

YATE DE 87m

## CÁLCULOS DE ARQUITECTURA NAVAL

### Cuaderno 4

Autor: Víctor Jesús Gavín Barberán

Proyecto: 18-105 Yate de lujo de 87m

Contacto: 617 872 329

[vj617872329@icloud.com](mailto:vj617872329@icloud.com)





Escola Politécnica Superior  
UNIVERSIDADE DA CORUÑA

DEPARTAMENTO DE INGENIERÍA NAVAL Y OCEÁNICA E INGENIERIA INDUSTRIAL

PROYECTO FIN DE MASTER

CURSO 2.017-2.018

**PROYECTO NÚMERO 18-105**

**TIPO DE BUQUE:** *YATE DE LUJO DE DESPLAZAMIENTO*

**CLASIFICACIÓN , COTA Y REGLAMENTOS DE APLICACIÓN :** *BUQUE DE PASAJE, OCEANICO, SOLAS MARPOL MCA. MARPOL*

**CARACTERÍSTICAS DE LA CARGA:** PERSONAS EN CRUCEROS TURÍSTICOS DE GRAN LUJO

**VELOCIDAD Y AUTONOMÍA:** 15 KN A MOTOR DE VELOCIDAD MAXIMA

**SISTEMAS Y EQUIPOS DE CARGA / DESCARGA:** *GRUA A BORDO, JACUZZI, GARAJE PARA MOTOS DE AGUA*

**PROPULSIÓN:** *UNO O DOS MOTORES DIESEL*

**TRIPULACIÓN Y PASAJE:** *40 PASAJEROS 20 TRIPULANTES*

**OTROS EQUIPOS E INSTALACIONES:** *GARAJE, HELICE TRASVERSAL PROA, HELIDECK*

ALUMNO: D. VICTOR GAVIN

TUTOR: D. VICENTE DIAZ

Ferrol, Abril de 2018

# ÍNDICE

## CUADERNO 4

1. Introducción
2. Tablas de cálculos hidrostáticos
3. Tablas de brazos adrizantes (KN)
4. Zona estanca
5. Puntos de inundación progresiva
6. Plano de compartimentado
7. Plano de tanques
8. Tabla de capacidades y CDG

# Anexos

## CUADERNO 4

- I. Hidrostáticas: *anexo 4.2.1*
- II. Cálculos KN: *anexo 4.3.1*
- III. Plano puntos de inundación progresiva: *anexo 4.5.1*
- IV. Arrangement tank: *anexo 4.7.1*
- V. Tank calibration: *anexo 4.8.1*

# 1 Introducción

En el presente cuaderno se realizarán los **cálculos de las hidrostáticas** y **curvas KN** a diferentes calados y asientos.

Se realizará una descripción del **compartimentado** incluyendo la separación de cuadernas, la posición de los mamparos estancos y los espacios de carga.

Se estudiarán los **tanques a bordo** del buque, así como las **capacidades** necesarias de consumos y lastre.

Los datos de partida del estudio realizado en los cuadernos anteriores son:

| Dimensiones           |                               |                |
|-----------------------|-------------------------------|----------------|
| <b>L</b>              | <b>Eslora</b>                 | <b>87,5 m</b>  |
| <b>L<sub>pp</sub></b> | <b>Eslora perpendiculares</b> | <b>73 m</b>    |
| <b>L<sub>wl</sub></b> | <b>Eslora flotación</b>       | <b>78,86 m</b> |
| <b>B</b>              | <b>Manga</b>                  | <b>13,47 m</b> |
| <b>T</b>              | <b>Calado</b>                 | <b>4,32 m</b>  |
| <b>D</b>              | <b>Puntal a c. super</b>      | <b>7,61 m</b>  |
|                       | <b>Tripulación</b>            | <b>20</b>      |
|                       | <b>Pasaje</b>                 | <b>40</b>      |

|                                   |                 |                                      |
|-----------------------------------|-----------------|--------------------------------------|
| Displacement                      | <b>2356</b>     | <b>t</b>                             |
| Volume (displaced)                | <b>2298,634</b> | <b>m<sup>3</sup></b>                 |
| Draft Amidships                   | <b>4,300</b>    | <b>m</b>                             |
| Immersed depth                    | <b>4,309</b>    | <b>m</b>                             |
| WL Length                         | <b>78,867</b>   | <b>m</b>                             |
| Beam max extents on WL            | <b>13,355</b>   | <b>m</b>                             |
| Wetted Area                       | <b>1198,923</b> | <b>m<sup>2</sup></b>                 |
| Max sect. area                    | <b>50,465</b>   | <b>m<sup>2</sup></b>                 |
| Waterpl. Area                     | <b>832,905</b>  | <b>m<sup>2</sup></b>                 |
| Prismatic coeff. (Cp)             | <b>0,578</b>    |                                      |
| Block coeff. (Cb)                 | <b>0,506</b>    |                                      |
| Max Sect. area coeff. (Cm)        | <b>0,897</b>    |                                      |
| Waterpl. area coeff. (Cwp)        | <b>0,791</b>    |                                      |
| LCB length                        | <b>33,219</b>   | <b>from zero pt. (+ve fwd) m</b>     |
| LCF length                        | <b>26,989</b>   | <b>from zero pt. (+ve fwd) m</b>     |
| LCB %                             | <b>42,121</b>   | <b>from zero pt. (+ve fwd) % Lwl</b> |
| LCF %                             | <b>34,221</b>   | <b>from zero pt. (+ve fwd) % Lwl</b> |
| KB                                | <b>2,544</b>    | <b>m</b>                             |
| KG fluid                          | <b>0,000</b>    | <b>m</b>                             |
| BMt                               | <b>4,316</b>    | <b>m</b>                             |
| BML                               | <b>140,668</b>  | <b>m</b>                             |
| GMt corrected                     | <b>6,860</b>    | <b>m</b>                             |
| GML                               | <b>143,213</b>  | <b>m</b>                             |
| KMt                               | <b>6,860</b>    | <b>m</b>                             |
| KML                               | <b>143,213</b>  | <b>m</b>                             |
| Immersion (TPc)                   | <b>8,537</b>    | <b>tonne/cm</b>                      |
| MTc                               | <b>46,666</b>   | <b>tonne.m</b>                       |
| RM at 1deg = GMt.Disp.sin(1)      | <b>282,094</b>  | <b>tonne.m</b>                       |
| Length:Beam ratio                 | <b>5,905</b>    |                                      |
| Beam:Draft ratio                  | <b>3,099</b>    |                                      |
| Length:Vol <sup>0.333</sup> ratio | <b>5,976</b>    |                                      |
| Precision                         | <b>Medium</b>   | <b>66 stations</b>                   |

## 2 Tablas de cálculos hidrostáticos

Las curvas hidrostáticas son necesarias porque definen los valores de la carena en diferentes situaciones de calados, datos necesarios para el cálculo de la estabilidad del buque. Estos cálculos se realizarán **desde 2 metros hasta 5 metros en intervalos de 0.2 m**. Este margen permite ampliar el calado máximo y mínimo (rosca y plena carga) a las que en condiciones normales el buque se va a enfrentar.

Los datos que se van a aportar son:

| Referencia                  | Descripción  | Unidad         |
|-----------------------------|--|----------------|
| Draft Amidsh.               | Calado   | m              |
| Displacement                | Desplazamiento   | t              |
| WL Length                   | Eslora en la flotación                                   | m              |
| WL Beam                     | Manga en la flotación                                    | m              |
| Wetted Area                 | Superficie mojada  | m <sup>2</sup> |
| Waterpl. Area               | Área del plano de flotación                              | m <sup>2</sup> |
| Prismatic Coeff.            | Coefficiente prismático                                  |                |
| Block Coeff.                | Coefficiente de bloque                                   |                |
| Midship Area Coeff.         | Coefficiente de maestra                                  |                |
| Waterpl. Area Coeff.        | Coefficiente de flotación                                |                |
| LCB from zero pt. (+ve fwd) | Posición longitudinal del centro de carena (+ a proa)    | m              |
| LCF from zero pt. (+ve fwd) | Posición longitudinal del centro de flotación (+ a proa) | m              |
| KB                          | Radio metacéntrico transversal                           | m              |
| BMt                         | Radio metacéntrico longitudinal                          | m              |
| GMt                         | Altura metacéntrica transversal                          | m              |
| GMI                         | Altura metacéntrica longitudinal                         | m              |
| Immersion (TPc)             | Toneladas por centímetro de inmersión                    | t/cm           |
| MTc                         | Momento para cambiar el trimado 1 cm                     | t/cm           |

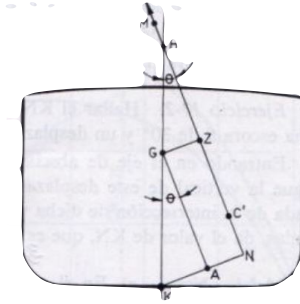
Anexos incluidos en este apartado:

- Hidrostáticas: *anexo 4.2.1*

### 3 Tablas de brazos adrizantes (KN)

Las curvas KN representan el valor de la distancia KN para diferentes valores de escora de la embarcación. El valor de KN es el equivalente al brazo adrizante del barco con el centro de gravedad en la posición hipotética de K (en la línea base), siendo los valores de KN dependientes únicamente de las formas de la carena. La utilidad de estas curvas reside en que permiten calcular de un modo sencillo el valor de GZ, una vez conocida la altura del centro de gravedad. De modo que:

$$GZ = KN - KG \text{ sen } \theta$$



Los cálculos se han realizado con escoras comprendidas entre 0° y 90° en tramos de 10° y superando los márgenes del desplazamiento en rosca (1700t) y máximo en plena carga (2200t), en saltos de 20t.

Anexos incluidos en este apartado:

- Cálculos KN: *anexo 4.3.1*



## 4 Zona estanca

Se consideran en este apartado las instrucciones recogidas en la SC que se aplica al buque: "Special Service Craft" (SSC) de Lloyd's Register.

### 4.1 Mamparos estancos

Definido en:

**Table 2.4.1 Total number of bulkheads**

| Length, $L_R$ , in metres |       | Total number of bulkheads     |               |
|---------------------------|-------|-------------------------------|---------------|
|                           |       | Machinery amidships           | Machinery aft |
| > 15                      | ≤ 25  | 3                             | 2             |
| > 25                      | ≤ 65  | 4                             | 3*            |
| > 65                      | ≤ 85  | 4                             | 4*            |
| > 85                      | ≤ 90  | 5                             | 5*            |
| > 90                      | ≤ 105 | 5                             | 5*            |
| > 105                     | ≤ 115 | 6                             | 5*            |
| > 115                     | ≤ 125 | 6                             | 6*            |
| > 125                     | ≤ 145 | 7                             | 6*            |
| > 145                     |       | To be individually considered |               |

\* With afterpeak bulkhead forming after boundary of machinery space

Teniendo esto en cuenta, la configuración óptima será de 4 mamparos estancos. No obstante, se ha optado por una configuración de 5 mamparos ya que esto favorecerá el grado de fiabilidad del buque.

Consideraciones practicas:

- La situación de los mamparos estancos coincidirá con sus respectivas cuadernas.
- Por lo dicho anteriormente, será necesario definir la separación entre cuadernas. Este parámetro no viene definido en el SSC, por lo tanto, se tomará como referencia la clara del buque base, correspondiente a 600mm. Este valor es estándar dentro de los barcos de estas dimensiones, que oscilan entre 500mm a 700mm. Por el momento el valor de la clara va a ser constante, pero se considerará en cálculos futuros reducirlo, si fuese necesario, en piques de proa y popa.

## 4.2 Mamparo de colisión

Definido en:

**Table 2.4.3 Collision bulkhead for passenger craft, patrol craft and yachts**

| Arrangement  | Distance of collision bulkhead aft of fore perpendicular, in metres |                      |
|--|---|----------------------|
|  | Minimum   | Maximum              |
| (a)  | $0,05L_{pp}$  | $3 + 0,05L_{pp}$     |
| (b)  | $0,05L_{pp} - f$  | $3 + 0,05L_{pp} - f$ |
| Symbols and definitions  |   |                      |
| $f = \frac{G}{2}$ or $0,015L_{pp}$ , whichever is the lesser<br><br>$G$ = Projection of bulbous bow forward of fore perpendicular, in metres<br><br>$L_{pp}$ is as defined in Pt 3, Ch 1, 6.2 <i>Principal particulars</i> .<br><br>Arrangement (a) A craft that has no part of its underwater body extending forward of the fore perpendicular.<br><br>Arrangement (b) A craft with part of its underwater body extending forward of the fore perpendicular (e.g. bulbous bow). |   |                      |

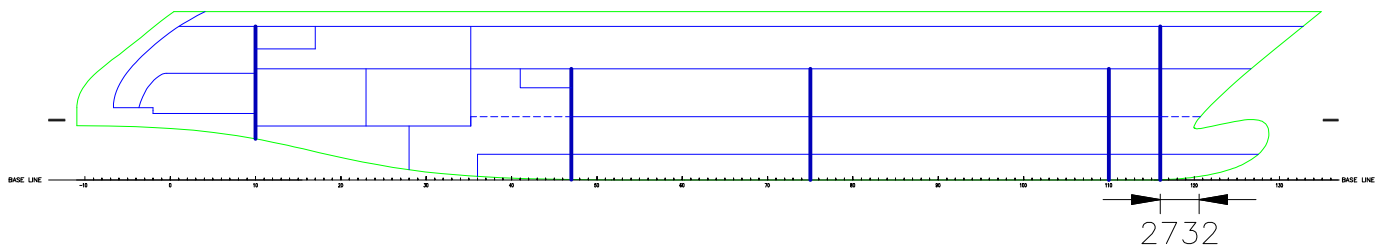
Teniendo esto en cuenta y realizando los cálculos obtenemos:

- Distancia mínima desde la perpendicular de proa hacia popa: 2,65m
- Distancia máxima desde la perpendicular de proa hacia popa: 5,65m

Consideraciones prácticas:

- Se ha decidido utilizar la mínima para poder optimizar el espacio de habilitación. Es decir, el mamparo irá situado lo más a proa posible.

## Mamparos estancos Compartimentado



## 5 Puntos de inundación progresiva

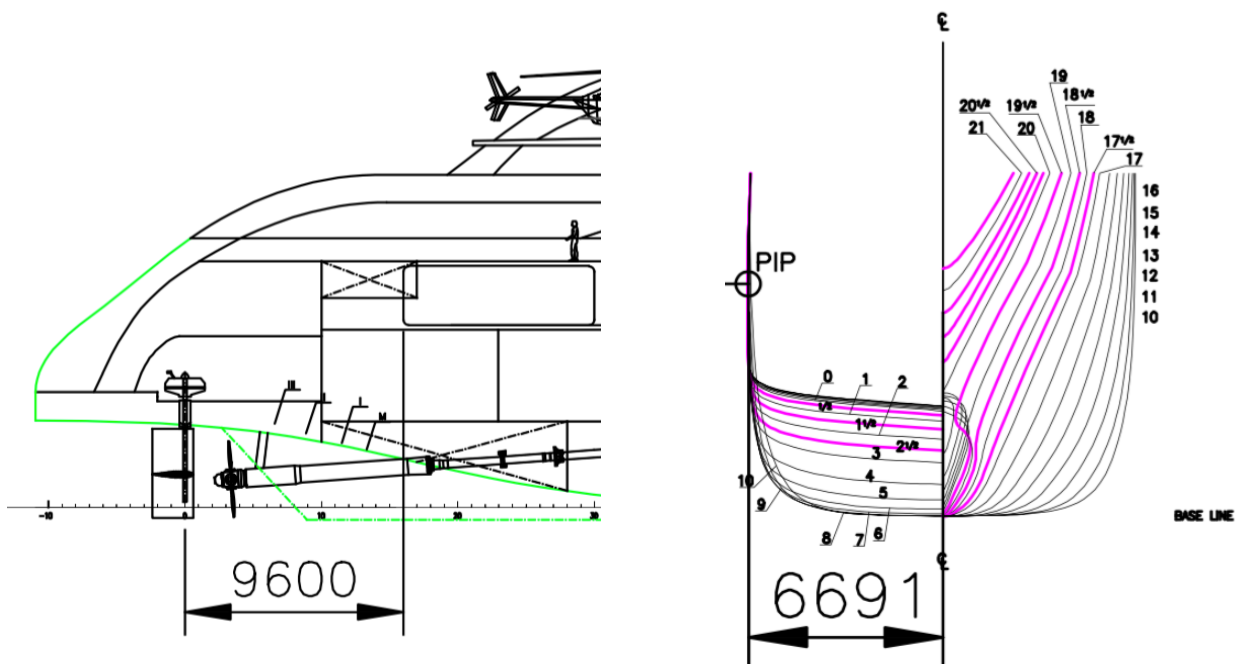
Los puntos de inundación progresiva son todos aquellos puntos que, estando situados por encima de la cubierta de francobordo pueden dar lugar, en caso de un embarque de agua o de una escora determinada, a la inundación del buque.

Pueden corresponder a puertas, portillos o cualquier tipo de abertura que presentan las superestructuras y a través de las cuales puede entrar agua.

El punto de inundación progresiva más bajo será el acceso al garaje en la cubierta *Main Deck* ( $h = 6691$  mm), ya que el resto de aberturas, más cercanas a la flotación, dispondrán de cierres estancos y no se prevé inundación a través de ellos. Este acceso encontrándose cerrado debería comportarse como estanco, para ello debería ir provisto de cilindros hidráulicos que retranqueén el portón. No obstante no siempre se encontrara cerrado.

La situación del punto de inundación será el punto más bajo de la puerta y el que esté más alejado de crujía. La situación longitudinal del PIP es a 9600 mm de la perpendicular de popa.

En el Cuaderno 5 se incluirán los puntos de inundación progresiva (PIP) en el cálculo de estabilidad.



Anexos incluidos en este apartado:

- Plano puntos de inundación progresiva: *anexo 4.5.1*

## 6 Plano de compartimentado

Comenzaremos este apartado definiendo las capacidades necesarias para cada fluido. De este modo las podremos repartir en sus respectivos tanques:

Autonomía = 6300 millas náuticas - 17 días de navegación

Consumo planta (MTU 10V 2000 M93) [x2 ud.] = 287,7 l/h

Consumo generadores (Caterpillar Marine Generator SET C9) = 50 l/h

Velocidad = 15kn

nº motores = 2

nº generadores = 3

|  | <b>CAPACIDAD NECESARIA</b> | <b>CAPACIDAD INSTALADA</b> |
|--|----------------------------|----------------------------|
| <b>PLANTA PROPULSORA</b><br>Tanques combustible (m <sup>3</sup> )<br>$V = (\text{autonomía/velocidad}) \times \text{consumo} \times \text{n}^\circ \text{motores}$ | 241,668                    | -                          |
| <b>GENERADORES</b><br>Tanques combustible (m <sup>3</sup> )<br>$V = (\text{autonomía/velocidad}) \times \text{consumo} \times \text{n}^\circ \text{motores}$       | 36                         | -                          |
| <b>GENERADOR EMERGENCIA SOLAS (36h)</b>  | 1,8                        | -                          |
| <b>TOTAL COMBUSTIBLE</b>   | <b>279,47</b>              | <b>283,13</b>              |
| <b>TANQUE USO DIARIO</b><br>(24h x consumo h x nºmotores)  | <b>11,51</b>               | <b>12,74</b>               |
| <b>Tanques de aceite (m<sup>3</sup>)</b><br>$V = 0,03 \times \text{Total combustible}$<br>(3% del total de los tanques de combustible)                             | <b>8,4</b>                 | <b>8,39</b>                |
| <b>Tanques de agua (m<sup>3</sup>)</b><br>$V = 125\text{l/persona} \times \text{personas} \times \text{autonomía}$   | <b>112,5</b>               | <b>123,91</b>              |
| <b>Aguas negras (m<sup>3</sup>)</b><br>$V = 10\text{l/persona} \times \text{personas} \times \text{autonomía}$   | <b>8,4</b>                 | <b>8,74</b>                |
| <b>Aguas grises (m<sup>3</sup>)</b><br>$V = 15\text{l/persona} \times \text{personas} \times \text{autonomía}$   | <b>12,6</b>                | <b>13,42</b>               |

Actualizamos las características de autonomía del buque con respecto a las capacidades reales de los tanques:

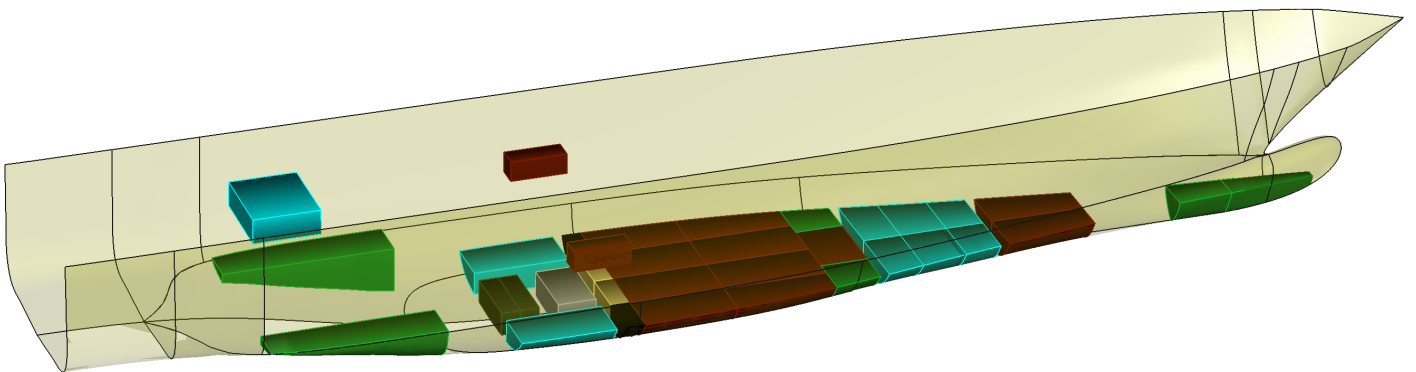
- Autonomía: 6350 millas.
- Litros de agua por persona: 140l.

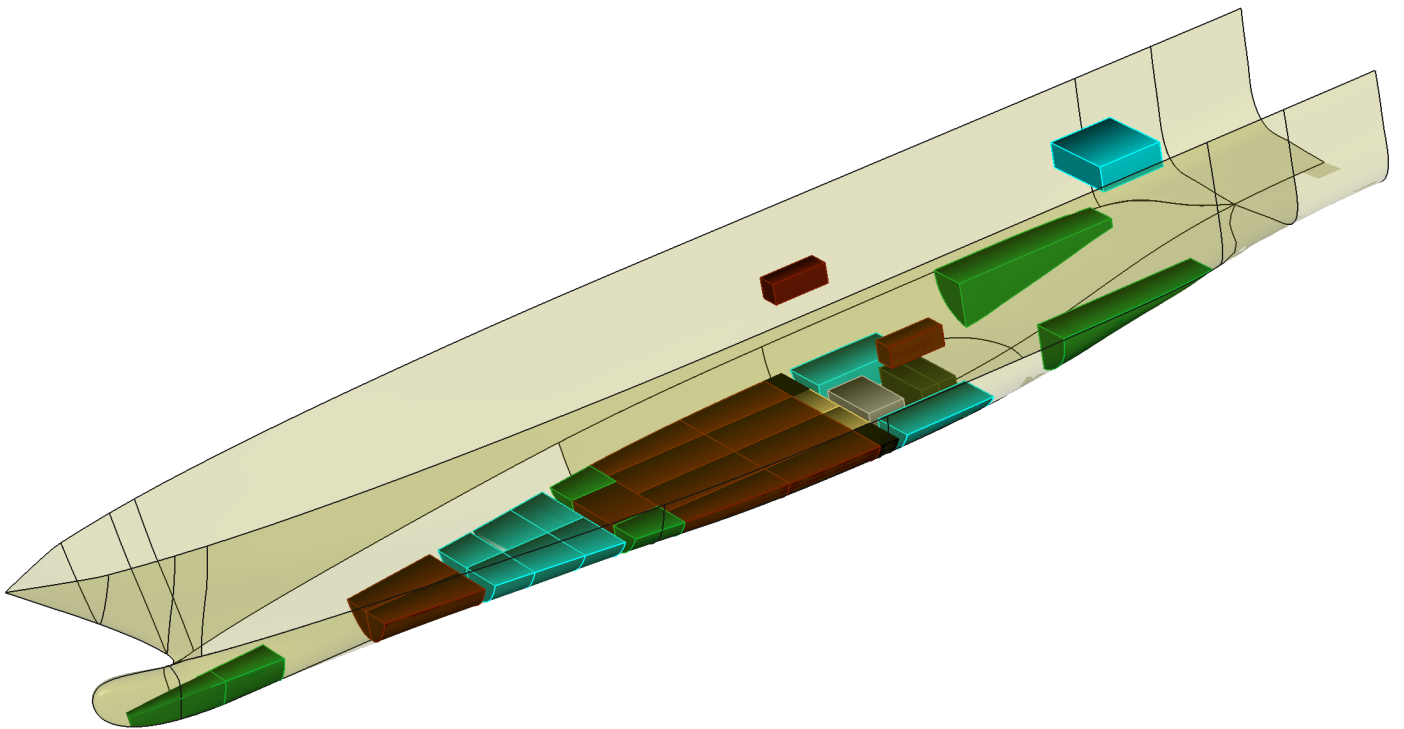
## 7 Plano de tanques

En el anexo relativo a este apartado se puede consultar la disposición de tanques.

Consideraciones prácticas:

- Se utilizará la clara de cuadernas para hacer coincidir el inicio y el fin de cada tanque con una cuaderna (600mm).
- Configuración de tanques simétrica para no entorpecer la estabilidad, trimado...
- Tanques de agua dulce separados por una clara de cuaderna en todas sus disposiciones del resto de tanques (coferdam).
- Según la normativa no se pueden poner tanques de combustible en cámara de máquinas, salvo uso diario.
- Los tanques impares corresponden a babor y los pares a estribor.
- Renunciando a capacidad de tanques de combustible, se instalará en este espacio un sistema de tanques estabilizadores pasivos (que se estudiará en el Cuaderno 5).





Leyenda de colores:

- **Ballast**
- **Diesel**
- **Fresh water**
- **Grey water**
- **Black water**
- **Lube and Oil**
- **JP5**
- **Swimming pool**

Anexos incluidos en este apartado:

- Arrangement tank: *anexo 4.7.1*

## 8 Tabla de capacidades y CDG

| TANK                       | CAPACITY (m3)  | LCG (m) | TCG (m) | VCG (m) |
|----------------------------|----------------|---------|---------|---------|
| Oil                        | 8,04           | 22,204  | 0,000   | 1,021   |
| <b>TOTAL OIL</b>           | <b>8,04</b>    |         |         |         |
| Grey Water                 | 17,719         | 26,407  | 0,000   | 0,941   |
| <b>TOTAL GREY WATER</b>    | <b>17,719</b>  |         |         |         |
| Black Water 1              | 4,374          | 28,801  | -4,344  | 1,085   |
| Black Water 2              | 4,374          | 28,801  | 4,344   | 1,085   |
| <b>TOTAL BLACK WATER</b>   | <b>8,748</b>   |         |         |         |
| Diesel 1                   | 20,857         | 32,339  | -4,299  | 1,090   |
| Diesel 3                   | 33,834         | 32,402  | -1,580  | 0,914   |
| Diesel 2                   | 20,857         | 32,339  | 4,299   | 1,090   |
| Diesel 4                   | 33,834         | 32,402  | 1,580   | 0,914   |
| Diesel 5                   | 17,508         | 38,428  | -4,104  | 1,136   |
| Diesel 7                   | 37,146         | 38,695  | -1,575  | 0,916   |
| Diesel 6                   | 17,508         | 38,428  | 4,104   | 1,136   |
| Diesel 8                   | 37,146         | 38,695  | 1,575   | 0,916   |
| Diesel 9                   | 20,205         | 56,778  | -1,025  | 1,040   |
| Diesel 10                  | 20,205         | 56,778  | 1,025   | 1,040   |
| Diesel 11                  | 24,03          | 43,499  | 0,000   | 0,906   |
| <b>TOTAL DIESEL</b>        | <b>283,13</b>  |         |         |         |
| Fresh Water 1              | 20,618         | 24,699  | -4,302  | 1,148   |
| Fresh Water 2              | 20,618         | 24,699  | 4,302   | 1,148   |
| Fresh Water 3              | 14,481         | 46,777  | -1,750  | 1,003   |
| Fresh Water 4              | 14,481         | 46,777  | 1,750   | 1,003   |
| Fresh Water 5              | 15,856         | 49,462  | -1,541  | 1,008   |
| Fresh Water 6              | 15,856         | 49,462  | 1,541   | 1,008   |
| Fresh Water 7              | 11             | 52,173  | -1,347  | 1,017   |
| Fresh Water 8              | 11             | 52,173  | 1,347   | 1,017   |
| <b>TOTAL FRESH WATER</b>   | <b>123,91</b>  |         |         |         |
| Ballast 1                  | 36,82          | 12,718  | -5,097  | 2,947   |
| Ballast 2                  | 36,82          | 12,718  | 5,097   | 2,947   |
| Ballast 3                  | 8,275          | 67,671  | 0,000   | 1,126   |
| Ballast 4_Forward          | 6,367          | 71,789  | 0,000   | 1,238   |
| Ballast Balance 1          | 9,103          | 43,425  | -3,249  | 1,118   |
| Ballast Balance 2          | 9,103          | 43,425  | 3,249   | 1,118   |
| <b>TOTAL BALLAST</b>       | <b>106,488</b> |         |         |         |
| Swimming Pool              | 33,602         | 8,100   | 0,000   | 10,000  |
| <b>TOTAL SWIMMING POOL</b> | <b>33,602</b>  |         |         |         |

| TANK                  | CAPACITY (m3) | LCG (m) | TCG (m) | VCG (m) |
|-----------------------|---------------|---------|---------|---------|
| Vertidos              | 8,04          | 23,403  | 0,000   | 0,992   |
| <b>TOTAL Vertidos</b> | <b>8,04</b>   |         |         |         |

| <b>TANK</b>             | <b>CAPACITY (m3)</b> | <b>LCG (m)</b> | <b>TCG (m)</b> | <b>VCG (m)</b> |
|-------------------------|----------------------|----------------|----------------|----------------|
| JP5 1                   | 6,711                |                |                |                |
| JP5 2                   | 6,711                |                |                |                |
| <b>TOTAL JP5</b>        | <b>13,422</b>        |                |                |                |
| Uso Diario 1            | 6,369                | 26,396         | -6,020         | 7,143          |
| Uso Diario 2            | 6,369                | 26,396         | 6,020          | 7,143          |
| <b>TOTAL USO DIARIO</b> | <b>12,738</b>        |                |                |                |

La tabla anterior presenta una recopilación de los tanques instalados, pudiéndose consultar en su anexo correspondiente el report directo del software.

Como se puede comprobar en la tabla, se han definido unos tanques dedicados a agua de lastre. Se ha considerado que era importante realizar una idea preliminar de esta carga y se ha utilizado el espacio sobrante en los dobles fondos para ello. En el Cuaderno 5 se estudiará si es necesario ampliar o corregir esta capacidad.

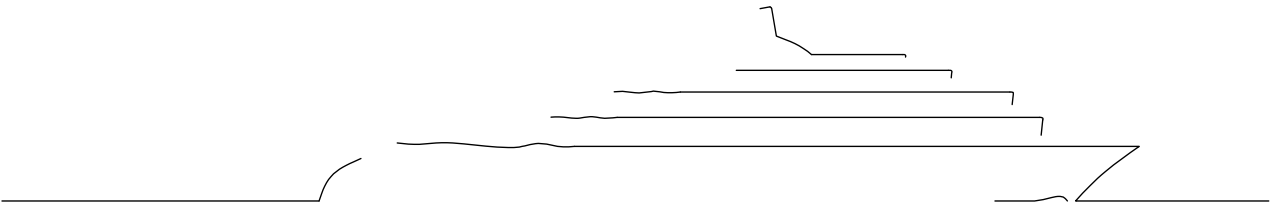
También se ha decidido modelizar la piscina como si de un tanque se tratase, debido a la importante influencia en la estabilidad del barco que va a suponer elevar tanto un tanque. En función de los estudios posteriores que realizaremos a la estabilidad, podremos considerar la posibilidad de modificar sus dimensiones o disposición.

Anexos incluidos en este apartado:

- Tank calibration: *anexo 4.8.1*



# ANEXO 4.2.1

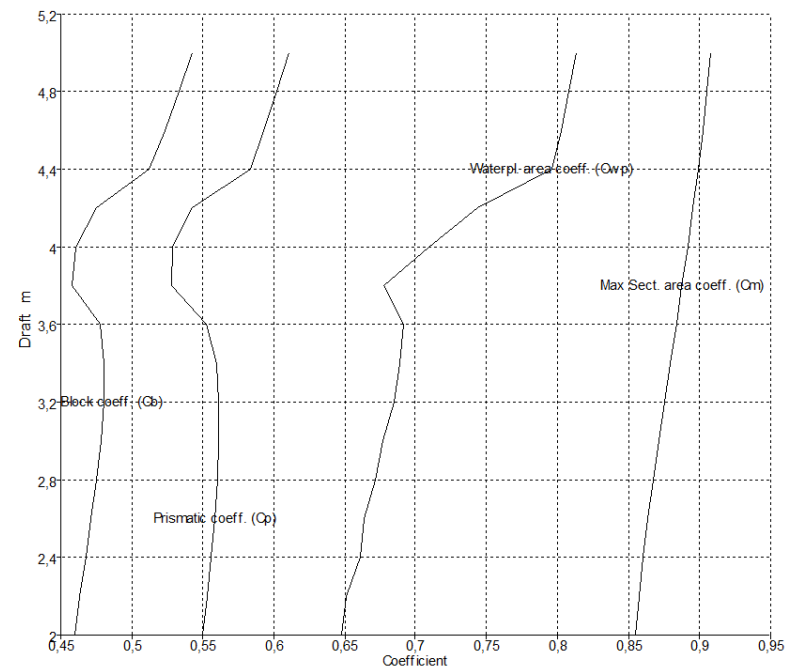
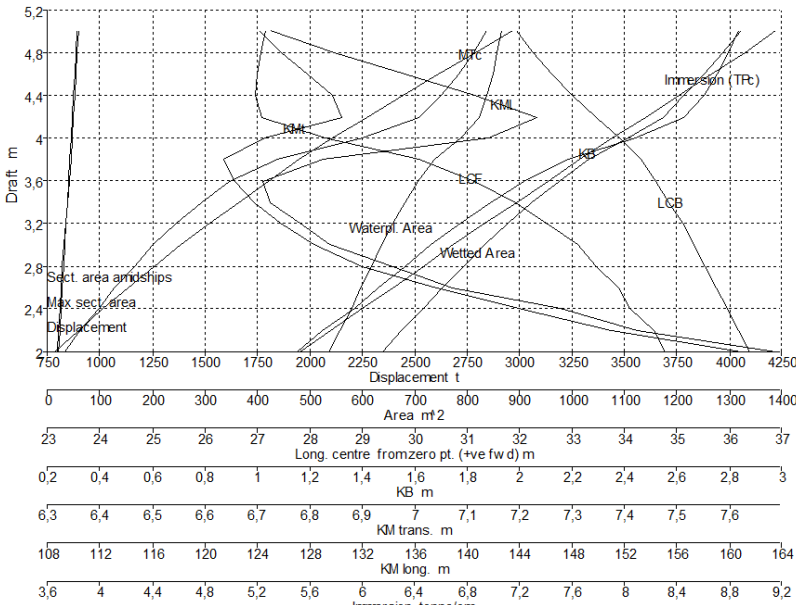


YATE DE 87m

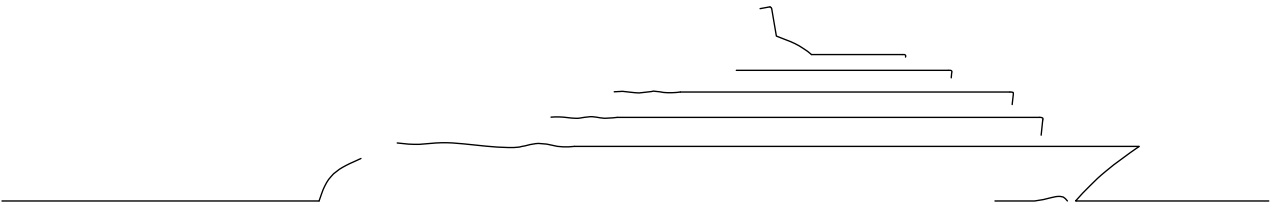
# Hydrostatic - tfg maxurf

Stability 20.00.04.9, build: 9  
 Model file: \\MacHome\Dropbox\0 TFG\Cuaderno 4\tfg maxurf (Medium precision, 66 sections, Trimming off, Skin thickness not applied). Long. datum: AP; Vert. datum: Baseline. Analysis tolerance - ideal(worst case): Disp. %: 0,01000(0,100); Trim % (LCG-TCG): 0,01000(0,100); Heel% (LCG-TCG): 0,01000(0,100)  
 Damage Case - Intact

|                                      | 2,000   | 2,200   | 2,400   | 2,600   | 2,800   | 3,000   | 3,200   | 3,400   | 3,600   | 3,800    | 4,000    | 4,200    | 4,400    | 4,600    | 4,800    | 5,000    |
|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|
| Draft Amidships m                    | 2,000   | 2,200   | 2,400   | 2,600   | 2,800   | 3,000   | 3,200   | 3,400   | 3,600   | 3,800    | 4,000    | 4,200    | 4,400    | 4,600    | 4,800    | 5,000    |
| Displacement t                       | 784,9   | 896,7   | 1013    | 1134    | 1259    | 1387    | 1521    | 1658    | 1801    | 1948     | 2105     | 2271     | 2442     | 2615     | 2790     | 2967     |
| Heel deg                             | 0,0     | 0,0     | 0,0     | 0,0     | 0,0     | 0,0     | 0,0     | 0,0     | 0,0     | 0,0      | 0,0      | 0,0      | 0,0      | 0,0      | 0,0      | 0,0      |
| Draft at FP m                        | 2,000   | 2,200   | 2,400   | 2,600   | 2,800   | 3,000   | 3,200   | 3,400   | 3,600   | 3,800    | 4,000    | 4,200    | 4,400    | 4,600    | 4,800    | 5,000    |
| Draft at AP m                        | 2,000   | 2,200   | 2,400   | 2,600   | 2,800   | 3,000   | 3,200   | 3,400   | 3,600   | 3,800    | 4,000    | 4,200    | 4,400    | 4,600    | 4,800    | 5,000    |
| Draft at LCF m                       | 2,000   | 2,200   | 2,400   | 2,600   | 2,800   | 3,000   | 3,200   | 3,400   | 3,600   | 3,800    | 4,000    | 4,200    | 4,400    | 4,600    | 4,800    | 5,000    |
| Trim (+ve by stern) m                | 0,000   | 0,000   | 0,000   | 0,000   | 0,000   | 0,000   | 0,000   | 0,000   | 0,000   | 0,000    | 0,000    | 0,000    | 0,000    | 0,000    | 0,000    | 0,000    |
| WL Length m                          | 66,568  | 67,609  | 68,635  | 69,665  | 70,728  | 71,880  | 73,167  | 74,741  | 76,913  | 81,996   | 83,506   | 83,091   | 78,958   | 79,133   | 79,312   | 79,496   |
| Beam max extents on WL m             | 12,454  | 12,631  | 12,778  | 12,906  | 13,007  | 13,092  | 13,162  | 13,220  | 13,263  | 13,292   | 13,320   | 13,347   | 13,362   | 13,369   | 13,381   | 13,388   |
| Wetted Area m^2                      | 640,092 | 676,150 | 717,418 | 753,299 | 794,047 | 833,493 | 876,231 | 923,564 | 973,920 | 1032,048 | 1108,331 | 1172,961 | 1212,805 | 1250,196 | 1287,203 | 1323,208 |
| Waterpl. Area m^2                    | 537,056 | 556,205 | 579,679 | 596,795 | 617,829 | 636,691 | 659,389 | 681,208 | 705,840 | 738,866  | 789,063  | 825,115  | 839,085  | 849,555  | 857,779  | 865,622  |
| Prismatic coeff. (Cp)                | 0,550   | 0,553   | 0,556   | 0,558   | 0,560   | 0,561   | 0,561   | 0,559   | 0,553   | 0,528    | 0,528    | 0,542    | 0,583    | 0,593    | 0,602    | 0,610    |
| Block coeff. (Cb)                    | 0,460   | 0,464   | 0,468   | 0,472   | 0,475   | 0,478   | 0,480   | 0,480   | 0,477   | 0,458    | 0,461    | 0,512    | 0,522    | 0,523    | 0,533    | 0,543    |
| Max Sect. area coeff. (Cm)           | 0,854   | 0,857   | 0,860   | 0,864   | 0,867   | 0,871   | 0,875   | 0,879   | 0,884   | 0,888    | 0,892    | 0,895    | 0,899    | 0,902    | 0,905    | 0,908    |
| Waterpl. area coeff. (Cwp)           | 0,648   | 0,651   | 0,661   | 0,664   | 0,672   | 0,677   | 0,685   | 0,689   | 0,692   | 0,678    | 0,709    | 0,744    | 0,795    | 0,803    | 0,808    | 0,813    |
| LCB from zero pt. (+ve fwd) m        | 36,375  | 36,172  | 35,961  | 35,748  | 35,539  | 35,324  | 35,100  | 34,859  | 34,594  | 34,298   | 33,911   | 33,451   | 33,000   | 32,601   | 32,251   | 31,945   |
| LCF from zero pt. (+ve fwd) m        | 34,788  | 34,566  | 34,106  | 33,882  | 33,459  | 33,095  | 32,521  | 31,924  | 31,139  | 30,080   | 28,281   | 27,081   | 26,960   | 26,978   | 27,061   | 27,150   |
| KB m                                 | 1,165   | 1,281   | 1,399   | 1,516   | 1,633   | 1,751   | 1,869   | 1,988   | 2,107   | 2,228    | 2,353    | 2,481    | 2,608    | 2,733    | 2,856    | 2,978    |
| KG m                                 | 4,300   | 4,300   | 4,300   | 4,300   | 4,300   | 4,300   | 4,300   | 4,300   | 4,300   | 4,300    | 4,300    | 4,300    | 4,300    | 4,300    | 4,300    | 4,300    |
| BMT m                                | 6,456   | 6,093   | 5,798   | 5,525   | 5,267   | 5,058   | 4,876   | 4,706   | 4,548   | 4,406    | 4,360    | 4,382    | 4,235    | 4,064    | 3,889    | 3,726    |
| BML m                                | 162,341 | 151,628 | 145,677 | 137,329 | 132,761 | 127,760 | 125,423 | 123,018 | 122,305 | 126,804  | 139,310  | 142,865  | 137,986  | 132,555  | 127,070  | 122,032  |
| GMT m                                | 3,321   | 3,075   | 2,897   | 2,741   | 2,600   | 2,509   | 2,445   | 2,394   | 2,356   | 2,334    | 2,413    | 2,562    | 2,543    | 2,497    | 2,446    | 2,404    |
| GML m                                | 159,206 | 148,609 | 142,776 | 134,545 | 130,095 | 125,211 | 122,992 | 120,706 | 120,113 | 124,732  | 137,363  | 141,046  | 136,294  | 130,988  | 125,626  | 120,710  |
| KM m                                 | 7,621   | 7,375   | 7,197   | 7,041   | 6,900   | 6,809   | 6,745   | 6,694   | 6,656   | 6,634    | 6,713    | 6,862    | 6,843    | 6,797    | 6,746    | 6,704    |
| KML m                                | 163,506 | 152,909 | 147,076 | 138,845 | 134,394 | 129,511 | 127,292 | 125,006 | 124,413 | 129,032  | 141,663  | 145,346  | 140,594  | 135,288  | 129,926  | 125,010  |
| Immersion (TPc) tonne/cm             | 5,505   | 5,701   | 5,942   | 6,117   | 6,333   | 6,526   | 6,759   | 6,982   | 7,235   | 7,573    | 8,088    | 8,457    | 8,601    | 8,708    | 8,792    | 8,873    |
| MTC tonne.m                          | 17,283  | 18,429  | 20,005  | 21,099  | 22,644  | 24,026  | 25,865  | 27,680  | 29,909  | 33,608   | 39,992   | 44,302   | 46,028   | 47,373   | 48,475   | 49,527   |
| RM at 1deg = GMT.Disp.sin(1) tonne.m | 45,499  | 48,121  | 51,222  | 54,244  | 57,115  | 60,746  | 64,887  | 69,282  | 74,029  | 79,370   | 88,663   | 101,567  | 108,371  | 113,959  | 119,103  | 124,496  |



# ANEXO 4.3.1

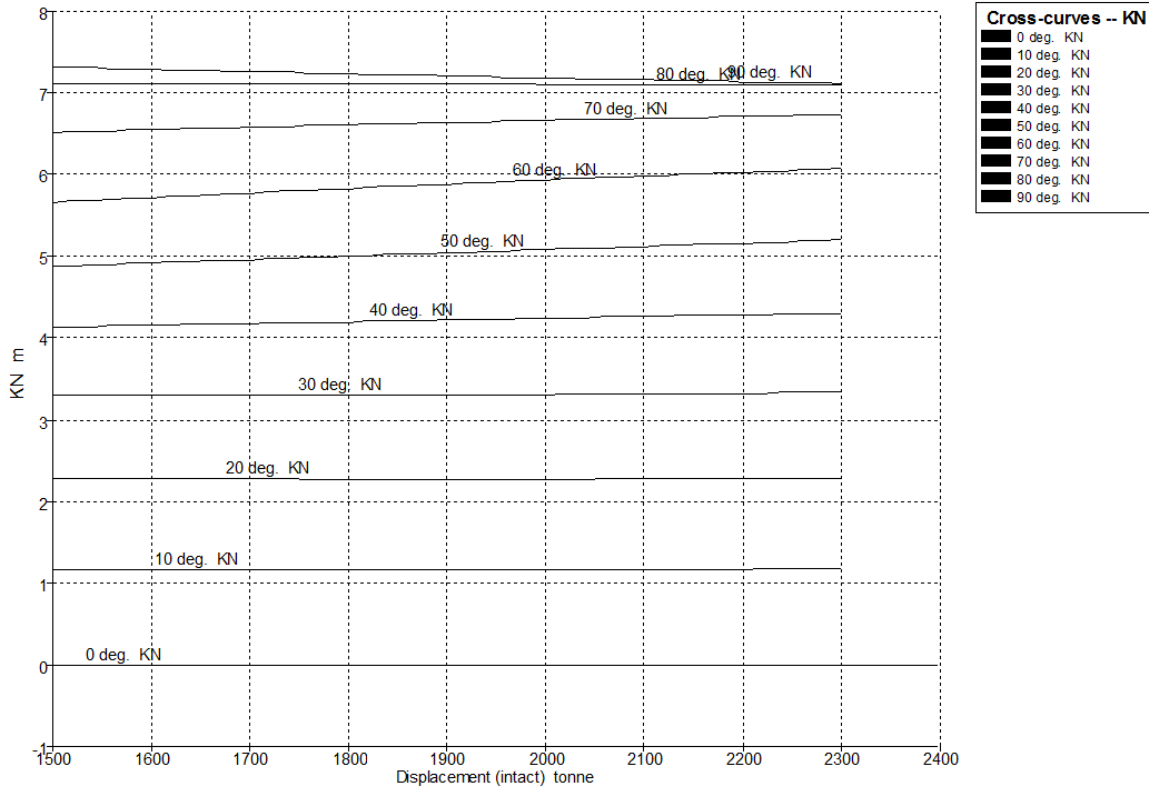


YATE DE 87m

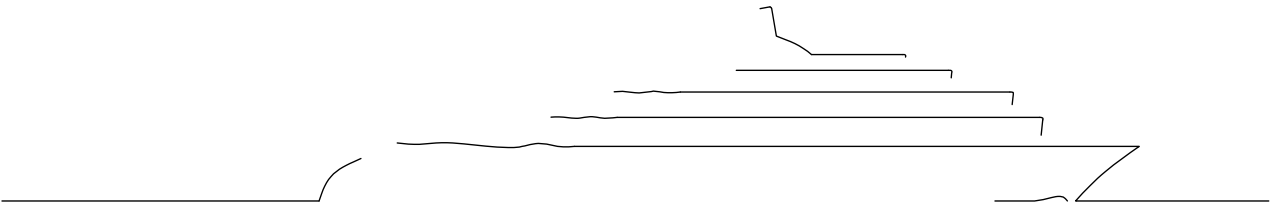
**KN Calculation - tfg maxurf**

Stability 20.00.04.9, build: 9  
 Model file: \\MacHome\Dropbox\0 TFG\Cuaderno 4\ tfg maxurf (Medium precision, 66 sections, Trimming off, Skin thickness not applied). Long. datum: AP; Vert. datum: Baseline. Analysis tolerance - ideal(worst case): Disp. %: 0,01000(0,100); Trim % (LCG-TCG): 0,01000(0,100); Heel% (LCG-TCG): 0,01000(0,100)  
**Damage Case - Intact**

| Displacement (intact) tonne | Draft Amidships m | LCG m  | KN 10,0 deg. Starb. | KN 20,0 deg. Starb. | KN 30,0 deg. Starb. | KN 40,0 deg. Starb. | KN 50,0 deg. Starb. | KN 60,0 deg. Starb. | KN 70,0 deg. Starb. | KN 80,0 deg. Starb. | KN 90,0 deg. Starb. |
|-----------------------------|-------------------|--------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1700                        | 3,460             | 34,783 | 1,159               | 2,277               | 3,295               | 4,177               | 4,960               | 5,775               | 6,580               | 7,114               | 7,259               |
| 1720                        | 3,488             | 34,746 | 1,159               | 2,276               | 3,296               | 4,181               | 4,968               | 5,787               | 6,586               | 7,113               | 7,254               |
| 1740                        | 3,516             | 34,709 | 1,158               | 2,276               | 3,297               | 4,185               | 4,976               | 5,798               | 6,591               | 7,113               | 7,248               |
| 1760                        | 3,544             | 34,672 | 1,158               | 2,275               | 3,297               | 4,189               | 4,984               | 5,809               | 6,597               | 7,112               | 7,243               |
| 1780                        | 3,572             | 34,634 | 1,158               | 2,275               | 3,298               | 4,194               | 4,992               | 5,820               | 6,603               | 7,112               | 7,237               |
| 1800                        | 3,599             | 34,595 | 1,159               | 2,274               | 3,299               | 4,198               | 5,000               | 5,831               | 6,608               | 7,111               | 7,232               |
| 1820                        | 3,627             | 34,557 | 1,159               | 2,274               | 3,299               | 4,202               | 5,008               | 5,842               | 6,614               | 7,110               | 7,227               |
| 1840                        | 3,654             | 34,518 | 1,159               | 2,274               | 3,300               | 4,206               | 5,016               | 5,852               | 6,619               | 7,109               | 7,222               |
| 1860                        | 3,682             | 34,479 | 1,159               | 2,274               | 3,301               | 4,210               | 5,024               | 5,863               | 6,625               | 7,108               | 7,216               |
| 1880                        | 3,709             | 34,439 | 1,160               | 2,274               | 3,302               | 4,215               | 5,032               | 5,873               | 6,630               | 7,107               | 7,211               |
| 1900                        | 3,736             | 34,399 | 1,160               | 2,273               | 3,303               | 4,219               | 5,040               | 5,883               | 6,635               | 7,106               | 7,206               |
| 1920                        | 3,763             | 34,358 | 1,160               | 2,273               | 3,304               | 4,223               | 5,048               | 5,894               | 6,641               | 7,105               | 7,201               |
| 1940                        | 3,789             | 34,316 | 1,161               | 2,273               | 3,305               | 4,227               | 5,056               | 5,903               | 6,646               | 7,104               | 7,196               |
| 1960                        | 3,816             | 34,272 | 1,161               | 2,274               | 3,306               | 4,231               | 5,064               | 5,913               | 6,651               | 7,103               | 7,191               |
| 1980                        | 3,842             | 34,227 | 1,162               | 2,274               | 3,308               | 4,236               | 5,072               | 5,923               | 6,656               | 7,102               | 7,187               |
| 2000                        | 3,868             | 34,180 | 1,162               | 2,274               | 3,309               | 4,240               | 5,080               | 5,933               | 6,661               | 7,101               | 7,182               |
| 2020                        | 3,893             | 34,131 | 1,163               | 2,274               | 3,310               | 4,244               | 5,088               | 5,943               | 6,666               | 7,100               | 7,177               |
| 2040                        | 3,919             | 34,081 | 1,163               | 2,275               | 3,312               | 4,249               | 5,096               | 5,953               | 6,671               | 7,099               | 7,172               |
| 2060                        | 3,944             | 34,029 | 1,164               | 2,275               | 3,313               | 4,253               | 5,104               | 5,962               | 6,676               | 7,098               | 7,168               |
| 2080                        | 3,969             | 33,977 | 1,165               | 2,276               | 3,315               | 4,258               | 5,112               | 5,972               | 6,681               | 7,097               | 7,163               |
| 2100                        | 3,994             | 33,924 | 1,165               | 2,277               | 3,317               | 4,262               | 5,120               | 5,981               | 6,686               | 7,096               | 7,159               |
| 2120                        | 4,018             | 33,871 | 1,166               | 2,277               | 3,318               | 4,267               | 5,128               | 5,991               | 6,691               | 7,095               | 7,154               |
| 2140                        | 4,043             | 33,817 | 1,166               | 2,278               | 3,320               | 4,271               | 5,136               | 6,000               | 6,696               | 7,094               | 7,150               |
| 2160                        | 4,067             | 33,762 | 1,167               | 2,278               | 3,322               | 4,276               | 5,144               | 6,009               | 6,700               | 7,093               | 7,145               |
| 2180                        | 4,091             | 33,707 | 1,167               | 2,279               | 3,323               | 4,280               | 5,152               | 6,018               | 6,705               | 7,092               | 7,141               |
| 2200                        | 4,116             | 33,651 | 1,168               | 2,280               | 3,325               | 4,285               | 5,159               | 6,027               | 6,710               | 7,090               | 7,137               |

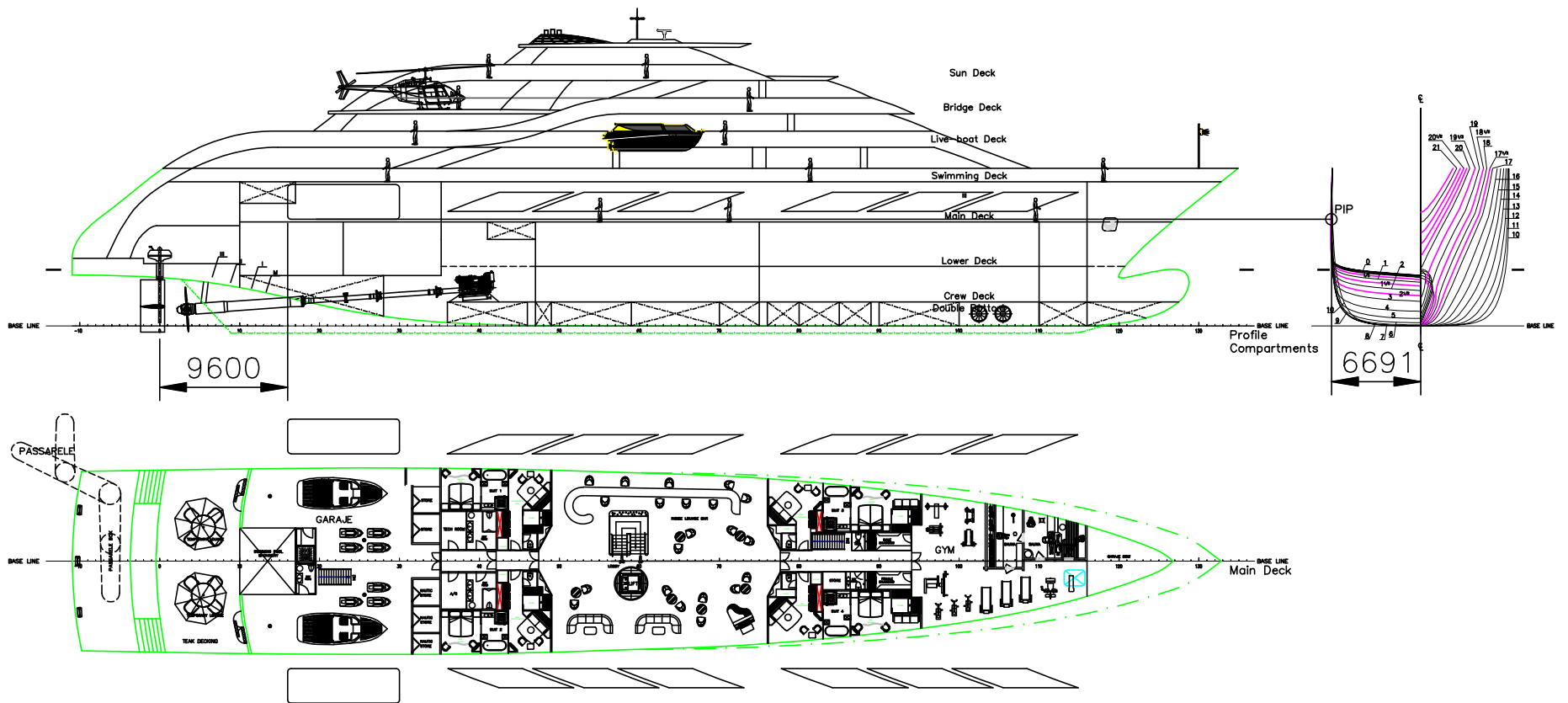


# ANEXO 4.5.1

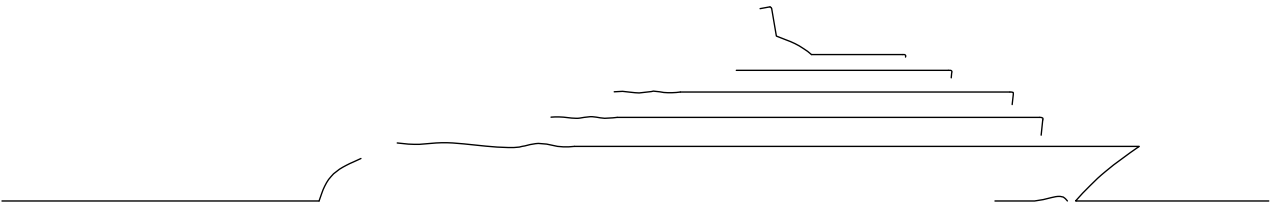


YATE DE 87m

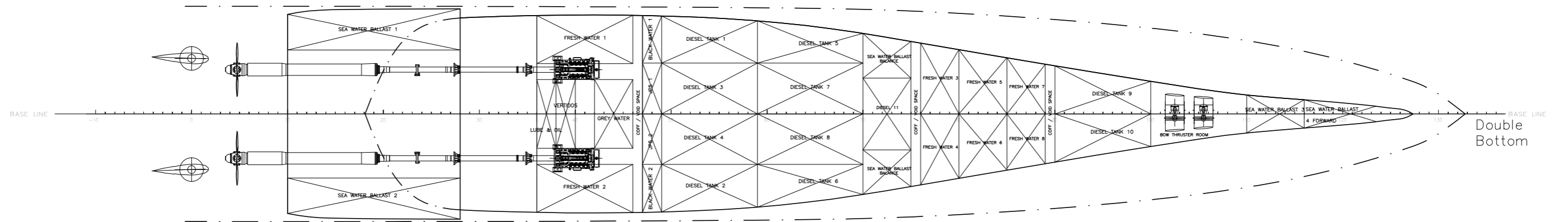
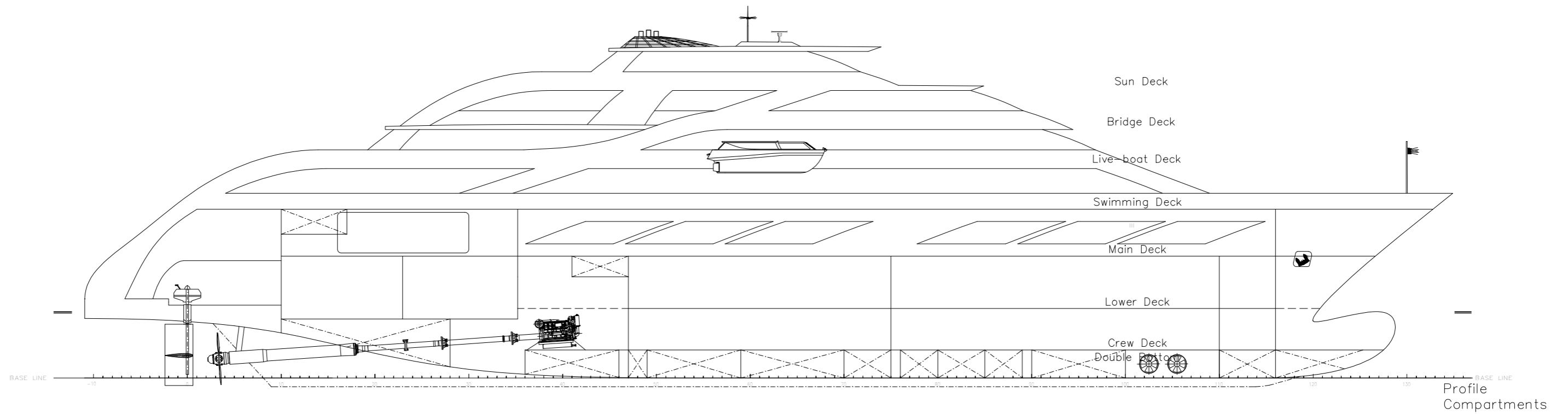
# PIP - Punto de inundación progresiva




# ANEXO 4.7.1



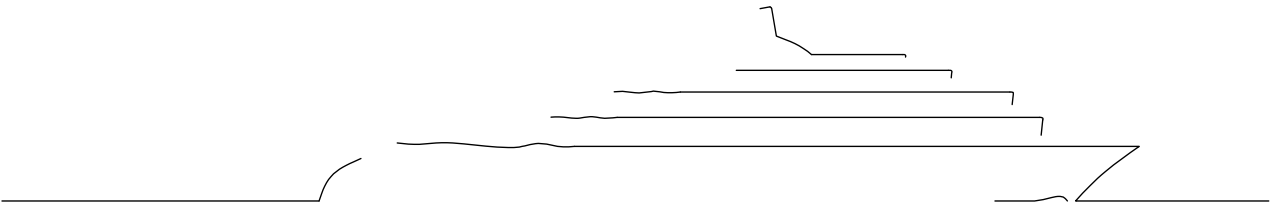
YATE DE 87m



|   |                                     |
|---|-------------------------------------|
|  UNIVERSIDAD DE LA CORUÑA<br>ESCUELA POLITÉCNICA SUPERIOR – FERROL |                                     |
| ARQUITECTURA NAVAL<br>PROYECTO FIN DE GRADO N° 18-105   | ALUMNO:<br>Víctor J. Gavín Barberán |
| TIPO DE BUQUE: YATE DE LUJO DE 87M  |                                     |
| DENOMINACIÓN PLANO:<br>ARRANGEMENT TANK   |                                     |
| ESCALA: 1:250<br>ANEXO 4.7.1 – C4<br>FECHA: SEPTIEMBRE 2018   |                                     |



# ANEXO 4.8.1



YATE DE 87m

## **Tank Calibrations - tfg maxurf**

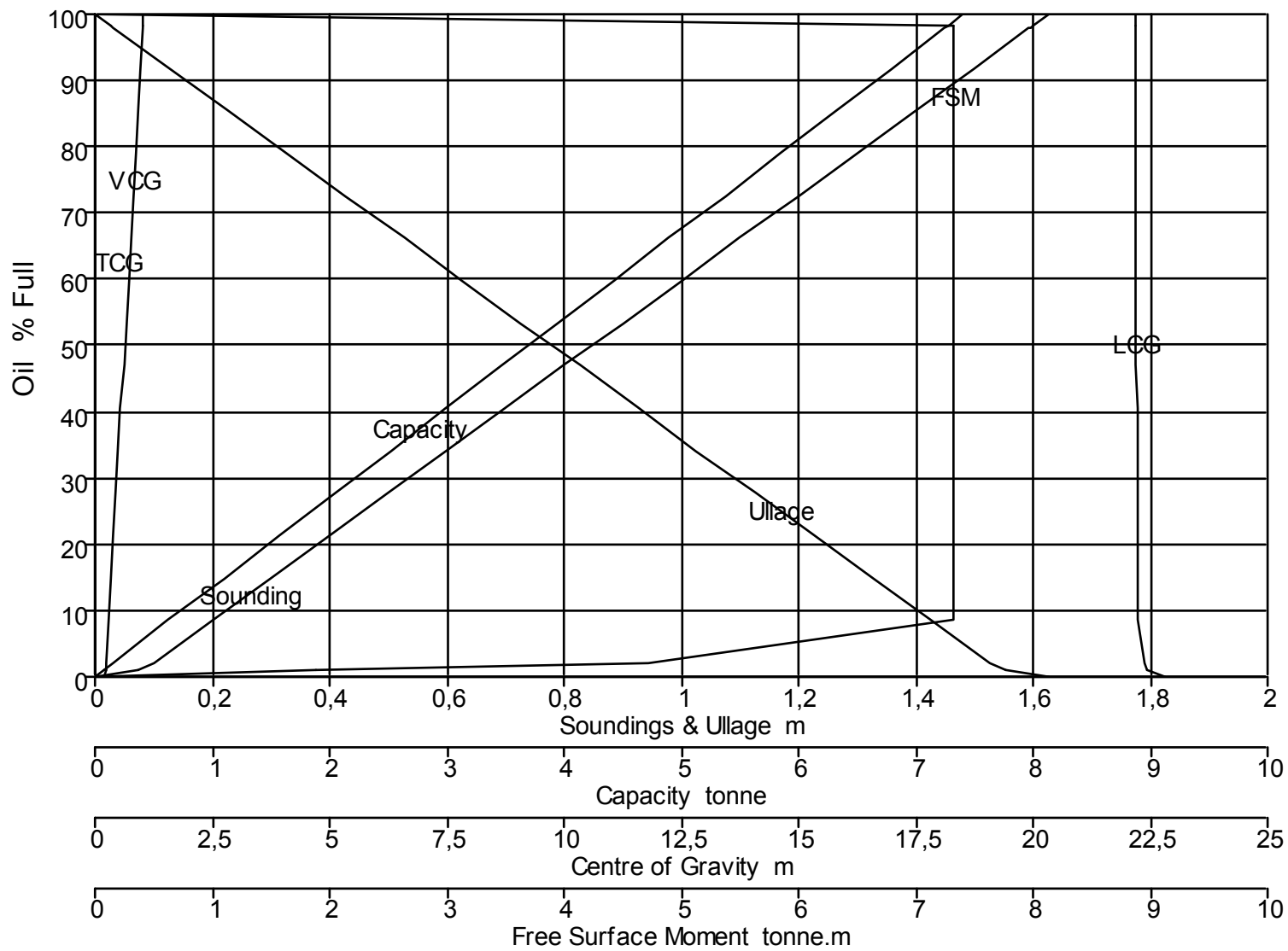
Stability 20.00.04.9, build: 9

### **Tank Calibrations - Oil**

Fluid Type = Lube Oil      Specific gravity = 0,92

Permeability = 100 %

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



**Oil**  
**Trim: 0 m; Heel: 0 deg to starboard**

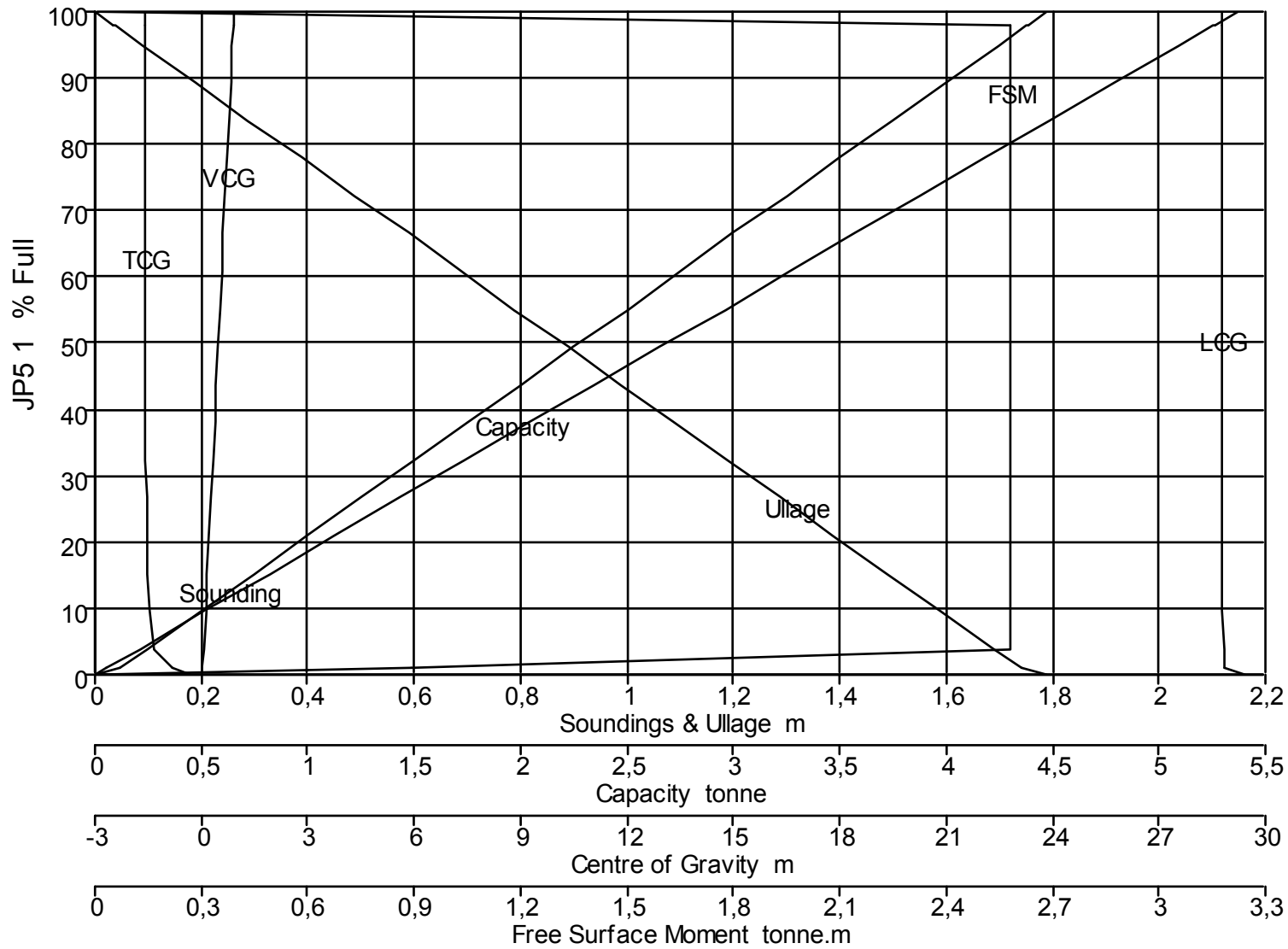
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Oil       | 1,626      | 0,000    | 100,000 | 8,040                   | 7,396          | 22,204 | 0,000 | 1,021 | 0,000       |
|           | 1,600      | 0,026    | 98,317  | 7,904                   | 7,272          | 22,204 | 0,000 | 1,008 | 7,315       |
|           | 1,595      | 0,031    | 98,000  | 7,879                   | 7,248          | 22,204 | 0,000 | 1,005 | 7,315       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,594 | 0,033 | 97,900 | 7,871 | 7,241 | 22,204 | 0,000 | 1,004 | 7,315 |
|  | 1,500 | 0,126 | 91,899 | 7,388 | 6,797 | 22,204 | 0,000 | 0,958 | 7,315 |
|  | 1,400 | 0,226 | 85,481 | 6,872 | 6,323 | 22,205 | 0,000 | 0,908 | 7,315 |
|  | 1,300 | 0,326 | 79,062 | 6,356 | 5,848 | 22,205 | 0,000 | 0,858 | 7,315 |
|  | 1,200 | 0,426 | 72,644 | 5,840 | 5,373 | 22,205 | 0,000 | 0,808 | 7,315 |
|  | 1,100 | 0,526 | 66,226 | 5,324 | 4,898 | 22,206 | 0,000 | 0,757 | 7,315 |
|  | 1,000 | 0,626 | 59,808 | 4,808 | 4,424 | 22,207 | 0,000 | 0,707 | 7,315 |
|  | 0,900 | 0,726 | 53,389 | 4,292 | 3,949 | 22,207 | 0,000 | 0,657 | 7,315 |
|  | 0,800 | 0,826 | 46,971 | 3,776 | 3,474 | 22,208 | 0,000 | 0,607 | 7,315 |
|  | 0,700 | 0,926 | 40,553 | 3,260 | 2,999 | 22,210 | 0,000 | 0,557 | 7,315 |
|  | 0,600 | 1,026 | 34,135 | 2,744 | 2,525 | 22,212 | 0,000 | 0,507 | 7,315 |
|  | 0,500 | 1,126 | 27,716 | 2,228 | 2,050 | 22,214 | 0,000 | 0,457 | 7,315 |
|  | 0,400 | 1,226 | 21,298 | 1,712 | 1,575 | 22,219 | 0,000 | 0,407 | 7,315 |
|  | 0,300 | 1,326 | 14,880 | 1,196 | 1,101 | 22,227 | 0,000 | 0,356 | 7,315 |
|  | 0,200 | 1,426 | 8,462  | 0,680 | 0,626 | 22,247 | 0,000 | 0,304 | 7,315 |
|  | 0,100 | 1,526 | 2,189  | 0,176 | 0,162 | 22,356 | 0,000 | 0,246 | 4,723 |
|  | 0,074 | 1,552 | 1,000  | 0,080 | 0,074 | 22,437 | 0,000 | 0,228 | 1,892 |
|  | 0,000 | 1,626 | 0,000  | 0,000 | 0,000 | 22,793 | 0,000 | 0,174 | 0,000 |

### Tank Calibrations - JP5 1

Fluid Type = JP5      Specific gravity = 0,8  
Permeability = 100 %  
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



**JP5 1**  
**Trim: 0 m; Heel: 0 deg to starboard**

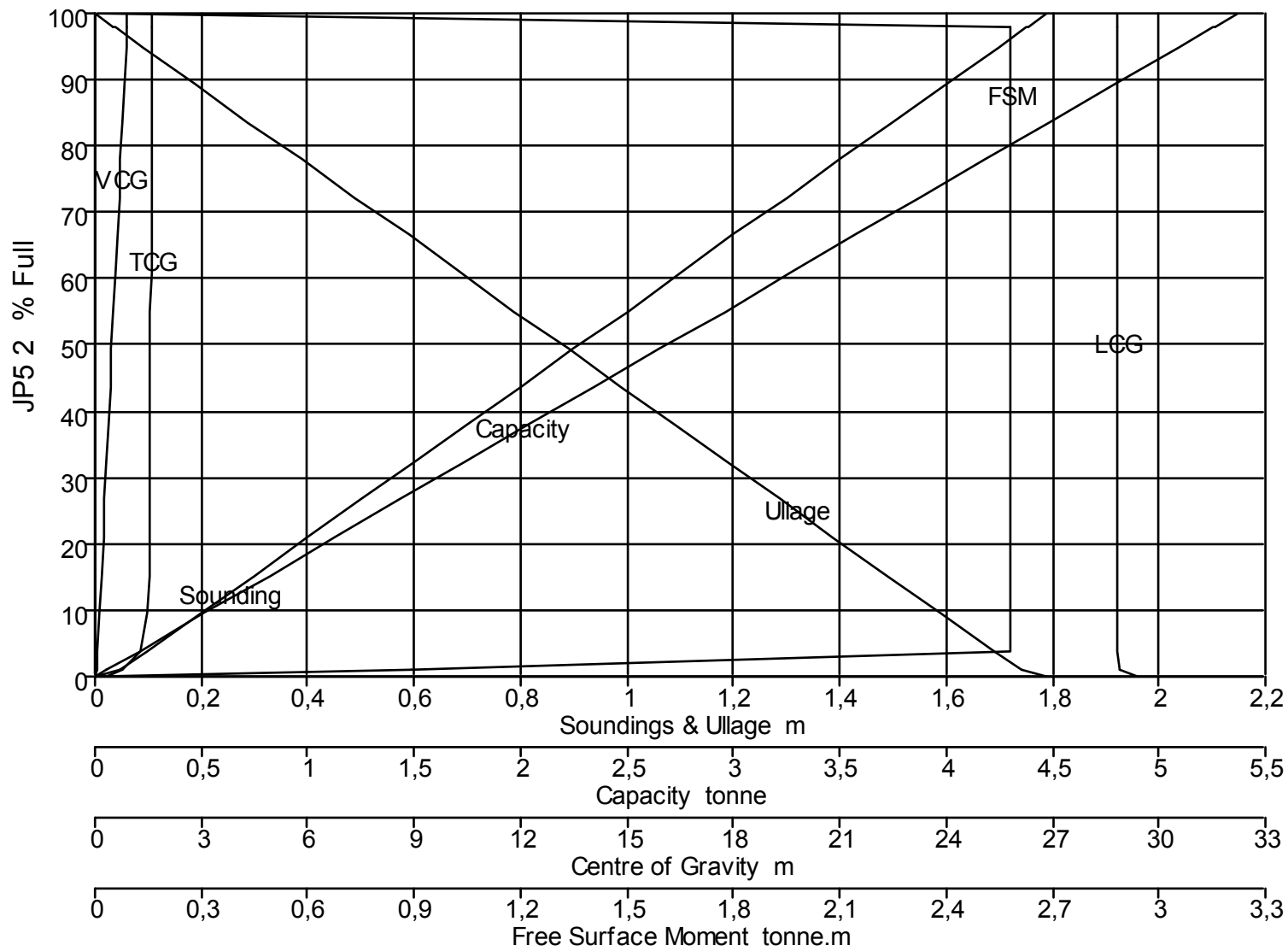
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| JP5 1     | 1,789      | 0,000    | 100,000 | 6,711                   | 5,368          | 28,801 | -1,581 | 0,921 | 0,000       |
|           | 1,753      | 0,035    | 98,000  | 6,576                   | 5,261          | 28,801 | -1,580 | 0,904 | 2,580       |
|           | 1,752      | 0,037    | 97,900  | 6,570                   | 5,256          | 28,801 | -1,580 | 0,903 | 2,580       |

|  |       |       |        |       |       |        |        |       |       |
|--|-------|-------|--------|-------|-------|--------|--------|-------|-------|
|  | 1,700 | 0,089 | 94,958 | 6,372 | 5,098 | 28,801 | -1,580 | 0,877 | 2,580 |
|  | 1,600 | 0,189 | 89,267 | 5,990 | 4,792 | 28,801 | -1,579 | 0,827 | 2,580 |
|  | 1,500 | 0,289 | 83,575 | 5,608 | 4,487 | 28,801 | -1,578 | 0,777 | 2,580 |
|  | 1,400 | 0,389 | 77,883 | 5,226 | 4,181 | 28,801 | -1,578 | 0,727 | 2,580 |
|  | 1,300 | 0,489 | 72,191 | 4,844 | 3,876 | 28,802 | -1,576 | 0,677 | 2,580 |
|  | 1,200 | 0,589 | 66,499 | 4,462 | 3,570 | 28,802 | -1,575 | 0,627 | 2,580 |
|  | 1,100 | 0,689 | 60,807 | 4,081 | 3,264 | 28,802 | -1,574 | 0,577 | 2,580 |
|  | 1,000 | 0,789 | 55,115 | 3,699 | 2,959 | 28,802 | -1,572 | 0,527 | 2,580 |
|  | 0,900 | 0,889 | 49,423 | 3,317 | 2,653 | 28,802 | -1,569 | 0,477 | 2,580 |
|  | 0,800 | 0,989 | 43,732 | 2,935 | 2,348 | 28,803 | -1,567 | 0,427 | 2,580 |
|  | 0,700 | 1,089 | 38,040 | 2,553 | 2,042 | 28,803 | -1,563 | 0,377 | 2,580 |
|  | 0,600 | 1,189 | 32,348 | 2,171 | 1,737 | 28,803 | -1,558 | 0,327 | 2,580 |
|  | 0,500 | 1,289 | 26,656 | 1,789 | 1,431 | 28,804 | -1,551 | 0,277 | 2,580 |
|  | 0,400 | 1,389 | 20,964 | 1,407 | 1,125 | 28,805 | -1,540 | 0,227 | 2,580 |
|  | 0,300 | 1,489 | 15,272 | 1,025 | 0,820 | 28,807 | -1,520 | 0,176 | 2,580 |
|  | 0,200 | 1,589 | 9,580  | 0,643 | 0,514 | 28,812 | -1,478 | 0,126 | 2,580 |
|  | 0,100 | 1,689 | 3,888  | 0,261 | 0,209 | 28,829 | -1,311 | 0,074 | 2,580 |
|  | 0,045 | 1,744 | 1,000  | 0,067 | 0,054 | 28,865 | -0,798 | 0,040 | 0,890 |
|  | 0,000 | 1,789 | 0,000  | 0,000 | 0,000 | 29,393 | -0,335 | 0,011 | 0,000 |

## Tank Calibrations - JP5 2

Fluid Type = JP5      Specific gravity = 0,8  
Permeability = 100 %  
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



**JP5 2**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

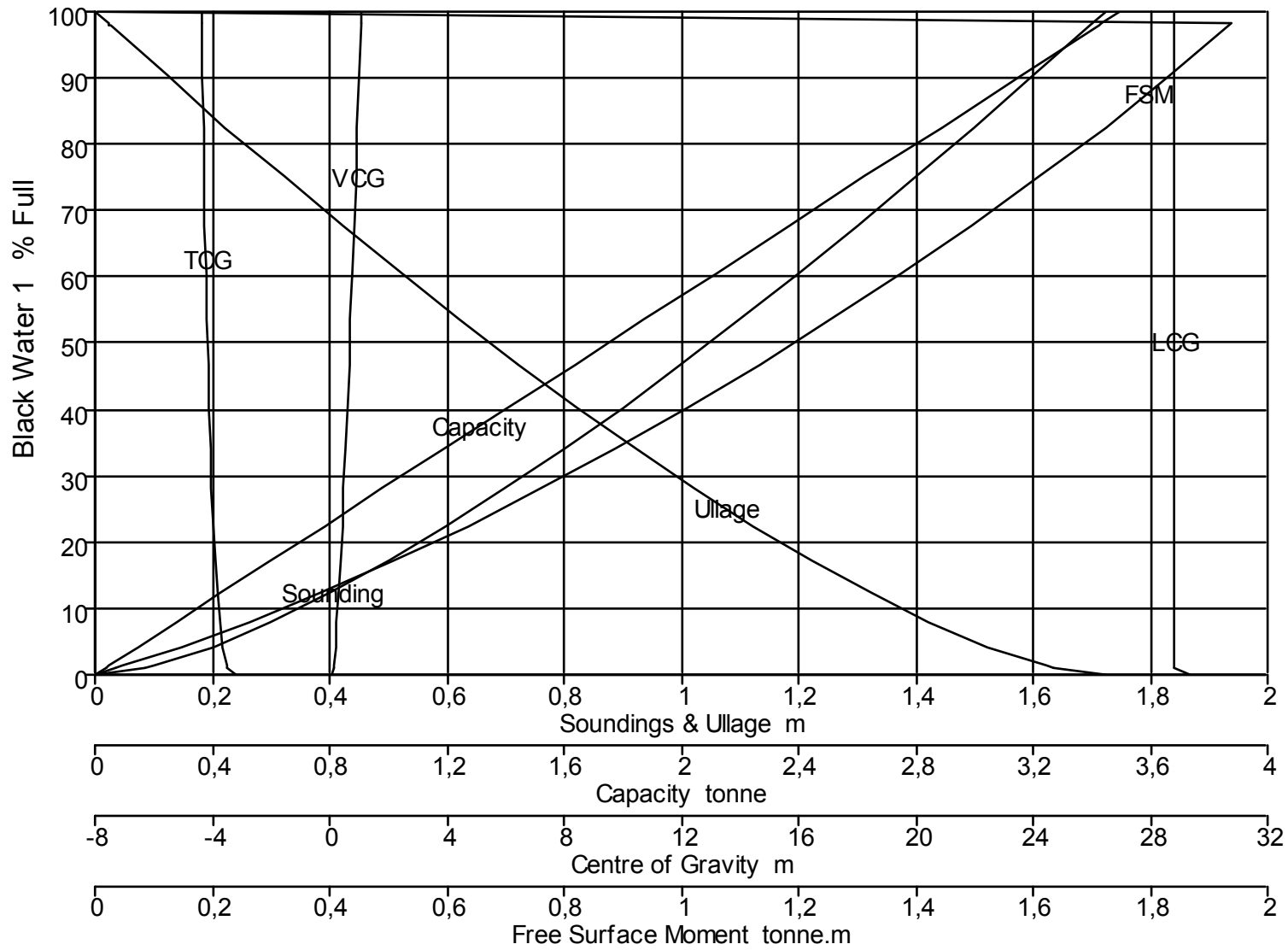
| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| JP5 2     | 1,789      | 0,000    | 100,000 | 6,711                   | 5,368          | 28,801 | 1,581 | 0,921 | 0,000       |
|           | 1,753      | 0,035    | 98,000  | 6,576                   | 5,261          | 28,801 | 1,580 | 0,904 | 2,580       |
|           | 1,752      | 0,037    | 97,900  | 6,570                   | 5,256          | 28,801 | 1,580 | 0,903 | 2,580       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,700 | 0,089 | 94,958 | 6,372 | 5,098 | 28,801 | 1,580 | 0,877 | 2,580 |
|  | 1,600 | 0,189 | 89,267 | 5,990 | 4,792 | 28,801 | 1,579 | 0,827 | 2,580 |
|  | 1,500 | 0,289 | 83,575 | 5,608 | 4,487 | 28,801 | 1,578 | 0,777 | 2,580 |
|  | 1,400 | 0,389 | 77,883 | 5,226 | 4,181 | 28,801 | 1,578 | 0,727 | 2,580 |
|  | 1,300 | 0,489 | 72,191 | 4,844 | 3,876 | 28,802 | 1,576 | 0,677 | 2,580 |
|  | 1,200 | 0,589 | 66,499 | 4,462 | 3,570 | 28,802 | 1,575 | 0,627 | 2,580 |
|  | 1,100 | 0,689 | 60,807 | 4,081 | 3,264 | 28,802 | 1,574 | 0,577 | 2,580 |
|  | 1,000 | 0,789 | 55,115 | 3,699 | 2,959 | 28,802 | 1,572 | 0,527 | 2,580 |
|  | 0,900 | 0,889 | 49,423 | 3,317 | 2,653 | 28,802 | 1,569 | 0,477 | 2,580 |
|  | 0,800 | 0,989 | 43,732 | 2,935 | 2,348 | 28,803 | 1,567 | 0,427 | 2,580 |
|  | 0,700 | 1,089 | 38,040 | 2,553 | 2,042 | 28,803 | 1,563 | 0,377 | 2,580 |
|  | 0,600 | 1,189 | 32,348 | 2,171 | 1,737 | 28,803 | 1,558 | 0,327 | 2,580 |
|  | 0,500 | 1,289 | 26,656 | 1,789 | 1,431 | 28,804 | 1,551 | 0,277 | 2,580 |
|  | 0,400 | 1,389 | 20,964 | 1,407 | 1,125 | 28,805 | 1,540 | 0,227 | 2,580 |
|  | 0,300 | 1,489 | 15,272 | 1,025 | 0,820 | 28,807 | 1,520 | 0,176 | 2,580 |
|  | 0,200 | 1,589 | 9,580  | 0,643 | 0,514 | 28,812 | 1,478 | 0,126 | 2,580 |
|  | 0,100 | 1,689 | 3,888  | 0,261 | 0,209 | 28,829 | 1,311 | 0,074 | 2,580 |
|  | 0,045 | 1,744 | 1,000  | 0,067 | 0,054 | 28,865 | 0,798 | 0,040 | 0,890 |
|  | 0,000 | 1,789 | 0,000  | 0,000 | 0,000 | 29,393 | 0,335 | 0,011 | 0,000 |

### Tank Calibrations - Black Water 1

Fluid Type = Black Water      Specific gravity = 0,8  
Permeability = 100 %  
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard





**Black Water 1**  
**Trim: 0 m; Heel: 0 deg to starboard**

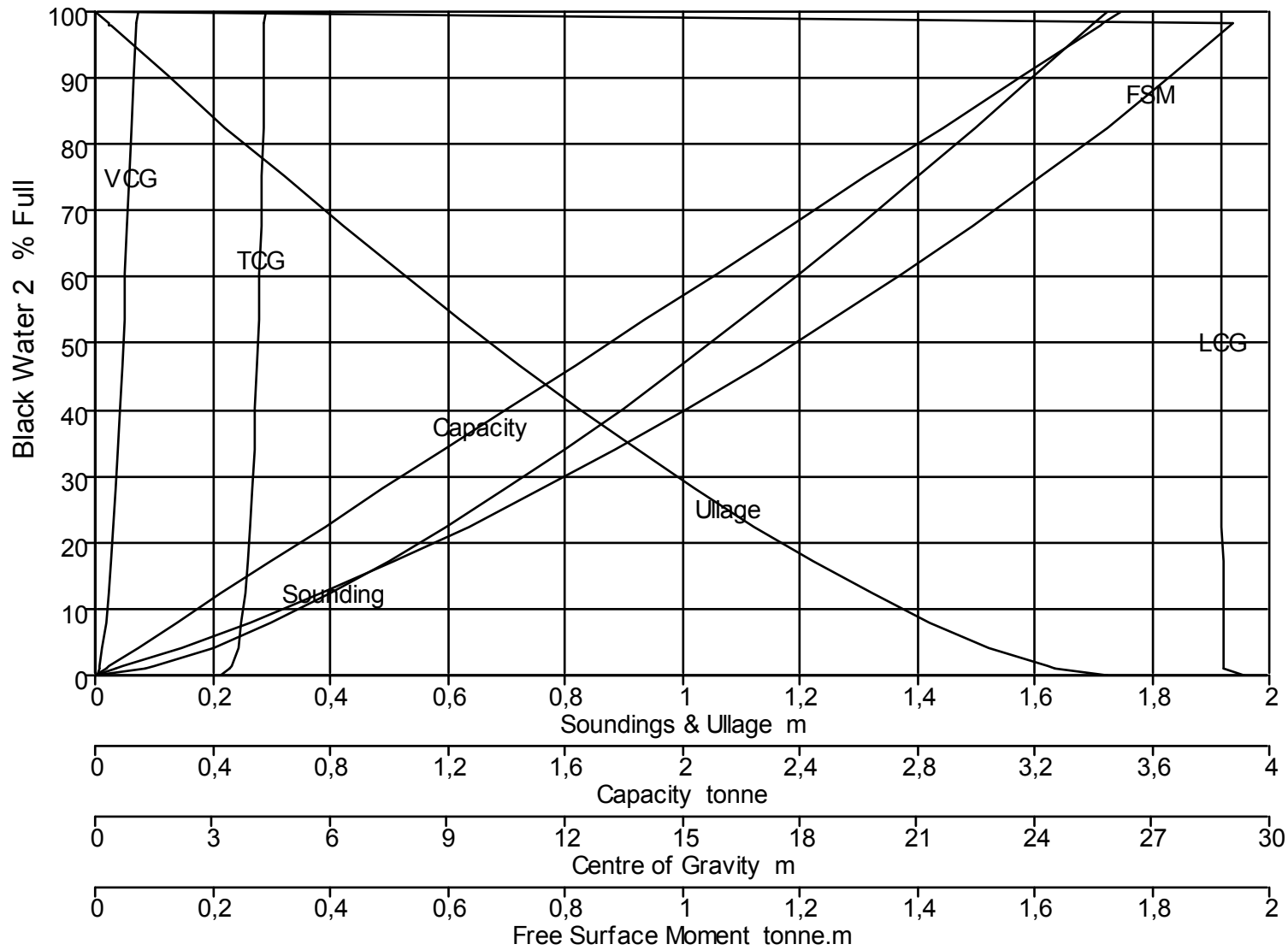
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Black Water 1 | 1,722      | 0,000    | 100,000 | 4,374                   | 3,499          | 28,801 | -4,344 | 1,085 | 0,000       |
|               | 1,700      | 0,022    | 98,217  | 4,296                   | 3,437          | 28,801 | -4,339 | 1,072 | 1,939       |
|               | 1,697      | 0,025    | 98,000  | 4,286                   | 3,429          | 28,801 | -4,338 | 1,071 | 1,936       |

|  |       |       |        |       |       |        |        |       |       |
|--|-------|-------|--------|-------|-------|--------|--------|-------|-------|
|  | 1,696 | 0,026 | 97,900 | 4,282 | 3,425 | 28,801 | -4,338 | 1,070 | 1,934 |
|  | 1,600 | 0,122 | 90,350 | 3,952 | 3,161 | 28,801 | -4,315 | 1,015 | 1,833 |
|  | 1,500 | 0,222 | 82,637 | 3,614 | 2,891 | 28,801 | -4,289 | 0,958 | 1,723 |
|  | 1,400 | 0,322 | 75,088 | 3,284 | 2,627 | 28,801 | -4,262 | 0,901 | 1,610 |
|  | 1,300 | 0,422 | 67,715 | 2,962 | 2,369 | 28,801 | -4,233 | 0,843 | 1,494 |
|  | 1,200 | 0,522 | 60,534 | 2,648 | 2,118 | 28,802 | -4,203 | 0,786 | 1,376 |
|  | 1,100 | 0,622 | 53,557 | 2,342 | 1,874 | 28,802 | -4,170 | 0,728 | 1,255 |
|  | 1,000 | 0,722 | 46,801 | 2,047 | 1,638 | 28,802 | -4,134 | 0,671 | 1,133 |
|  | 0,900 | 0,822 | 40,286 | 1,762 | 1,410 | 28,803 | -4,096 | 0,613 | 1,010 |
|  | 0,800 | 0,922 | 34,032 | 1,488 | 1,191 | 28,803 | -4,055 | 0,555 | 0,886 |
|  | 0,700 | 1,022 | 28,064 | 1,227 | 0,982 | 28,804 | -4,009 | 0,497 | 0,761 |
|  | 0,600 | 1,122 | 22,419 | 0,981 | 0,784 | 28,805 | -3,957 | 0,439 | 0,636 |
|  | 0,500 | 1,222 | 17,136 | 0,749 | 0,600 | 28,806 | -3,899 | 0,381 | 0,511 |
|  | 0,400 | 1,322 | 12,269 | 0,537 | 0,429 | 28,808 | -3,831 | 0,322 | 0,386 |
|  | 0,300 | 1,422 | 7,900  | 0,346 | 0,276 | 28,812 | -3,749 | 0,263 | 0,263 |
|  | 0,200 | 1,522 | 4,159  | 0,182 | 0,146 | 28,819 | -3,643 | 0,203 | 0,148 |
|  | 0,100 | 1,622 | 1,292  | 0,056 | 0,045 | 28,843 | -3,489 | 0,143 | 0,047 |
|  | 0,087 | 1,636 | 1,000  | 0,044 | 0,035 | 28,851 | -3,462 | 0,135 | 0,036 |
|  | 0,000 | 1,722 | 0,000  | 0,000 | 0,000 | 29,333 | -3,184 | 0,078 | 0,000 |

### Tank Calibrations - Black Water 2

Fluid Type = Black Water      Specific gravity = 0,8  
Permeability = 100 %  
Trim = 0 m (+ve by stern); Heel = 0 deg to starboard



**Black Water 2**  
**Trim: 0 m; Heel: 0 deg to starboard**

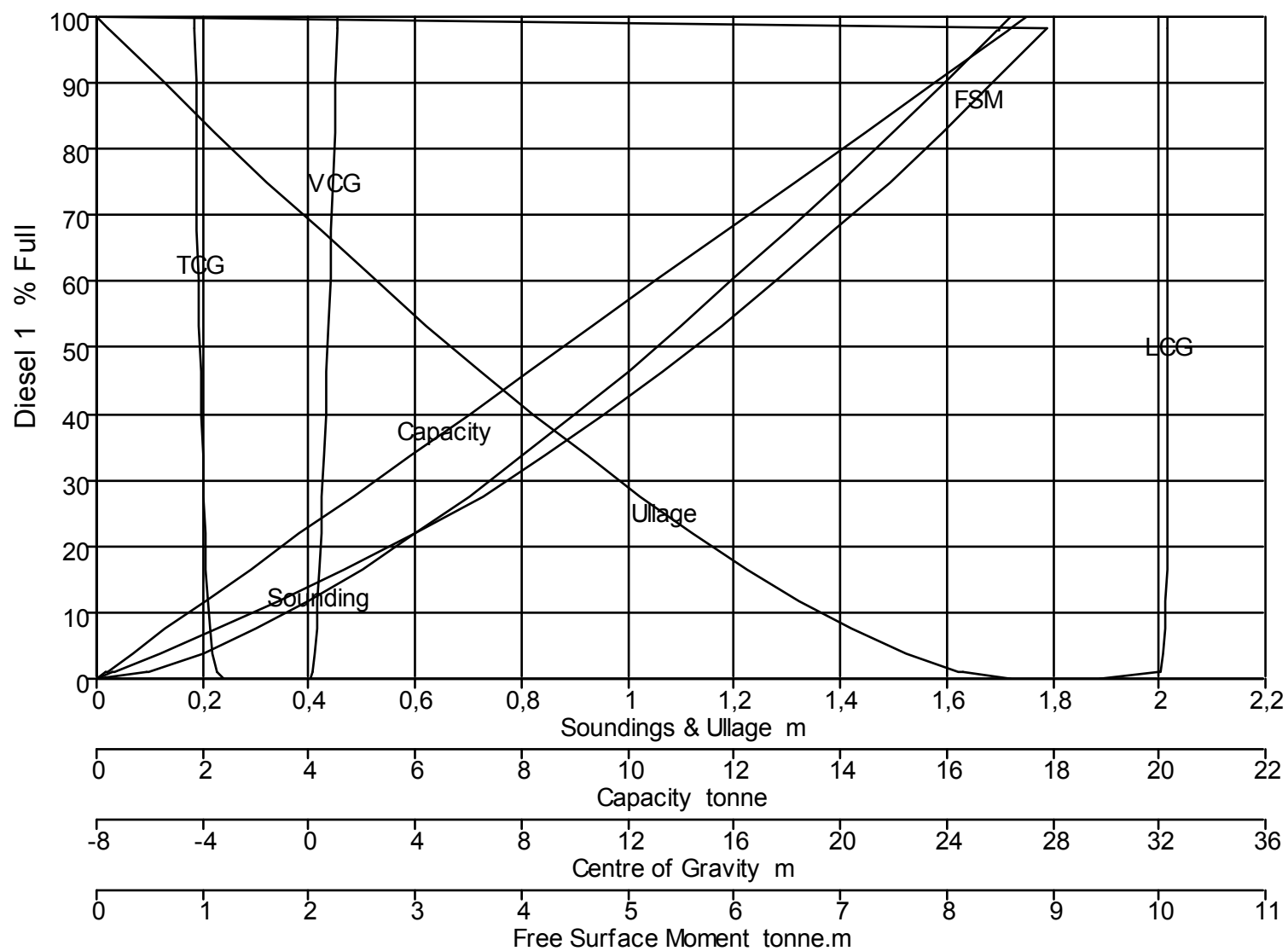
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Black Water 2 | 1,722      | 0,000    | 100,000 | 4,374                   | 3,499          | 28,801 | 4,344 | 1,085 | 0,000       |
|               | 1,700      | 0,022    | 98,217  | 4,296                   | 3,437          | 28,801 | 4,339 | 1,072 | 1,939       |
|               | 1,697      | 0,025    | 98,000  | 4,286                   | 3,429          | 28,801 | 4,338 | 1,071 | 1,936       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,696 | 0,026 | 97,900 | 4,282 | 3,425 | 28,801 | 4,338 | 1,070 | 1,934 |
|  | 1,600 | 0,122 | 90,350 | 3,952 | 3,161 | 28,801 | 4,315 | 1,015 | 1,833 |
|  | 1,500 | 0,222 | 82,637 | 3,614 | 2,891 | 28,801 | 4,289 | 0,958 | 1,723 |
|  | 1,400 | 0,322 | 75,088 | 3,284 | 2,627 | 28,801 | 4,262 | 0,901 | 1,610 |
|  | 1,300 | 0,422 | 67,715 | 2,962 | 2,369 | 28,801 | 4,233 | 0,843 | 1,494 |
|  | 1,200 | 0,522 | 60,534 | 2,648 | 2,118 | 28,802 | 4,203 | 0,786 | 1,376 |
|  | 1,100 | 0,622 | 53,557 | 2,342 | 1,874 | 28,802 | 4,170 | 0,728 | 1,255 |
|  | 1,000 | 0,722 | 46,801 | 2,047 | 1,638 | 28,802 | 4,134 | 0,671 | 1,133 |
|  | 0,900 | 0,822 | 40,286 | 1,762 | 1,410 | 28,803 | 4,096 | 0,613 | 1,010 |
|  | 0,800 | 0,922 | 34,032 | 1,488 | 1,191 | 28,803 | 4,055 | 0,555 | 0,886 |
|  | 0,700 | 1,022 | 28,064 | 1,227 | 0,982 | 28,804 | 4,009 | 0,497 | 0,761 |
|  | 0,600 | 1,122 | 22,419 | 0,981 | 0,784 | 28,805 | 3,957 | 0,439 | 0,636 |
|  | 0,500 | 1,222 | 17,136 | 0,749 | 0,600 | 28,806 | 3,899 | 0,381 | 0,511 |
|  | 0,400 | 1,322 | 12,269 | 0,537 | 0,429 | 28,808 | 3,831 | 0,322 | 0,386 |
|  | 0,300 | 1,422 | 7,900  | 0,346 | 0,276 | 28,812 | 3,749 | 0,263 | 0,263 |
|  | 0,200 | 1,522 | 4,159  | 0,182 | 0,146 | 28,819 | 3,643 | 0,203 | 0,148 |
|  | 0,100 | 1,622 | 1,292  | 0,056 | 0,045 | 28,843 | 3,489 | 0,143 | 0,047 |
|  | 0,087 | 1,636 | 1,000  | 0,044 | 0,035 | 28,851 | 3,462 | 0,135 | 0,036 |
|  | 0,000 | 1,722 | 0,000  | 0,000 | 0,000 | 29,333 | 3,184 | 0,078 | 0,000 |

### Tank Calibrations - Diesel 1

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



**Diesel 1**  
**Trim: 0 m; Heel: 0 deg to starboard**

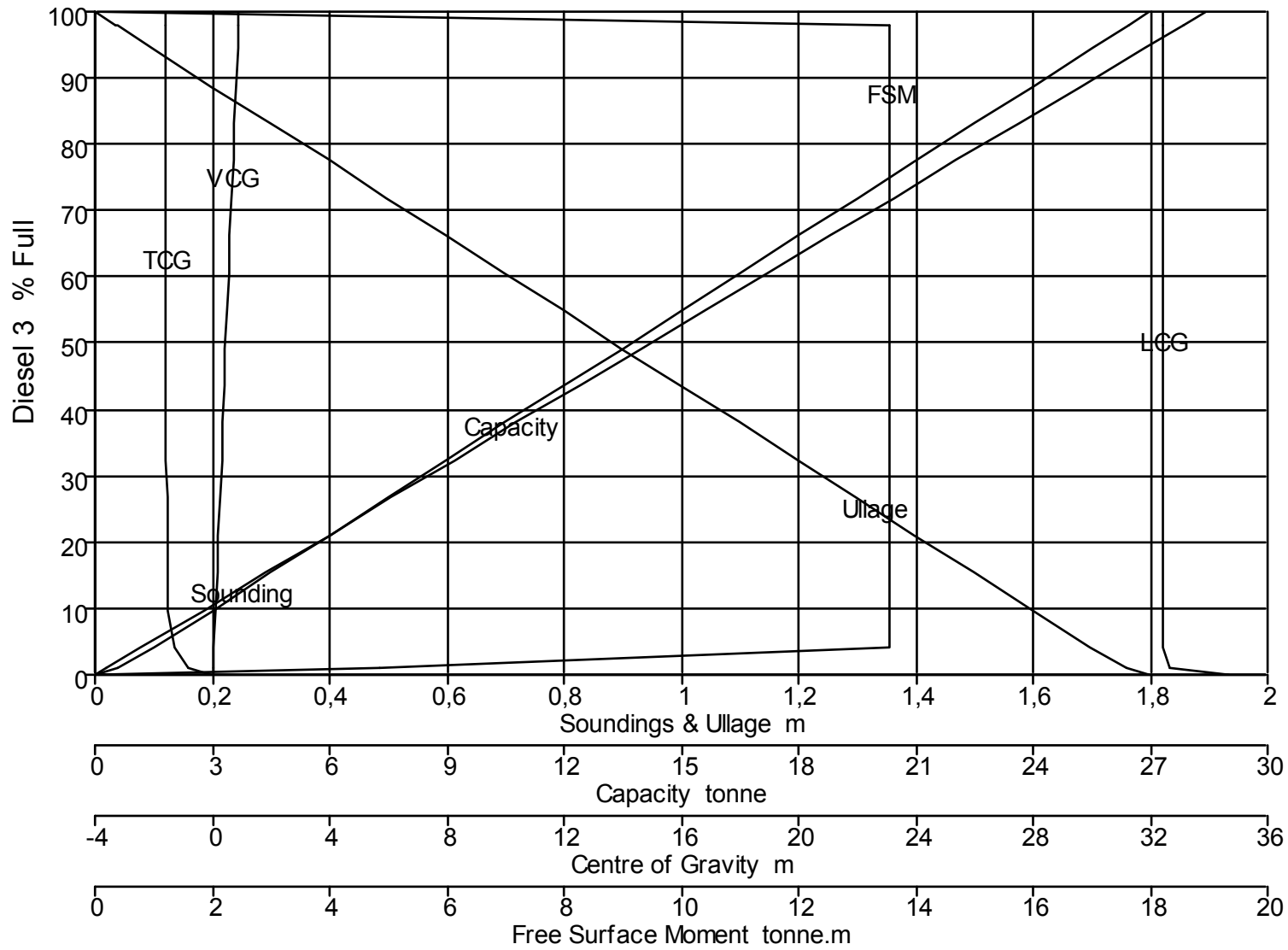
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Diesel 1  | 1,723      | 0,000    | 100,000 | 20,857                  | 17,520         | 32,339 | -4,299 | 1,090 | 0,000       |
|           | 1,700      | 0,023    | 98,203  | 20,482                  | 17,205         | 32,339 | -4,294 | 1,077 | 8,938       |
|           | 1,697      | 0,025    | 98,000  | 20,440                  | 17,169         | 32,339 | -4,294 | 1,076 | 8,926       |

|  |       |       |        |        |        |        |        |       |       |
|--|-------|-------|--------|--------|--------|--------|--------|-------|-------|
|  | 1,696 | 0,026 | 97,900 | 20,419 | 17,152 | 32,339 | -4,293 | 1,075 | 8,920 |
|  | 1,600 | 0,123 | 90,316 | 18,837 | 15,823 | 32,338 | -4,272 | 1,020 | 8,460 |
|  | 1,500 | 0,223 | 82,578 | 17,223 | 14,467 | 32,337 | -4,247 | 0,963 | 7,969 |
|  | 1,400 | 0,323 | 75,000 | 15,643 | 13,140 | 32,335 | -4,222 | 0,906 | 7,462 |
|  | 1,300 | 0,423 | 67,594 | 14,098 | 11,842 | 32,334 | -4,194 | 0,849 | 6,943 |
|  | 1,200 | 0,523 | 60,371 | 12,591 | 10,577 | 32,332 | -4,165 | 0,792 | 6,415 |
|  | 1,100 | 0,623 | 53,346 | 11,126 | 9,346  | 32,329 | -4,133 | 0,735 | 5,878 |
|  | 1,000 | 0,723 | 46,533 | 9,705  | 8,152  | 32,325 | -4,099 | 0,677 | 5,334 |
|  | 0,900 | 0,823 | 39,950 | 8,332  | 6,999  | 32,321 | -4,061 | 0,619 | 4,779 |
|  | 0,800 | 0,923 | 33,618 | 7,012  | 5,890  | 32,315 | -4,019 | 0,561 | 4,221 |
|  | 0,700 | 1,023 | 27,561 | 5,748  | 4,829  | 32,306 | -3,972 | 0,503 | 3,648 |
|  | 0,600 | 1,123 | 21,846 | 4,556  | 3,827  | 32,294 | -3,918 | 0,444 | 2,987 |
|  | 0,500 | 1,223 | 16,539 | 3,449  | 2,898  | 32,279 | -3,857 | 0,385 | 2,342 |
|  | 0,400 | 1,323 | 11,697 | 2,440  | 2,049  | 32,258 | -3,787 | 0,325 | 1,719 |
|  | 0,300 | 1,423 | 7,407  | 1,545  | 1,298  | 32,226 | -3,702 | 0,265 | 1,131 |
|  | 0,200 | 1,523 | 3,802  | 0,793  | 0,666  | 32,170 | -3,596 | 0,205 | 0,596 |
|  | 0,100 | 1,623 | 1,133  | 0,236  | 0,198  | 32,028 | -3,447 | 0,143 | 0,170 |
|  | 0,093 | 1,629 | 1,000  | 0,209  | 0,175  | 32,009 | -3,435 | 0,139 | 0,149 |
|  | 0,000 | 1,723 | 0,000  | 0,000  | 0,000  | 29,760 | -3,184 | 0,078 | 0,000 |

### Tank Calibrations - Diesel 3

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



**Diesel 3**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

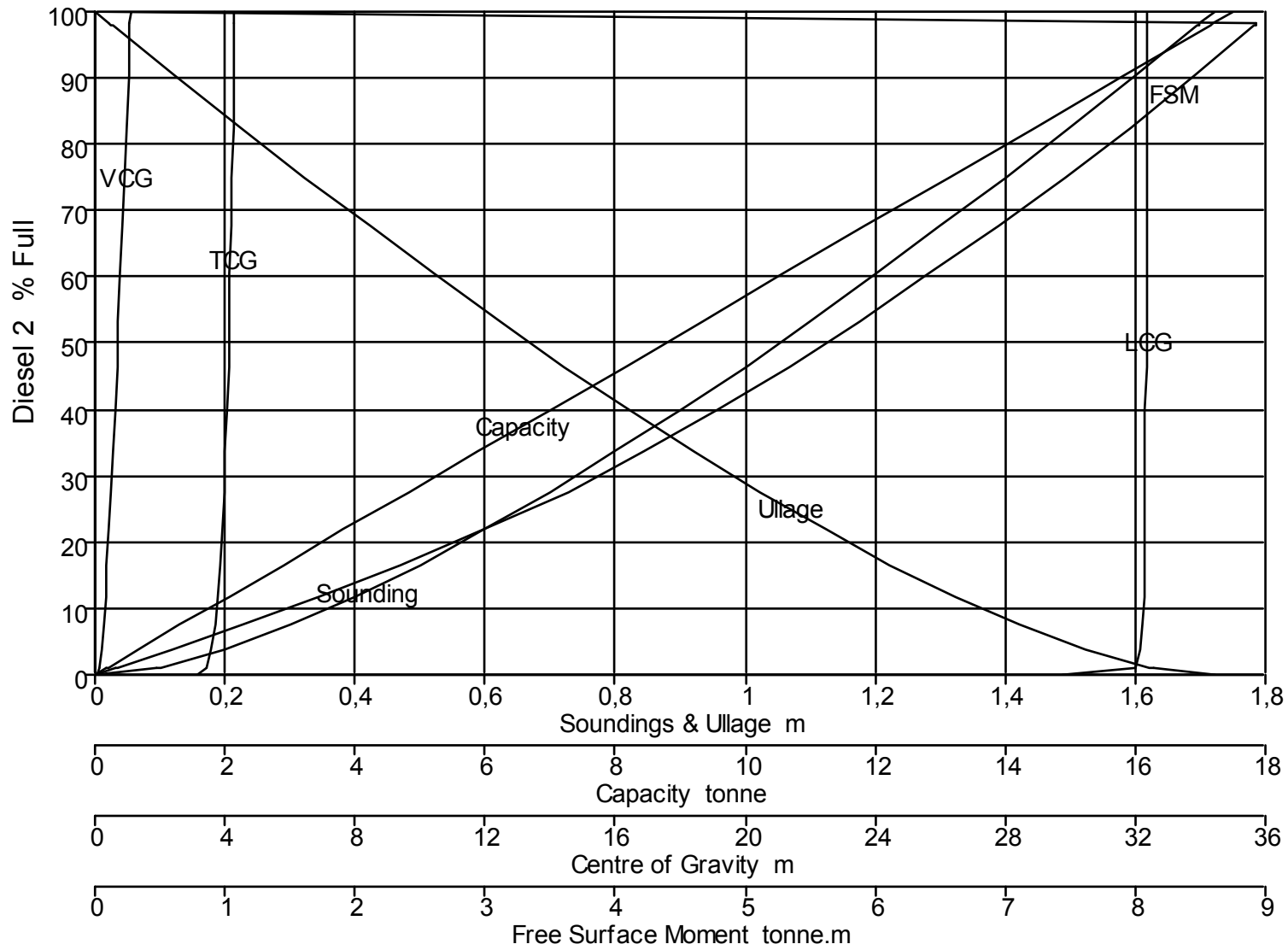
| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Diesel 3  | 1,799      | 0,000    | 100,000 | 33,834                  | 28,420         | 32,402 | -1,580 | 0,914 | 0,000       |
|           | 1,763      | 0,035    | 98,000  | 33,157                  | 27,852         | 32,402 | -1,580 | 0,896 | 13,544      |
|           | 1,762      | 0,037    | 97,900  | 33,123                  | 27,823         | 32,402 | -1,580 | 0,896 | 13,544      |

|  |       |       |        |        |        |        |        |       |        |
|--|-------|-------|--------|--------|--------|--------|--------|-------|--------|
|  | 1,700 | 0,099 | 94,428 | 31,948 | 26,837 | 32,403 | -1,580 | 0,865 | 13,544 |
|  | 1,600 | 0,199 | 88,784 | 30,039 | 25,232 | 32,403 | -1,579 | 0,815 | 13,544 |
|  | 1,500 | 0,299 | 83,139 | 28,129 | 23,628 | 32,403 | -1,578 | 0,765 | 13,544 |
|  | 1,400 | 0,399 | 77,494 | 26,219 | 22,024 | 32,403 | -1,577 | 0,715 | 13,544 |
|  | 1,300 | 0,499 | 71,850 | 24,309 | 20,420 | 32,403 | -1,576 | 0,665 | 13,544 |
|  | 1,200 | 0,599 | 66,205 | 22,399 | 18,816 | 32,404 | -1,575 | 0,615 | 13,544 |
|  | 1,100 | 0,699 | 60,560 | 20,490 | 17,211 | 32,404 | -1,573 | 0,565 | 13,544 |
|  | 1,000 | 0,799 | 54,915 | 18,580 | 15,607 | 32,404 | -1,571 | 0,515 | 13,544 |
|  | 0,900 | 0,899 | 49,271 | 16,670 | 14,003 | 32,405 | -1,569 | 0,465 | 13,544 |
|  | 0,800 | 0,999 | 43,626 | 14,760 | 12,399 | 32,406 | -1,566 | 0,415 | 13,544 |
|  | 0,700 | 1,099 | 37,981 | 12,850 | 10,794 | 32,406 | -1,562 | 0,365 | 13,544 |
|  | 0,600 | 1,199 | 32,337 | 10,941 | 9,190  | 32,407 | -1,557 | 0,314 | 13,544 |
|  | 0,500 | 1,299 | 26,692 | 9,031  | 7,586  | 32,409 | -1,549 | 0,264 | 13,544 |
|  | 0,400 | 1,399 | 21,047 | 7,121  | 5,982  | 32,411 | -1,538 | 0,214 | 13,544 |
|  | 0,300 | 1,499 | 15,403 | 5,211  | 4,377  | 32,416 | -1,519 | 0,164 | 13,544 |
|  | 0,200 | 1,599 | 9,758  | 3,301  | 2,773  | 32,425 | -1,476 | 0,113 | 13,544 |
|  | 0,100 | 1,699 | 4,113  | 1,392  | 1,169  | 32,459 | -1,318 | 0,061 | 13,544 |
|  | 0,040 | 1,759 | 1,000  | 0,338  | 0,284  | 32,624 | -0,846 | 0,026 | 4,856  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 34,641 | -0,011 | 0,001 | 0,000  |

## Tank Calibrations - Diesel 2

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





**Diesel 2**  
**Trim: 0 m; Heel: 0 deg to starboard**

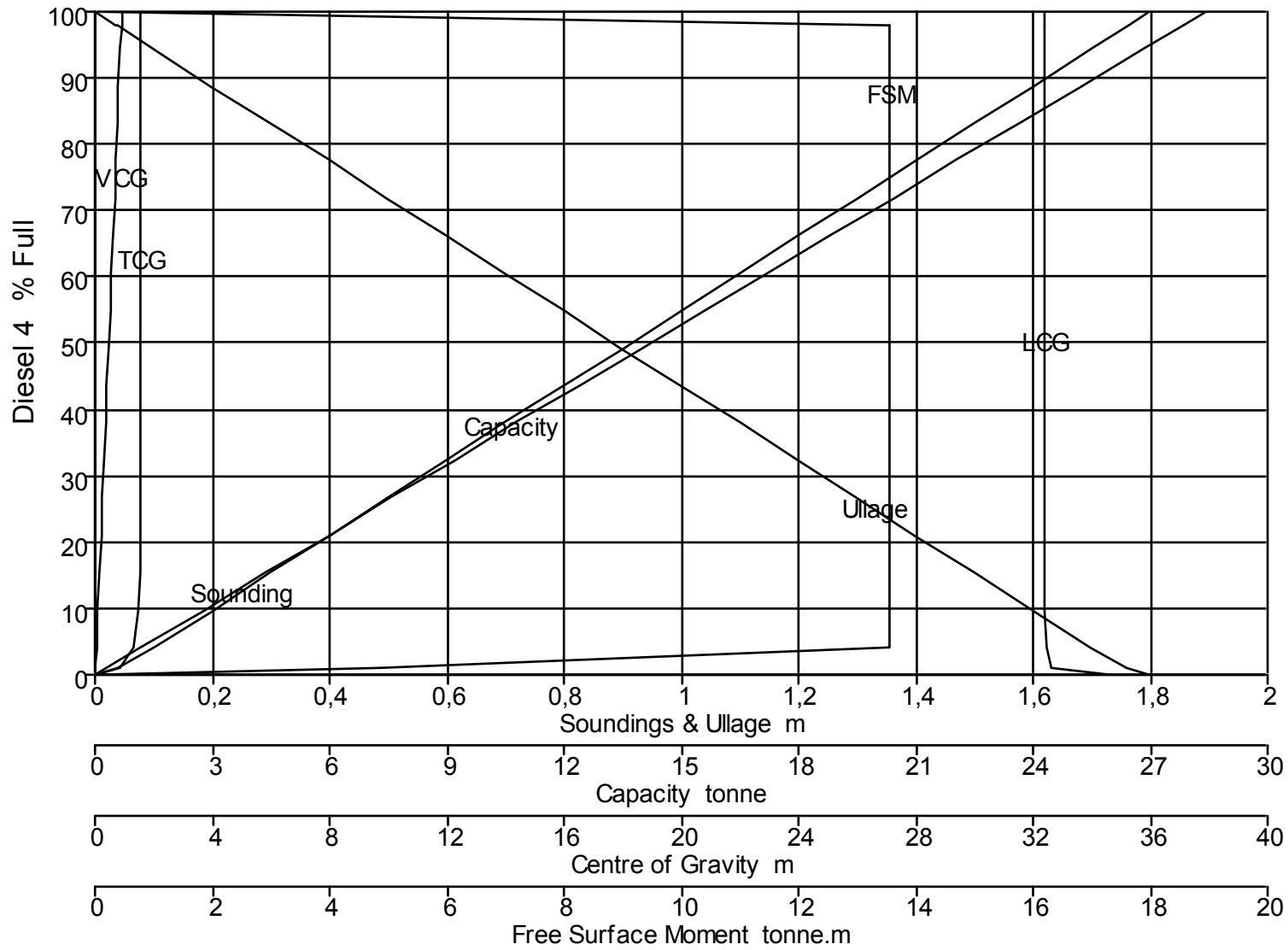
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Diesel 2  | 1,723      | 0,000    | 100,000 | 20,857                  | 17,520         | 32,339 | 4,299 | 1,090 | 0,000       |
|           | 1,700      | 0,023    | 98,203  | 20,482                  | 17,205         | 32,339 | 4,294 | 1,077 | 8,938       |
|           | 1,697      | 0,025    | 98,000  | 20,440                  | 17,169         | 32,339 | 4,294 | 1,076 | 8,926       |

|  |       |       |        |        |        |        |       |       |       |
|--|-------|-------|--------|--------|--------|--------|-------|-------|-------|
|  | 1,696 | 0,026 | 97,900 | 20,419 | 17,152 | 32,339 | 4,293 | 1,075 | 8,920 |
|  | 1,600 | 0,123 | 90,316 | 18,837 | 15,823 | 32,338 | 4,272 | 1,020 | 8,460 |
|  | 1,500 | 0,223 | 82,578 | 17,223 | 14,467 | 32,337 | 4,247 | 0,963 | 7,969 |
|  | 1,400 | 0,323 | 75,000 | 15,643 | 13,140 | 32,335 | 4,222 | 0,906 | 7,462 |
|  | 1,300 | 0,423 | 67,594 | 14,098 | 11,842 | 32,334 | 4,194 | 0,849 | 6,943 |
|  | 1,200 | 0,523 | 60,371 | 12,591 | 10,577 | 32,332 | 4,165 | 0,792 | 6,415 |
|  | 1,100 | 0,623 | 53,346 | 11,126 | 9,346  | 32,329 | 4,133 | 0,735 | 5,878 |
|  | 1,000 | 0,723 | 46,533 | 9,705  | 8,152  | 32,325 | 4,099 | 0,677 | 5,334 |
|  | 0,900 | 0,823 | 39,950 | 8,332  | 6,999  | 32,321 | 4,061 | 0,619 | 4,779 |
|  | 0,800 | 0,923 | 33,618 | 7,012  | 5,890  | 32,315 | 4,019 | 0,561 | 4,221 |
|  | 0,700 | 1,023 | 27,561 | 5,748  | 4,829  | 32,306 | 3,972 | 0,503 | 3,648 |
|  | 0,600 | 1,123 | 21,846 | 4,556  | 3,827  | 32,294 | 3,918 | 0,444 | 2,987 |
|  | 0,500 | 1,223 | 16,539 | 3,449  | 2,898  | 32,279 | 3,857 | 0,385 | 2,342 |
|  | 0,400 | 1,323 | 11,697 | 2,440  | 2,049  | 32,258 | 3,787 | 0,325 | 1,719 |
|  | 0,300 | 1,423 | 7,407  | 1,545  | 1,298  | 32,226 | 3,702 | 0,265 | 1,131 |
|  | 0,200 | 1,523 | 3,802  | 0,793  | 0,666  | 32,170 | 3,596 | 0,205 | 0,596 |
|  | 0,100 | 1,623 | 1,133  | 0,236  | 0,198  | 32,028 | 3,447 | 0,143 | 0,170 |
|  | 0,093 | 1,629 | 1,000  | 0,209  | 0,175  | 32,009 | 3,435 | 0,139 | 0,149 |
|  | 0,000 | 1,723 | 0,000  | 0,000  | 0,000  | 29,760 | 3,184 | 0,078 | 0,000 |

#### Tank Calibrations - Diesel 4

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

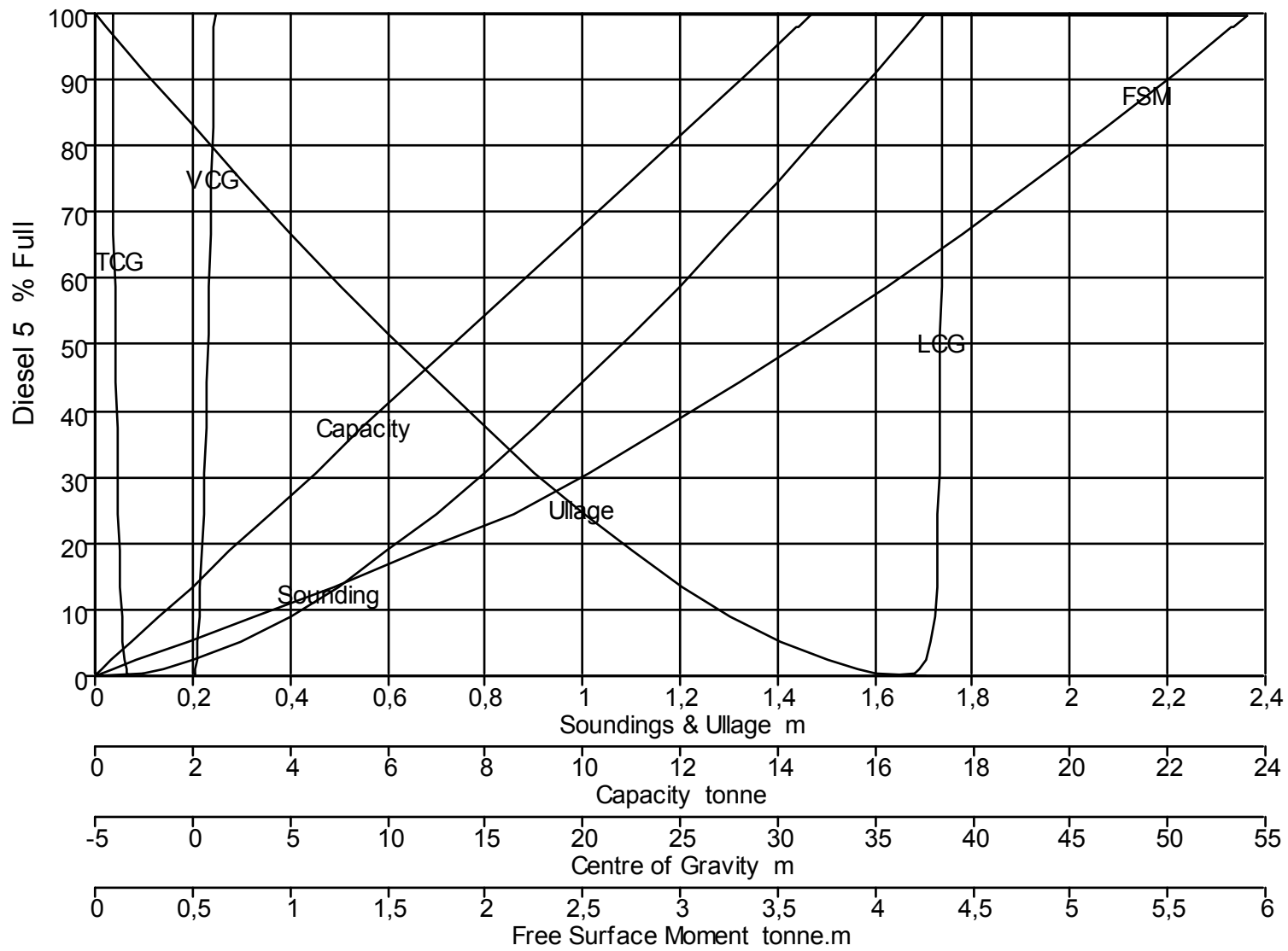


| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Diesel 4  | 1,799      | 0,000    | 100,000 | 33,834                  | 28,420         | 32,402 | 1,580 | 0,914 | 0,000       |
|           | 1,763      | 0,035    | 98,000  | 33,157                  | 27,852         | 32,402 | 1,580 | 0,896 | 13,544      |
|           | 1,762      | 0,037    | 97,900  | 33,123                  | 27,823         | 32,402 | 1,580 | 0,896 | 13,544      |

|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 1,700 | 0,099 | 94,428 | 31,948 | 26,837 | 32,403 | 1,580 | 0,865 | 13,544 |
|  | 1,600 | 0,199 | 88,784 | 30,039 | 25,232 | 32,403 | 1,579 | 0,815 | 13,544 |
|  | 1,500 | 0,299 | 83,139 | 28,129 | 23,628 | 32,403 | 1,578 | 0,765 | 13,544 |
|  | 1,400 | 0,399 | 77,494 | 26,219 | 22,024 | 32,403 | 1,577 | 0,715 | 13,544 |
|  | 1,300 | 0,499 | 71,850 | 24,309 | 20,420 | 32,403 | 1,576 | 0,665 | 13,544 |
|  | 1,200 | 0,599 | 66,205 | 22,399 | 18,816 | 32,404 | 1,575 | 0,615 | 13,544 |
|  | 1,100 | 0,699 | 60,560 | 20,490 | 17,211 | 32,404 | 1,573 | 0,565 | 13,544 |
|  | 1,000 | 0,799 | 54,915 | 18,580 | 15,607 | 32,404 | 1,571 | 0,515 | 13,544 |
|  | 0,900 | 0,899 | 49,271 | 16,670 | 14,003 | 32,405 | 1,569 | 0,465 | 13,544 |
|  | 0,800 | 0,999 | 43,626 | 14,760 | 12,399 | 32,406 | 1,566 | 0,415 | 13,544 |
|  | 0,700 | 1,099 | 37,981 | 12,850 | 10,794 | 32,406 | 1,562 | 0,365 | 13,544 |
|  | 0,600 | 1,199 | 32,337 | 10,941 | 9,190  | 32,407 | 1,557 | 0,314 | 13,544 |
|  | 0,500 | 1,299 | 26,692 | 9,031  | 7,586  | 32,409 | 1,549 | 0,264 | 13,544 |
|  | 0,400 | 1,399 | 21,047 | 7,121  | 5,982  | 32,411 | 1,538 | 0,214 | 13,544 |
|  | 0,300 | 1,499 | 15,403 | 5,211  | 4,377  | 32,416 | 1,519 | 0,164 | 13,544 |
|  | 0,200 | 1,599 | 9,758  | 3,301  | 2,773  | 32,425 | 1,476 | 0,113 | 13,544 |
|  | 0,100 | 1,699 | 4,113  | 1,392  | 1,169  | 32,459 | 1,318 | 0,061 | 13,544 |
|  | 0,040 | 1,759 | 1,000  | 0,338  | 0,284  | 32,624 | 0,846 | 0,026 | 4,856  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 34,641 | 0,011 | 0,001 | 0,000  |

### Tank Calibrations - Diesel 5

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



**Diesel 5**  
**Trim: 0 m; Heel: 0 deg to starboard**

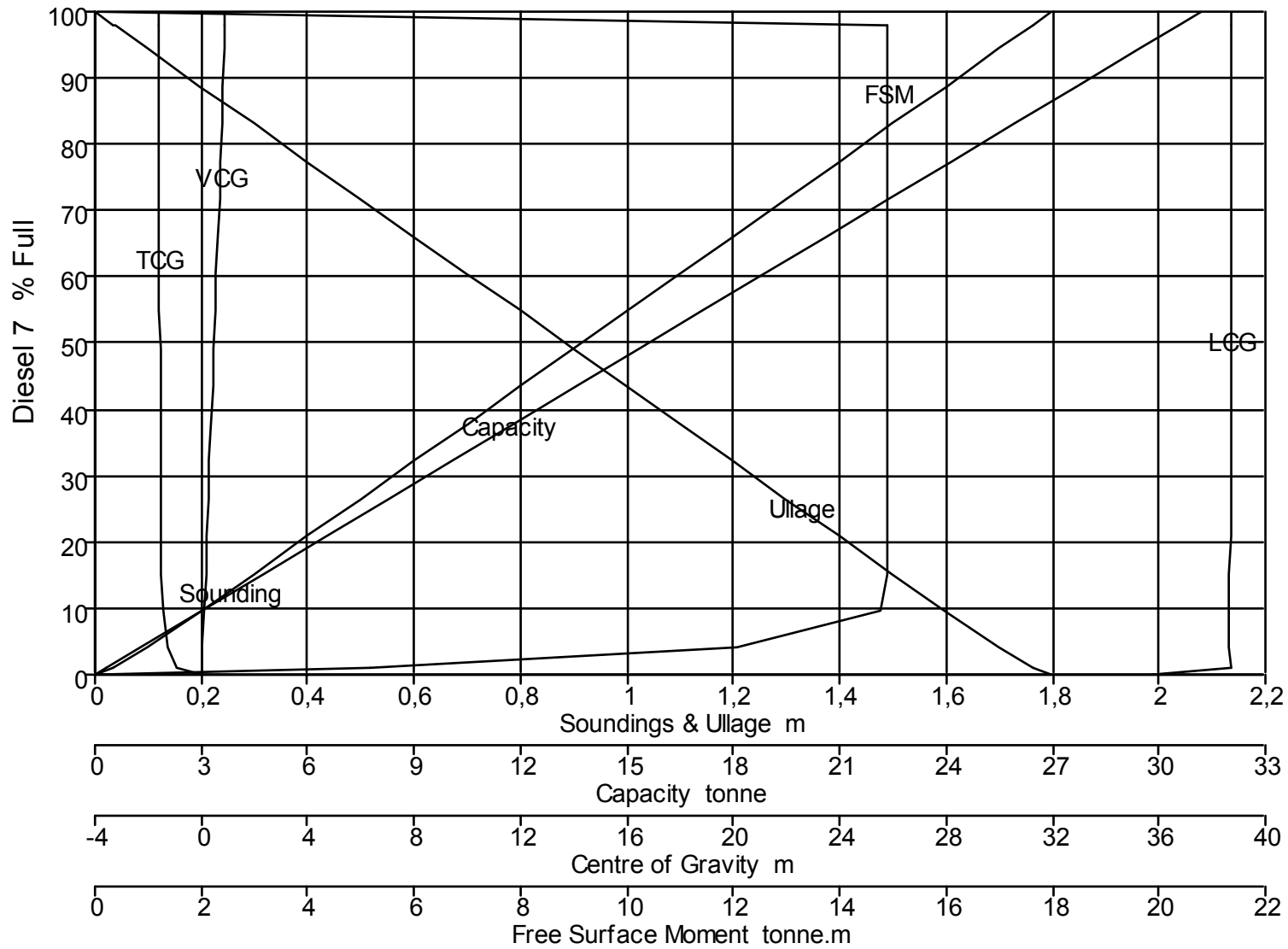
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Diesel 5  | 1,703      | 0,000    | 100,000 | 17,508                  | 14,707         | 38,428 | -4,104 | 1,136 | 0,000       |
|           | 1,700      | 0,003    | 99,718  | 17,459                  | 14,665         | 38,428 | -4,104 | 1,135 | 5,904       |
|           | 1,680      | 0,023    | 98,000  | 17,158                  | 14,412         | 38,426 | -4,099 | 1,123 | 5,833       |

|  |       |       |        |        |        |        |        |       |       |
|--|-------|-------|--------|--------|--------|--------|--------|-------|-------|
|  | 1,679 | 0,024 | 97,900 | 17,140 | 14,398 | 38,426 | -4,099 | 1,123 | 5,829 |
|  | 1,600 | 0,103 | 91,137 | 15,956 | 13,403 | 38,419 | -4,082 | 1,077 | 5,544 |
|  | 1,500 | 0,203 | 82,751 | 14,488 | 12,170 | 38,408 | -4,060 | 1,019 | 5,181 |
|  | 1,400 | 0,303 | 74,570 | 13,056 | 10,967 | 38,397 | -4,036 | 0,961 | 4,814 |
|  | 1,300 | 0,403 | 66,608 | 11,662 | 9,796  | 38,384 | -4,010 | 0,903 | 4,442 |
|  | 1,200 | 0,503 | 58,882 | 10,309 | 8,659  | 38,369 | -3,982 | 0,845 | 4,064 |
|  | 1,100 | 0,603 | 51,408 | 9,000  | 7,560  | 38,352 | -3,952 | 0,787 | 3,683 |
|  | 1,000 | 0,703 | 44,207 | 7,740  | 6,501  | 38,332 | -3,920 | 0,728 | 3,302 |
|  | 0,900 | 0,803 | 37,303 | 6,531  | 5,486  | 38,308 | -3,884 | 0,669 | 2,919 |
|  | 0,800 | 0,903 | 30,723 | 5,379  | 4,518  | 38,279 | -3,844 | 0,609 | 2,532 |
|  | 0,700 | 1,003 | 24,503 | 4,290  | 3,604  | 38,243 | -3,797 | 0,548 | 2,149 |
|  | 0,600 | 1,103 | 18,731 | 3,279  | 2,755  | 38,196 | -3,744 | 0,487 | 1,674 |
|  | 0,500 | 1,203 | 13,532 | 2,369  | 1,990  | 38,133 | -3,686 | 0,425 | 1,221 |
|  | 0,400 | 1,303 | 8,978  | 1,572  | 1,320  | 38,043 | -3,620 | 0,363 | 0,819 |
|  | 0,300 | 1,403 | 5,161  | 0,904  | 0,759  | 37,897 | -3,546 | 0,300 | 0,479 |
|  | 0,200 | 1,503 | 2,237  | 0,392  | 0,329  | 37,617 | -3,458 | 0,235 | 0,207 |
|  | 0,139 | 1,564 | 1,000  | 0,175  | 0,147  | 37,300 | -3,395 | 0,194 | 0,088 |
|  | 0,100 | 1,603 | 0,465  | 0,081  | 0,068  | 37,014 | -3,348 | 0,168 | 0,037 |
|  | 0,000 | 1,703 | 0,000  | 0,000  | 0,000  | 35,437 | -3,183 | 0,097 | 0,000 |

### Tank Calibrations - Diesel 7

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



**Diesel 7**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

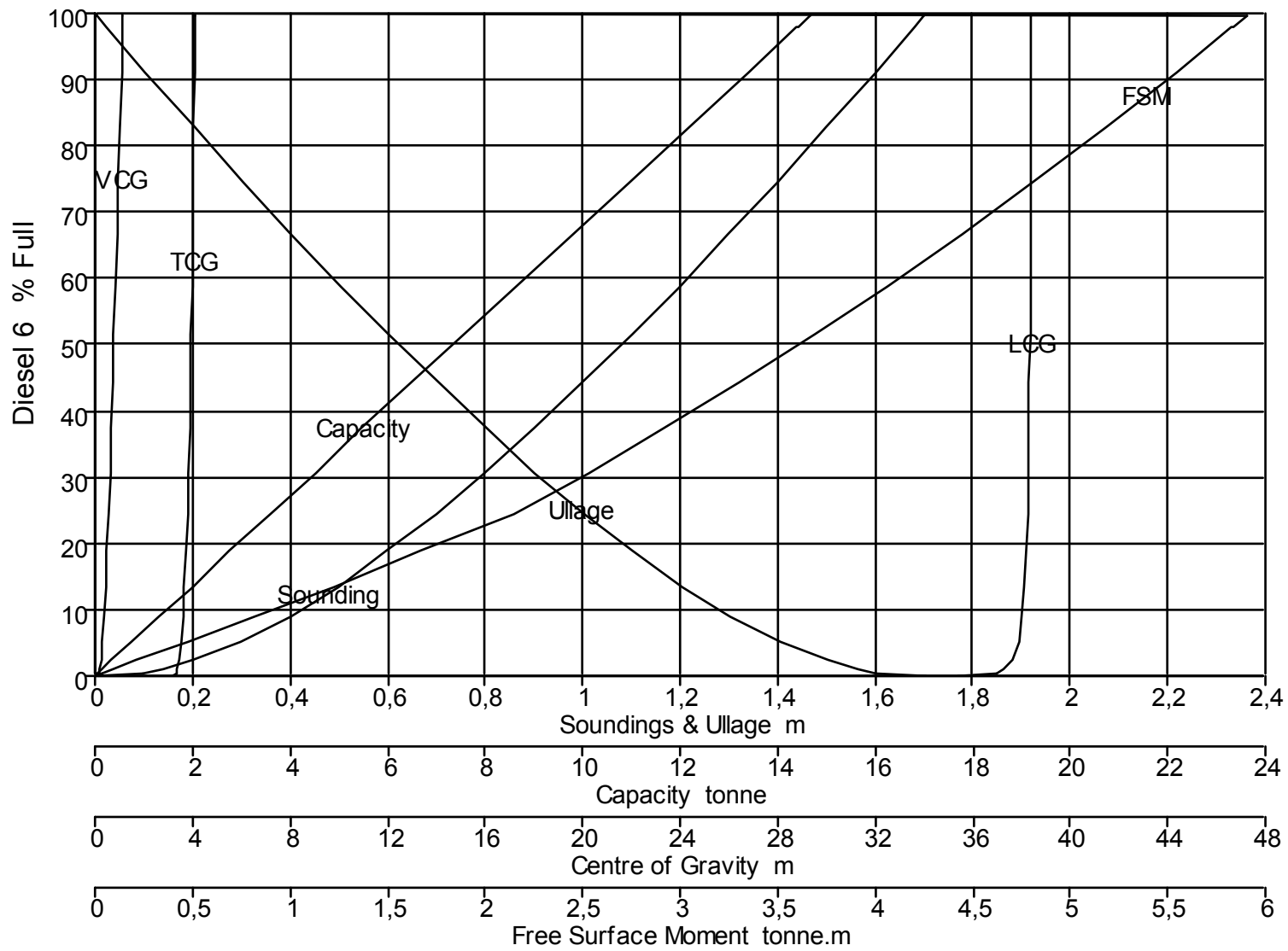
| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Diesel 7  | 1,799      | 0,000    | 100,000 | 37,146                  | 31,202         | 38,695 | -1,575 | 0,916 | 0,000       |
|           | 1,763      | 0,035    | 98,000  | 36,403                  | 30,578         | 38,695 | -1,575 | 0,898 | 14,899      |
|           | 1,761      | 0,037    | 97,900  | 36,366                  | 30,547         | 38,695 | -1,575 | 0,897 | 14,899      |

|  |       |       |        |        |        |        |        |       |        |
|--|-------|-------|--------|--------|--------|--------|--------|-------|--------|
|  | 1,700 | 0,099 | 94,425 | 35,075 | 29,463 | 38,694 | -1,574 | 0,866 | 14,899 |
|  | 1,600 | 0,199 | 88,769 | 32,974 | 27,698 | 38,694 | -1,573 | 0,816 | 14,899 |
|  | 1,500 | 0,299 | 83,114 | 30,873 | 25,933 | 38,694 | -1,571 | 0,766 | 14,899 |
|  | 1,400 | 0,399 | 77,458 | 28,772 | 24,169 | 38,693 | -1,570 | 0,716 | 14,899 |
|  | 1,300 | 0,499 | 71,803 | 26,672 | 22,404 | 38,693 | -1,568 | 0,666 | 14,899 |
|  | 1,200 | 0,599 | 66,147 | 24,571 | 20,640 | 38,692 | -1,566 | 0,616 | 14,899 |
|  | 1,100 | 0,699 | 60,492 | 22,470 | 18,875 | 38,691 | -1,564 | 0,566 | 14,899 |
|  | 1,000 | 0,799 | 54,836 | 20,369 | 17,110 | 38,690 | -1,561 | 0,516 | 14,899 |
|  | 0,900 | 0,899 | 49,181 | 18,269 | 15,346 | 38,689 | -1,558 | 0,466 | 14,899 |
|  | 0,800 | 0,999 | 43,525 | 16,168 | 13,581 | 38,688 | -1,553 | 0,416 | 14,899 |
|  | 0,700 | 1,099 | 37,870 | 14,067 | 11,816 | 38,686 | -1,548 | 0,366 | 14,899 |
|  | 0,600 | 1,199 | 32,214 | 11,966 | 10,052 | 38,684 | -1,540 | 0,315 | 14,899 |
|  | 0,500 | 1,299 | 26,559 | 9,865  | 8,287  | 38,680 | -1,529 | 0,265 | 14,899 |
|  | 0,400 | 1,399 | 20,903 | 7,765  | 6,522  | 38,675 | -1,512 | 0,215 | 14,899 |
|  | 0,300 | 1,499 | 15,248 | 5,664  | 4,758  | 38,665 | -1,482 | 0,164 | 14,899 |
|  | 0,200 | 1,599 | 9,594  | 3,564  | 2,994  | 38,645 | -1,418 | 0,112 | 14,780 |
|  | 0,100 | 1,699 | 4,082  | 1,516  | 1,274  | 38,643 | -1,236 | 0,058 | 12,084 |
|  | 0,035 | 1,764 | 1,000  | 0,371  | 0,312  | 38,757 | -0,927 | 0,022 | 5,182  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 35,755 | -0,007 | 0,001 | 0,000  |

### Tank Calibrations - Diesel 6

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





**Diesel 6**  
**Trim: 0 m; Heel: 0 deg to starboard**

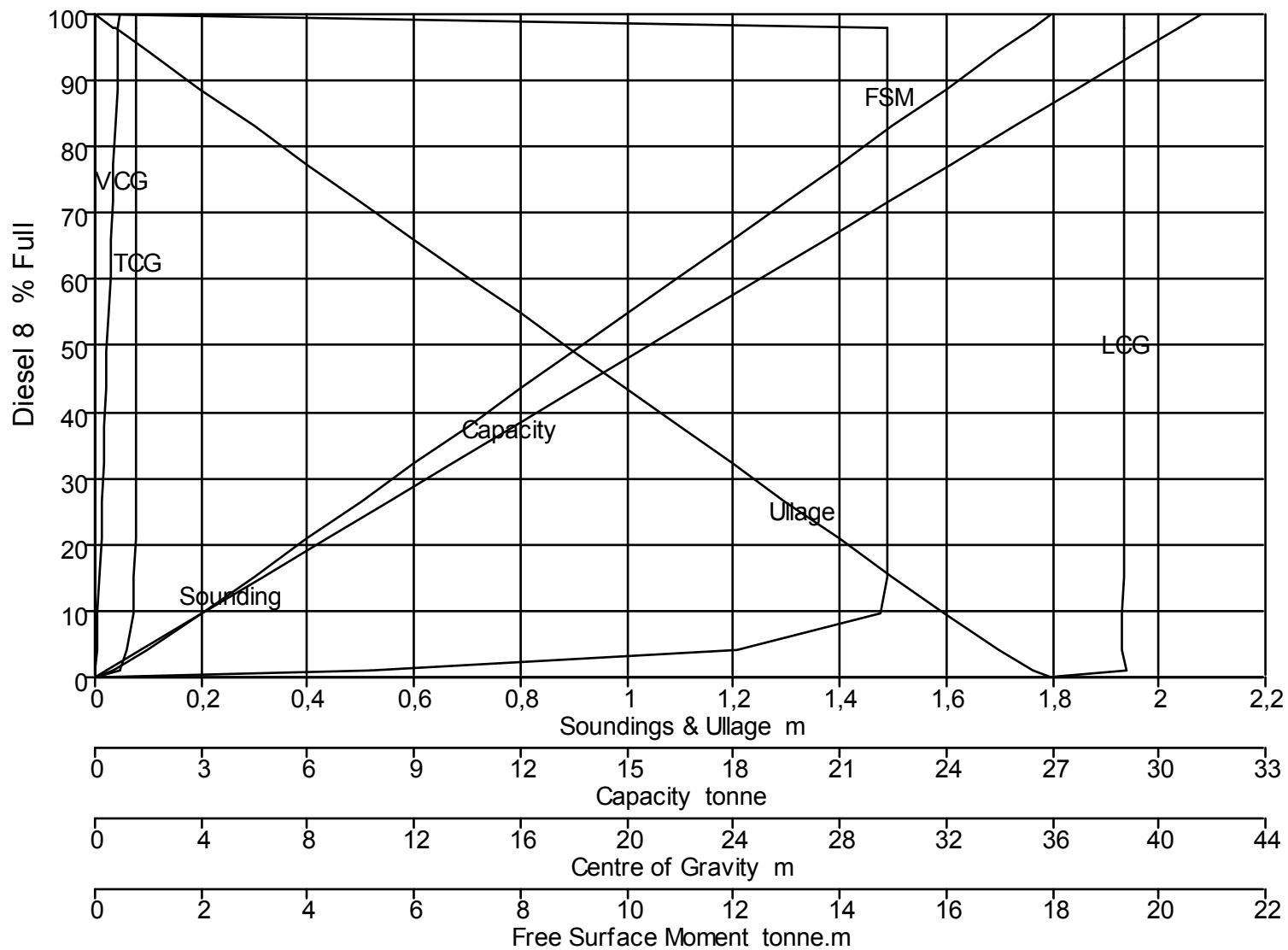
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Diesel 6  | 1,703      | 0,000    | 100,000 | 17,508                  | 14,707         | 38,428 | 4,104 | 1,136 | 0,000       |
|           | 1,700      | 0,003    | 99,718  | 17,459                  | 14,665         | 38,428 | 4,104 | 1,135 | 5,904       |
|           | 1,680      | 0,023    | 98,000  | 17,158                  | 14,412         | 38,426 | 4,099 | 1,123 | 5,833       |

|  |       |       |        |        |        |        |       |       |       |
|--|-------|-------|--------|--------|--------|--------|-------|-------|-------|
|  | 1,679 | 0,024 | 97,900 | 17,140 | 14,398 | 38,426 | 4,099 | 1,123 | 5,829 |
|  | 1,600 | 0,103 | 91,137 | 15,956 | 13,403 | 38,419 | 4,082 | 1,077 | 5,544 |
|  | 1,500 | 0,203 | 82,751 | 14,488 | 12,170 | 38,408 | 4,060 | 1,019 | 5,181 |
|  | 1,400 | 0,303 | 74,570 | 13,056 | 10,967 | 38,397 | 4,036 | 0,961 | 4,814 |
|  | 1,300 | 0,403 | 66,608 | 11,662 | 9,796  | 38,384 | 4,010 | 0,903 | 4,442 |
|  | 1,200 | 0,503 | 58,882 | 10,309 | 8,659  | 38,369 | 3,982 | 0,845 | 4,064 |
|  | 1,100 | 0,603 | 51,408 | 9,000  | 7,560  | 38,352 | 3,952 | 0,787 | 3,683 |
|  | 1,000 | 0,703 | 44,207 | 7,740  | 6,501  | 38,332 | 3,920 | 0,728 | 3,302 |
|  | 0,900 | 0,803 | 37,303 | 6,531  | 5,486  | 38,308 | 3,884 | 0,669 | 2,919 |
|  | 0,800 | 0,903 | 30,723 | 5,379  | 4,518  | 38,279 | 3,844 | 0,609 | 2,532 |
|  | 0,700 | 1,003 | 24,503 | 4,290  | 3,604  | 38,243 | 3,797 | 0,548 | 2,149 |
|  | 0,600 | 1,103 | 18,731 | 3,279  | 2,755  | 38,196 | 3,744 | 0,487 | 1,674 |
|  | 0,500 | 1,203 | 13,532 | 2,369  | 1,990  | 38,133 | 3,686 | 0,425 | 1,221 |
|  | 0,400 | 1,303 | 8,978  | 1,572  | 1,320  | 38,043 | 3,620 | 0,363 | 0,819 |
|  | 0,300 | 1,403 | 5,161  | 0,904  | 0,759  | 37,897 | 3,546 | 0,300 | 0,479 |
|  | 0,200 | 1,503 | 2,237  | 0,392  | 0,329  | 37,617 | 3,458 | 0,235 | 0,207 |
|  | 0,139 | 1,564 | 1,000  | 0,175  | 0,147  | 37,300 | 3,395 | 0,194 | 0,088 |
|  | 0,100 | 1,603 | 0,465  | 0,081  | 0,068  | 37,014 | 3,348 | 0,168 | 0,037 |
|  | 0,000 | 1,703 | 0,000  | 0,000  | 0,000  | 35,437 | 3,183 | 0,097 | 0,000 |

### Tank Calibrations - Diesel 8

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



**Diesel 8**  
**Trim: 0 m; Heel: 0 deg to starboard**

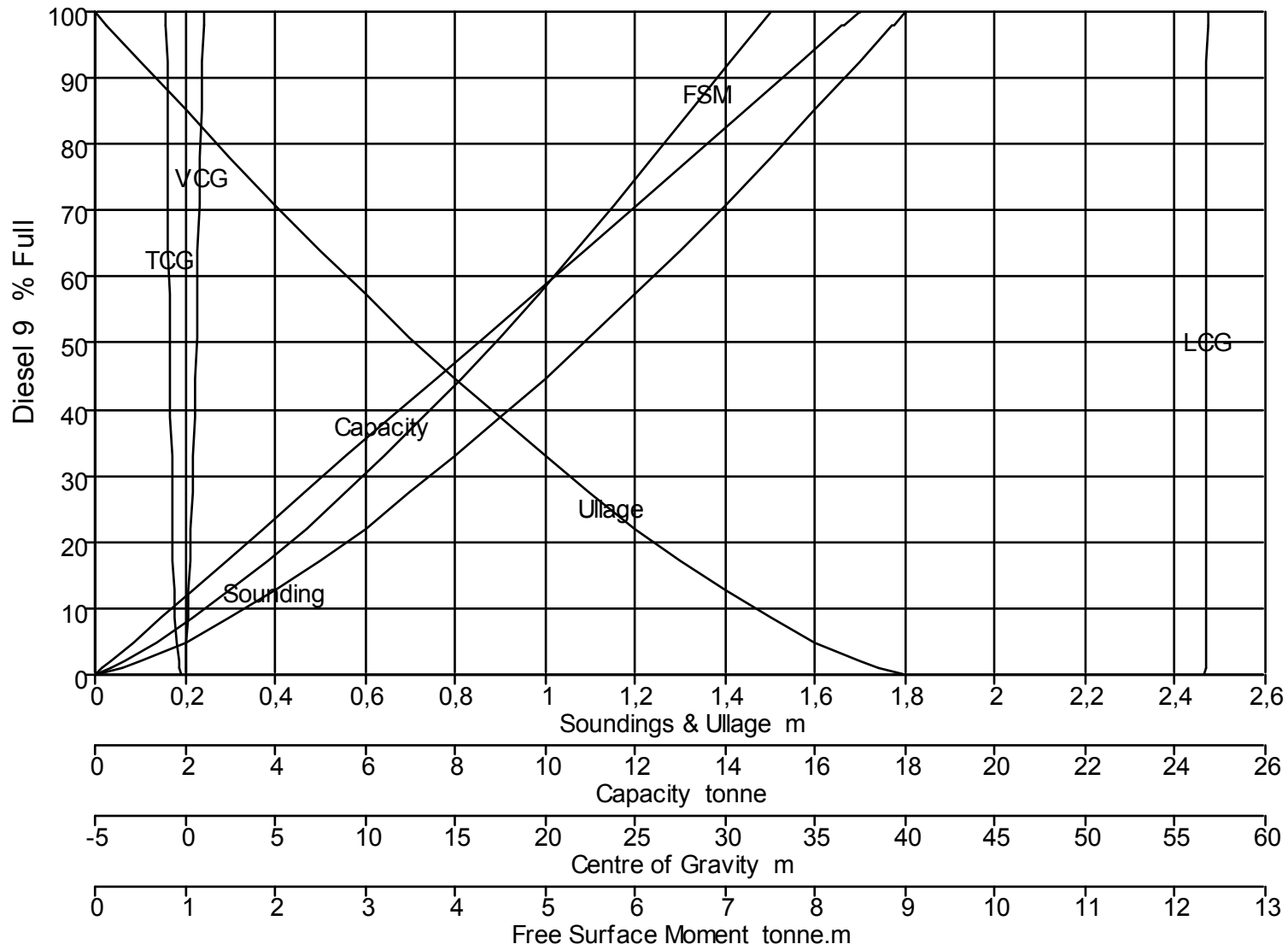
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Diesel 8  | 1,799      | 0,000    | 100,000 | 37,146                  | 31,202         | 38,695 | 1,575 | 0,916 | 0,000       |
|           | 1,763      | 0,035    | 98,000  | 36,403                  | 30,578         | 38,695 | 1,575 | 0,898 | 14,899      |
|           | 1,761      | 0,037    | 97,900  | 36,366                  | 30,547         | 38,695 | 1,575 | 0,897 | 14,899      |

|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 1,700 | 0,099 | 94,425 | 35,075 | 29,463 | 38,694 | 1,574 | 0,866 | 14,899 |
|  | 1,600 | 0,199 | 88,769 | 32,974 | 27,698 | 38,694 | 1,573 | 0,816 | 14,899 |
|  | 1,500 | 0,299 | 83,114 | 30,873 | 25,933 | 38,694 | 1,571 | 0,766 | 14,899 |
|  | 1,400 | 0,399 | 77,458 | 28,772 | 24,169 | 38,693 | 1,570 | 0,716 | 14,899 |
|  | 1,300 | 0,499 | 71,803 | 26,672 | 22,404 | 38,693 | 1,568 | 0,666 | 14,899 |
|  | 1,200 | 0,599 | 66,147 | 24,571 | 20,640 | 38,692 | 1,566 | 0,616 | 14,899 |
|  | 1,100 | 0,699 | 60,492 | 22,470 | 18,875 | 38,691 | 1,564 | 0,566 | 14,899 |
|  | 1,000 | 0,799 | 54,836 | 20,369 | 17,110 | 38,690 | 1,561 | 0,516 | 14,899 |
|  | 0,900 | 0,899 | 49,181 | 18,269 | 15,346 | 38,689 | 1,558 | 0,466 | 14,899 |
|  | 0,800 | 0,999 | 43,525 | 16,168 | 13,581 | 38,688 | 1,553 | 0,416 | 14,899 |
|  | 0,700 | 1,099 | 37,870 | 14,067 | 11,816 | 38,686 | 1,548 | 0,366 | 14,899 |
|  | 0,600 | 1,199 | 32,214 | 11,966 | 10,052 | 38,684 | 1,540 | 0,315 | 14,899 |
|  | 0,500 | 1,299 | 26,559 | 9,865  | 8,287  | 38,680 | 1,529 | 0,265 | 14,899 |
|  | 0,400 | 1,399 | 20,903 | 7,765  | 6,522  | 38,675 | 1,512 | 0,215 | 14,899 |
|  | 0,300 | 1,499 | 15,248 | 5,664  | 4,758  | 38,665 | 1,482 | 0,164 | 14,899 |
|  | 0,200 | 1,599 | 9,594  | 3,564  | 2,994  | 38,645 | 1,418 | 0,112 | 14,780 |
|  | 0,100 | 1,699 | 4,082  | 1,516  | 1,274  | 38,643 | 1,236 | 0,058 | 12,084 |
|  | 0,035 | 1,764 | 1,000  | 0,371  | 0,312  | 38,757 | 0,927 | 0,022 | 5,182  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 35,755 | 0,007 | 0,001 | 0,000  |

### Tank Calibrations - Diesel 9

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



**Diesel 9**  
**Trim: 0 m; Heel: 0 deg to starboard**

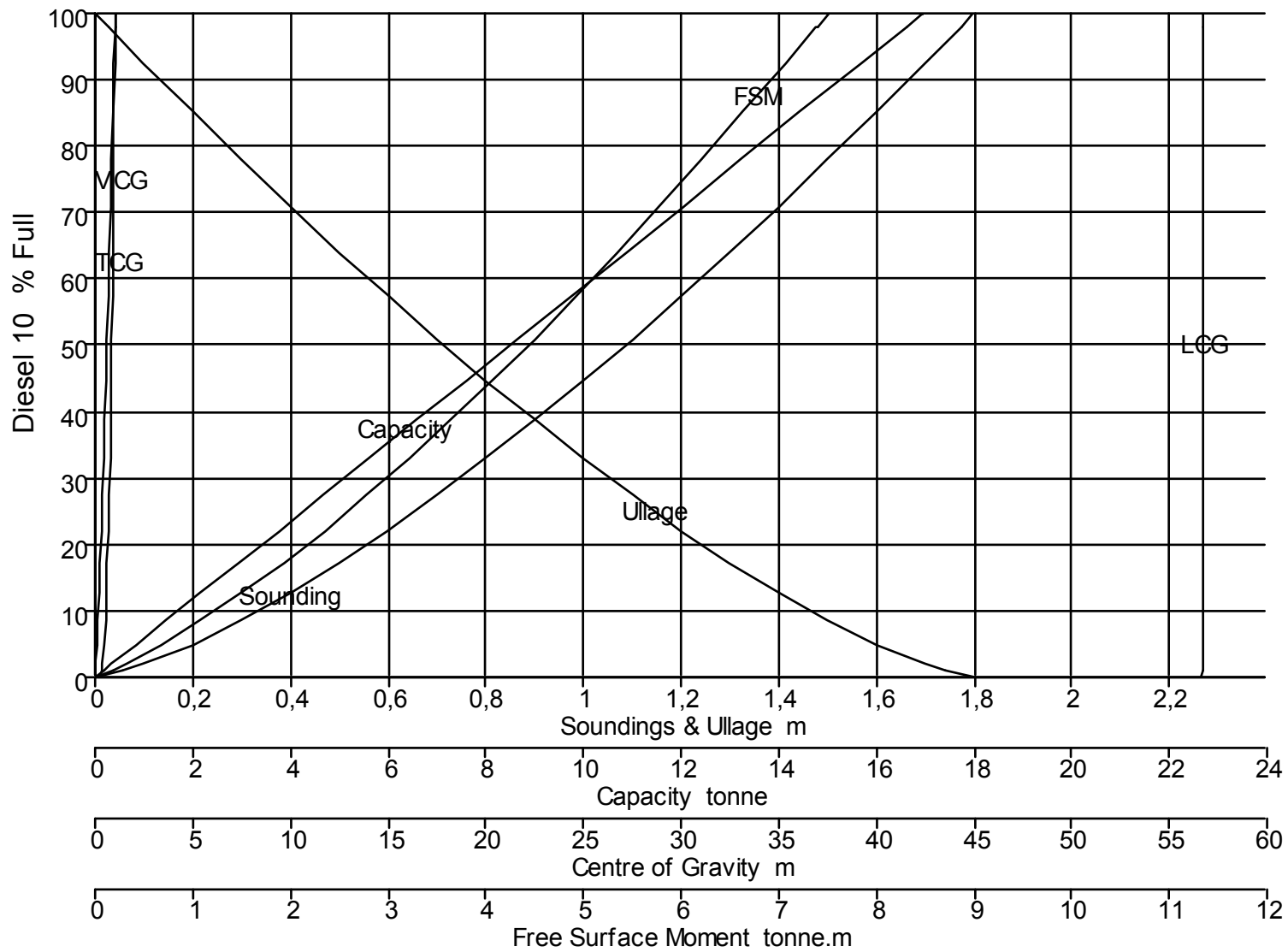
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Diesel 9  | 1,800      | 0,000    | 100,000 | 20,205                  | 16,972         | 56,778 | -1,025 | 1,040 | 0,000       |
|           | 1,800      | 0,000    | 99,996  | 20,204                  | 16,972         | 56,778 | -1,025 | 1,040 | 7,509       |
|           | 1,774      | 0,026    | 98,000  | 19,801                  | 16,633         | 56,777 | -1,019 | 1,025 | 7,391       |

|  |       |       |        |        |        |        |        |       |       |
|--|-------|-------|--------|--------|--------|--------|--------|-------|-------|
|  | 1,772 | 0,028 | 97,900 | 19,781 | 16,616 | 56,777 | -1,019 | 1,024 | 7,385 |
|  | 1,700 | 0,100 | 92,484 | 18,687 | 15,697 | 56,775 | -1,004 | 0,983 | 7,066 |
|  | 1,600 | 0,200 | 85,130 | 17,201 | 14,449 | 56,772 | -0,982 | 0,925 | 6,632 |
|  | 1,500 | 0,300 | 77,940 | 15,748 | 13,228 | 56,769 | -0,960 | 0,867 | 6,204 |
|  | 1,400 | 0,400 | 70,919 | 14,329 | 12,037 | 56,766 | -0,936 | 0,810 | 5,772 |
|  | 1,300 | 0,500 | 64,076 | 12,947 | 10,875 | 56,762 | -0,911 | 0,752 | 5,346 |
|  | 1,200 | 0,600 | 57,419 | 11,602 | 9,745  | 56,758 | -0,885 | 0,694 | 4,924 |
|  | 1,100 | 0,700 | 50,961 | 10,297 | 8,649  | 56,754 | -0,858 | 0,636 | 4,494 |
|  | 1,000 | 0,800 | 44,711 | 9,034  | 7,588  | 56,750 | -0,828 | 0,578 | 4,068 |
|  | 0,900 | 0,900 | 38,685 | 7,816  | 6,566  | 56,745 | -0,796 | 0,520 | 3,644 |
|  | 0,800 | 1,000 | 32,901 | 6,648  | 5,584  | 56,741 | -0,762 | 0,462 | 3,221 |
|  | 0,700 | 1,100 | 27,381 | 5,532  | 4,647  | 56,735 | -0,725 | 0,404 | 2,786 |
|  | 0,600 | 1,200 | 22,151 | 4,476  | 3,760  | 56,730 | -0,684 | 0,346 | 2,352 |
|  | 0,500 | 1,300 | 17,243 | 3,484  | 2,927  | 56,725 | -0,638 | 0,288 | 1,926 |
|  | 0,400 | 1,400 | 12,700 | 2,566  | 2,156  | 56,719 | -0,587 | 0,230 | 1,504 |
|  | 0,300 | 1,500 | 8,581  | 1,734  | 1,456  | 56,714 | -0,526 | 0,171 | 1,085 |
|  | 0,200 | 1,600 | 4,966  | 1,003  | 0,843  | 56,708 | -0,454 | 0,113 | 0,685 |
|  | 0,100 | 1,700 | 1,993  | 0,403  | 0,338  | 56,700 | -0,360 | 0,056 | 0,324 |
|  | 0,058 | 1,742 | 1,000  | 0,202  | 0,170  | 56,694 | -0,307 | 0,032 | 0,188 |
|  | 0,000 | 1,800 | 0,000  | 0,000  | 0,000  | 56,646 | -0,211 | 0,000 | 0,000 |

### Tank Calibrations - Diesel 10

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



**Diesel 10**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

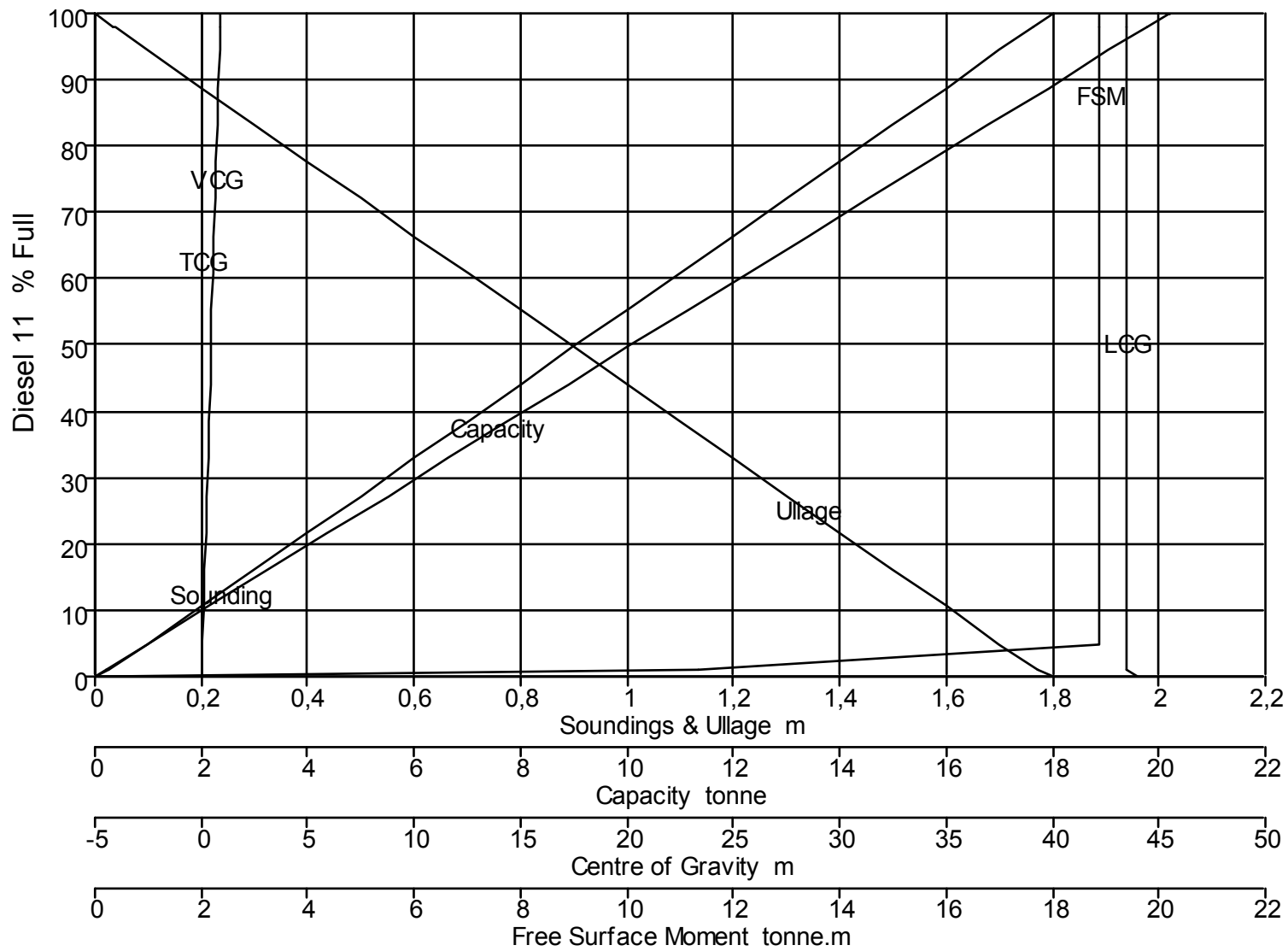
| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Diesel 10 | 1,800      | 0,000    | 100,000 | 20,205                  | 16,972         | 56,778 | 1,025 | 1,040 | 0,000       |
|           | 1,800      | 0,000    | 99,996  | 20,204                  | 16,972         | 56,778 | 1,025 | 1,040 | 7,509       |
|           | 1,774      | 0,026    | 98,000  | 19,801                  | 16,633         | 56,777 | 1,019 | 1,025 | 7,391       |

|  |       |       |        |        |        |        |       |       |       |
|--|-------|-------|--------|--------|--------|--------|-------|-------|-------|
|  | 1,772 | 0,028 | 97,900 | 19,781 | 16,616 | 56,777 | 1,019 | 1,024 | 7,385 |
|  | 1,700 | 0,100 | 92,484 | 18,687 | 15,697 | 56,775 | 1,004 | 0,983 | 7,066 |
|  | 1,600 | 0,200 | 85,130 | 17,201 | 14,449 | 56,772 | 0,982 | 0,925 | 6,632 |
|  | 1,500 | 0,300 | 77,940 | 15,748 | 13,228 | 56,769 | 0,960 | 0,867 | 6,204 |
|  | 1,400 | 0,400 | 70,919 | 14,329 | 12,037 | 56,766 | 0,936 | 0,810 | 5,772 |
|  | 1,300 | 0,500 | 64,076 | 12,947 | 10,875 | 56,762 | 0,911 | 0,752 | 5,346 |
|  | 1,200 | 0,600 | 57,419 | 11,602 | 9,745  | 56,758 | 0,885 | 0,694 | 4,924 |
|  | 1,100 | 0,700 | 50,961 | 10,297 | 8,649  | 56,754 | 0,858 | 0,636 | 4,494 |
|  | 1,000 | 0,800 | 44,711 | 9,034  | 7,588  | 56,750 | 0,828 | 0,578 | 4,068 |
|  | 0,900 | 0,900 | 38,685 | 7,816  | 6,566  | 56,745 | 0,796 | 0,520 | 3,644 |
|  | 0,800 | 1,000 | 32,901 | 6,648  | 5,584  | 56,741 | 0,762 | 0,462 | 3,221 |
|  | 0,700 | 1,100 | 27,381 | 5,532  | 4,647  | 56,735 | 0,725 | 0,404 | 2,786 |
|  | 0,600 | 1,200 | 22,151 | 4,476  | 3,760  | 56,730 | 0,684 | 0,346 | 2,352 |
|  | 0,500 | 1,300 | 17,243 | 3,484  | 2,927  | 56,725 | 0,638 | 0,288 | 1,926 |
|  | 0,400 | 1,400 | 12,700 | 2,566  | 2,156  | 56,719 | 0,587 | 0,230 | 1,504 |
|  | 0,300 | 1,500 | 8,581  | 1,734  | 1,456  | 56,714 | 0,526 | 0,171 | 1,085 |
|  | 0,200 | 1,600 | 4,966  | 1,003  | 0,843  | 56,708 | 0,454 | 0,113 | 0,685 |
|  | 0,100 | 1,700 | 1,993  | 0,403  | 0,338  | 56,700 | 0,360 | 0,056 | 0,324 |
|  | 0,058 | 1,742 | 1,000  | 0,202  | 0,170  | 56,694 | 0,307 | 0,032 | 0,188 |
|  | 0,000 | 1,800 | 0,000  | 0,000  | 0,000  | 56,646 | 0,211 | 0,000 | 0,000 |

### Tank Calibrations - Diesel 11

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





**Diesel 11**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Diesel 11 | 1,800      | 0,000    | 100,000 | 24,030                  | 20,185         | 43,499 | 0,000 | 0,906 | 0,000       |
|           | 1,800      | 0,000    | 99,997  | 24,029                  | 20,184         | 43,499 | 0,000 | 0,906 | 18,882      |
|           | 1,764      | 0,036    | 98,000  | 23,549                  | 19,781         | 43,499 | 0,000 | 0,888 | 18,882      |

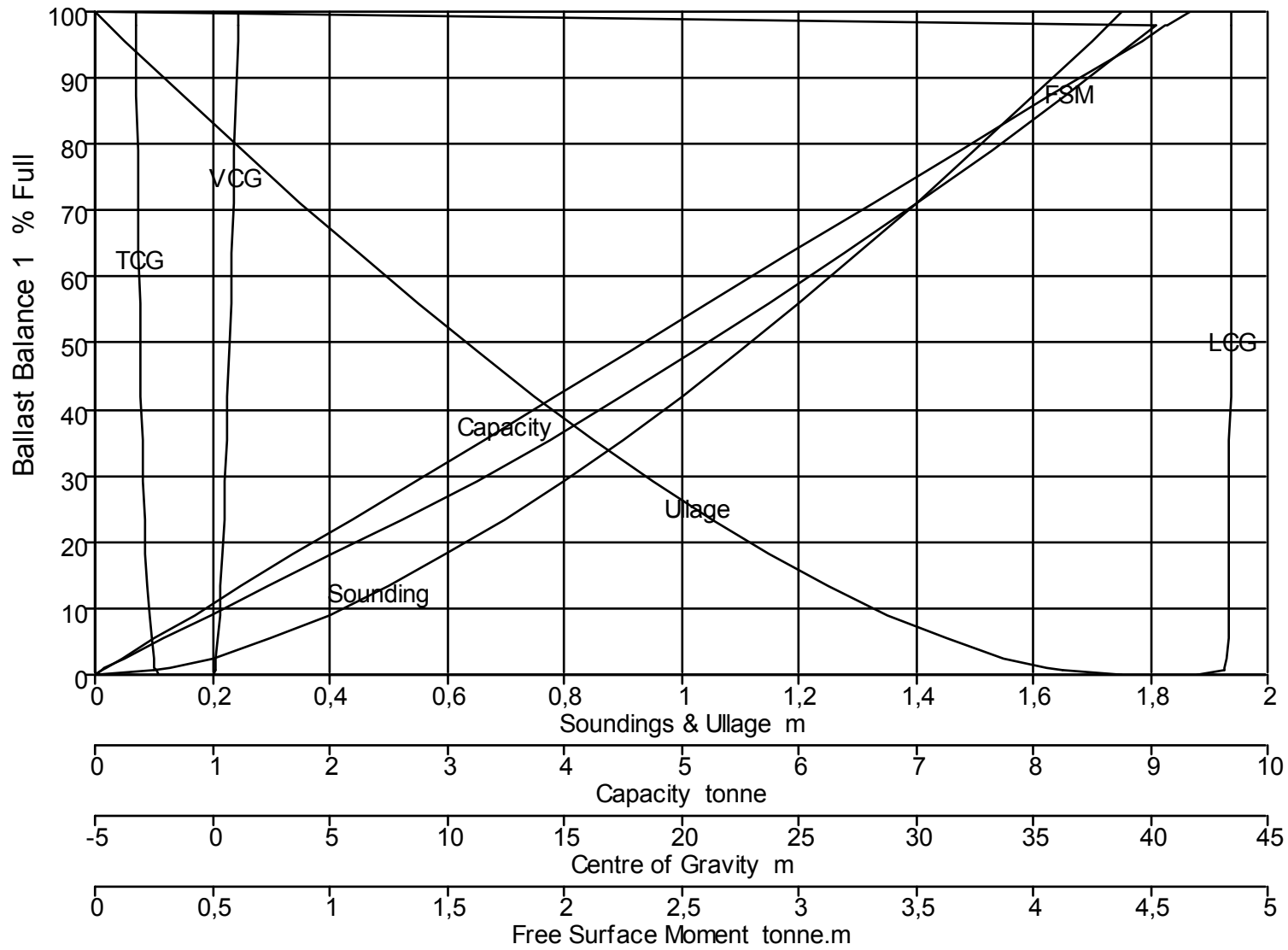
|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 1,763 | 0,038 | 97,900 | 23,525 | 19,761 | 43,499 | 0,000 | 0,887 | 18,882 |
|  | 1,700 | 0,100 | 94,404 | 22,685 | 19,055 | 43,499 | 0,000 | 0,856 | 18,882 |
|  | 1,600 | 0,200 | 88,811 | 21,341 | 17,926 | 43,499 | 0,000 | 0,806 | 18,882 |
|  | 1,500 | 0,300 | 83,218 | 19,997 | 16,797 | 43,499 | 0,000 | 0,756 | 18,882 |
|  | 1,400 | 0,400 | 77,625 | 18,653 | 15,668 | 43,499 | 0,000 | 0,706 | 18,882 |
|  | 1,300 | 0,500 | 72,032 | 17,309 | 14,540 | 43,499 | 0,000 | 0,656 | 18,882 |
|  | 1,200 | 0,600 | 66,439 | 15,965 | 13,411 | 43,499 | 0,000 | 0,606 | 18,882 |
|  | 1,100 | 0,700 | 60,846 | 14,621 | 12,282 | 43,499 | 0,000 | 0,556 | 18,882 |
|  | 1,000 | 0,800 | 55,252 | 13,277 | 11,153 | 43,499 | 0,000 | 0,506 | 18,882 |
|  | 0,900 | 0,900 | 49,659 | 11,933 | 10,024 | 43,498 | 0,000 | 0,456 | 18,882 |
|  | 0,800 | 1,000 | 44,066 | 10,589 | 8,895  | 43,498 | 0,000 | 0,406 | 18,882 |
|  | 0,700 | 1,100 | 38,473 | 9,245  | 7,766  | 43,498 | 0,000 | 0,356 | 18,882 |
|  | 0,600 | 1,200 | 32,880 | 7,901  | 6,637  | 43,498 | 0,000 | 0,306 | 18,882 |
|  | 0,500 | 1,300 | 27,287 | 6,557  | 5,508  | 43,497 | 0,000 | 0,256 | 18,882 |
|  | 0,400 | 1,400 | 21,694 | 5,213  | 4,379  | 43,496 | 0,000 | 0,206 | 18,882 |
|  | 0,300 | 1,500 | 16,101 | 3,869  | 3,250  | 43,495 | 0,000 | 0,156 | 18,882 |
|  | 0,200 | 1,600 | 10,508 | 2,525  | 2,121  | 43,493 | 0,000 | 0,105 | 18,882 |
|  | 0,100 | 1,700 | 4,915  | 1,181  | 0,992  | 43,484 | 0,000 | 0,054 | 18,882 |
|  | 0,027 | 1,773 | 1,000  | 0,240  | 0,202  | 43,489 | 0,000 | 0,016 | 11,339 |
|  | 0,000 | 1,800 | 0,000  | 0,000  | 0,000  | 44,057 | 0,000 | 0,000 | 0,000  |

### Tank Calibrations - Ballast Balance 1

Fluid Type = Water Ballast      Specific gravity = 1,025

Permeability = 100 %

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



**Ballast Balance 1**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

| Tank Name         | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-------------------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Ballast Balance 1 | 1,751      | 0,000    | 100,000 | 9,103                   | 9,331          | 43,425 | -3,249 | 1,118 | 0,000       |
|                   | 1,728      | 0,023    | 98,000  | 8,921                   | 9,144          | 43,424 | -3,243 | 1,104 | 4,525       |
|                   | 1,726      | 0,025    | 97,900  | 8,912                   | 9,135          | 43,424 | -3,243 | 1,103 | 4,521       |

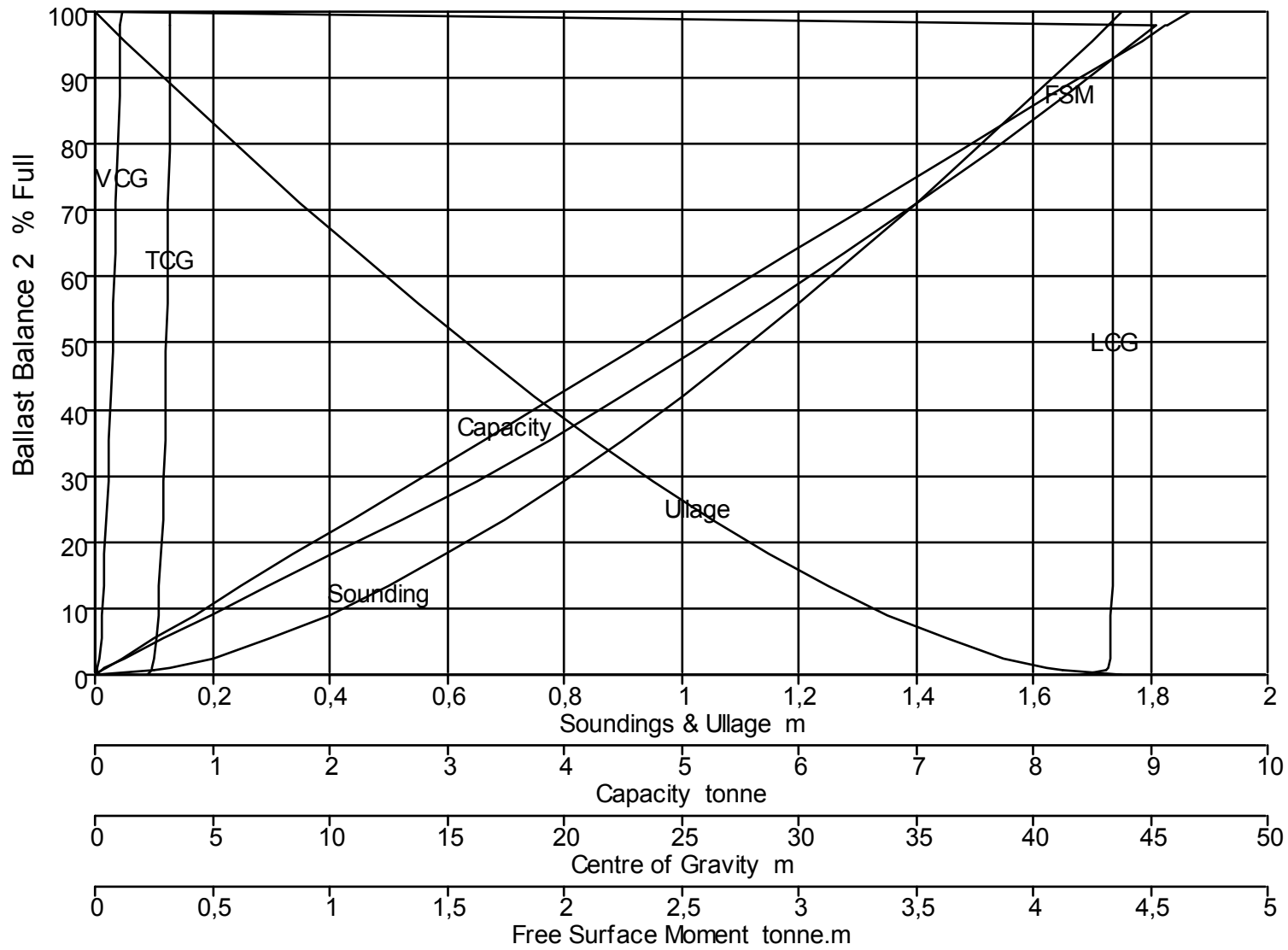
|  |       |       |        |       |       |        |        |       |       |
|--|-------|-------|--------|-------|-------|--------|--------|-------|-------|
|  | 1,700 | 0,051 | 95,655 | 8,708 | 8,925 | 43,424 | -3,236 | 1,088 | 4,440 |
|  | 1,600 | 0,151 | 87,284 | 7,946 | 8,144 | 43,421 | -3,209 | 1,029 | 4,133 |
|  | 1,500 | 0,251 | 79,126 | 7,203 | 7,383 | 43,418 | -3,181 | 0,970 | 3,821 |
|  | 1,400 | 0,351 | 71,192 | 6,481 | 6,643 | 43,415 | -3,151 | 0,911 | 3,507 |
|  | 1,300 | 0,451 | 63,497 | 5,780 | 5,925 | 43,412 | -3,120 | 0,852 | 3,194 |
|  | 1,200 | 0,551 | 56,060 | 5,103 | 5,231 | 43,408 | -3,086 | 0,793 | 2,876 |
|  | 1,100 | 0,651 | 48,899 | 4,451 | 4,563 | 43,404 | -3,050 | 0,733 | 2,556 |
|  | 1,000 | 0,751 | 42,040 | 3,827 | 3,923 | 43,400 | -3,011 | 0,674 | 2,243 |
|  | 0,900 | 0,851 | 35,499 | 3,232 | 3,312 | 43,395 | -2,969 | 0,614 | 1,940 |
|  | 0,800 | 0,951 | 29,304 | 2,668 | 2,734 | 43,389 | -2,922 | 0,553 | 1,632 |
|  | 0,700 | 1,051 | 23,508 | 2,140 | 2,193 | 43,382 | -2,872 | 0,492 | 1,314 |
|  | 0,600 | 1,151 | 18,169 | 1,654 | 1,695 | 43,373 | -2,817 | 0,431 | 1,012 |
|  | 0,500 | 1,251 | 13,338 | 1,214 | 1,245 | 43,362 | -2,756 | 0,370 | 0,736 |
|  | 0,400 | 1,351 | 9,055  | 0,824 | 0,845 | 43,346 | -2,688 | 0,309 | 0,496 |
|  | 0,300 | 1,451 | 5,410  | 0,492 | 0,505 | 43,322 | -2,610 | 0,247 | 0,289 |
|  | 0,200 | 1,551 | 2,522  | 0,230 | 0,235 | 43,274 | -2,515 | 0,183 | 0,124 |
|  | 0,126 | 1,625 | 1,000  | 0,091 | 0,093 | 43,188 | -2,431 | 0,136 | 0,043 |
|  | 0,100 | 1,651 | 0,608  | 0,055 | 0,057 | 43,128 | -2,398 | 0,119 | 0,024 |
|  | 0,000 | 1,751 | 0,000  | 0,000 | 0,000 | 42,017 | -2,240 | 0,049 | 0,000 |

## Tank Calibrations - Ballast Balance 2

Fluid Type = Water Ballast      Specific gravity = 1,025

Permeability = 100 %

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



**Ballast Balance 2**  
**Trim: 0 m; Heel: 0 deg to starboard**

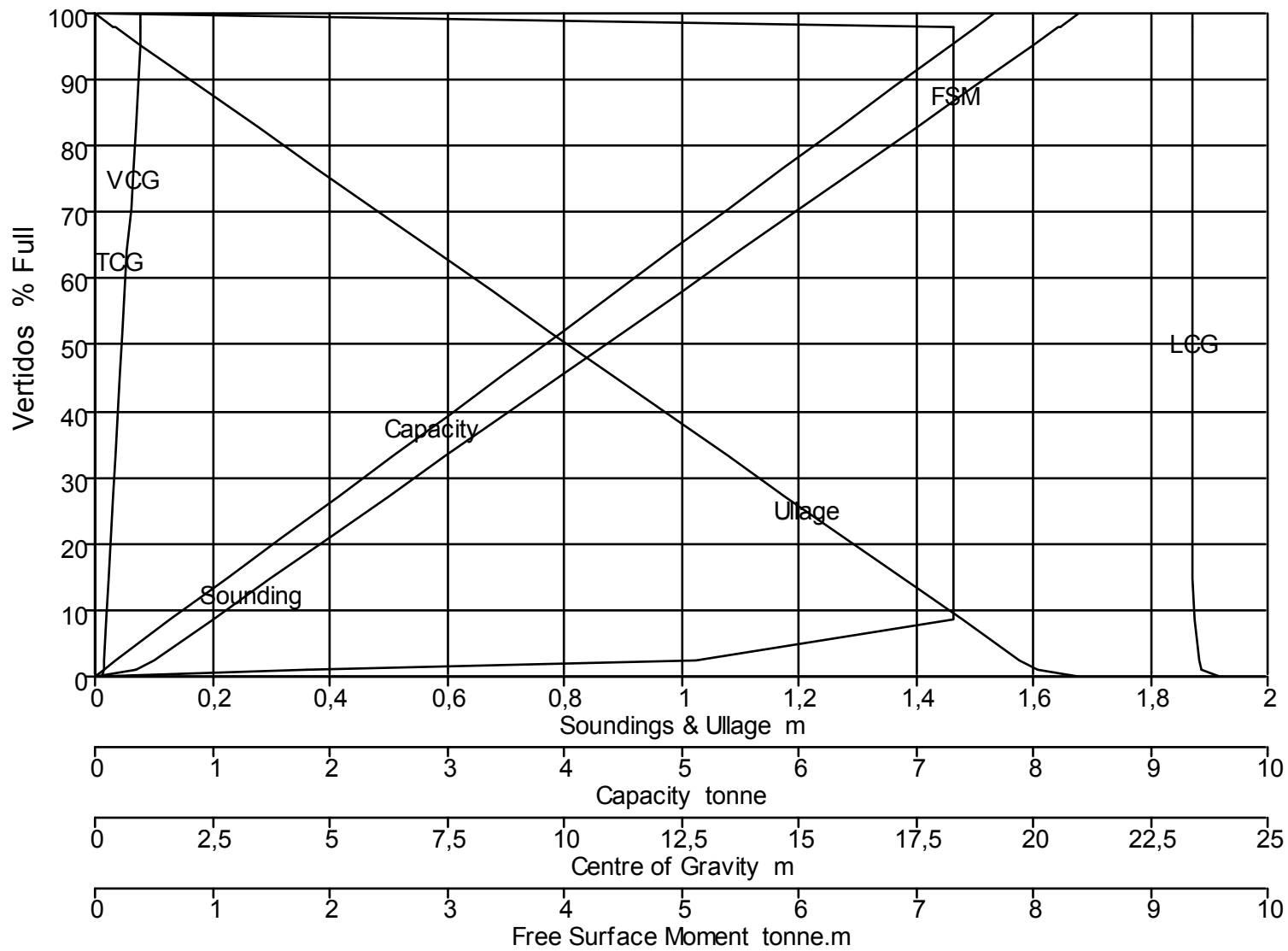
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name         | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-------------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Ballast Balance 2 | 1,751      | 0,000    | 100,000 | 9,103                   | 9,331          | 43,425 | 3,249 | 1,118 | 0,000       |
|                   | 1,728      | 0,023    | 98,000  | 8,921                   | 9,144          | 43,424 | 3,243 | 1,104 | 4,525       |
|                   | 1,726      | 0,025    | 97,900  | 8,912                   | 9,135          | 43,424 | 3,243 | 1,103 | 4,521       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,700 | 0,051 | 95,655 | 8,708 | 8,925 | 43,424 | 3,236 | 1,088 | 4,440 |
|  | 1,600 | 0,151 | 87,284 | 7,946 | 8,144 | 43,421 | 3,209 | 1,029 | 4,133 |
|  | 1,500 | 0,251 | 79,126 | 7,203 | 7,383 | 43,418 | 3,181 | 0,970 | 3,821 |
|  | 1,400 | 0,351 | 71,192 | 6,481 | 6,643 | 43,415 | 3,151 | 0,911 | 3,507 |
|  | 1,300 | 0,451 | 63,497 | 5,780 | 5,925 | 43,412 | 3,120 | 0,852 | 3,194 |
|  | 1,200 | 0,551 | 56,060 | 5,103 | 5,231 | 43,408 | 3,086 | 0,793 | 2,876 |
|  | 1,100 | 0,651 | 48,899 | 4,451 | 4,563 | 43,404 | 3,050 | 0,733 | 2,556 |
|  | 1,000 | 0,751 | 42,040 | 3,827 | 3,923 | 43,400 | 3,011 | 0,674 | 2,243 |
|  | 0,900 | 0,851 | 35,499 | 3,232 | 3,312 | 43,395 | 2,969 | 0,614 | 1,940 |
|  | 0,800 | 0,951 | 29,304 | 2,668 | 2,734 | 43,389 | 2,922 | 0,553 | 1,632 |
|  | 0,700 | 1,051 | 23,508 | 2,140 | 2,193 | 43,382 | 2,872 | 0,492 | 1,314 |
|  | 0,600 | 1,151 | 18,169 | 1,654 | 1,695 | 43,373 | 2,817 | 0,431 | 1,012 |
|  | 0,500 | 1,251 | 13,338 | 1,214 | 1,245 | 43,362 | 2,756 | 0,370 | 0,736 |
|  | 0,400 | 1,351 | 9,055  | 0,824 | 0,845 | 43,346 | 2,688 | 0,309 | 0,496 |
|  | 0,300 | 1,451 | 5,410  | 0,492 | 0,505 | 43,322 | 2,610 | 0,247 | 0,289 |
|  | 0,200 | 1,551 | 2,522  | 0,230 | 0,235 | 43,274 | 2,515 | 0,183 | 0,124 |
|  | 0,126 | 1,625 | 1,000  | 0,091 | 0,093 | 43,188 | 2,431 | 0,136 | 0,043 |
|  | 0,100 | 1,651 | 0,608  | 0,055 | 0,057 | 43,128 | 2,398 | 0,119 | 0,024 |
|  | 0,000 | 1,751 | 0,000  | 0,000 | 0,000 | 42,017 | 2,240 | 0,049 | 0,000 |

### Tank Calibrations - Vertidos

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



**Vertidos**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

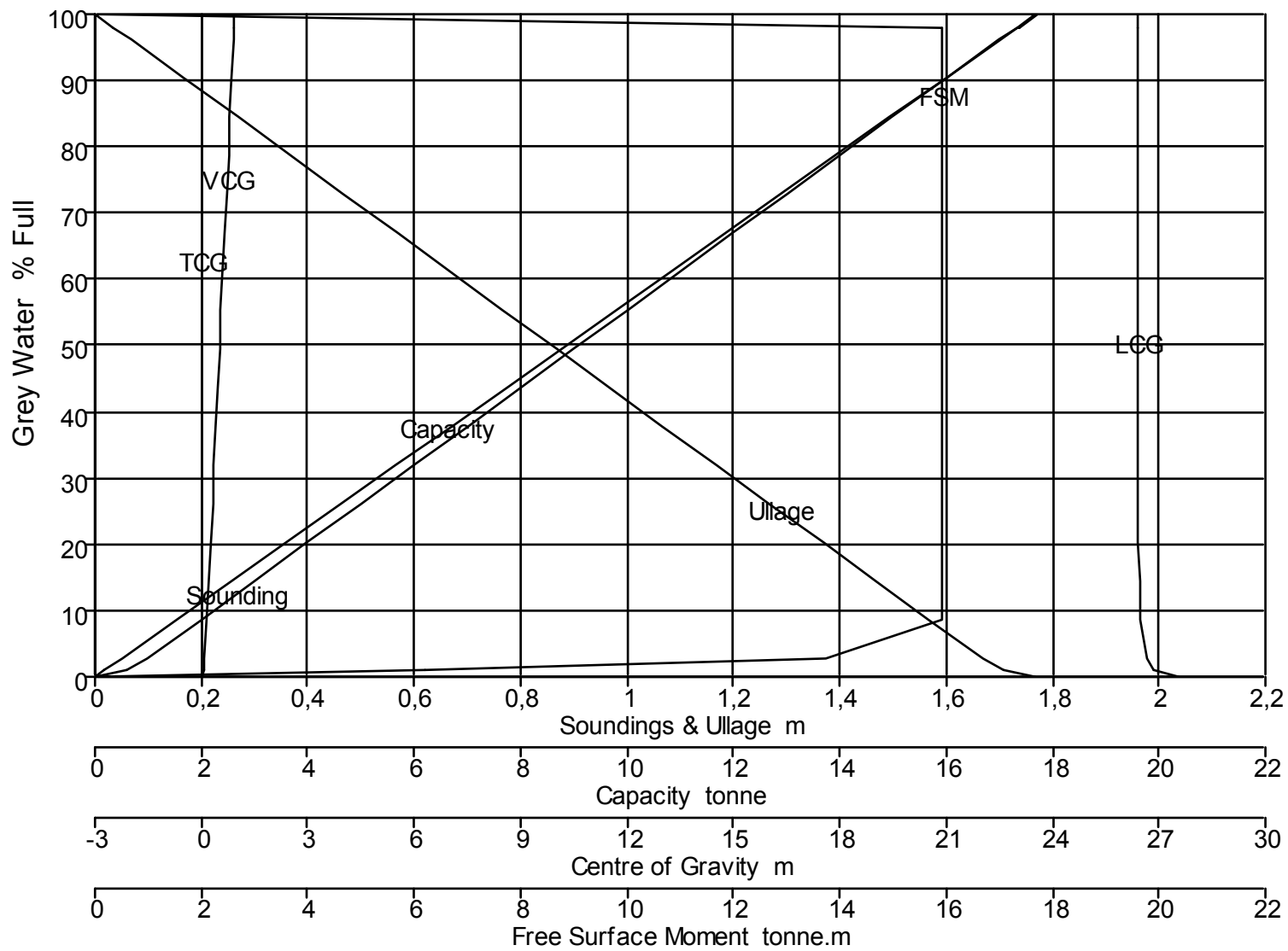
| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Vertidos  | 1,678      | 0,000    | 100,000 | 8,333                   | 7,666          | 23,403 | 0,000 | 0,992 | 0,000       |
|           | 1,646      | 0,032    | 98,000  | 8,166                   | 7,513          | 23,403 | 0,000 | 0,976 | 7,315       |
|           | 1,644      | 0,034    | 97,900  | 8,158                   | 7,505          | 23,403 | 0,000 | 0,975 | 7,315       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,600 | 0,078 | 95,156 | 7,929 | 7,295 | 23,403 | 0,000 | 0,953 | 7,315 |
|  | 1,500 | 0,178 | 88,964 | 7,413 | 6,820 | 23,404 | 0,000 | 0,903 | 7,315 |
|  | 1,400 | 0,278 | 82,771 | 6,897 | 6,345 | 23,404 | 0,000 | 0,853 | 7,315 |
|  | 1,300 | 0,378 | 76,579 | 6,381 | 5,871 | 23,404 | 0,000 | 0,803 | 7,315 |
|  | 1,200 | 0,478 | 70,387 | 5,865 | 5,396 | 23,405 | 0,000 | 0,753 | 7,315 |
|  | 1,100 | 0,578 | 64,194 | 5,349 | 4,921 | 23,405 | 0,000 | 0,703 | 7,315 |
|  | 1,000 | 0,678 | 58,002 | 4,833 | 4,447 | 23,406 | 0,000 | 0,653 | 7,315 |
|  | 0,900 | 0,778 | 51,810 | 4,317 | 3,972 | 23,406 | 0,000 | 0,603 | 7,315 |
|  | 0,800 | 0,878 | 45,617 | 3,801 | 3,497 | 23,407 | 0,000 | 0,553 | 7,315 |
|  | 0,700 | 0,978 | 39,425 | 3,285 | 3,022 | 23,408 | 0,000 | 0,503 | 7,315 |
|  | 0,600 | 1,078 | 33,233 | 2,769 | 2,548 | 23,410 | 0,000 | 0,453 | 7,315 |
|  | 0,500 | 1,178 | 27,040 | 2,253 | 2,073 | 23,412 | 0,000 | 0,402 | 7,315 |
|  | 0,400 | 1,278 | 20,848 | 1,737 | 1,598 | 23,415 | 0,000 | 0,352 | 7,315 |
|  | 0,300 | 1,378 | 14,655 | 1,221 | 1,124 | 23,422 | 0,000 | 0,302 | 7,315 |
|  | 0,200 | 1,478 | 8,463  | 0,705 | 0,649 | 23,438 | 0,000 | 0,250 | 7,315 |
|  | 0,100 | 1,578 | 2,367  | 0,197 | 0,181 | 23,520 | 0,000 | 0,193 | 5,132 |
|  | 0,070 | 1,608 | 1,000  | 0,083 | 0,077 | 23,589 | 0,000 | 0,173 | 1,805 |
|  | 0,000 | 1,678 | 0,000  | 0,000 | 0,000 | 23,993 | 0,000 | 0,122 | 0,000 |

### Tank Calibrations - Grey Water

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





**Grey Water**  
**Trim: 0 m; Heel: 0 deg to starboard**

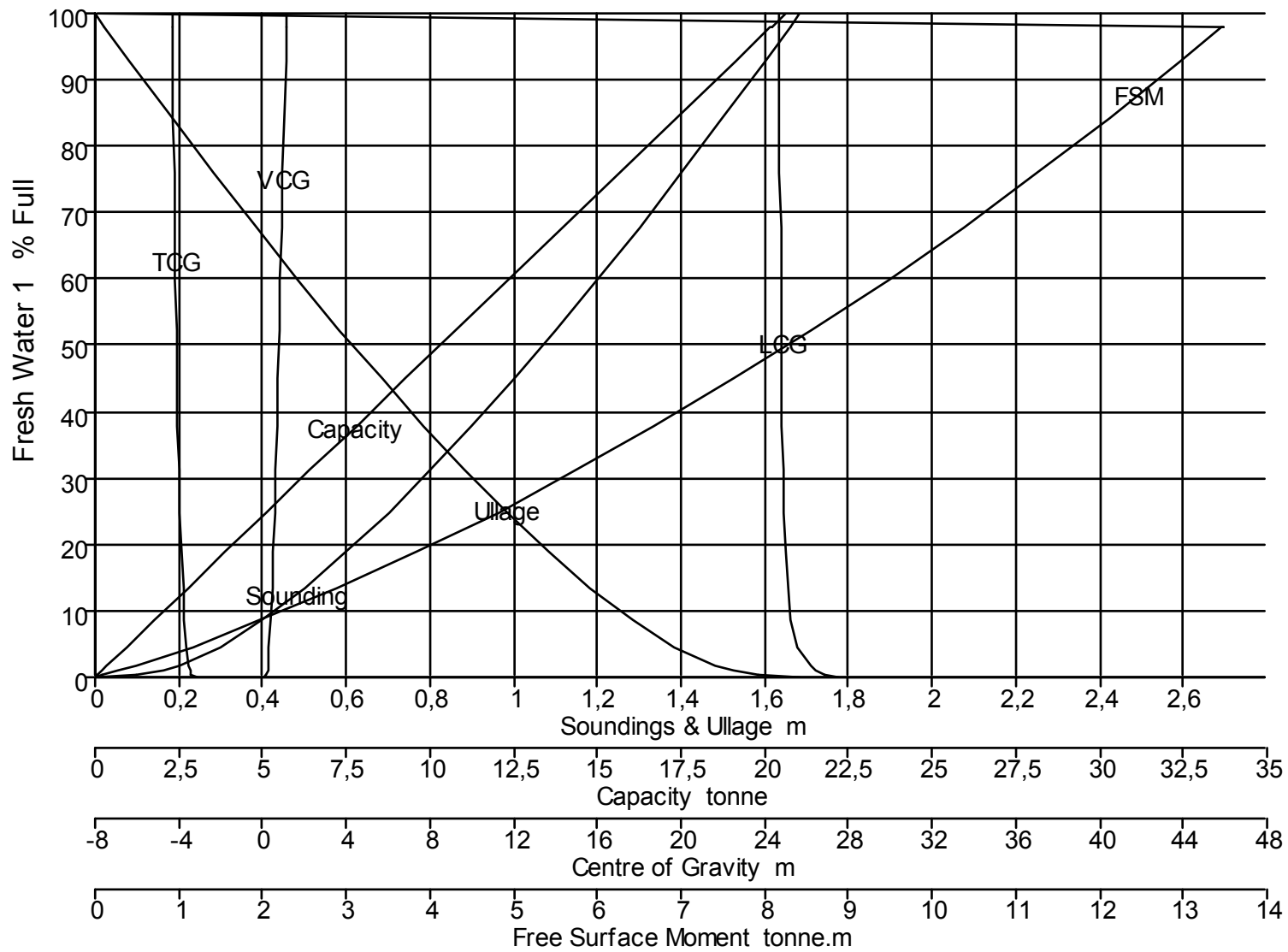
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name  | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Grey Water | 1,768      | 0,000    | 100,000 | 17,719                  | 17,719         | 26,407 | 0,000 | 0,941 | 0,000       |
|            | 1,733      | 0,034    | 98,000  | 17,365                  | 17,365         | 26,408 | 0,000 | 0,924 | 15,901      |
|            | 1,732      | 0,036    | 97,900  | 17,347                  | 17,347         | 26,408 | 0,000 | 0,923 | 15,901      |

|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 1,700 | 0,068 | 96,064 | 17,022 | 17,022 | 26,408 | 0,000 | 0,908 | 15,901 |
|  | 1,600 | 0,168 | 90,240 | 15,990 | 15,990 | 26,408 | 0,000 | 0,858 | 15,901 |
|  | 1,500 | 0,268 | 84,416 | 14,958 | 14,958 | 26,409 | 0,000 | 0,808 | 15,901 |
|  | 1,400 | 0,368 | 78,592 | 13,926 | 13,926 | 26,409 | 0,000 | 0,757 | 15,901 |
|  | 1,300 | 0,468 | 72,767 | 12,894 | 12,894 | 26,410 | 0,000 | 0,707 | 15,901 |
|  | 1,200 | 0,568 | 66,943 | 11,862 | 11,862 | 26,411 | 0,000 | 0,657 | 15,901 |
|  | 1,100 | 0,668 | 61,119 | 10,830 | 10,830 | 26,412 | 0,000 | 0,607 | 15,901 |
|  | 1,000 | 0,768 | 55,295 | 9,798  | 9,798  | 26,413 | 0,000 | 0,557 | 15,901 |
|  | 0,900 | 0,868 | 49,471 | 8,766  | 8,766  | 26,415 | 0,000 | 0,507 | 15,901 |
|  | 0,800 | 0,968 | 43,646 | 7,734  | 7,734  | 26,417 | 0,000 | 0,457 | 15,901 |
|  | 0,700 | 1,068 | 37,822 | 6,702  | 6,702  | 26,420 | 0,000 | 0,407 | 15,901 |
|  | 0,600 | 1,168 | 31,998 | 5,670  | 5,670  | 26,423 | 0,000 | 0,357 | 15,901 |
|  | 0,500 | 1,268 | 26,174 | 4,638  | 4,638  | 26,428 | 0,000 | 0,307 | 15,901 |
|  | 0,400 | 1,368 | 20,350 | 3,606  | 3,606  | 26,436 | 0,000 | 0,257 | 15,901 |
|  | 0,300 | 1,468 | 14,525 | 2,574  | 2,574  | 26,451 | 0,000 | 0,206 | 15,901 |
|  | 0,200 | 1,568 | 8,701  | 1,542  | 1,542  | 26,485 | 0,000 | 0,155 | 15,901 |
|  | 0,100 | 1,668 | 2,909  | 0,515  | 0,515  | 26,645 | 0,000 | 0,100 | 13,751 |
|  | 0,060 | 1,707 | 1,000  | 0,177  | 0,177  | 26,852 | 0,000 | 0,075 | 6,218  |
|  | 0,000 | 1,768 | 0,000  | 0,000  | 0,000  | 27,586 | 0,000 | 0,032 | 0,000  |

### Tank Calibrations - Fresh Water 1

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



**Fresh Water 1**  
**Trim: 0 m; Heel: 0 deg to starboard**

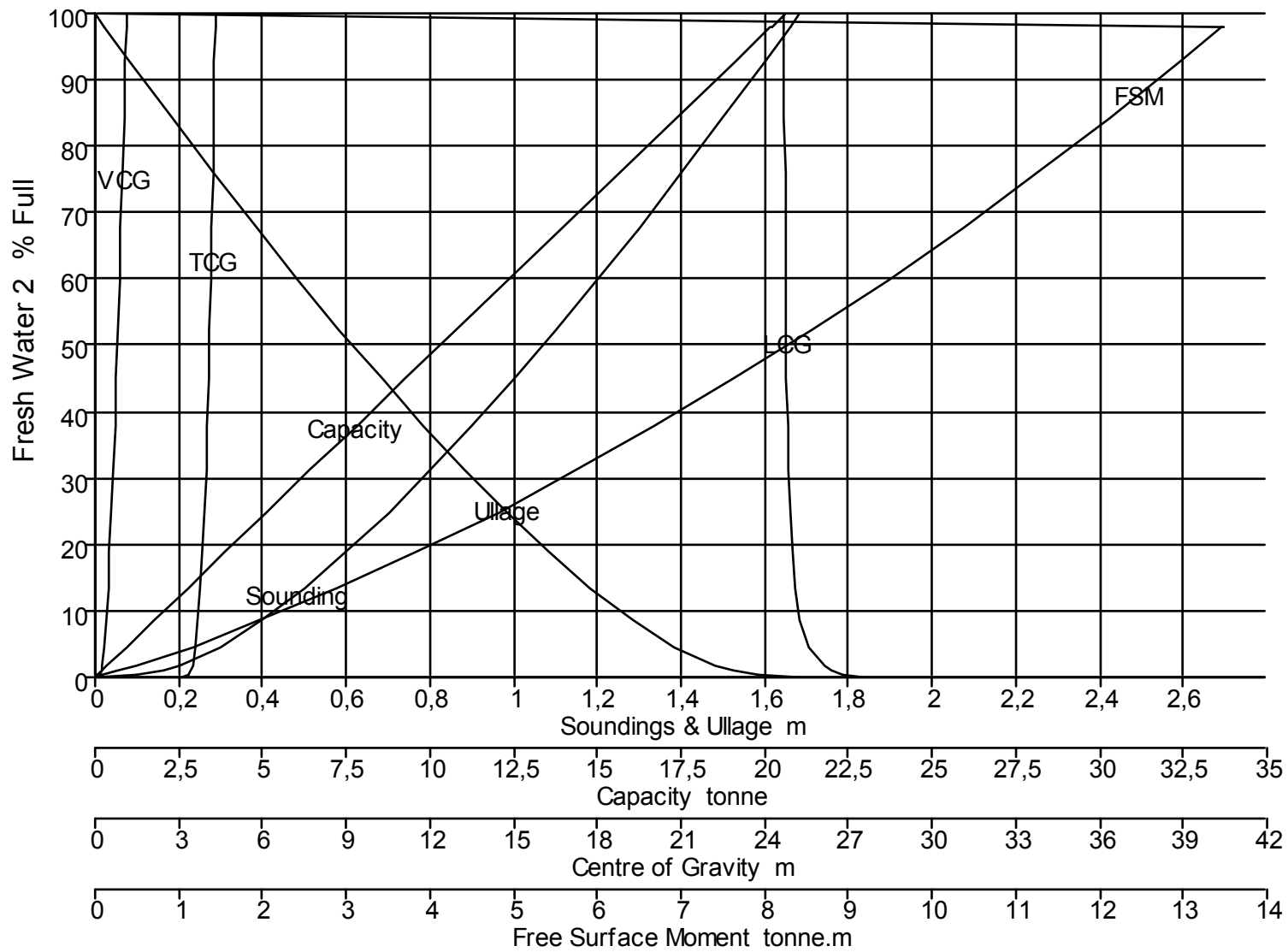
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Fresh Water 1 | 1,684      | 0,000    | 100,000 | 20,618                  | 20,618         | 24,699 | -4,302 | 1,148 | 0,000       |
|               | 1,661      | 0,023    | 98,000  | 20,206                  | 20,206         | 24,701 | -4,296 | 1,134 | 13,471      |
|               | 1,660      | 0,024    | 97,900  | 20,185                  | 20,185         | 24,701 | -4,296 | 1,134 | 13,462      |

|  |       |       |        |        |        |        |        |       |        |
|--|-------|-------|--------|--------|--------|--------|--------|-------|--------|
|  | 1,600 | 0,084 | 92,694 | 19,112 | 19,112 | 24,707 | -4,280 | 1,099 | 12,969 |
|  | 1,500 | 0,184 | 84,174 | 17,355 | 17,355 | 24,716 | -4,251 | 1,042 | 12,128 |
|  | 1,400 | 0,284 | 75,853 | 15,640 | 15,640 | 24,728 | -4,220 | 0,985 | 11,259 |
|  | 1,300 | 0,384 | 67,746 | 13,968 | 13,968 | 24,741 | -4,187 | 0,927 | 10,371 |
|  | 1,200 | 0,484 | 59,872 | 12,345 | 12,345 | 24,757 | -4,152 | 0,869 | 9,466  |
|  | 1,100 | 0,584 | 52,248 | 10,773 | 10,773 | 24,776 | -4,115 | 0,811 | 8,547  |
|  | 1,000 | 0,684 | 44,898 | 9,257  | 9,257  | 24,799 | -4,074 | 0,753 | 7,618  |
|  | 0,900 | 0,784 | 37,846 | 7,803  | 7,803  | 24,828 | -4,030 | 0,695 | 6,683  |
|  | 0,800 | 0,884 | 31,122 | 6,417  | 6,417  | 24,865 | -3,980 | 0,636 | 5,746  |
|  | 0,700 | 0,984 | 24,759 | 5,105  | 5,105  | 24,915 | -3,925 | 0,577 | 4,820  |
|  | 0,600 | 1,084 | 18,816 | 3,880  | 3,880  | 24,986 | -3,862 | 0,517 | 3,840  |
|  | 0,500 | 1,184 | 13,391 | 2,761  | 2,761  | 25,092 | -3,791 | 0,456 | 2,874  |
|  | 0,400 | 1,284 | 8,583  | 1,770  | 1,770  | 25,266 | -3,709 | 0,394 | 1,971  |
|  | 0,300 | 1,384 | 4,566  | 0,941  | 0,941  | 25,592 | -3,616 | 0,329 | 1,165  |
|  | 0,200 | 1,484 | 1,711  | 0,353  | 0,353  | 26,163 | -3,515 | 0,259 | 0,477  |
|  | 0,161 | 1,523 | 1,000  | 0,206  | 0,206  | 26,409 | -3,468 | 0,232 | 0,285  |
|  | 0,100 | 1,584 | 0,297  | 0,061  | 0,061  | 26,818 | -3,377 | 0,188 | 0,083  |
|  | 0,000 | 1,684 | 0,000  | 0,000  | 0,000  | 27,566 | -3,101 | 0,116 | 0,000  |

## Tank Calibrations - Fresh Water 2

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



**Fresh Water 2**  
**Trim: 0 m; Heel: 0 deg to starboard**

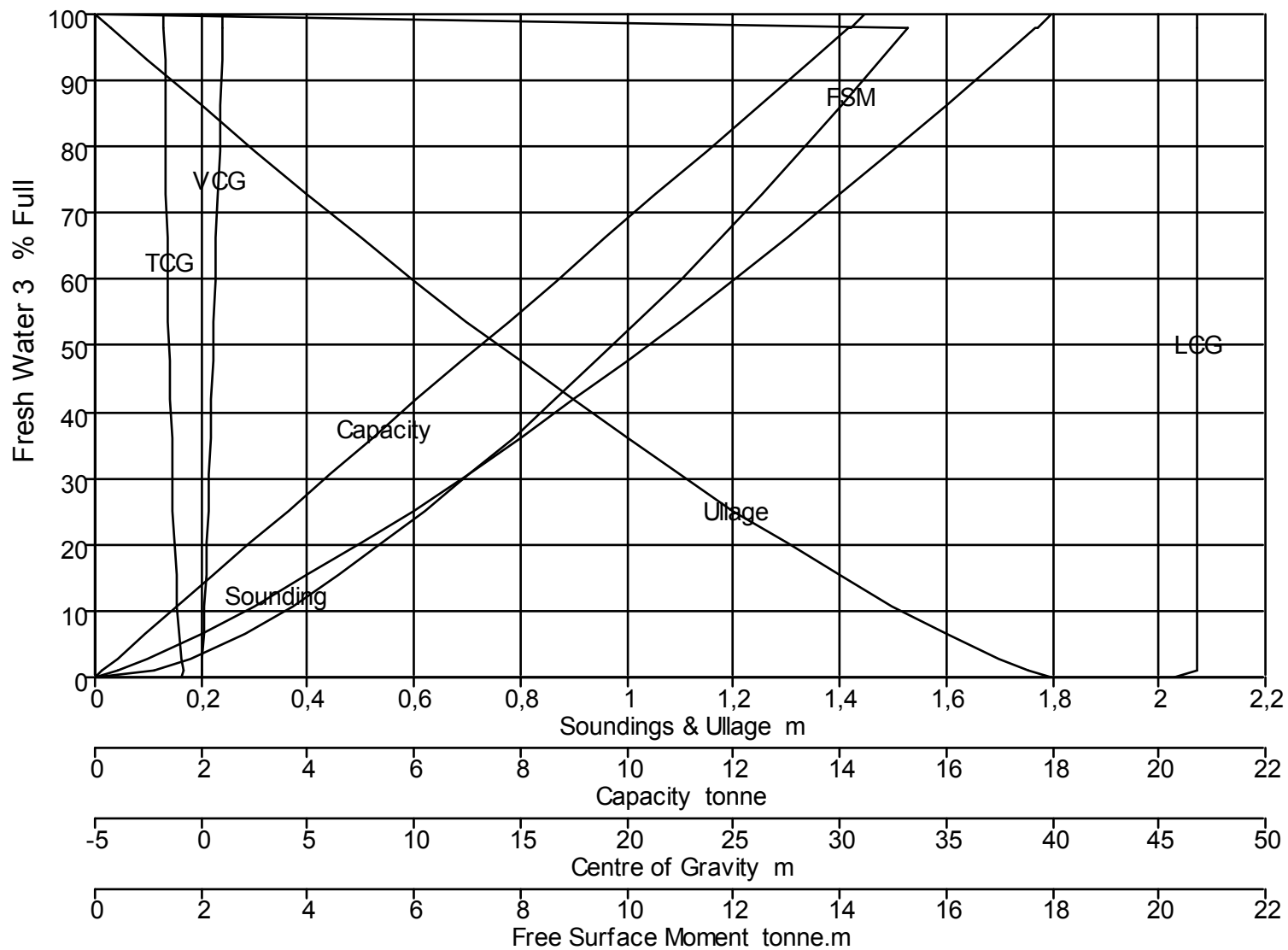
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Fresh Water 2 | 1,684      | 0,000    | 100,000 | 20,618                  | 20,618         | 24,699 | 4,302 | 1,148 | 0,000       |
|               | 1,661      | 0,023    | 98,000  | 20,206                  | 20,206         | 24,701 | 4,296 | 1,134 | 13,471      |
|               | 1,660      | 0,024    | 97,900  | 20,185                  | 20,185         | 24,701 | 4,296 | 1,134 | 13,462      |

|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 1,600 | 0,084 | 92,694 | 19,112 | 19,112 | 24,707 | 4,280 | 1,099 | 12,969 |
|  | 1,500 | 0,184 | 84,174 | 17,355 | 17,355 | 24,716 | 4,251 | 1,042 | 12,128 |
|  | 1,400 | 0,284 | 75,853 | 15,640 | 15,640 | 24,728 | 4,220 | 0,985 | 11,259 |
|  | 1,300 | 0,384 | 67,746 | 13,968 | 13,968 | 24,741 | 4,187 | 0,927 | 10,371 |
|  | 1,200 | 0,484 | 59,872 | 12,345 | 12,345 | 24,757 | 4,152 | 0,869 | 9,466  |
|  | 1,100 | 0,584 | 52,248 | 10,773 | 10,773 | 24,776 | 4,115 | 0,811 | 8,547  |
|  | 1,000 | 0,684 | 44,898 | 9,257  | 9,257  | 24,799 | 4,074 | 0,753 | 7,618  |
|  | 0,900 | 0,784 | 37,846 | 7,803  | 7,803  | 24,828 | 4,030 | 0,695 | 6,683  |
|  | 0,800 | 0,884 | 31,122 | 6,417  | 6,417  | 24,865 | 3,980 | 0,636 | 5,746  |
|  | 0,700 | 0,984 | 24,759 | 5,105  | 5,105  | 24,915 | 3,925 | 0,577 | 4,820  |
|  | 0,600 | 1,084 | 18,816 | 3,880  | 3,880  | 24,986 | 3,862 | 0,517 | 3,841  |
|  | 0,500 | 1,184 | 13,391 | 2,761  | 2,761  | 25,092 | 3,791 | 0,456 | 2,874  |
|  | 0,400 | 1,284 | 8,583  | 1,770  | 1,770  | 25,266 | 3,709 | 0,394 | 1,971  |
|  | 0,300 | 1,384 | 4,566  | 0,941  | 0,941  | 25,592 | 3,616 | 0,329 | 1,165  |
|  | 0,200 | 1,484 | 1,711  | 0,353  | 0,353  | 26,163 | 3,515 | 0,259 | 0,477  |
|  | 0,161 | 1,523 | 1,000  | 0,206  | 0,206  | 26,409 | 3,468 | 0,232 | 0,285  |
|  | 0,100 | 1,584 | 0,297  | 0,061  | 0,061  | 26,818 | 3,377 | 0,188 | 0,083  |
|  | 0,000 | 1,684 | 0,000  | 0,000  | 0,000  | 27,566 | 3,101 | 0,116 | 0,000  |

### Tank Calibrations - Fresh Water 3

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



**Fresh Water 3**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

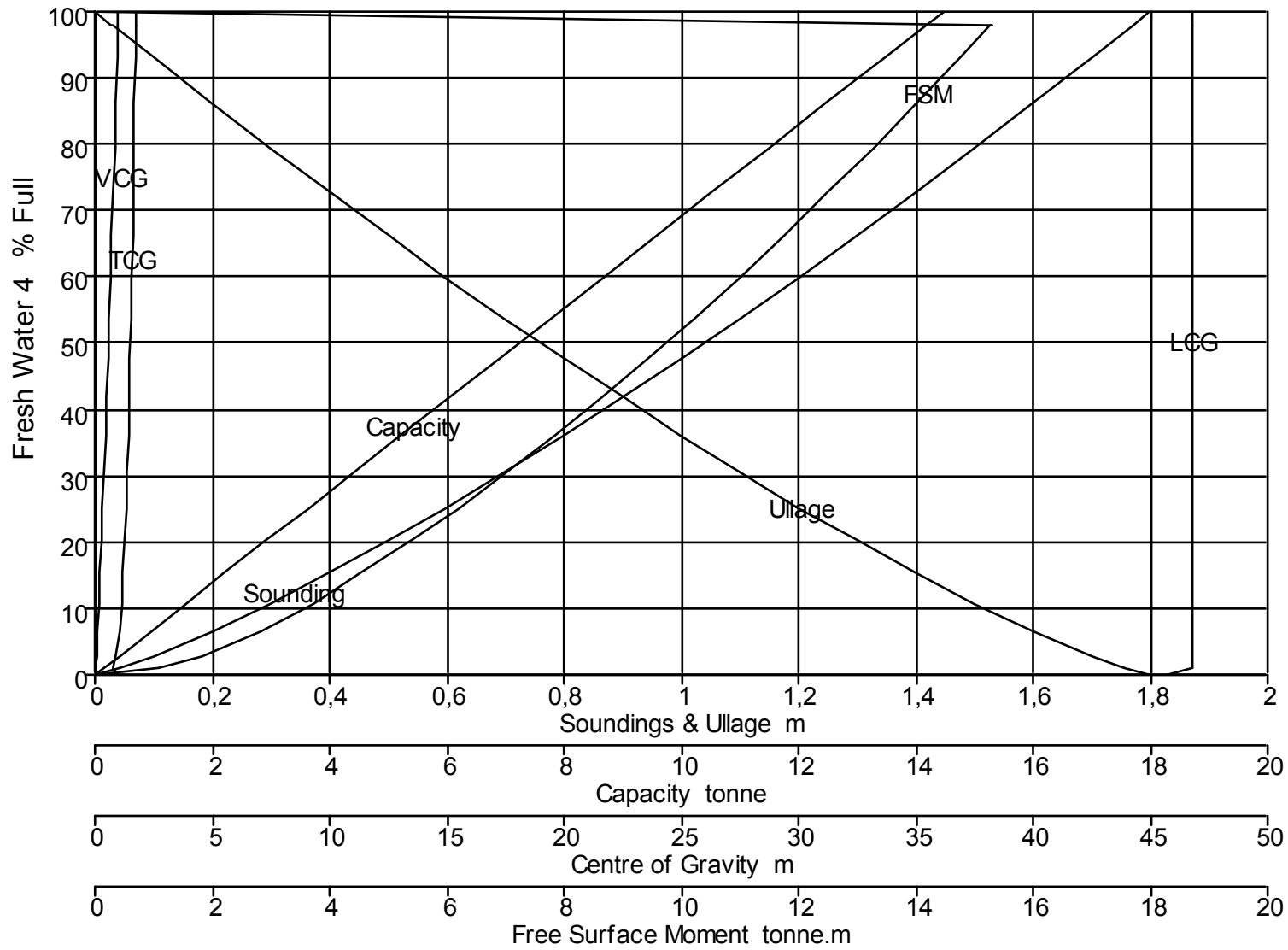
| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Fresh Water 3 | 1,799      | 0,000    | 100,000 | 14,481                  | 14,481         | 46,777 | -1,750 | 1,003 | 0,000       |
|               | 1,771      | 0,028    | 98,000  | 14,192                  | 14,192         | 46,777 | -1,742 | 0,987 | 15,289      |
|               | 1,770      | 0,030    | 97,900  | 14,177                  | 14,177         | 46,777 | -1,742 | 0,986 | 15,278      |

|  |       |       |        |        |        |        |        |       |        |
|--|-------|-------|--------|--------|--------|--------|--------|-------|--------|
|  | 1,700 | 0,099 | 93,043 | 13,474 | 13,474 | 46,776 | -1,723 | 0,947 | 14,766 |
|  | 1,600 | 0,199 | 86,162 | 12,477 | 12,477 | 46,776 | -1,695 | 0,891 | 14,022 |
|  | 1,500 | 0,299 | 79,403 | 11,499 | 11,499 | 46,776 | -1,665 | 0,835 | 13,279 |
|  | 1,400 | 0,399 | 72,771 | 10,538 | 10,538 | 46,776 | -1,634 | 0,779 | 12,521 |
|  | 1,300 | 0,499 | 66,272 | 9,597  | 9,597  | 46,776 | -1,602 | 0,722 | 11,754 |
|  | 1,200 | 0,599 | 59,913 | 8,676  | 8,676  | 46,776 | -1,568 | 0,666 | 10,988 |
|  | 1,100 | 0,699 | 53,704 | 7,777  | 7,777  | 46,776 | -1,533 | 0,610 | 10,206 |
|  | 1,000 | 0,799 | 47,650 | 6,900  | 6,900  | 46,775 | -1,495 | 0,554 | 9,432  |
|  | 0,900 | 0,899 | 41,759 | 6,047  | 6,047  | 46,775 | -1,455 | 0,498 | 8,654  |
|  | 0,800 | 0,999 | 36,044 | 5,220  | 5,220  | 46,775 | -1,412 | 0,443 | 7,855  |
|  | 0,700 | 1,099 | 30,526 | 4,421  | 4,421  | 46,775 | -1,366 | 0,387 | 7,033  |
|  | 0,600 | 1,199 | 25,217 | 3,652  | 3,652  | 46,775 | -1,316 | 0,331 | 6,203  |
|  | 0,500 | 1,299 | 20,139 | 2,916  | 2,916  | 46,775 | -1,261 | 0,276 | 5,411  |
|  | 0,400 | 1,399 | 15,309 | 2,217  | 2,217  | 46,774 | -1,198 | 0,220 | 4,562  |
|  | 0,300 | 1,499 | 10,765 | 1,559  | 1,559  | 46,773 | -1,124 | 0,165 | 3,722  |
|  | 0,200 | 1,599 | 6,573  | 0,952  | 0,952  | 46,772 | -1,033 | 0,110 | 2,830  |
|  | 0,100 | 1,699 | 2,838  | 0,411  | 0,411  | 46,767 | -0,904 | 0,056 | 1,806  |
|  | 0,043 | 1,757 | 1,000  | 0,145  | 0,145  | 46,758 | -0,786 | 0,025 | 1,098  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 45,731 | -0,969 | 0,001 | 0,000  |

#### Tank Calibrations - Fresh Water 4

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





**Fresh Water 4**  
**Trim: 0 m; Heel: 0 deg to starboard**

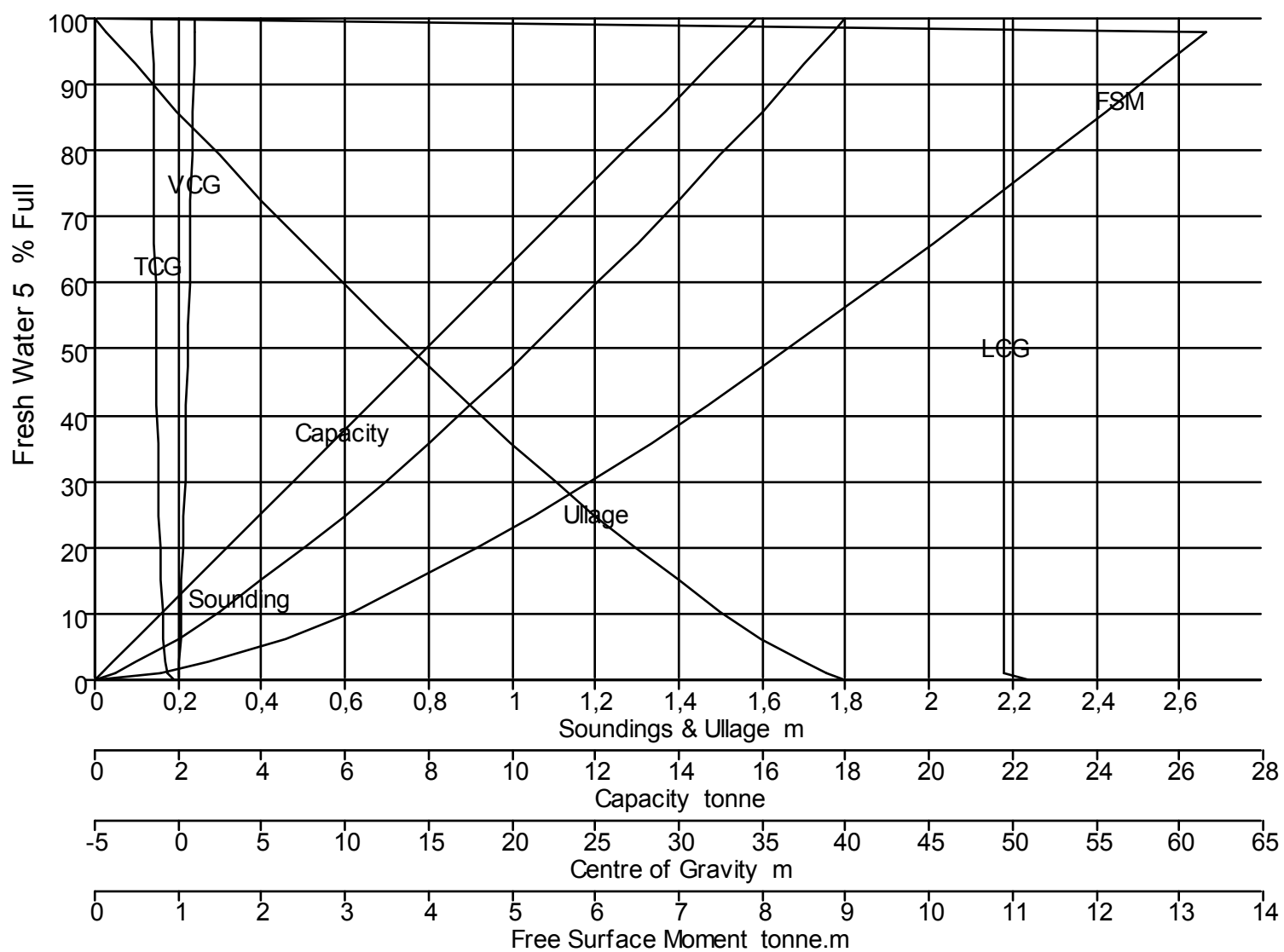
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Fresh Water 4 | 1,799      | 0,000    | 100,000 | 14,481                  | 14,481         | 46,777 | 1,750 | 1,003 | 0,000       |
|               | 1,771      | 0,028    | 98,000  | 14,192                  | 14,192         | 46,777 | 1,742 | 0,987 | 15,289      |
|               | 1,770      | 0,030    | 97,900  | 14,177                  | 14,177         | 46,777 | 1,742 | 0,986 | 15,278      |

|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 1,700 | 0,099 | 93,043 | 13,474 | 13,474 | 46,776 | 1,723 | 0,947 | 14,766 |
|  | 1,600 | 0,199 | 86,162 | 12,477 | 12,477 | 46,776 | 1,695 | 0,891 | 14,022 |
|  | 1,500 | 0,299 | 79,403 | 11,499 | 11,499 | 46,776 | 1,665 | 0,835 | 13,279 |
|  | 1,400 | 0,399 | 72,771 | 10,538 | 10,538 | 46,776 | 1,634 | 0,779 | 12,521 |
|  | 1,300 | 0,499 | 66,272 | 9,597  | 9,597  | 46,776 | 1,602 | 0,722 | 11,754 |
|  | 1,200 | 0,599 | 59,913 | 8,676  | 8,676  | 46,776 | 1,568 | 0,666 | 10,988 |
|  | 1,100 | 0,699 | 53,704 | 7,777  | 7,777  | 46,776 | 1,533 | 0,610 | 10,206 |
|  | 1,000 | 0,799 | 47,650 | 6,900  | 6,900  | 46,775 | 1,495 | 0,554 | 9,432  |
|  | 0,900 | 0,899 | 41,759 | 6,047  | 6,047  | 46,775 | 1,455 | 0,498 | 8,654  |
|  | 0,800 | 0,999 | 36,044 | 5,220  | 5,220  | 46,775 | 1,412 | 0,443 | 7,855  |
|  | 0,700 | 1,099 | 30,526 | 4,421  | 4,421  | 46,775 | 1,366 | 0,387 | 7,033  |
|  | 0,600 | 1,199 | 25,217 | 3,652  | 3,652  | 46,775 | 1,316 | 0,331 | 6,203  |
|  | 0,500 | 1,299 | 20,139 | 2,916  | 2,916  | 46,775 | 1,261 | 0,276 | 5,411  |
|  | 0,400 | 1,399 | 15,309 | 2,217  | 2,217  | 46,774 | 1,198 | 0,220 | 4,562  |
|  | 0,300 | 1,499 | 10,765 | 1,559  | 1,559  | 46,773 | 1,124 | 0,165 | 3,722  |
|  | 0,200 | 1,599 | 6,573  | 0,952  | 0,952  | 46,772 | 1,033 | 0,110 | 2,830  |
|  | 0,100 | 1,699 | 2,838  | 0,411  | 0,411  | 46,767 | 0,904 | 0,056 | 1,806  |
|  | 0,043 | 1,757 | 1,000  | 0,145  | 0,145  | 46,758 | 0,786 | 0,025 | 1,098  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 45,731 | 0,969 | 0,001 | 0,000  |

### Tank Calibrations - Fresh Water 5

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



**Fresh Water 5**  
**Trim: 0 m; Heel: 0 deg to starboard**

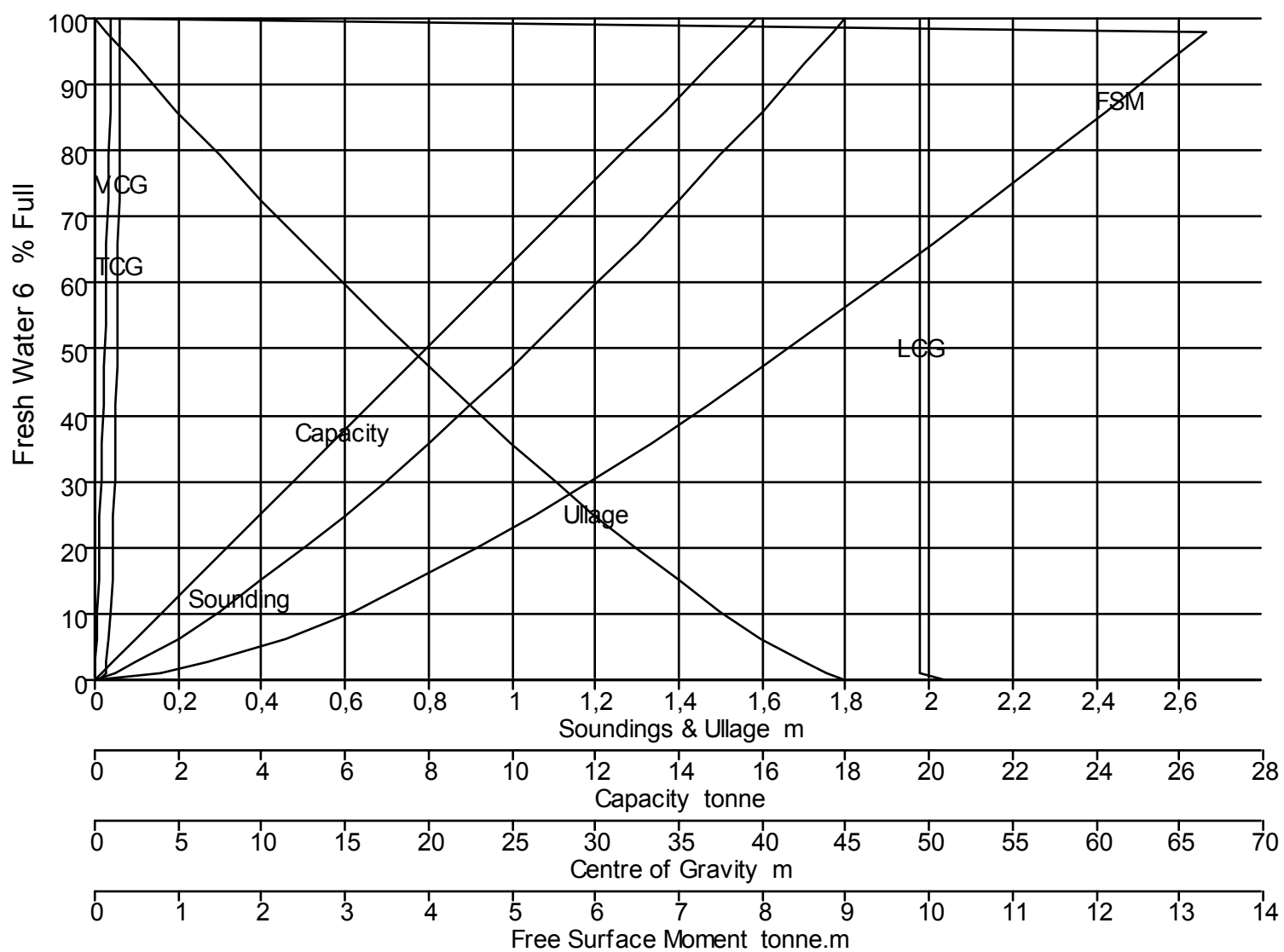
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Fresh Water 5 | 1,799      | 0,000    | 100,000 | 15,856                  | 15,856         | 49,462 | -1,541 | 1,008 | 0,000       |
|               | 1,771      | 0,028    | 98,000  | 15,539                  | 15,539         | 49,462 | -1,534 | 0,992 | 13,318      |
|               | 1,769      | 0,030    | 97,900  | 15,523                  | 15,523         | 49,462 | -1,533 | 0,991 | 13,308      |

|  |       |       |        |        |        |        |        |       |        |
|--|-------|-------|--------|--------|--------|--------|--------|-------|--------|
|  | 1,700 | 0,099 | 93,014 | 14,748 | 14,748 | 49,462 | -1,516 | 0,952 | 12,817 |
|  | 1,600 | 0,199 | 86,073 | 13,647 | 13,647 | 49,462 | -1,490 | 0,896 | 12,117 |
|  | 1,500 | 0,299 | 79,265 | 12,568 | 12,568 | 49,462 | -1,463 | 0,839 | 11,429 |
|  | 1,400 | 0,399 | 72,592 | 11,510 | 11,510 | 49,462 | -1,435 | 0,783 | 10,738 |
|  | 1,300 | 0,499 | 66,059 | 10,474 | 10,474 | 49,461 | -1,406 | 0,727 | 10,052 |
|  | 1,200 | 0,599 | 59,673 | 9,462  | 9,462  | 49,461 | -1,376 | 0,671 | 9,374  |
|  | 1,100 | 0,699 | 53,441 | 8,473  | 8,473  | 49,461 | -1,344 | 0,615 | 8,690  |
|  | 1,000 | 0,799 | 47,368 | 7,510  | 7,510  | 49,460 | -1,310 | 0,559 | 8,017  |
|  | 0,900 | 0,899 | 41,462 | 6,574  | 6,574  | 49,460 | -1,274 | 0,503 | 7,346  |
|  | 0,800 | 0,999 | 35,734 | 5,666  | 5,666  | 49,459 | -1,235 | 0,447 | 6,666  |
|  | 0,700 | 1,099 | 30,204 | 4,789  | 4,789  | 49,458 | -1,193 | 0,391 | 5,965  |
|  | 0,600 | 1,199 | 24,884 | 3,946  | 3,946  | 49,457 | -1,147 | 0,335 | 5,258  |
|  | 0,500 | 1,299 | 19,797 | 3,139  | 3,139  | 49,455 | -1,096 | 0,280 | 4,582  |
|  | 0,400 | 1,399 | 14,966 | 2,373  | 2,373  | 49,452 | -1,036 | 0,224 | 3,845  |
|  | 0,300 | 1,499 | 10,431 | 1,654  | 1,654  | 49,448 | -0,965 | 0,168 | 3,100  |
|  | 0,200 | 1,599 | 6,269  | 0,994  | 0,994  | 49,442 | -0,873 | 0,113 | 2,293  |
|  | 0,100 | 1,699 | 2,620  | 0,415  | 0,415  | 49,430 | -0,738 | 0,057 | 1,364  |
|  | 0,047 | 1,752 | 1,000  | 0,159  | 0,159  | 49,419 | -0,615 | 0,028 | 0,787  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 50,983 | -0,236 | 0,001 | 0,000  |

### Tank Calibrations - Fresh Water 6

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



**Fresh Water 6**  
**Trim: 0 m; Heel: 0 deg to starboard**

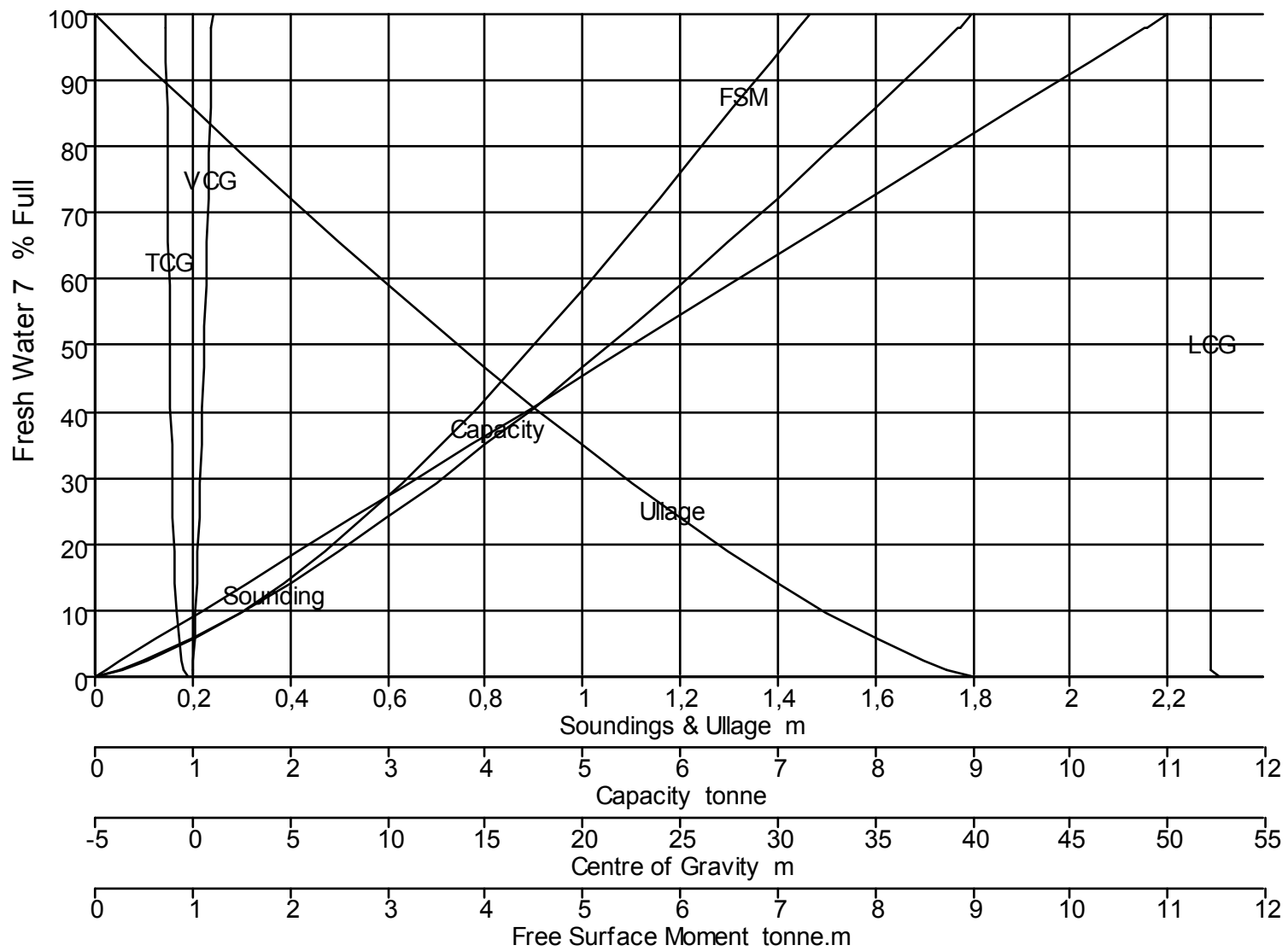
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Fresh Water 6 | 1,799      | 0,000    | 100,000 | 15,856                  | 15,856         | 49,462 | 1,541 | 1,008 | 0,000       |
|               | 1,771      | 0,028    | 98,000  | 15,539                  | 15,539         | 49,462 | 1,534 | 0,992 | 13,318      |
|               | 1,769      | 0,030    | 97,900  | 15,523                  | 15,523         | 49,462 | 1,533 | 0,991 | 13,308      |

|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 1,700 | 0,099 | 93,014 | 14,748 | 14,748 | 49,462 | 1,516 | 0,952 | 12,817 |
|  | 1,600 | 0,199 | 86,073 | 13,647 | 13,647 | 49,462 | 1,490 | 0,896 | 12,117 |
|  | 1,500 | 0,299 | 79,265 | 12,568 | 12,568 | 49,462 | 1,463 | 0,839 | 11,429 |
|  | 1,400 | 0,399 | 72,592 | 11,510 | 11,510 | 49,462 | 1,435 | 0,783 | 10,738 |
|  | 1,300 | 0,499 | 66,059 | 10,474 | 10,474 | 49,461 | 1,406 | 0,727 | 10,052 |
|  | 1,200 | 0,599 | 59,673 | 9,462  | 9,462  | 49,461 | 1,376 | 0,671 | 9,374  |
|  | 1,100 | 0,699 | 53,441 | 8,473  | 8,473  | 49,461 | 1,344 | 0,615 | 8,690  |
|  | 1,000 | 0,799 | 47,368 | 7,510  | 7,510  | 49,460 | 1,310 | 0,559 | 8,017  |
|  | 0,900 | 0,899 | 41,462 | 6,574  | 6,574  | 49,460 | 1,274 | 0,503 | 7,346  |
|  | 0,800 | 0,999 | 35,734 | 5,666  | 5,666  | 49,459 | 1,235 | 0,447 | 6,666  |
|  | 0,700 | 1,099 | 30,204 | 4,789  | 4,789  | 49,458 | 1,193 | 0,391 | 5,965  |
|  | 0,600 | 1,199 | 24,884 | 3,946  | 3,946  | 49,457 | 1,147 | 0,335 | 5,258  |
|  | 0,500 | 1,299 | 19,797 | 3,139  | 3,139  | 49,455 | 1,096 | 0,280 | 4,582  |
|  | 0,400 | 1,399 | 14,966 | 2,373  | 2,373  | 49,452 | 1,036 | 0,224 | 3,845  |
|  | 0,300 | 1,499 | 10,431 | 1,654  | 1,654  | 49,448 | 0,965 | 0,168 | 3,100  |
|  | 0,200 | 1,599 | 6,269  | 0,994  | 0,994  | 49,442 | 0,873 | 0,113 | 2,293  |
|  | 0,100 | 1,699 | 2,620  | 0,415  | 0,415  | 49,430 | 0,738 | 0,057 | 1,364  |
|  | 0,047 | 1,752 | 1,000  | 0,159  | 0,159  | 49,419 | 0,615 | 0,028 | 0,787  |
|  | 0,000 | 1,799 | 0,000  | 0,000  | 0,000  | 50,983 | 0,236 | 0,001 | 0,000  |

### Tank Calibrations - Fresh Water 7

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



**Fresh Water 7**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

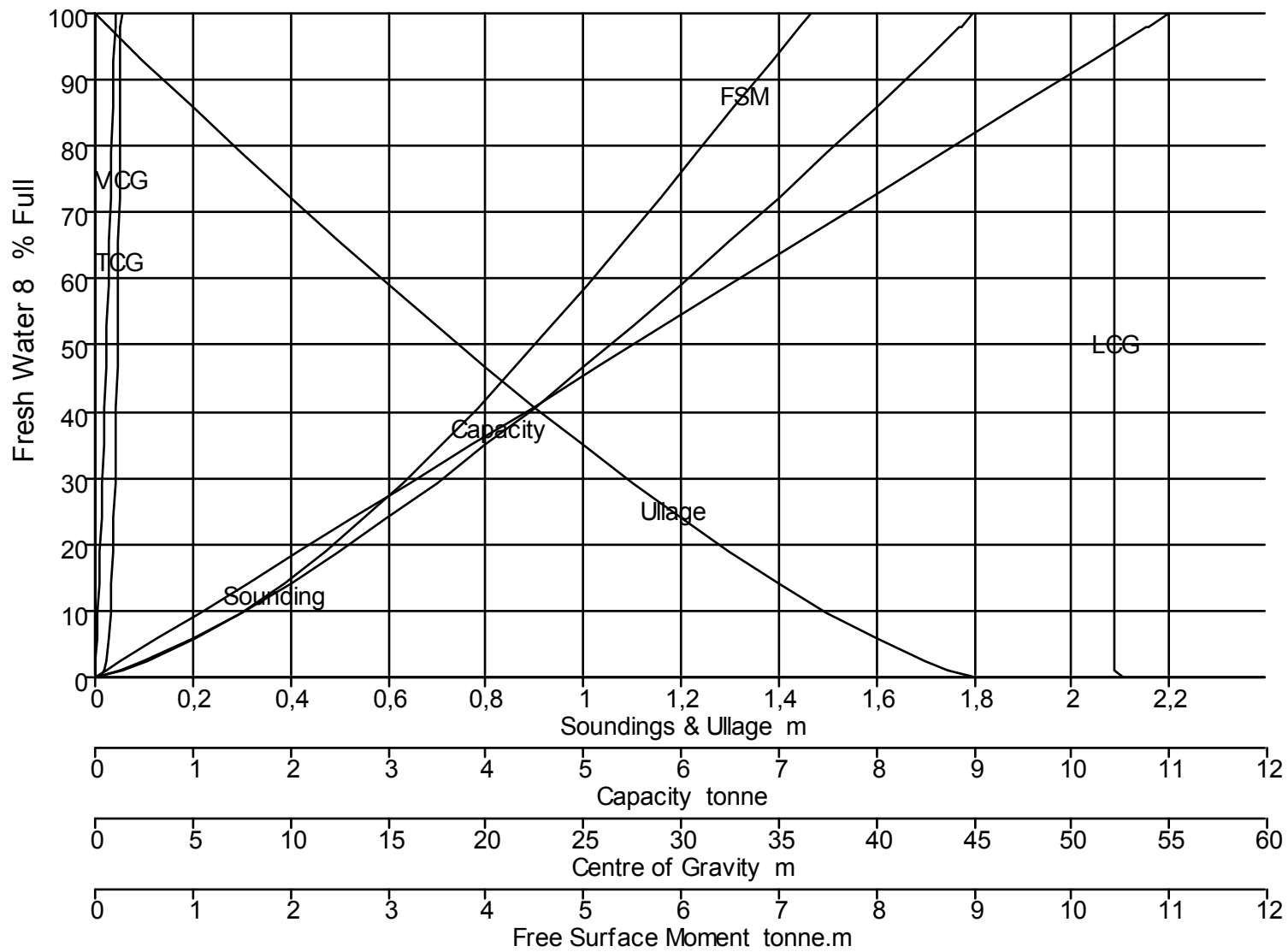
| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Fresh Water 7 | 1,800      | 0,000    | 100,000 | 11,000                  | 11,000         | 52,173 | -1,347 | 1,017 | 0,000       |
|               | 1,800      | 0,000    | 99,996  | 11,000                  | 11,000         | 52,173 | -1,347 | 1,017 | 7,333       |
|               | 1,772      | 0,028    | 98,000  | 10,780                  | 10,780         | 52,173 | -1,340 | 1,001 | 7,221       |

|  |       |       |        |        |        |        |        |       |       |
|--|-------|-------|--------|--------|--------|--------|--------|-------|-------|
|  | 1,771 | 0,029 | 97,900 | 10,769 | 10,769 | 52,173 | -1,340 | 1,001 | 7,216 |
|  | 1,700 | 0,100 | 92,832 | 10,212 | 10,212 | 52,173 | -1,324 | 0,960 | 6,935 |
|  | 1,600 | 0,200 | 85,801 | 9,439  | 9,439  | 52,173 | -1,300 | 0,904 | 6,546 |
|  | 1,500 | 0,300 | 78,907 | 8,680  | 8,680  | 52,172 | -1,275 | 0,847 | 6,167 |
|  | 1,400 | 0,400 | 72,153 | 7,937  | 7,937  | 52,172 | -1,250 | 0,791 | 5,788 |
|  | 1,300 | 0,500 | 65,544 | 7,210  | 7,210  | 52,171 | -1,223 | 0,735 | 5,412 |
|  | 1,200 | 0,600 | 59,086 | 6,500  | 6,500  | 52,171 | -1,195 | 0,678 | 5,041 |
|  | 1,100 | 0,700 | 52,786 | 5,807  | 5,807  | 52,170 | -1,165 | 0,622 | 4,665 |
|  | 1,000 | 0,800 | 46,652 | 5,132  | 5,132  | 52,170 | -1,133 | 0,566 | 4,294 |
|  | 0,900 | 0,900 | 40,692 | 4,476  | 4,476  | 52,169 | -1,098 | 0,509 | 3,922 |
|  | 0,800 | 1,000 | 34,920 | 3,841  | 3,841  | 52,168 | -1,061 | 0,453 | 3,544 |
|  | 0,700 | 1,100 | 29,357 | 3,229  | 3,229  | 52,167 | -1,020 | 0,396 | 3,150 |
|  | 0,600 | 1,200 | 24,022 | 2,643  | 2,643  | 52,165 | -0,974 | 0,340 | 2,750 |
|  | 0,500 | 1,300 | 18,939 | 2,083  | 2,083  | 52,163 | -0,922 | 0,284 | 2,363 |
|  | 0,400 | 1,400 | 14,147 | 1,556  | 1,556  | 52,161 | -0,862 | 0,227 | 1,940 |
|  | 0,300 | 1,500 | 9,697  | 1,067  | 1,067  | 52,158 | -0,788 | 0,170 | 1,496 |
|  | 0,200 | 1,600 | 5,688  | 0,626  | 0,626  | 52,155 | -0,693 | 0,113 | 1,028 |
|  | 0,100 | 1,700 | 2,288  | 0,252  | 0,252  | 52,153 | -0,556 | 0,056 | 0,535 |
|  | 0,053 | 1,747 | 1,000  | 0,110  | 0,110  | 52,157 | -0,457 | 0,030 | 0,291 |
|  | 0,000 | 1,800 | 0,000  | 0,000  | 0,000  | 52,634 | -0,265 | 0,000 | 0,000 |

### Tank Calibrations - Fresh Water 8

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





**Fresh Water 8**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Fresh Water 8 | 1,800      | 0,000    | 100,000 | 11,000                  | 11,000         | 52,173 | 1,347 | 1,017 | 0,000       |
|               | 1,800      | 0,000    | 99,996  | 11,000                  | 11,000         | 52,173 | 1,347 | 1,017 | 7,333       |
|               | 1,772      | 0,028    | 98,000  | 10,780                  | 10,780         | 52,173 | 1,340 | 1,001 | 7,221       |

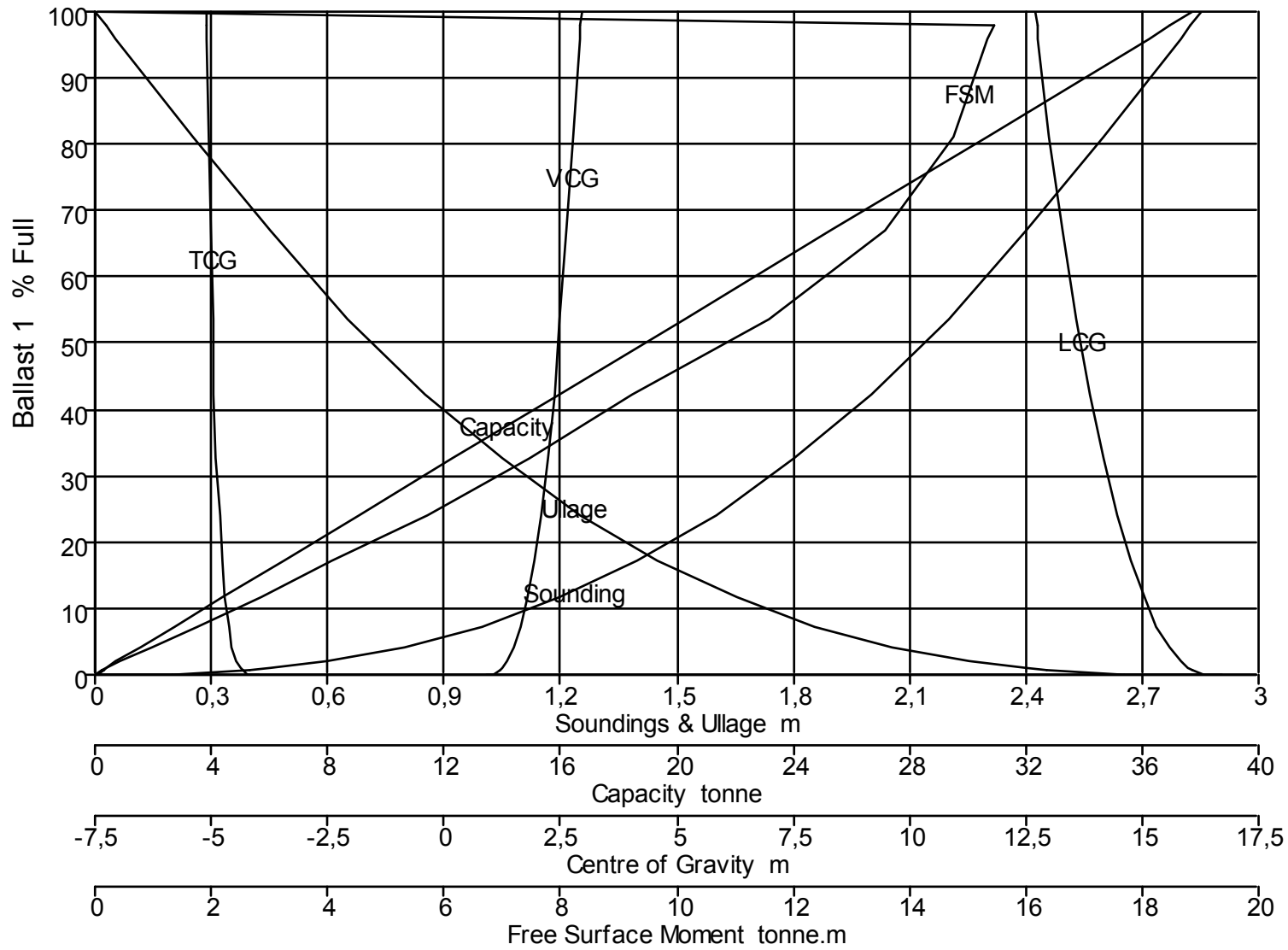
|  |       |       |        |        |        |        |       |       |       |
|--|-------|-------|--------|--------|--------|--------|-------|-------|-------|
|  | 1,771 | 0,029 | 97,900 | 10,769 | 10,769 | 52,173 | 1,340 | 1,001 | 7,216 |
|  | 1,700 | 0,100 | 92,832 | 10,212 | 10,212 | 52,173 | 1,324 | 0,960 | 6,935 |
|  | 1,600 | 0,200 | 85,801 | 9,439  | 9,439  | 52,173 | 1,300 | 0,904 | 6,546 |
|  | 1,500 | 0,300 | 78,907 | 8,680  | 8,680  | 52,172 | 1,275 | 0,847 | 6,167 |
|  | 1,400 | 0,400 | 72,153 | 7,937  | 7,937  | 52,172 | 1,250 | 0,791 | 5,788 |
|  | 1,300 | 0,500 | 65,544 | 7,210  | 7,210  | 52,171 | 1,223 | 0,735 | 5,412 |
|  | 1,200 | 0,600 | 59,086 | 6,500  | 6,500  | 52,171 | 1,195 | 0,678 | 5,041 |
|  | 1,100 | 0,700 | 52,786 | 5,807  | 5,807  | 52,170 | 1,165 | 0,622 | 4,665 |
|  | 1,000 | 0,800 | 46,652 | 5,132  | 5,132  | 52,170 | 1,133 | 0,566 | 4,294 |
|  | 0,900 | 0,900 | 40,692 | 4,476  | 4,476  | 52,169 | 1,098 | 0,509 | 3,922 |
|  | 0,800 | 1,000 | 34,920 | 3,841  | 3,841  | 52,168 | 1,061 | 0,453 | 3,544 |
|  | 0,700 | 1,100 | 29,357 | 3,229  | 3,229  | 52,167 | 1,020 | 0,396 | 3,150 |
|  | 0,600 | 1,200 | 24,022 | 2,643  | 2,643  | 52,165 | 0,974 | 0,340 | 2,750 |
|  | 0,500 | 1,300 | 18,939 | 2,083  | 2,083  | 52,163 | 0,922 | 0,284 | 2,363 |
|  | 0,400 | 1,400 | 14,147 | 1,556  | 1,556  | 52,161 | 0,862 | 0,227 | 1,940 |
|  | 0,300 | 1,500 | 9,697  | 1,067  | 1,067  | 52,158 | 0,788 | 0,170 | 1,496 |
|  | 0,200 | 1,600 | 5,688  | 0,626  | 0,626  | 52,155 | 0,693 | 0,113 | 1,028 |
|  | 0,100 | 1,700 | 2,288  | 0,252  | 0,252  | 52,153 | 0,556 | 0,056 | 0,535 |
|  | 0,053 | 1,747 | 1,000  | 0,110  | 0,110  | 52,157 | 0,457 | 0,030 | 0,291 |
|  | 0,000 | 1,800 | 0,000  | 0,000  | 0,000  | 52,634 | 0,265 | 0,000 | 0,000 |

### Tank Calibrations - Ballast 1

Fluid Type = Water Ballast      Specific gravity = 1,025

Permeability = 100 %

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



**Ballast 1**  
**Trim: 0 m; Heel: 0 deg to starboard**

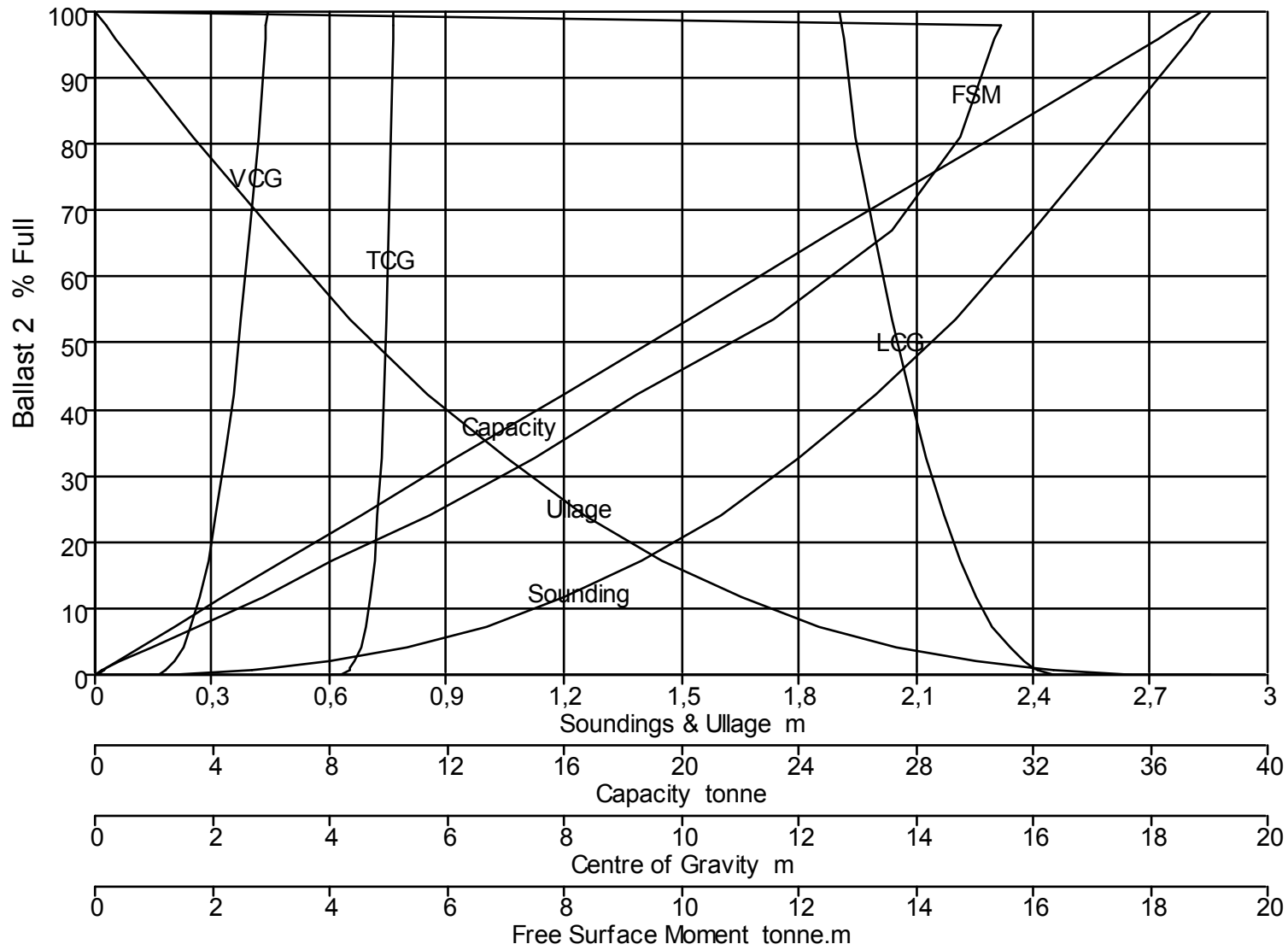
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Ballast 1 | 2,853      | 0,000    | 100,000 | 36,820                  | 37,740         | 12,718 | -5,097 | 2,947 | 0,000       |
|           | 2,826      | 0,027    | 98,000  | 36,083                  | 36,985         | 12,742 | -5,094 | 2,930 | 15,451      |
|           | 2,825      | 0,028    | 97,900  | 36,046                  | 36,948         | 12,743 | -5,093 | 2,929 | 15,446      |

|  |       |       |        |        |        |        |        |       |        |
|--|-------|-------|--------|--------|--------|--------|--------|-------|--------|
|  | 2,800 | 0,053 | 96,041 | 35,362 | 36,246 | 12,767 | -5,090 | 2,913 | 15,346 |
|  | 2,600 | 0,253 | 81,256 | 29,918 | 30,666 | 12,986 | -5,058 | 2,783 | 14,747 |
|  | 2,400 | 0,453 | 66,924 | 24,641 | 25,257 | 13,271 | -5,020 | 2,645 | 13,575 |
|  | 2,200 | 0,653 | 53,763 | 19,795 | 20,290 | 13,592 | -4,979 | 2,503 | 11,576 |
|  | 2,000 | 0,853 | 42,347 | 15,592 | 15,982 | 13,893 | -4,934 | 2,361 | 9,230  |
|  | 1,800 | 1,053 | 32,527 | 11,976 | 12,276 | 14,182 | -4,885 | 2,219 | 7,483  |
|  | 1,600 | 1,253 | 24,143 | 8,889  | 9,112  | 14,470 | -4,829 | 2,076 | 5,706  |
|  | 1,400 | 1,453 | 17,151 | 6,315  | 6,473  | 14,767 | -4,770 | 1,932 | 4,051  |
|  | 1,200 | 1,653 | 11,596 | 4,270  | 4,376  | 15,042 | -4,704 | 1,789 | 2,874  |
|  | 1,000 | 1,853 | 7,306  | 2,690  | 2,757  | 15,306 | -4,630 | 1,646 | 1,759  |
|  | 0,800 | 2,053 | 4,089  | 1,506  | 1,543  | 15,599 | -4,545 | 1,499 | 0,967  |
|  | 0,600 | 2,253 | 1,970  | 0,725  | 0,743  | 15,854 | -4,445 | 1,354 | 0,445  |
|  | 0,453 | 2,400 | 1,000  | 0,368  | 0,377  | 16,005 | -4,364 | 1,251 | 0,180  |
|  | 0,400 | 2,453 | 0,738  | 0,272  | 0,279  | 16,060 | -4,331 | 1,215 | 0,135  |
|  | 0,200 | 2,653 | 0,128  | 0,047  | 0,048  | 16,342 | -4,198 | 1,072 | 0,017  |
|  | 0,000 | 2,853 | 0,000  | 0,000  | 0,000  | 16,739 | -4,000 | 0,927 | 0,000  |

### Tank Calibrations - Ballast 2

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



**Ballast 2**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Ballast 2 | 2,853      | 0,000    | 100,000 | 36,820                  | 37,740         | 12,718 | 5,097 | 2,947 | 0,000       |
|           | 2,826      | 0,027    | 98,000  | 36,083                  | 36,985         | 12,742 | 5,094 | 2,930 | 15,451      |
|           | 2,825      | 0,028    | 97,900  | 36,046                  | 36,948         | 12,743 | 5,093 | 2,929 | 15,446      |

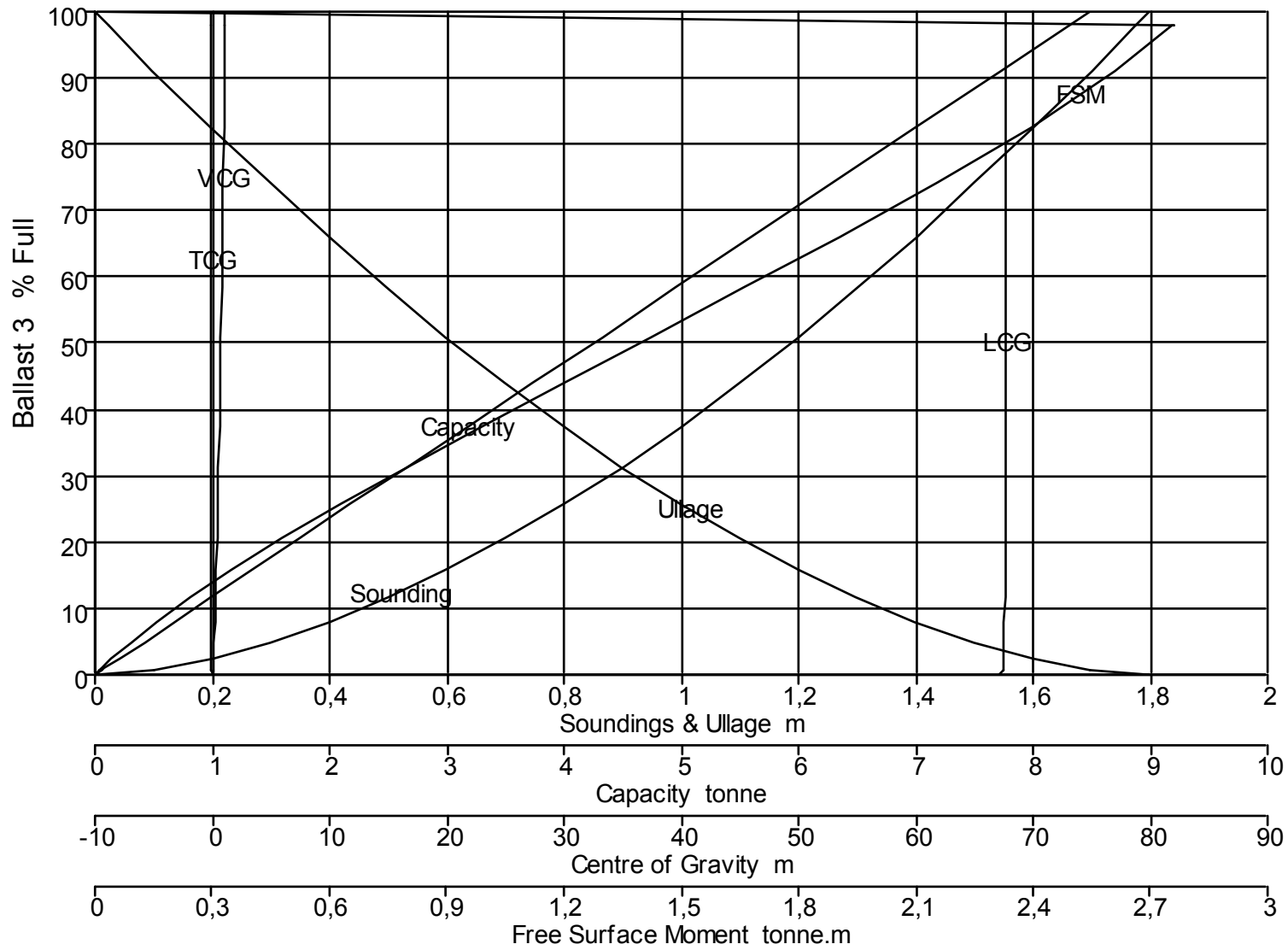
|  |       |       |        |        |        |        |       |       |        |
|--|-------|-------|--------|--------|--------|--------|-------|-------|--------|
|  | 2,800 | 0,053 | 96,041 | 35,362 | 36,246 | 12,767 | 5,090 | 2,913 | 15,346 |
|  | 2,600 | 0,253 | 81,256 | 29,918 | 30,666 | 12,986 | 5,058 | 2,783 | 14,747 |
|  | 2,400 | 0,453 | 66,924 | 24,641 | 25,257 | 13,271 | 5,020 | 2,645 | 13,575 |
|  | 2,200 | 0,653 | 53,763 | 19,795 | 20,290 | 13,592 | 4,979 | 2,503 | 11,576 |
|  | 2,000 | 0,853 | 42,347 | 15,592 | 15,982 | 13,893 | 4,934 | 2,361 | 9,230  |
|  | 1,800 | 1,053 | 32,527 | 11,976 | 12,276 | 14,182 | 4,885 | 2,219 | 7,483  |
|  | 1,600 | 1,253 | 24,143 | 8,889  | 9,112  | 14,470 | 4,829 | 2,076 | 5,706  |
|  | 1,400 | 1,453 | 17,151 | 6,315  | 6,473  | 14,767 | 4,770 | 1,932 | 4,051  |
|  | 1,200 | 1,653 | 11,596 | 4,270  | 4,376  | 15,042 | 4,704 | 1,789 | 2,874  |
|  | 1,000 | 1,853 | 7,306  | 2,690  | 2,757  | 15,306 | 4,630 | 1,646 | 1,759  |
|  | 0,800 | 2,053 | 4,089  | 1,506  | 1,543  | 15,599 | 4,545 | 1,499 | 0,967  |
|  | 0,600 | 2,253 | 1,970  | 0,725  | 0,743  | 15,854 | 4,445 | 1,354 | 0,445  |
|  | 0,453 | 2,400 | 1,000  | 0,368  | 0,377  | 16,005 | 4,364 | 1,251 | 0,180  |
|  | 0,400 | 2,453 | 0,738  | 0,272  | 0,279  | 16,060 | 4,331 | 1,215 | 0,135  |
|  | 0,200 | 2,653 | 0,128  | 0,047  | 0,048  | 16,342 | 4,198 | 1,072 | 0,017  |
|  | 0,000 | 2,853 | 0,000  | 0,000  | 0,000  | 16,739 | 4,000 | 0,927 | 0,000  |

### Tank Calibrations - Ballast 3

Fluid Type = Water Ballast      Specific gravity = 1,025

Permeability = 100 %

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



**Ballast 3**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

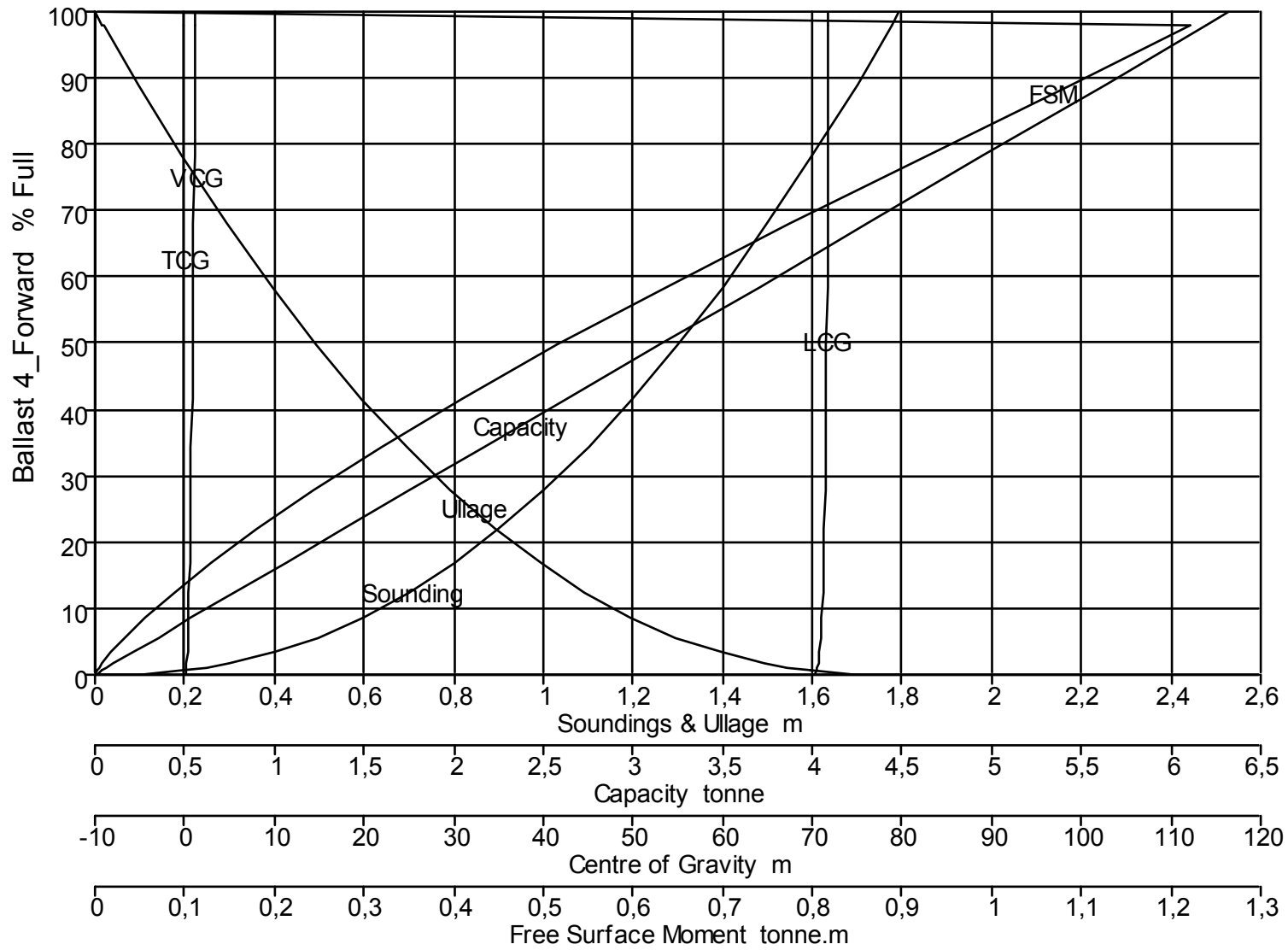
| Tank Name | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-----------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Ballast 3 | 1,798      | 0,000    | 100,000 | 8,275                   | 8,482          | 67,671 | 0,000 | 1,126 | 0,000       |
|           | 1,776      | 0,022    | 98,000  | 8,109                   | 8,312          | 67,670 | 0,000 | 1,113 | 2,760       |
|           | 1,775      | 0,023    | 97,900  | 8,101                   | 8,303          | 67,670 | 0,000 | 1,112 | 2,758       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,700 | 0,098 | 91,211 | 7,547 | 7,736 | 67,666 | 0,000 | 1,066 | 2,607 |
|  | 1,600 | 0,198 | 82,521 | 6,828 | 6,999 | 67,661 | 0,000 | 1,004 | 2,397 |
|  | 1,500 | 0,298 | 74,114 | 6,133 | 6,286 | 67,656 | 0,000 | 0,942 | 2,155 |
|  | 1,400 | 0,398 | 66,028 | 5,464 | 5,600 | 67,651 | 0,000 | 0,880 | 1,906 |
|  | 1,300 | 0,498 | 58,298 | 4,824 | 4,945 | 67,646 | 0,000 | 0,817 | 1,661 |
|  | 1,200 | 0,598 | 50,950 | 4,216 | 4,321 | 67,640 | 0,000 | 0,755 | 1,423 |
|  | 1,100 | 0,698 | 44,002 | 3,641 | 3,732 | 67,635 | 0,000 | 0,692 | 1,198 |
|  | 1,000 | 0,798 | 37,471 | 3,101 | 3,178 | 67,629 | 0,000 | 0,629 | 0,988 |
|  | 0,900 | 0,898 | 31,377 | 2,596 | 2,661 | 67,623 | 0,000 | 0,566 | 0,798 |
|  | 0,800 | 0,998 | 25,739 | 2,130 | 2,183 | 67,615 | 0,000 | 0,504 | 0,627 |
|  | 0,700 | 1,098 | 20,567 | 1,702 | 1,744 | 67,607 | 0,000 | 0,441 | 0,479 |
|  | 0,600 | 1,198 | 15,880 | 1,314 | 1,347 | 67,597 | 0,000 | 0,379 | 0,351 |
|  | 0,500 | 1,298 | 11,697 | 0,968 | 0,992 | 67,583 | 0,000 | 0,316 | 0,245 |
|  | 0,400 | 1,398 | 8,035  | 0,665 | 0,681 | 67,565 | 0,000 | 0,254 | 0,160 |
|  | 0,300 | 1,498 | 4,930  | 0,408 | 0,418 | 67,540 | 0,000 | 0,192 | 0,093 |
|  | 0,200 | 1,598 | 2,450  | 0,203 | 0,208 | 67,502 | 0,000 | 0,130 | 0,043 |
|  | 0,120 | 1,678 | 1,000  | 0,083 | 0,085 | 67,453 | 0,000 | 0,080 | 0,015 |
|  | 0,100 | 1,698 | 0,715  | 0,059 | 0,061 | 67,435 | 0,000 | 0,067 | 0,010 |
|  | 0,000 | 1,798 | 0,000  | 0,000 | 0,000 | 67,142 | 0,000 | 0,002 | 0,000 |

#### Tank Calibrations - Ballast 4\_Forward

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





**Ballast 4\_Forward**  
**Trim: 0 m; Heel: 0 deg to starboard**

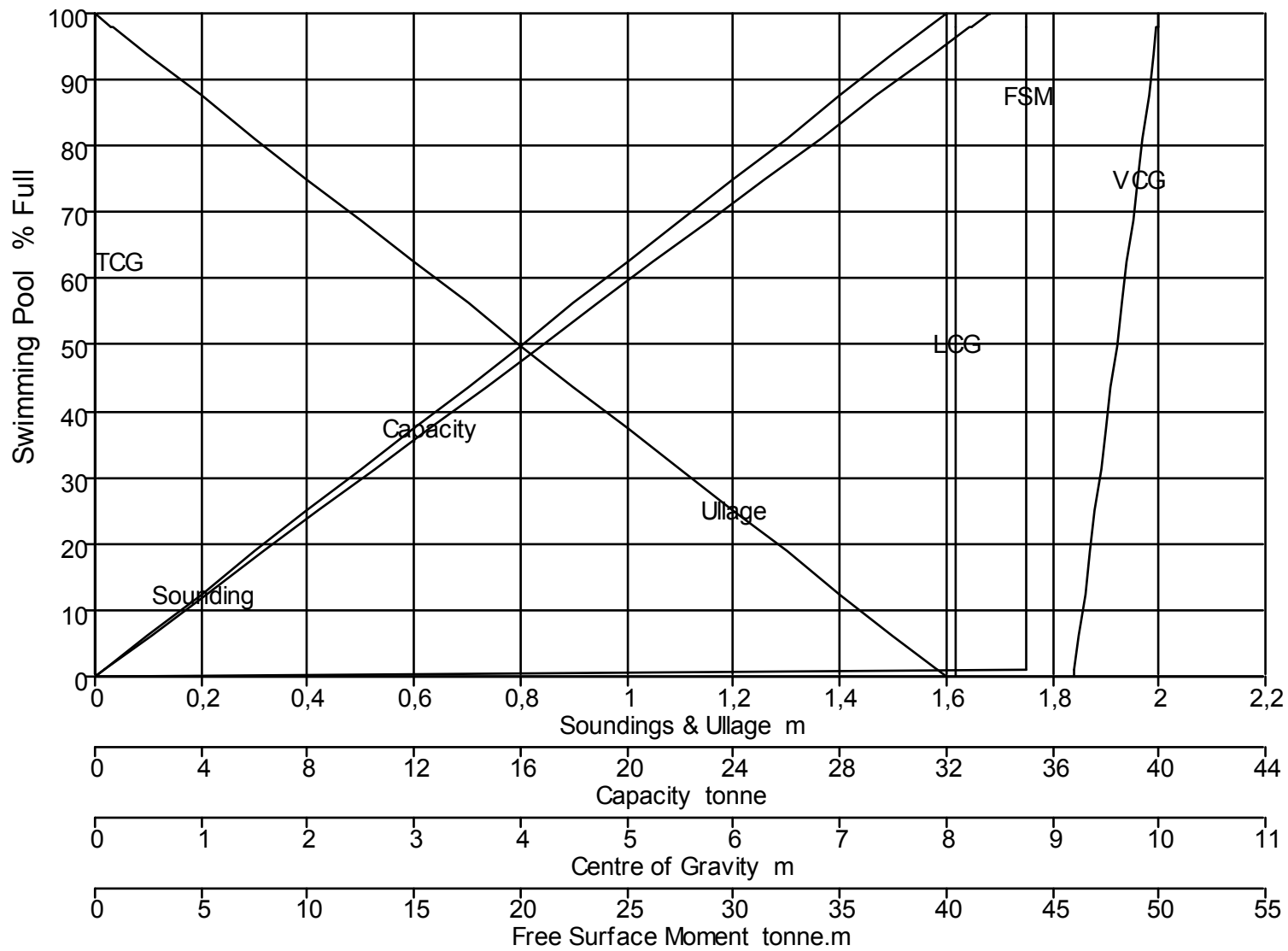
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name         | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|-------------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Ballast 4_Forward | 1,794      | 0,000    | 100,000 | 6,174                   | 6,328          | 71,789 | 0,000 | 1,238 | 0,000       |
|                   | 1,777      | 0,017    | 98,000  | 6,050                   | 6,201          | 71,784 | 0,000 | 1,227 | 1,222       |
|                   | 1,776      | 0,018    | 97,900  | 6,044                   | 6,195          | 71,784 | 0,000 | 1,227 | 1,221       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,700 | 0,094 | 89,172 | 5,505 | 5,643 | 71,761 | 0,000 | 1,176 | 1,090 |
|  | 1,600 | 0,194 | 78,286 | 4,833 | 4,954 | 71,728 | 0,000 | 1,109 | 0,929 |
|  | 1,500 | 0,294 | 68,068 | 4,202 | 4,307 | 71,691 | 0,000 | 1,042 | 0,775 |
|  | 1,400 | 0,394 | 58,540 | 3,614 | 3,704 | 71,648 | 0,000 | 0,974 | 0,638 |
|  | 1,300 | 0,494 | 49,720 | 3,070 | 3,146 | 71,600 | 0,000 | 0,907 | 0,516 |
|  | 1,200 | 0,594 | 41,616 | 2,569 | 2,633 | 71,546 | 0,000 | 0,838 | 0,410 |
|  | 1,100 | 0,694 | 34,246 | 2,114 | 2,167 | 71,483 | 0,000 | 0,770 | 0,319 |
|  | 1,000 | 0,794 | 27,717 | 1,711 | 1,754 | 71,425 | 0,000 | 0,702 | 0,243 |
|  | 0,900 | 0,894 | 21,907 | 1,352 | 1,386 | 71,360 | 0,000 | 0,635 | 0,179 |
|  | 0,800 | 0,994 | 16,770 | 1,035 | 1,061 | 71,279 | 0,000 | 0,567 | 0,128 |
|  | 0,700 | 1,094 | 12,297 | 0,759 | 0,778 | 71,173 | 0,000 | 0,497 | 0,088 |
|  | 0,600 | 1,194 | 8,520  | 0,526 | 0,539 | 71,033 | 0,000 | 0,426 | 0,056 |
|  | 0,500 | 1,294 | 5,628  | 0,347 | 0,356 | 70,934 | 0,000 | 0,358 | 0,034 |
|  | 0,400 | 1,394 | 3,358  | 0,207 | 0,212 | 70,829 | 0,000 | 0,291 | 0,018 |
|  | 0,300 | 1,494 | 1,629  | 0,101 | 0,103 | 70,616 | 0,000 | 0,219 | 0,008 |
|  | 0,248 | 1,546 | 1,000  | 0,062 | 0,063 | 70,479 | 0,000 | 0,180 | 0,004 |
|  | 0,200 | 1,594 | 0,611  | 0,038 | 0,039 | 70,434 | 0,000 | 0,147 | 0,002 |
|  | 0,100 | 1,694 | 0,114  | 0,007 | 0,007 | 70,298 | 0,000 | 0,079 | 0,000 |
|  | 0,000 | 1,794 | 0,000  | 0,000 | 0,000 | 69,900 | 0,000 | 0,006 | 0,000 |

### Tank Calibrations - Swimming Pool

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



**Swimming Pool**  
**Trim: 0 m; Heel: 0 deg to starboard**

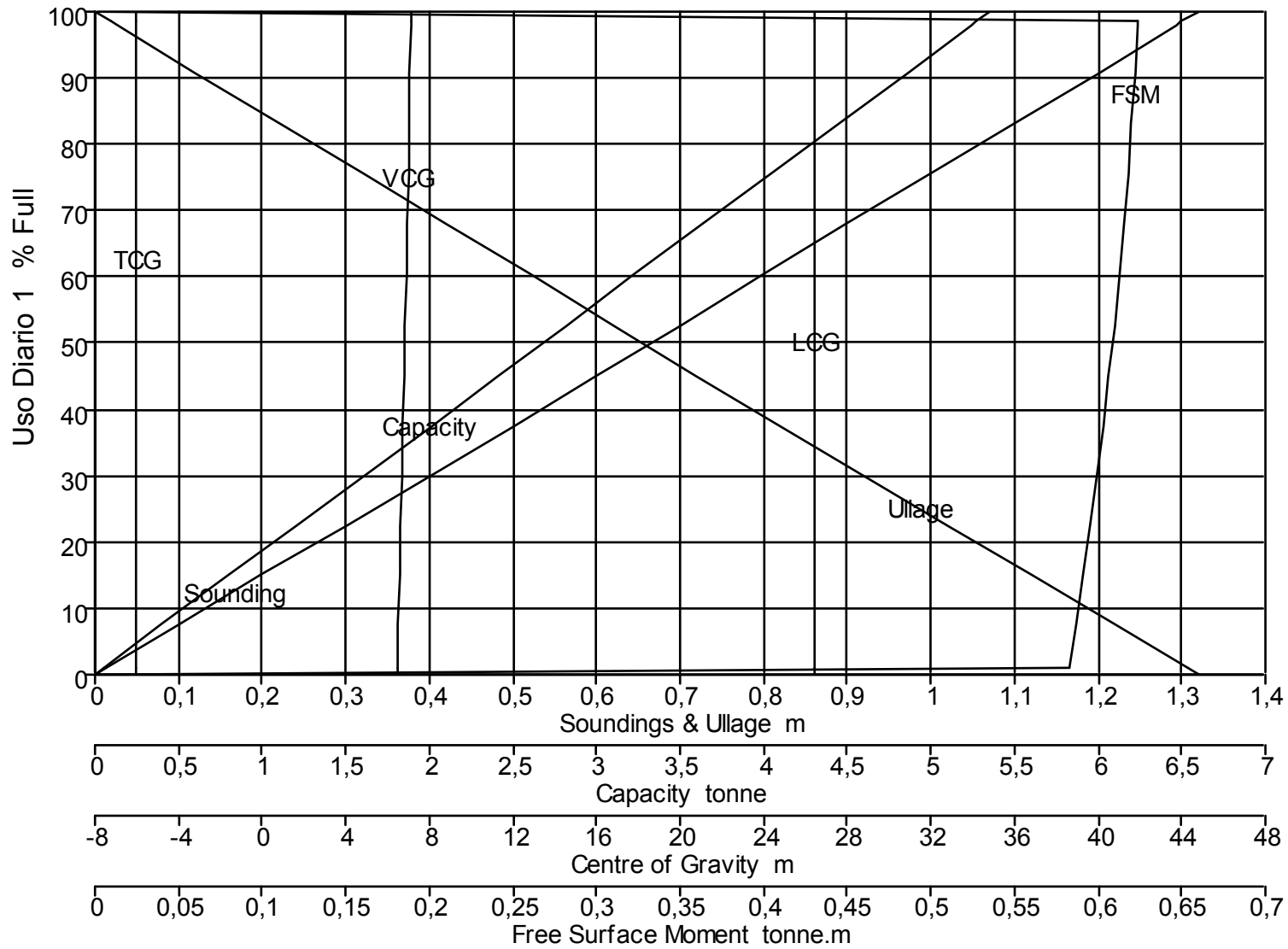
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name     | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m | TCG m | VCG m  | FSM tonne.m |
|---------------|------------|----------|---------|-------------------------|----------------|-------|-------|--------|-------------|
| Swimming Pool | 1,600      | 0,000    | 100,000 | 33,602                  | 33,602         | 8,100 | 0,000 | 10,000 | 0,000       |
|               | 1,600      | 0,000    | 99,994  | 33,600                  | 33,600         | 8,100 | 0,000 | 10,000 | 43,750      |
|               | 1,568      | 0,032    | 98,000  | 32,930                  | 32,930         | 8,100 | 0,000 | 9,984  | 43,750      |

|  |       |       |        |        |        |       |       |       |        |
|--|-------|-------|--------|--------|--------|-------|-------|-------|--------|
|  | 1,566 | 0,034 | 97,900 | 32,896 | 32,896 | 8,100 | 0,000 | 9,983 | 43,750 |
|  | 1,500 | 0,100 | 93,744 | 31,500 | 31,500 | 8,100 | 0,000 | 9,950 | 43,750 |
|  | 1,400 | 0,200 | 87,495 | 29,400 | 29,400 | 8,100 | 0,000 | 9,900 | 43,750 |
|  | 1,300 | 0,300 | 81,245 | 27,300 | 27,300 | 8,100 | 0,000 | 9,850 | 43,750 |
|  | 1,200 | 0,400 | 74,995 | 25,200 | 25,200 | 8,100 | 0,000 | 9,800 | 43,750 |
|  | 1,100 | 0,500 | 68,746 | 23,100 | 23,100 | 8,100 | 0,000 | 9,750 | 43,750 |
|  | 1,000 | 0,600 | 62,496 | 21,000 | 21,000 | 8,100 | 0,000 | 9,700 | 43,750 |
|  | 0,900 | 0,700 | 56,247 | 18,900 | 18,900 | 8,100 | 0,000 | 9,650 | 43,750 |
|  | 0,800 | 0,800 | 49,997 | 16,800 | 16,800 | 8,100 | 0,000 | 9,600 | 43,750 |
|  | 0,700 | 0,900 | 43,747 | 14,700 | 14,700 | 8,100 | 0,000 | 9,550 | 43,750 |
|  | 0,600 | 1,000 | 37,498 | 12,600 | 12,600 | 8,100 | 0,000 | 9,500 | 43,750 |
|  | 0,500 | 1,100 | 31,248 | 10,500 | 10,500 | 8,100 | 0,000 | 9,450 | 43,750 |
|  | 0,400 | 1,200 | 24,998 | 8,400  | 8,400  | 8,100 | 0,000 | 9,400 | 43,750 |
|  | 0,300 | 1,300 | 18,749 | 6,300  | 6,300  | 8,100 | 0,000 | 9,350 | 43,750 |
|  | 0,200 | 1,400 | 12,499 | 4,200  | 4,200  | 8,100 | 0,000 | 9,300 | 43,750 |
|  | 0,100 | 1,500 | 6,250  | 2,100  | 2,100  | 8,100 | 0,000 | 9,250 | 43,750 |
|  | 0,016 | 1,584 | 1,000  | 0,336  | 0,336  | 8,100 | 0,000 | 9,208 | 43,750 |
|  | 0,000 | 1,600 | 0,000  | 0,000  | 0,000  | 8,100 | 0,000 | 9,200 | 0,000  |

### Tank Calibrations - Uso Diario 1

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



**Usó Diario 1**  
**Trim: 0 m; Heel: 0 deg to starboard**

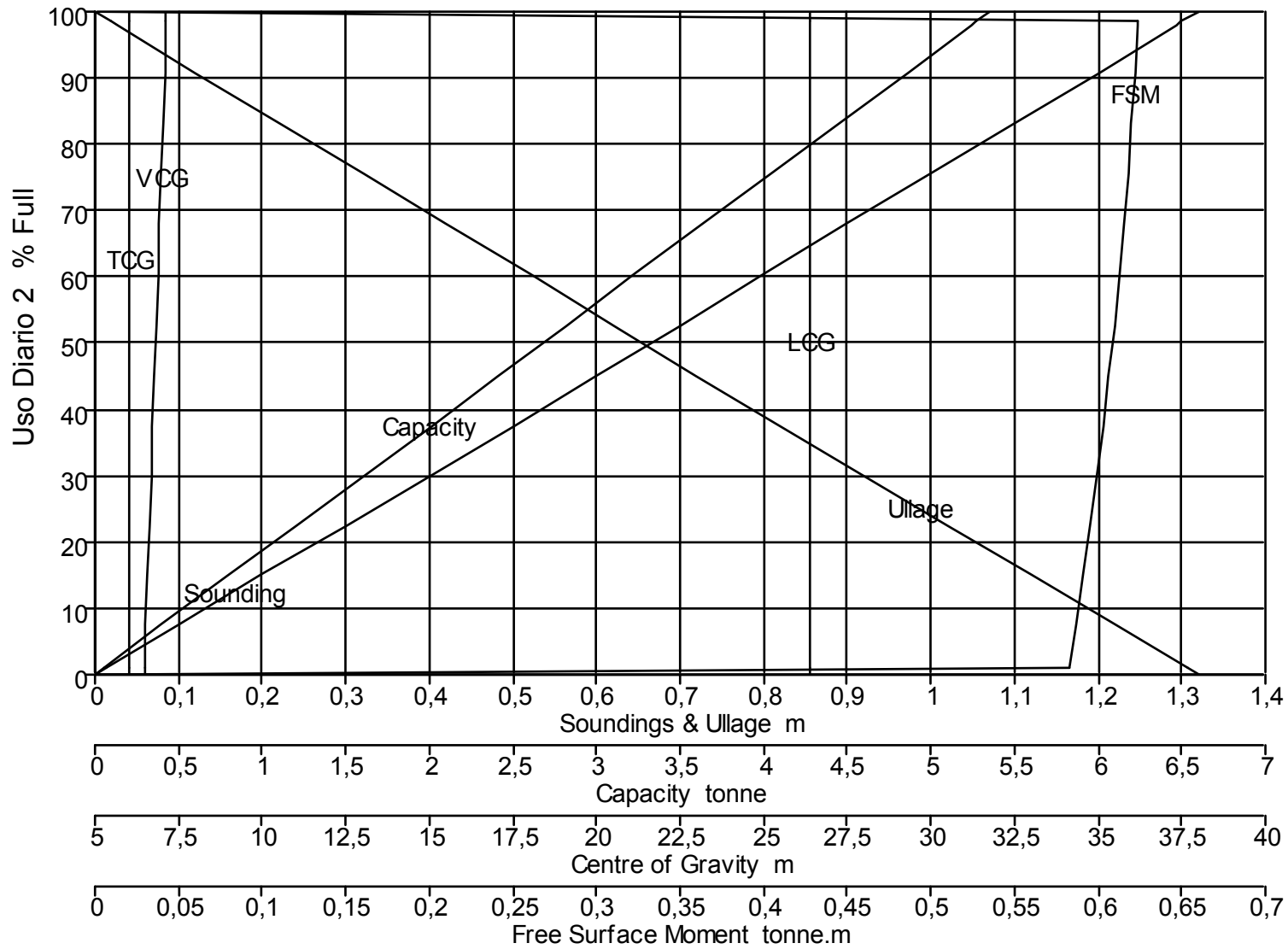
- Sounding
- Ullage
- Capacity
- LCG
- TCG
- VCG
- FSM

| Tank Name    | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m  | VCG m | FSM tonne.m |
|--------------|------------|----------|---------|-------------------------|----------------|--------|--------|-------|-------------|
| Usó Diario 1 | 1,320      | 0,000    | 100,000 | 6,369                   | 5,350          | 26,396 | -6,020 | 7,143 | 0,000       |
|              | 1,300      | 0,020    | 98,466  | 6,271                   | 5,268          | 26,396 | -6,020 | 7,132 | 0,623       |
|              | 1,294      | 0,026    | 98,000  | 6,242                   | 5,243          | 26,396 | -6,020 | 7,129 | 0,623       |

|  |       |       |        |       |       |        |        |       |       |
|--|-------|-------|--------|-------|-------|--------|--------|-------|-------|
|  | 1,293 | 0,027 | 97,900 | 6,235 | 5,238 | 26,396 | -6,020 | 7,129 | 0,623 |
|  | 1,200 | 0,120 | 90,824 | 5,785 | 4,859 | 26,396 | -6,020 | 7,082 | 0,622 |
|  | 1,100 | 0,220 | 83,191 | 5,298 | 4,451 | 26,396 | -6,019 | 7,032 | 0,620 |
|  | 1,000 | 0,320 | 75,565 | 4,813 | 4,043 | 26,396 | -6,018 | 6,982 | 0,618 |
|  | 0,900 | 0,420 | 67,948 | 4,328 | 3,635 | 26,396 | -6,018 | 6,931 | 0,615 |
|  | 0,800 | 0,520 | 60,342 | 3,843 | 3,228 | 26,396 | -6,017 | 6,881 | 0,613 |
|  | 0,700 | 0,620 | 52,747 | 3,359 | 2,822 | 26,396 | -6,017 | 6,831 | 0,610 |
|  | 0,600 | 0,720 | 45,165 | 2,877 | 2,416 | 26,396 | -6,016 | 6,781 | 0,607 |
|  | 0,500 | 0,820 | 37,596 | 2,395 | 2,011 | 26,396 | -6,015 | 6,730 | 0,603 |
|  | 0,400 | 0,920 | 30,043 | 1,913 | 1,607 | 26,395 | -6,014 | 6,680 | 0,599 |
|  | 0,300 | 1,020 | 22,506 | 1,433 | 1,204 | 26,395 | -6,014 | 6,630 | 0,596 |
|  | 0,200 | 1,120 | 14,985 | 0,954 | 0,802 | 26,395 | -6,013 | 6,580 | 0,591 |
|  | 0,100 | 1,220 | 7,483  | 0,477 | 0,400 | 26,395 | -6,012 | 6,530 | 0,587 |
|  | 0,013 | 1,307 | 1,000  | 0,064 | 0,053 | 26,395 | -6,011 | 6,487 | 0,583 |
|  | 0,000 | 1,320 | 0,000  | 0,000 | 0,000 | 26,395 | -6,011 | 6,480 | 0,000 |

## Tank Calibrations - Uso Diario 2

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



**Usa Diario 2**  
**Trim: 0 m; Heel: 0 deg to starboard**

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

| Tank Name    | Sounding m | Ullage m | % Full  | Capacity m <sup>3</sup> | Capacity tonne | LCG m  | TCG m | VCG m | FSM tonne.m |
|--------------|------------|----------|---------|-------------------------|----------------|--------|-------|-------|-------------|
| Usa Diario 2 | 1,320      | 0,000    | 100,000 | 6,369                   | 5,350          | 26,396 | 6,020 | 7,143 | 0,000       |
|              | 1,300      | 0,020    | 98,466  | 6,271                   | 5,268          | 26,396 | 6,020 | 7,132 | 0,623       |
|              | 1,294      | 0,026    | 98,000  | 6,242                   | 5,243          | 26,396 | 6,020 | 7,129 | 0,623       |

|  |       |       |        |       |       |        |       |       |       |
|--|-------|-------|--------|-------|-------|--------|-------|-------|-------|
|  | 1,293 | 0,027 | 97,900 | 6,235 | 5,238 | 26,396 | 6,020 | 7,129 | 0,623 |
|  | 1,200 | 0,120 | 90,824 | 5,785 | 4,859 | 26,396 | 6,020 | 7,082 | 0,622 |
|  | 1,100 | 0,220 | 83,191 | 5,298 | 4,451 | 26,396 | 6,019 | 7,032 | 0,620 |
|  | 1,000 | 0,320 | 75,565 | 4,813 | 4,043 | 26,396 | 6,018 | 6,982 | 0,618 |
|  | 0,900 | 0,420 | 67,948 | 4,328 | 3,635 | 26,396 | 6,018 | 6,931 | 0,615 |
|  | 0,800 | 0,520 | 60,342 | 3,843 | 3,228 | 26,396 | 6,017 | 6,881 | 0,613 |
|  | 0,700 | 0,620 | 52,747 | 3,359 | 2,822 | 26,396 | 6,017 | 6,831 | 0,610 |
|  | 0,600 | 0,720 | 45,165 | 2,877 | 2,416 | 26,396 | 6,016 | 6,781 | 0,607 |
|  | 0,500 | 0,820 | 37,596 | 2,395 | 2,011 | 26,396 | 6,015 | 6,730 | 0,603 |
|  | 0,400 | 0,920 | 30,043 | 1,913 | 1,607 | 26,395 | 6,014 | 6,680 | 0,599 |
|  | 0,300 | 1,020 | 22,506 | 1,433 | 1,204 | 26,395 | 6,014 | 6,630 | 0,596 |
|  | 0,200 | 1,120 | 14,985 | 0,954 | 0,802 | 26,395 | 6,013 | 6,580 | 0,591 |
|  | 0,100 | 1,220 | 7,483  | 0,477 | 0,400 | 26,395 | 6,012 | 6,530 | 0,587 |
|  | 0,013 | 1,307 | 1,000  | 0,064 | 0,053 | 26,395 | 6,011 | 6,487 | 0,583 |
|  | 0,000 | 1,320 | 0,000  | 0,000 | 0,000 | 26,395 | 6,011 | 6,480 | 0,000 |