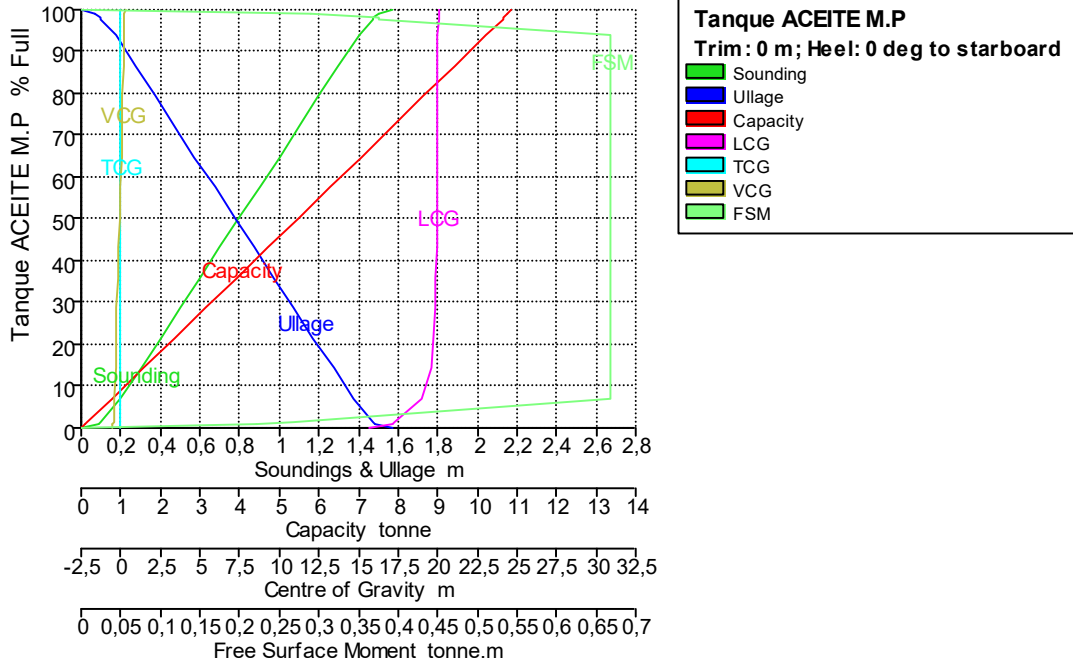
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque ACEITE M.P	1,574	0,000	100,000	12,224	10,880	20,119	0,000	0,263	0,000
	1,500	0,074	98,849	12,084	10,755	20,082	0,000	0,255	0,291
	1,476	0,097	98,000	11,980	10,662	20,062	0,000	0,249	0,377
	1,474	0,100	97,900	11,968	10,651	20,060	0,000	0,248	0,377
	1,400	0,174	93,737	11,459	10,198	20,020	0,000	0,219	0,667
	1,300	0,274	86,522	10,577	9,413	20,013	0,000	0,169	0,667
	1,200	0,374	79,307	9,695	8,628	20,005	0,000	0,119	0,667
	1,100	0,474	72,092	8,813	7,843	19,996	0,000	0,069	0,667
	1,000	0,574	64,877	7,931	7,058	19,984	0,000	0,019	0,667
	0,900	0,674	57,662	7,049	6,273	19,969	0,000	-0,031	0,667
	0,800	0,774	50,447	6,167	5,489	19,951	0,000	-0,082	0,667
	0,700	0,874	43,232	5,285	4,704	19,926	0,000	-0,132	0,667
	0,600	0,974	36,017	4,403	3,919	19,891	0,000	-0,182	0,667
	0,500	1,074	28,802	3,521	3,134	19,839	0,000	-0,233	0,667
	0,400	1,174	21,587	2,639	2,349	19,751	0,000	-0,283	0,667
	0,300	1,274	14,372	1,757	1,564	19,576	0,000	-0,335	0,667
	0,200	1,374	7,157	0,875	0,779	19,048	0,000	-0,390	0,667
	0,100	1,474	1,302	0,159	0,142	17,295	0,000	-0,457	0,268
	0,091	1,483	1,000	0,122	0,109	17,131	0,000	-0,474	0,222
	0,000	1,574	0,000	0,000	0,000	15,651	0,000	-0,531	0,000

## Tank Calibrations - Tanque ACEITE MMAA ER

Fluid Type = Lube Oil   Specific gravity = 0,89
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard

Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque ACEITE MMAA ER	1,501	0,000	100,000	16,346	14,548	20,193	1,222	0,336	0,000
	1,500	0,001	99,999	16,345	14,547	20,193	1,222	0,336	0,019
	1,409	0,092	98,000	16,019	14,257	20,136	1,221	0,323	1,272
	1,406	0,094	97,900	16,002	14,242	20,134	1,221	0,322	1,272
	1,400	0,101	97,609	15,955	14,200	20,129	1,221	0,321	1,272
	1,300	0,201	90,790	14,840	13,208	20,086	1,219	0,278	2,253
	1,200	0,301	82,696	13,517	12,030	20,085	1,216	0,228	2,253
	1,100	0,401	74,602	12,194	10,853	20,083	1,212	0,177	2,253
	1,000	0,501	66,508	10,871	9,675	20,081	1,207	0,127	2,253
	0,900	0,601	58,414	9,548	8,498	20,078	1,202	0,076	2,253
	0,800	0,701	50,320	8,225	7,320	20,075	1,194	0,025	2,253
	0,700	0,801	42,226	6,902	6,143	20,070	1,183	-0,026	2,253
	0,600	0,901	34,132	5,579	4,965	20,063	1,167	-0,078	2,253
	0,500	1,001	26,040	4,256	3,788	20,051	1,141	-0,130	2,246
	0,400	1,101	17,993	2,941	2,617	20,019	1,094	-0,185	2,173
	0,300	1,201	10,176	1,663	1,480	19,863	0,992	-0,245	1,902
	0,200	1,301	3,874	0,633	0,564	19,330	0,823	-0,312	0,533
	0,122	1,379	1,000	0,163	0,145	18,262	0,691	-0,368	0,095
	0,100	1,401	0,568	0,093	0,083	17,853	0,656	-0,386	0,045
	0,000	1,501	0,000	0,000	0,000	15,651	0,334	-0,458	0,000

Tank Calibrations - Tanque ACEITE REDUCTORA + HÉLIC

Fluid Type = Lube Oil   Specific gravity = 0,89
Permeability = 98 %
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard
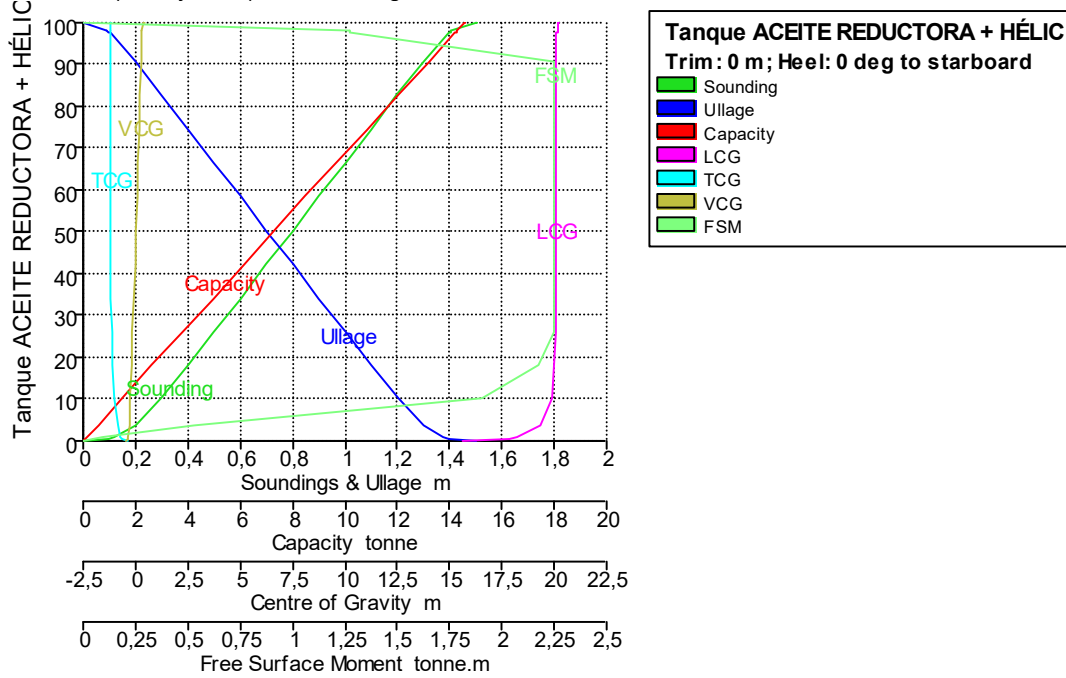
Tank Name	Sounding m	Ullage m	% Full	Capacity m^3	Capacity tonne	LCG m	TCG m	VCG m	FSM tonne.m
Tanque ACEITE REDUCTORA + HÉLIC	1,501	0,000	100,000	16,346	14,548	20,193	-1,222	0,336	0,000
	1,500	0,001	99,999	16,345	14,547	20,193	-1,222	0,336	0,019
	1,409	0,092	98,000	16,019	14,257	20,136	-1,221	0,323	1,272
	1,406	0,094	97,900	16,002	14,242	20,134	-1,221	0,322	1,272
	1,400	0,101	97,609	15,955	14,200	20,129	-1,221	0,321	1,272
	1,300	0,201	90,790	14,840	13,208	20,086	-1,219	0,278	2,253
	1,200	0,301	82,696	13,517	12,030	20,085	-1,216	0,228	2,253
	1,100	0,401	74,602	12,194	10,853	20,083	-1,212	0,177	2,253
	1,000	0,501	66,508	10,871	9,675	20,081	-1,207	0,127	2,253
	0,900	0,601	58,414	9,548	8,498	20,078	-1,202	0,076	2,253
	0,800	0,701	50,320	8,225	7,320	20,075	-1,194	0,025	2,253
	0,700	0,801	42,226	6,902	6,143	20,070	-1,183	-0,026	2,253
	0,600	0,901	34,132	5,579	4,965	20,063	-1,167	-0,078	2,253
	0,500	1,001	26,040	4,256	3,788	20,051	-1,141	-0,130	2,246
	0,400	1,101	17,993	2,941	2,617	20,019	-1,094	-0,185	2,173
	0,300	1,201	10,176	1,663	1,480	19,863	-0,992	-0,245	1,902
	0,200	1,301	3,874	0,633	0,564	19,330	-0,823	-0,312	0,533
	0,122	1,379	1,000	0,163	0,145	18,262	-0,691	-0,368	0,095
	0,100	1,401	0,568	0,093	0,083	17,853	-0,656	-0,386	0,045
	0,000	1,501	0,000	0,000	0,000	15,651	-0,334	-0,458	0,000