



UNIVERSIDADE DA CORUÑA



Escola Politécnica Superior

**TRABAJO FIN DE GRADO  
CURSO 2019/20**

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*MEGAYATE DE LUJO*

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**Grado en Ingeniería Naval y Oceánica**

**Cuaderno 5  
SITUACIONES DE CARGA**

ALUMNA: ROSA PÉREZ RAMÓN

TUTOR: RAÚL VILLA CARO

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**TRABAJO FIN DE GRADO**

*CURSO 2018-2019*

**PROYECTO NÚMERO 19-19**

**TIPO DE BUQUE:** MEGAYATE DE LUJO DE DESPLAZAMIENTO, DE 114 M DE ESLORA. TIPO WORLD GRAND EXPLORER

**CLASIFICACIÓN, COTA Y REGLAMENTOS DE APLICACIÓN:** BUQUE DE PASAJE, OCEÁNICO, SOLAS MARPOL MCA, ZONA ECA POLAR CODE B ICE. RUTAS DE LA ANTÁRTIDA PERIODOS RESTRINGIDOS Y ÁRTICO (VERANO). PANAMÁ.

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

**VELOCIDAD Y AUTONOMÍA:** 17 KNOTS AL 90% MCR Y 10% MM. AUTONOMÍA A 3500 MILLAS.

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

**PROPULSIÓN:** UNO O DOS MOTORES DIESEL

**TRIPULACIÓN Y PASAJE:** 50 PASAJEROS Y 42 TRIPULANTES.

**OTROS EQUIPOS E INSTALACIONES:** GARAJE, WATERMAKER x 2, STABILIZER TRAC, AIR CONDITIONING CRUISAIR, HELIPUERTO (NO CERTIFICADO). MARINA EN POPA Y LATERALES, BOTES TENDER.

Ferrol, diciembre 2019

ALUMNO/A: **Rosa Pérez Ramón**

TUTOR: **Raúl Villa Caro**

## 1 INTRODUCCIÓN

En este cuaderno se realizará un estudio de los criterios de estabilidad requeridos para el buque proyecto, así como las condiciones de carga reglamentarias, con el objetivo de cumplir con los criterios necesarios para garantizar la seguridad del pasaje que se encuentra a bordo.

Para la realización de este cuaderno, se partirán de las dimensiones principales obtenidas en el Cuaderno 1: “*Dimensionamiento preliminar y elección de la cifra de mérito*”.

| <b>L (M)</b> | <b>B (M)</b> | <b>D (M)</b> | <b>T (M)</b> |
|--------------|--------------|--------------|--------------|
| 111,15       | 21,63        | 8,77         | 5,17         |

Cada reglamentación establece su propia definición de las condiciones de carga a analizar. El SSC deja a decisión del diseñador establecer las condiciones de carga de operación del buque. El Código IS 2008, define 4 condiciones de carga, pero dado que la carga no existe en este buque proyecto, se reducen a dos condiciones de carga:

- . Salida de Puerto: 100% Pasajeros y equipaje y 100% consumos.
- . Llegada a puerto: 100% Pasajeros y equipaje y 10% consumos

En este buque, no tiene sentido hablar de carga, ya que supone un 3% del peso muerto. Según el MCA se deben cumplir todas las condiciones posibles en las que opera el yate, por lo cual, a partes de las dos condiciones mencionadas anteriormente, se añadirá una condición intermedia, quedando de la siguiente manera:

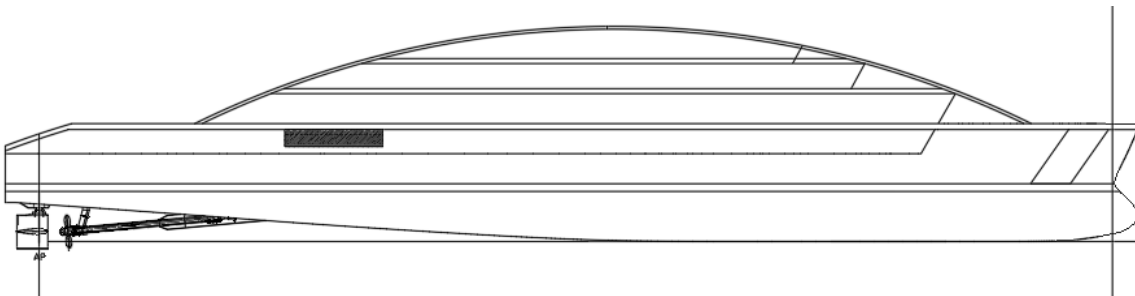
- . Salida de Puerto: 100% Pasajeros y equipaje y 100% consumos.
- . Situación Intermedia: 100% Pasajeros y equipaje y 50% consumos.
- . Llegada a puerto: 100% Pasajeros y equipaje y 10% consumos

## 2 ANOTACIONES

Durante el Cuaderno 4: "Cálculos de Arquitectura Naval" se planteó la posibilidad de utilizar tanques de lastre, para corregir el trimado. Finalmente, no ha sido necesaria la utilización de los mismos, debido a una redistribución de los tanques.

### 2.1 PUNTO DE INUNDACIÓN PROGRESIVA

Según lo indicado en el Cuaderno 4: "Cálculos de arquitectura Naval" la situación del punto de inundación será el punto más bajo de la puerta, a la vez, el más alejado de crujía. El punto de inundación progresiva está situada a 24,66 m de la Perpendicular de Popa (longitudinalmente), a 10,7548 m de la Línea de Crujía (Semimanga) y a una altura de 9,47 m.



*Imagen 1. Diseño Superestructura Buque Proyecto con PIP en sombreado*

### 3 CORRECCIÓN POR SUPERFICIES LIBRES

Continuando con las normas establecidas para la estabilidad, se deberá aplicar una corrección por superficies libres, para cada una de las condiciones de carga.

Esta corrección se aplica sobre la curva de brazos adrizantes y sobre la altura metacéntrica inicial para poder tener en cuenta el efecto de los líquidos en los tanques que presentan superficies libres al no estar éstos totalmente llenos. Esta corrección se empezará a aplicar cuando el nivel de llenado del tanque sea menor del 98%. No será necesario considerar el efecto de superficie libre cuando un tanque esté nominalmente lleno, un nivel de llenado que sea igual o superior al 98%, o cuando éste esté vacío.

Se denomina Msl al momento por superficie libre de un tanque, a una inclinación de 30°, se mide en  $ton \cdot m$  y se obtendrá a partir de la siguiente expresión:

$$Msl = V \cdot b \cdot \rho \cdot K \sqrt{\delta}$$

Siendo V la capacidad total del tanque, en  $m^3$ ; b la anchura máxima del tanque, en m;  $\rho$  el peso específico del líquido contenido en el tanque, en  $m^3/ton$ ;  $\delta$  el coeficiente de bloque del tanque; h la altura máxima del tanque, en m; l la longitud máxima del tanque, en m; y K un coeficiente adimensional que se obtiene según la relación b/h.

Según la norma, todos los tanques que presenten un Msl > 1% del peso en rosca del buque, deberán ser corregidos por superficies libres.

Se debe tener en cuenta que la corrección por superficies libres es la misma para el cálculo individual de un tanque que para el de dos tanques simétricos; por lo tanto se calculará la corrección para cada tanque individualmente, a excepción de aquellas parejas de tanques simétricos que se consuman simultáneamente, para estos casos se calculará la corrección para el Msl 30° que tendrían los dos tanques juntos.

A continuación se muestra el listado de tanques

| TANQUE            | V<br>( $m^3$ ) | L<br>(m)  | B<br>(m)  | D (m) | $\rho$    | C.B       | b/h       | K         | Msl   | 1% P.R | COR<br>RIG<br>E |
|-------------------|----------------|-----------|-----------|-------|-----------|-----------|-----------|-----------|-------|--------|-----------------|
| Tank001<br>Aceite | 1,200          | 1,40<br>0 | 3,38<br>0 | 1,500 | 0,92<br>0 | 0,16<br>9 | 2,25<br>3 | 0,10<br>1 | 0,154 | 23,000 | NO              |
| Tank001Lo<br>dos  | 1,611          | 1,40<br>0 | 3,38<br>0 | 1,500 | 1,00<br>0 | 0,22<br>7 | 2,25<br>3 | 0,10<br>1 | 0,261 | 23,000 | NO              |

| TANQUE               | V<br>( $m^3$ ) | L<br>(m) | B<br>(m) | D (m) | $\rho$ | C.B  | b/h  | K    | Msl   | 1% P.R | COR<br>RIG<br>E |
|----------------------|----------------|----------|----------|-------|--------|------|------|------|-------|--------|-----------------|
| Tank2Agu<br>asGrisas | 24,38          | 10,5     | 3,38     | 1,50  | 1,00   | 0,46 | 2,25 | 0,10 | 5,61  | 23,00  | NO              |
| Tank1Agu<br>asGrisas | 41,64          | 11,2     | 3,38     | 1,10  | 1,00   | 1,00 | 3,07 | 0,11 | 15,42 | 23,00  | NO              |
| Tank3Agu<br>asGrisas | 41,64          | 11,2     | 3,38     | 1,10  | 1,00   | 1,00 | 3,07 | 0,11 | 15,42 | 23,00  | NO              |
| Tank1Agu<br>asNegras | 27,19          | 13,3     | 3,38     | 1,50  | 1,00   | 0,40 | 2,25 | 0,10 | 5,87  | 23,00  | NO              |

## MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| <b>TANQUE</b>          | <b>V<br/>(m<sup>3</sup>)</b> | <b>L<br/>(m)</b> | <b>B<br/>(m)</b> | <b>D (m)</b> | <b><math>\rho</math></b> | <b>C.B</b> | <b>b/h</b> | <b>K</b> | <b>Msl</b> | <b>1% P.R</b> | <b>COR<br/>RIG<br/>E</b> |
|------------------------|------------------------------|------------------|------------------|--------------|--------------------------|------------|------------|----------|------------|---------------|--------------------------|
| Tank001<br>Combustible | 46,11                        | 11,2             | 3,38             | 1,50         | 0,84                     | 0,81       | 2,25       | 0,10     | 11,86      | 23,00         | NO                       |
| Tank002<br>Combustible | 46,11                        | 11,2             | 3,38             | 1,50         | 0,84                     | 0,81       | 2,25       | 0,10     | 11,86      | 23,00         | NO                       |
| Tank003<br>Combustible | 34,30                        | 11,2             | 3,40             | 1,50         | 0,84                     | 0,60       | 2,27       | 0,10     | 7,65       | 23,00         | NO                       |
| Tank004<br>Combustible | 34,30                        | 11,2             | 3,40             | 1,50         | 0,84                     | 0,60       | 2,27       | 0,10     | 7,65       | 23,00         | NO                       |
| Tank005<br>Combustible | 37,86                        | 11,2             | 3,38             | 1,00         | 0,84                     | 1,00       | 3,38       | 0,11     | 11,93      | 23,00         | NO                       |
| Tank006<br>Combustible | 37,86                        | 11,2             | 3,38             | 1,00         | 0,84                     | 1,00       | 3,38       | 0,11     | 11,93      | 23,00         | NO                       |
| Tank007<br>Combustible | 53,06                        | 11,2             | 3,38             | 1,50         | 0,84                     | 0,93       | 2,25       | 0,10     | 14,64      | 23,00         | NO                       |
| Tank008<br>Combustible | 53,06                        | 11,2             | 3,38             | 1,50         | 0,84                     | 0,93       | 2,25       | 0,10     | 14,64      | 23,00         | NO                       |
| Tannk1CG<br>E          | 6,00                         | 2,00             | 2,00             | 1,50         | 0,84                     | 1,00       | 1,33       | 0,06     | 0,65       | 23,00         | NO                       |

| <b>TANQUE</b>           | <b>V<br/>(m<sup>3</sup>)</b> | <b>L<br/>(m)</b> | <b>B<br/>(m)</b> | <b>D (m)</b> | <b><math>\rho</math></b> | <b>C.B</b> | <b>b/h</b> | <b>K</b> | <b>Msl</b> | <b>1% P.R</b> | <b>COR<br/>RIG<br/>E</b> |
|-------------------------|------------------------------|------------------|------------------|--------------|--------------------------|------------|------------|----------|------------|---------------|--------------------------|
| Tank001<br>Agua Potable | 44,95                        | 13,3             | 3,38             | 1,00         | 1,00                     | 1,00       | 3,38       | 0,11     | 16,87      | 23,00         | NO                       |
| Tank002<br>Agua Potable | 44,95                        | 13,3             | 3,38             | 1,00         | 1,00                     | 1,00       | 3,38       | 0,11     | 16,87      | 23,00         | NO                       |
| Tank003<br>Agua Potable | 49,03                        | 13,3             | 3,40             | 1,10         | 1,00                     | 0,99       | 3,09       | 0,11     | 18,14      | 23,00         | NO                       |
| Tank004<br>Agua Potable | 49,03                        | 13,3             | 3,40             | 1,10         | 1,00                     | 0,99       | 3,09       | 0,11     | 18,14      | 23,00         | NO                       |

| TANQUE                | V<br>(m <sup>3</sup> ) | L<br>(m) | B<br>(m) | D (m) | $\rho$ | C.B  | b/h  | K    | Msl  | 1% P.R | COR<br>RIG<br>E |
|-----------------------|------------------------|----------|----------|-------|--------|------|------|------|------|--------|-----------------|
| Tank001<br>Uso Diario | 10,42                  | 4,90     | 3,38     | 1,0   | 1,0    | 0,63 | 3,38 | 0,11 | 3,10 | 23,000 | NO              |
| Tank002<br>Uso Diario | 10,42                  | 4,90     | 3,38     | 1,0   | 1,0    | 0,63 | 3,38 | 0,11 | 3,10 | 23,000 | NO              |

Ninguno de los tanques corrige por superficie libre.

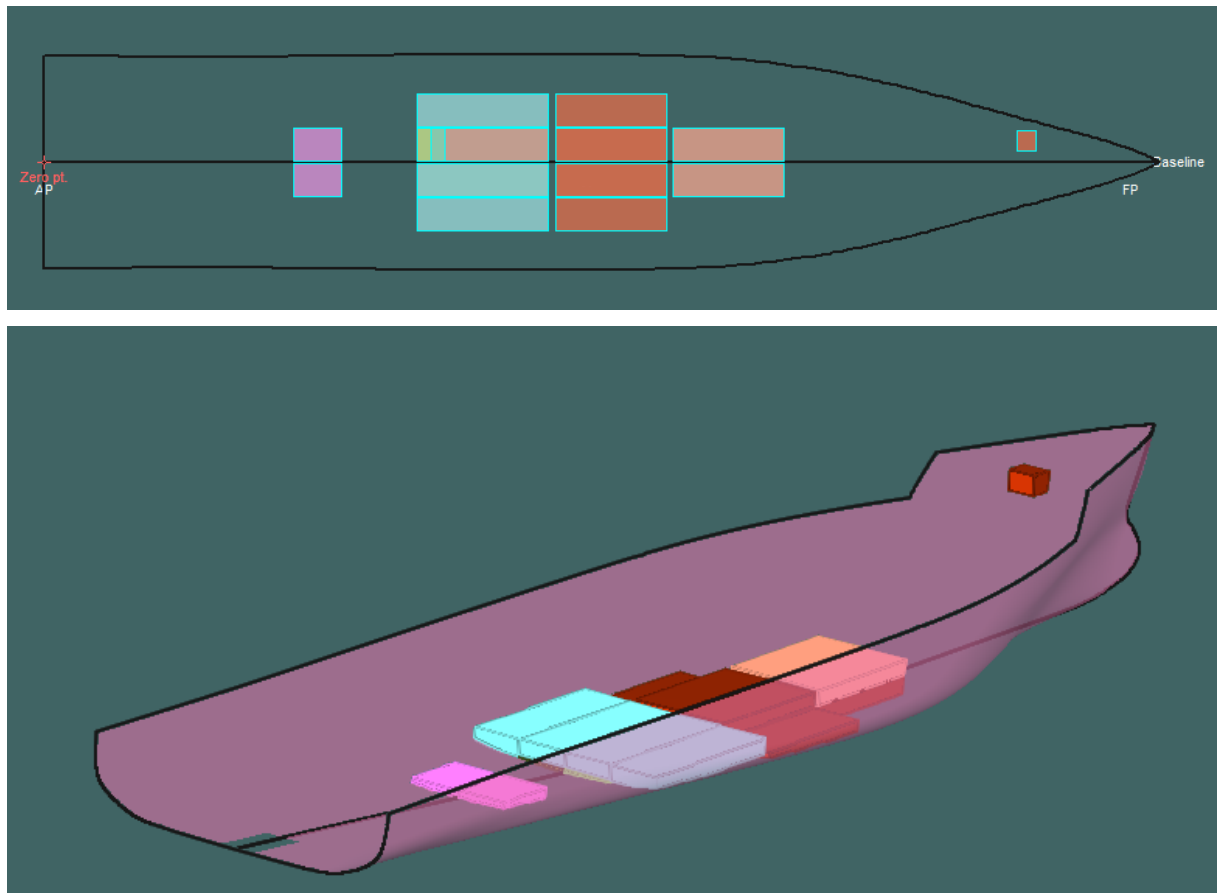


Imagen 2. Distribución Tanques



## 4 JUSTIFICACIÓN DE PESOS

El peso en rosca, al igual que el peso muerto, fue calculado en el Cuaderno 2. Estas partidas serán necesarias en este cuaderno para el cálculo de las diferentes condiciones de carga. A continuación se mostrará un resumen de los cálculos realizados en el cuaderno anteriormente mencionado:

### 4.1 DESGLOSE PESO EN ROSCA

|                                   | (t)   | XG    | KG   |
|-----------------------------------|-------|-------|------|
| <i>Peso Acero</i>                 | 3002  | 58    | 6,02 |
| <i>Peso Maquinaria</i>            |       |       |      |
| <i>Peso Motores</i>               | 17,8  | 32,4  | 4,15 |
| <i>Peso Maquinaria Restante</i>   | 356   | 27,20 | 4,15 |
| <i>Tanques CM</i>                 | 56    | 32,4  | 4,15 |
| <i>Grupo de Emergencia</i>        | 58,8  | 93,55 | 9,40 |
| <i>CI Cámara de Máquinas</i>      | 3,4   | 32,4  | 4,15 |
| <i>Tecles Cámara de Máquinas</i>  | 11,6  | 32,40 | 4,15 |
| <i>Hélices</i>                    | 7,9   | 5,30  | 1    |
| <i>Peso Equipos</i>               |       |       |      |
| <i>Peso Pintura Pi</i>            | 23,3  | 58    | 6,02 |
| <i>Protección Catódica</i>        | 0,8   | 58    | 6,02 |
| <i>Peso Tuberías y Bombas</i>     | 119,1 | 58    | 6,02 |
| <i>Peso Aire Acondicionado</i>    | 88,8  | 40    | 5    |
| <i>Peso Instalación Eléctrica</i> | 192,5 | 58    | 6,02 |
| <i>Peso Navegación</i>            | 2,0   | 90    | 15,3 |
| <i>Peso Equipo Gobierno</i>       | 3,8   | 90    | 15,3 |
| <i>Peso Equipo Chimenea</i>       | 8,2   | 60    | 20   |
| <i>Peso Equipo Salvamento</i>     | 15,2  | 36    | 11   |
| <i>Peso Generador Agua Dulce</i>  | 0,4   | 24,5  | 4,10 |
| <i>Peso Habilitación</i>          | 574   | 57    | 12   |
| <i>Peso Equipo Carga</i>          | 2,2   | 36    | 12   |
| <i>Peso Portillos y Ventanas</i>  | 11    | 48    | 12   |
| <i>Peso Planta TAR</i>            | 0,2   | 23,4  | 4,1  |
| <i>Peso Separador de Sentinas</i> | 0,2   | 23,4  | 4,1  |
| <i>Peso Amarre y Fondeo</i>       | 446,4 | 100   | 6    |

## 4.2 DESGLOSE PESO MUERTO

|                                   | (t)   | XG    | KG   |
|-----------------------------------|-------|-------|------|
| <i>Peso Acero</i>                 | 3002  | 58    | 6,02 |
| <i>Peso Maquinaria</i>            |       |       |      |
| <i>Peso Motores</i>               | 17,8  | 32,4  | 4,15 |
| <i>Peso Maquinaria Restante</i>   | 356   | 27,20 | 4,15 |
| <i>Tanques CM</i>                 | 56    | 32,4  | 4,15 |
| <i>Grupo de Emergencia</i>        | 58,8  | 93,55 | 9,40 |
| <i>CI Cámara de Máquinas</i>      | 3,4   | 32,4  | 4,15 |
| <i>Tecles Cámara de Máquinas</i>  | 11,6  | 32,40 | 4,15 |
| <i>Hélices</i>                    | 7,9   | 5,30  | 1    |
| <i>Peso Equipos</i>               |       |       |      |
| <i>Peso Pintura Pi</i>            | 23,3  | 58    | 6,02 |
| <i>Protección Catódica</i>        | 0,8   | 58    | 6,02 |
| <i>Peso Tuberías y Bombas</i>     | 119,1 | 58    | 6,02 |
| <i>Peso Aire Acondicionado</i>    | 88,8  | 40    | 5    |
| <i>Peso Instalación Eléctrica</i> | 192,5 | 58    | 6,02 |
| <i>Peso Navegación</i>            | 2,0   | 90    | 15,3 |
| <i>Peso Equipo Gobierno</i>       | 3,8   | 90    | 15,3 |
| <i>Peso Equipo Chimenea</i>       | 8,2   | 60    | 20   |
| <i>Peso Equipo Salvamento</i>     | 15,2  | 36    | 11   |
| <i>Peso Generador Agua Dulce</i>  | 0,4   | 24,5  | 4,10 |
| <i>Peso Habilitación</i>          | 574   | 57    | 12   |
| <i>Peso Equipo Carga</i>          | 2,2   | 36    | 12   |
| <i>Peso Portillos y Ventanas</i>  | 11    | 48    | 12   |
| <i>Peso Planta TAR</i>            | 0,2   | 23,4  | 4,1  |
| <i>Peso Separador de Sentinas</i> | 0,2   | 23,4  | 4,1  |
| <i>Peso Amarre y Fondeo</i>       | 446,4 | 100   | 6    |

**4.3 DESPLAZAMIENTO**

|                              | <i>Peso (t)</i> | <i>KG</i> | <i>XG</i> |
|------------------------------|-----------------|-----------|-----------|
| <i>Rosca</i>                 | 4653,6          | 6,65      | 55,22     |
| <i>Peso Muerto</i>           | 1062,89         | 3,76      | 55,37     |
| <i>Desplazamiento</i>        | 5716            | 6,12      | 6,12      |
| <i>Desplazamiento (+10%)</i> | 6288            | 55,25     | 6,12      |

## 5 CONDICIONES DE CARGA REGLAMENTARIAS

Las condiciones de carga que se van a estudiar son las siguientes:

- . Salida de Puerto: 100% Pasajeros y equipaje y 100% consumos.
- . Situación Intermedia: 100% Pasajeros y equipaje y 50% consumos.
- . Llegada a puerto: 100% Pasajeros y equipaje y 10% consumos

### 5.1 SALIDA DE PUERTO

En esta condición el buque sale de puerto con el 100% de pesos fijos y consumibles. Tanques como aguas grises, y negras, poseerán una carga residual del 10%.

| Item Name               | Quality | Peso (t) | Vol (m3) | Total Vol (m3) | XG (m) | YG (m) | KG (m) |
|-------------------------|---------|----------|----------|----------------|--------|--------|--------|
| <i>Lightship</i>        | 1       | 4653,6   |          |                | 55,2   | 0,0    | 6,7    |
| <i>Tank1Combustible</i> | 100%    | 38,7     | 46,1     | 46,1           | 57,7   | 1,7    | 0,9    |
| <i>Tank2Combustible</i> | 100%    | 38,7     | 46,1     | 46,1           | 57,7   | -1,7   | 0,9    |
| <i>Tank3Combustible</i> | 100%    | 28,8     | 34,3     | 34,3           | 57,8   | 5,1    | 1,0    |
| <i>Tank4Combustible</i> | 100%    | 28,8     | 34,3     | 34,3           | 57,8   | -5,1   | 1,0    |
| <i>Tank5Combustible</i> | 100%    | 31,8     | 37,9     | 37,9           | 57,4   | 1,8    | 2,1    |
| <i>Tank6Combustible</i> | 100%    | 31,8     | 37,9     | 37,9           | 57,4   | -1,8   | 2,1    |
| <i>Tank7Combustible</i> | 100%    | 44,6     | 53,1     | 53,1           | 69,3   | 1,7    | 0,8    |
| <i>Tank8Combustible</i> | 100%    | 44,6     | 53,1     | 53,1           | 69,3   | -1,7   | 0,8    |
| <i>Tank1CGE</i>         | 100%    | 5,0      | 6,0      | 6,0            | 99,5   | -2,2   | 9,5    |
| <i>Tank1AguasNegras</i> | 10%     | 2,7      | 27,2     | 2,7            | 49,2   | 1,4    | 0,7    |
| <i>Tank1Uso Diario</i>  | 100%    | 10,4     | 10,4     | 10,4           | 27,9   | 1,7    | 2,3    |
| <i>Tank2UsoDiario</i>   | 100%    | 10,4     | 10,4     | 10,4           | 27,9   | -1,7   | 2,3    |
| <i>Tank1AguaPotable</i> | 100%    | 45,0     | 45,0     | 45,0           | 44,5   | 1,8    | 2,1    |
| <i>Tank2AguaPotable</i> | 100%    | 45,0     | 45,0     | 45,0           | 44,5   | -1,8   | 2,1    |
| <i>Tank3AguaPotable</i> | 100%    | 49,0     | 49,0     | 49,0           | 44,5   | 5,2    | 2,1    |
| <i>Tank4AguaPotable</i> | 100%    | 49,0     | 49,0     | 49,0           | 44,5   | -5,2   | 2,1    |
| <i>TankAceite</i>       | 100%    | 1,1      | 1,2      | 1,2            | 38,5   | -1,6   | 1,4    |
| <i>TankLodos</i>        | 10%     | 0,2      | 1,6      | 0,2            | 40,1   | -0,9   | 1,1    |
| <i>Tank2AguasGrises</i> | 10%     | 2,4      | 24,4     | 2,4            | 49,3   | -1,4   | 0,7    |
| <i>Tank1AguasGrises</i> | 0%      | 0,0      | 41,6     | 0,0            | 69,3   | 1,8    | 1,5    |
| <i>Tank3AguasGrises</i> | 0%      | 0,0      | 41,6     | 0,0            | 69,3   | -1,8   | 1,5    |
| <i>Tripulación</i>      | 1       | 6,3      |          |                | 55,0   | 0,0    | 6,3    |
| <i>Pasaje</i>           | 1       | 10,0     |          |                | 55,0   | 0,0    | 16,0   |
| <i>Pertrechos</i>       | 1       | 80,0     |          |                | 55,0   | 0,0    | 6,0    |
| <i>Elementos Garaje</i> | 1       | 11,4     |          |                | 36,0   | 0,0    | 11,0   |
| <i>Piscina</i>          | 1       | 142,0    |          |                | 31,6   | 0,0    | 9,5    |
| <i>Helicóptero</i>      | 1       | 2,7      |          |                | 8,7    | 0,0    | 8,2    |
| <i>Total Loadcase</i>   |         | 5414,1   | 695,1    | 564,0          | 54,4   | 0,0    | 6,3    |

|   |          |
|---|----------|
| <i>Draft Amidship</i>                       | 5,17     |
| <i>Displacement t</i>                       | 6314     |
| <i>Heel deg</i>                             | 0        |
| <i>Draft at FP m</i>                        | 5,17     |
| <i>Draft at AP m</i>                        | 5,17     |
| <i>Draft at LCF m</i>                       | 5,17     |
| <i>Trim (+ve by stern) m</i>                | 0        |
| <i>WL Length m</i>                          | 110,711  |
| <i>Beam max extents on WL m</i>             | 21,654   |
| <i>Wetted Area m<sup>2</sup></i>            | 2363,313 |
| <i>Waterpl. Area m<sup>2</sup></i>          | 1885,122 |
| <i>Prismatic coeff. (Cp)</i>                | 0,589    |
| <i>Block coeff. (Cb)</i>                    | 0,497    |
| <i>Max Sect. area coeff. (Cm)</i>           | 0,855    |
| <i>Waterpl. area coeff. (Cwp)</i>           | 0,786    |
| <i>LCB from zero pt. (+ve fwd) m</i>        | 53,979   |
| <i>LCF from zero pt. (+ve fwd) m</i>        | 46,924   |
| <i>KB m</i>                                 | 3,25     |
| <i>KG m</i>                                 | 5,17     |
| <i>BMt m</i>                                | 9,831    |
| <i>BML m</i>                                | 223,982  |
| <i>GMt m</i>                                | 7,911    |
| <i>GML m</i>                                | 222,062  |
| <i>KMt m</i>                                | 13,081   |
| <i>KML m</i>                                | 227,232  |
| <i>Immersion (TPc) tonne/cm</i>             | 19,323   |
| <i>MTc tonne.m</i>                          | 127,471  |
| <i>RM at 1deg = GMt.Disp.sin(1) tonne.m</i> | 871,745  |
| <i>Max deck inclination deg</i>             | 0        |
| <i>Trim angle (+ve by stern) deg</i>        | 0        |

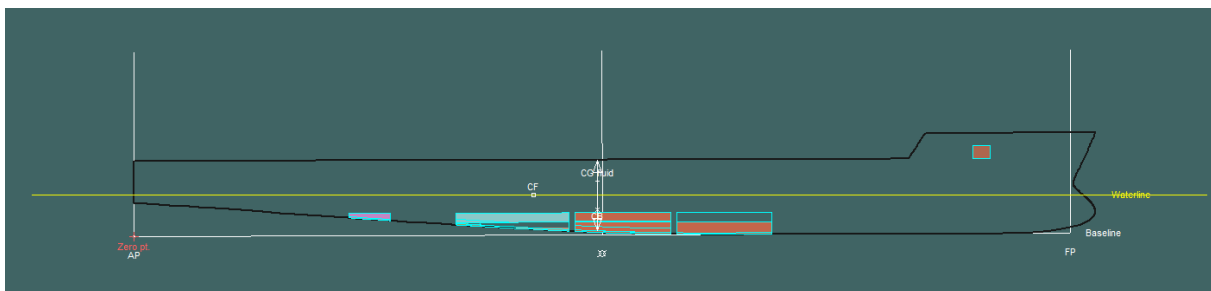


Imagen 3. Salida de Puerto

## 5.2 SITUACIÓN INTERMEDIA

En esta situación los pesos finos se mantienen al 100%. Sin embargo los consumos descienden al 50% de su capacidad. De esta manera se supone una situación intermedia del ciclo del viaje. Los tanques de aguas negras y grises se fijarán al 50%.

Los tanques se consumen de Popa a Proa, tanto los de agua potable como los de combustible. Además se consumen por parejas, para corregir el trimado del buque.

| <i>Item Name</i>        | <i>Quality</i> | <i>Peso<br/>(t)</i> | <i>Vol<br/>(m3)</i> | <i>Total<br/>Vol<br/>(m3)</i> | <i>XG<br/>(m)</i> | <i>YG<br/>(m)</i> | <i>KG<br/>(m)</i> |
|-------------------------|----------------|---------------------|---------------------|-------------------------------|-------------------|-------------------|-------------------|
| <i>Lightship</i>        | 1              | 4653,6              |                     |                               | 55,22             | 0                 | 6,65              |
| <i>Tank1Combustible</i> | 100%           | 38,7                | 46,11               | 46,11                         | 57,68             | 1,717             | 0,89              |
| <i>Tank2Combustible</i> | 100%           | 38,7                | 46,11               | 46,11                         | 57,68             | -1,717            | 0,89              |
| <i>Tank3Combustible</i> | 0%             | 0                   | 34,3                | 0                             | 62,811            | 2,393             | 0,25              |
| <i>Tank4Combustible</i> | 0%             | 0                   | 34,3                | 0                             | 62,811            | -2,393            | 0,25              |
| <i>Tank5Combustible</i> | 100%           | 31,8                | 37,86               | 37,856                        | 57,4              | 1,76              | 2,1               |
| <i>Tank6Combustible</i> | 100%           | 31,78               | 37,86               | 37,856                        | 57,4              | -1,76             | 2,1               |
| <i>Tank7Combustible</i> | 0%             | 0                   | 53,06               | 0                             | 74,72             | 0,047             | 0,003             |
| <i>Tank8Combustible</i> | 0%             | 0                   | 53,06               | 0                             | 74,72             | -0,047            | 0,003             |
| <i>Tank1CGE</i>         | 100%           | 5,04                | 6                   | 6                             | 99,51             | -2,15             | 9,52              |
| <i>Tank1AguasNegras</i> | 50%            | 13,59               | 27,19               | 13,59                         | 47,10             | 1,62              | 0,96              |
| <i>Tank1Uso Diario</i>  | 50%            | 5,21                | 10,42               | 5,21                          | 28,1              | 1,639             | 2,11              |
| <i>Tank2UsoDiario</i>   | 50%            | 5,21                | 10,42               | 5,21                          | 28,1              | -1,639            | 2,11              |
| <i>Tank1AguaPotable</i> | 100%           | 44,95               | 44,95               | 44,95                         | 44,45             | 1,76              | 2,1               |
| <i>Tank2AguaPotable</i> | 100%           | 44,95               | 44,95               | 44,95                         | 44,45             | -1,76             | 2,1               |
| <i>Tank3AguaPotable</i> | 0%             | 0                   | 49,03               | 0                             | 45,17             | 5,09              | 1,5               |
| <i>Tank4AguaPotable</i> | 0%             | 0                   | 49,03               | 0                             | 45,17             | -5,09             | 1,5               |
| <i>TankAceite</i>       | 50%            | 0,55                | 1,2                 | 0,6                           | 38,58             | -1,412            | 1,30              |
| <i>TankLodos</i>        | 50%            | 0,81                | 1,611               | 0,81                          | 39,95             | -1,495            | 1,24              |
| <i>Tank2AguasGrises</i> | 100%           | 24,37               | 24,38               | 24,38                         | 46,60             | -1,689            | 1,13              |
| <i>Tank1AguasGrises</i> | 0,00%          | 0                   | 41,6                | 0                             | 69,3              | 1,76              | 1,5               |
| <i>Tank3AguasGrises</i> | 50,00<br>%     | 20,8                | 41,6                | 20,8                          | 69,3              | -1,76             | 1,78              |
| <i>Tripulación</i>      | 1              | 6,3                 |                     |                               | 55                | 0                 | 6,3               |
| <i>Pasaje</i>           | 1              | 10                  |                     |                               | 55                | 0                 | 16                |
| <i>Pertrechos</i>       | 1              | 80                  |                     |                               | 55                | 0                 | 6,02              |
| <i>Elementos Garaje</i> | 1              | 11,3                |                     |                               | 36                | 0                 | 11                |
| <i>Piscina</i>          | 1              | 142                 |                     |                               | 31,58             | 0                 | 9,47              |
| <i>Helicóptero</i>      | 1              | 2,72                |                     |                               | 8,67              | 0                 | 8,17              |
| <i>Total Loadcase</i>   |                | 5212,5              | 695,1               | 334,4                         | 54,3              | -0,013            | 6,45              |

|   |          |
|---|----------|
| <i>Draft Amidships m</i>                    | 4,675    |
| <i>Displacement t</i>                       | 5414     |
| <i>Heel deg</i>                             | 0        |
| <i>Draft at FP m</i>                        | 4,51     |
| <i>Draft at AP m</i>                        | 4,84     |
| <i>Draft at LCF m</i>                       | 4,699    |
| <i>Trim (+ve by stern) m</i>                | 0,33     |
| <i>WL Length m</i>                          | 111,469  |
| <i>Beam max extents on WL m</i>             | 21,596   |
| <i>Wetted Area m<sup>2</sup></i>            | 2241,826 |
| <i>Waterpl. Area m<sup>2</sup></i>          | 1844,586 |
| <i>Prismatic coeff. (Cp)</i>                | 0,569    |
| <i>Block coeff. (Cb)</i>                    | 0,474    |
| <i>Max Sect. area coeff. (Cm)</i>           | 0,841    |
| <i>Waterpl. area coeff. (Cwp)</i>           | 0,766    |
| <i>LCB from zero pt. (+ve fwd) m</i>        | 54,392   |
| <i>LCF from zero pt. (+ve fwd) m</i>        | 46,86    |
| <i>KB m</i>                                 | 2,97     |
| <i>KG fluid m</i>                           | 6,284    |
| <i>BMt m</i>                                | 10,919   |
| <i>BML m</i>                                | 250,331  |
| <i>GMt corrected m</i>                      | 7,605    |
| <i>GML m</i>                                | 247,017  |
| <i>KMt m</i>                                | 13,89    |
| <i>KML m</i>                                | 253,301  |
| <i>Immersion (TPc) tonne/cm</i>             | 18,907   |
| <i>MTc tonne.m</i>                          | 121,579  |
| <i>RM at 1deg = GMt.Disp.sin(1) tonne.m</i> | 718,604  |
| <i>Max deck inclination deg</i>             | 0,1718   |
| <i>Trim angle (+ve by stern) deg</i>        | 0,1718   |

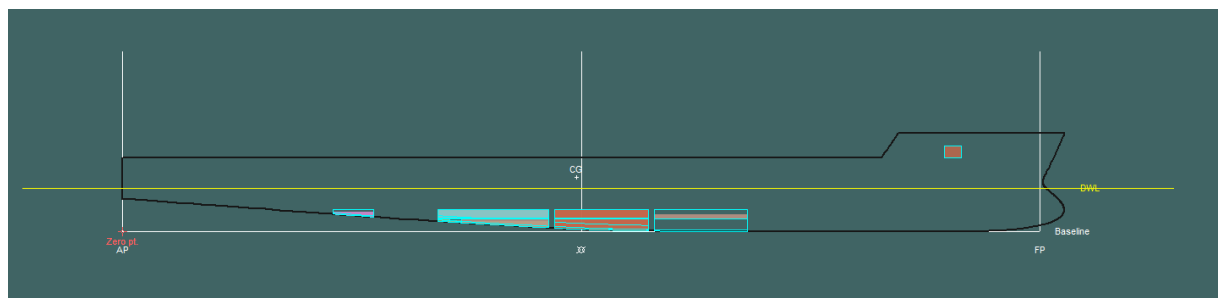


Imagen 4. Situación Intermedia

### 5.3 LLEGADA A PUERTO

En esta situación los pesos fijos se mantienen al 100%. Los consumos descienden al 10% de su capacidad total, representando de esta manera un supuesto fin de travesía. Los tanques tales como aguas negras y grises en este caso están llenos.

| <i>Item Name</i>        | <i>Quality</i> | <i>Peso<br/>(t)</i> | <i>Vol<br/>(m3)</i> | <i>Total<br/>Vol<br/>(m3)</i> | <i>XG (m)</i> | <i>YG (m)</i> | <i>KG (m)</i> |
|-------------------------|----------------|---------------------|---------------------|-------------------------------|---------------|---------------|---------------|
| <i>Lightship</i>        | 1              | 4653,6              |                     |                               | 55,22         | 0             | 6,65          |
| <i>Tank1Combustible</i> | 10%            | 3,873               | 46,11               | 4,611                         | 59,687        | 1,424         | 0,29          |
| <i>Tank2Combustible</i> | 10%            | 3,873               | 46,11               | 4,611                         | 59,687        | -1,424        | 0,29          |
| <i>Tank3Combustible</i> | 0%             | 0                   | 34,3                | 0                             | 62,811        | 2,393         | 0,248         |
| <i>Tank4Combustible</i> | 0%             | 0                   | 34,3                | 0                             | 62,811        | -2,393        | 0,248         |
| <i>Tank5Combustible</i> | 0%             | 0                   | 37,856              | 0                             | 57,4          | 1,76          | 1,6           |
| <i>Tank6Combustible</i> | 0%             | 0                   | 37,856              | 0                             | 57,4          | -1,76         | 1,6           |
| <i>Tank7Combustible</i> | 0%             | 0                   | 53,058              | 0                             | 74,716        | 0,047         | 0,003         |
| <i>Tank8Combustible</i> | 0%             | 0                   | 53,058              | 0                             | 74,716        | -0,047        | 0,003         |
| <i>Tank1CGE</i>         | 100%           | 5,04                | 6                   | 6                             | 99,514        | -2,15         | 9,52          |
| <i>Tank1AguasNegras</i> | 100%           | 27,188              | 27,188              | 27,188                        | 45,848        | 1,681         | 1,155         |
| <i>Tank1Uso Diario</i>  | 10%            | 1,042               | 10,424              | 1,042                         | 29,054        | 1,395         | 1,929         |
| <i>Tank2UsoDiario</i>   | 10%            | 1,042               | 10,424              | 1,042                         | 29,054        | -1,395        | 1,929         |
| <i>Tank1AguaPotable</i> | 100%           | 44,954              | 44,954              | 44,954                        | 44,45         | 1,76          | 2,1           |
| <i>Tank2AguaPotable</i> | 10%            | 4,495               | 44,954              | 4,495                         | 44,45         | -1,76         | 1,65          |
| <i>Tank3AguaPotable</i> | 0%             | 0                   | 49,025              | 0                             | 45,171        | 5,09          | 1,5           |
| <i>Tank4AguaPotable</i> | 0%             | 0                   | 49,025              | 0                             | 45,171        | -5,09         | 1,5           |
| <i>TankAceite</i>       | 10%            | 0,11                | 1,2                 | 0,12                          | 38,731        | -0,839        | 1,222         |
| <i>TankLodos</i>        | 100%           | 1,611               | 1,611               | 1,611                         | 39,93         | -1,628        | 1,326         |
| <i>Tank2AguasGrises</i> | 100%           | 24,377              | 24,377              | 24,377                        | 46,599        | -1,689        | 1,134         |
| <i>Tank1AguasGrises</i> | 100%           | 41,642              | 41,642              | 41,642                        | 69,3          | 1,76          | 2,05          |
| <i>Tank3AguasGrises</i> | 100%           | 41,642              | 41,642              | 41,642                        | 69,3          | -1,76         | 2,05          |
| <i>Tripulación</i>      | 100%           | 6,3                 |                     |                               | 55            | 0             | 6,3           |
| <i>Pasaje</i>           | 100%           | 10                  |                     |                               | 55            | 0             | 16            |
| <i>Pertrechos</i>       | 100%           | 80                  |                     |                               | 55            | 0             | 6,02          |
| <i>Elementos Garaje</i> | 100%           | 11,353              |                     |                               | 36            | 0             | 11            |
| <i>Piscina</i>          | 100%           | 142                 |                     |                               | 31,58         | 0             | 9,47          |
| <i>Helicóptero</i>      | 1              | 2,72                |                     |                               | 8,67          | 0             | 8,17          |
| <i>Total Loadcase</i>   |                | 5106,8<br>64        | 695,11<br>3         | 203,33<br>6                   | 54,56         | 0,012         | 6,561         |



|   |          |
|---|----------|
| <i>Draft Amidships m</i>                    | 4,503    |
| <i>Displacement t</i>                       | 5107     |
| <i>Heel deg</i>                             | 0,1      |
| <i>Draft at FP m</i>                        | 4,277    |
| <i>Draft at AP m</i>                        | 4,728    |
| <i>Draft at LCF m</i>                       | 4,536    |
| <i>Trim (+ve by stern) m</i>                | 0,452    |
| <i>WL Length m</i>                          | 111,743  |
| <i>Beam max extents on WL m</i>             | 21,57    |
| <i>Wetted Area m<sup>2</sup></i>            | 2198,826 |
| <i>Waterpl. Area m<sup>2</sup></i>          | 1829,588 |
| <i>Prismatic coeff. (Cp)</i>                | 0,562    |
| <i>Block coeff. (Cb)</i>                    | 0,466    |
| <i>Max Sect. area coeff. (Cm)</i>           | 0,836    |
| <i>Waterpl. area coeff. (Cwp)</i>           | 0,759    |
| <i>LCB from zero pt. (+ve fwd) m</i>        | 54,553   |
| <i>LCF from zero pt. (+ve fwd) m</i>        | 46,859   |
| <i>KB m</i>                                 | 2,872    |
| <i>KG fluid m</i>                           | 6,589    |
| <i>BMt m</i>                                | 11,361   |
| <i>BML m</i>                                | 261,306  |
| <i>GMt corrected m</i>                      | 7,645    |
| <i>GML m</i>                                | 257,59   |
| <i>KMt m</i>                                | 14,234   |
| <i>KML m</i>                                | 264,176  |
| <i>Immersion (TPc) tonne/cm</i>             | 18,753   |
| <i>MTc tonne.m</i>                          | 119,589  |
| <i>RM at 1deg = GMt.Disp.sin(1) tonne.m</i> | 681,399  |
| <i>Max deck inclination deg</i>             | 0,253    |
| <i>Trim angle (+ve by stern) deg</i>        | 0,2354   |

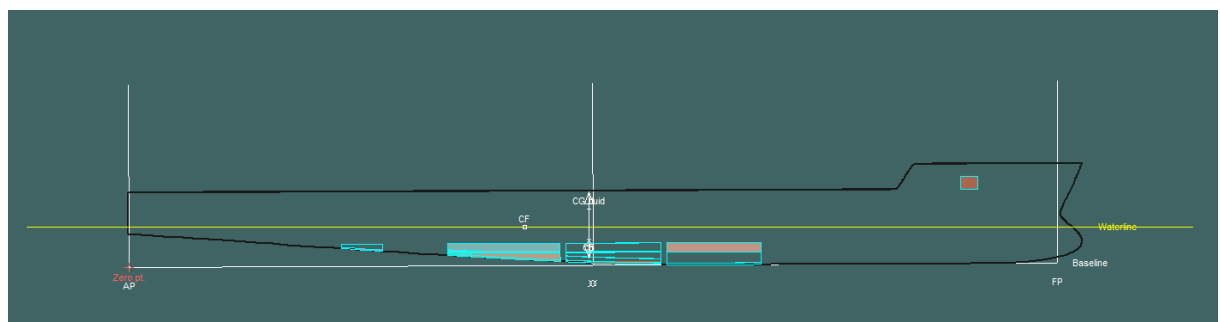


Imagen 5. Llegada a Puerto

## 6 ESTABILIDAD EN ESTADO INTACTO

En este apartado se procederá a la definición de los criterios de estabilidad aplicables para en caso de un buque sin averías, en estado intacto; dichos criterios están contenidos en el “Código Internacional de Estabilidad sin Avería, 2008 (Código IS 2008)” adoptado el 4 de diciembre del 2008 en la resolución MSC 267(85). Estos criterios son los siguientes:

### 6.1 CRITERIOS DE ESTABILIDAD

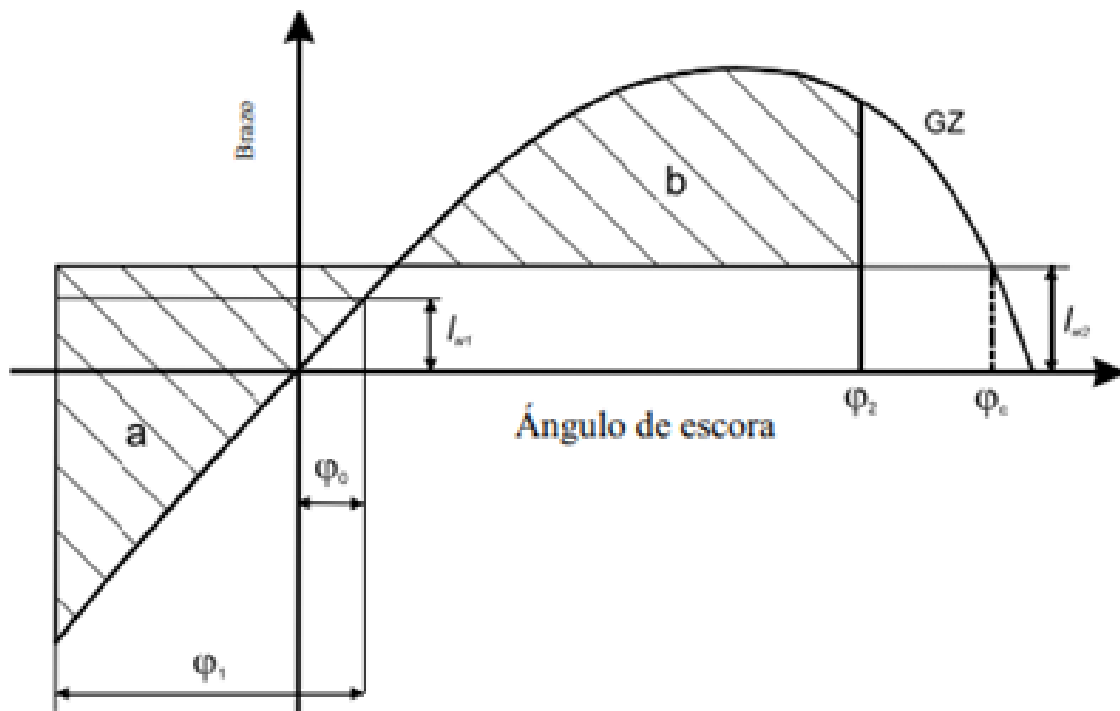
En este apartado, se van a definir los criterios de estabilidad aplicables para un buque sin averías, en estado intacto; dichos criterios están contenidos en el “Código Internacional de Estabilidad sin Avería 2008 (Código IS 2008)” adoptado el 4 de diciembre del 2008 en la resolución MSC 267(85). Estos criterios son los siguientes:

1.  $GZ \geq 0,200$  m para  $\alpha \geq 30^\circ$ .
2.  $GZ$  máximo para  $\alpha > 30^\circ$  preferiblemente, pero siempre  $\alpha \geq 25^\circ$ .
3.  $GM_0 \geq 0,150$  m.
4.  $d30 \geq 0,055 \text{ m} \cdot \text{rad} = 3,15 \text{ m} \cdot \text{deg}$ .
5.  $d40 \geq 0,09 \text{ m} \cdot \text{rad} = 5,1 \text{ m} \cdot \text{deg}$ .
6.  $d40 - d30 \geq 0,03 \text{ m} \cdot \text{rad} = 1,71 \text{ m} \cdot \text{deg}$ .

Siendo  $GZ$  el brazo adrizante,  $GM_0$  la altura metacéntrica inicial,  $\alpha$  el ángulo de escora y  $d40$  y  $d30$  los brazos de estabilidad dinámica para  $\alpha = 40^\circ$  y  $\alpha = 30^\circ$ .

### 6.2 CRITERIOS DE VIENTO

Existe un criterio adicional a los anteriores, contenido en el mismo código, y que en nuestro caso se debe tener en cuenta, es el criterio de viento, en el cual se comprueba la estabilidad del barco ante el viento. Y se explica mediante la siguiente gráfica:



Donde el criterio que se debe el cumplir es la siguiente relación entre las áreas A y B de la gráfica:

$$B \geq A$$

Siendo ,  $l_{w1}$  el par producido por un viento constante en función de la presión del viento y la gravedad;  $l_{w2}$  el par escorante producido por un viento racheado, normalmente equivalente a  $l_{w2} = 1,5 \cdot l_{w1}$ ;  $\varphi_0$  es el ángulo producido por  $l_{w1}$ ;  $\varphi_1$  el ángulo de escora a barlovento; y  $\varphi_2$  el ángulo de inundación progresiva o  $50^\circ$  si es menor.

## 7 APLICACIÓN CONDICIONES DE CARGA

Se presenta a continuación los valores obtenidos para cada criterio, además de la verificación de que se cumple.

### 7.1 SALIDA DE PUERTO

Stability calculation - Yate Rosa Pérez Ramón

Stability 22.01.00.131, build: 131

Model file: C:\Users\Rosa\Desktop\Después de ir donde Vicente\MAXSURF DISEÑO\MOD\Yate Rosa Pérez Ramón (Highest precision, 213 sections, Trimming on, Skin thickness not applied). Long. datum: AP; Vert. datum: Baseline. Analysis tolerance - ideal(worst case): Disp.%(0,100); Trim%(LCG-TCG): 0,01000(0,100); Heel%(LCG-TCG): 0,01000(0,100)

**Loadcase - SALIDA PUERTO**  
**Damage Case - Intact**

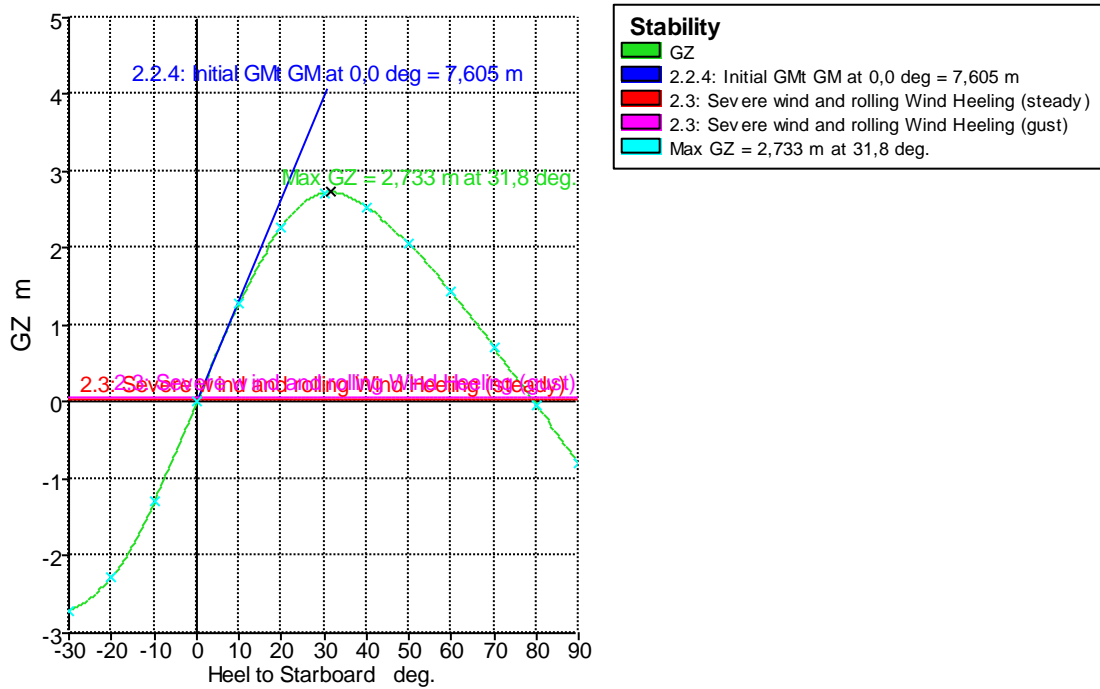
Free to Trim

Specific gravity = 1,025; (Density = 1,025 tonne/m<sup>3</sup>)

Fluid analysis method: Use corrected VCG

| Item Name        | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Lightship        | 1        | 4653,600           | 4653,600            |                               |                                | 55,220         | 0,000           | 6,650          | 0,000                | User Specified |
| Tank1Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | 1,717           | 0,885          | 0,000                | Maximum        |
| Tank2Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | -1,717          | 0,885          | 0,000                | Maximum        |
| Tank3Combustible | 100%     | 28,812             | 28,812              | 34,300                        | 34,300                         | 57,782         | 5,098           | 1,032          | 0,000                | Maximum        |
| Tank4Combustible | 100%     | 28,812             | 28,812              | 34,300                        | 34,300                         | 57,782         | -5,098          | 1,032          | 0,000                | Maximum        |
| Tank5Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank6Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank7Combustible | 100%     | 44,569             | 44,569              | 53,058                        | 53,058                         | 69,318         | 1,721           | 0,798          | 0,000                | Maximum        |
| Tank8Combustible | 100%     | 44,569             | 44,569              | 53,058                        | 53,058                         | 69,318         | -1,721          | 0,798          | 0,000                | Maximum        |
| Tank1CGE         | 100%     | 5,040              | 5,040               | 6,000                         | 6,000                          | 99,514         | -2,150          | 9,520          | 0,000                | Maximum        |
| Tank1AguasNegras | 10%      | 27,188             | 2,719               | 27,188                        | 2,719                          | 49,191         | 1,429           | 0,714          | 42,798               | Maximum        |
| Tank1Uso Diario  | 100%     | 10,424             | 10,424              | 10,424                        | 10,424                         | 27,875         | 1,700           | 2,276          | 0,000                | Maximum        |
| Tank2UsoDiario   | 100%     | 10,424             | 10,424              | 10,424                        | 10,424                         | 27,875         | -1,700          | 2,276          | 0,000                | Maximum        |
| Tank1AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank2AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank3AguaPotable | 100%     | 49,025             | 49,025              | 49,025                        | 49,025                         | 44,525         | 5,232           | 2,057          | 0,000                | Maximum        |
| Tank4AguaPotable | 100%     | 49,025             | 49,025              | 49,025                        | 49,025                         | 44,525         | -5,232          | 2,057          | 0,000                | Maximum        |
| TankAceite       | 100%     | 1,104              | 1,104               | 1,200                         | 1,200                          | 38,540         | -1,586          | 1,368          | 0,000                | Maximum        |
| TankLodos        | 10%      | 1,611              | 0,161               | 1,611                         | 0,161                          | 40,093         | -0,912          | 1,144          | 4,505                | Maximum        |
| Tank2AguasGrises | 10%      | 24,377             | 2,438               | 24,377                        | 2,438                          | 49,281         | -1,410          | 0,702          | 33,788               | Maximum        |
| Tank1AguasGrises | 0%       | 41,642             | 0,000               | 41,642                        | 0,000                          | 69,300         | 1,760           | 1,500          | 0,000                | Maximum        |
| Tank3AguasGrises | 0%       | 41,642             | 0,000               | 41,642                        | 0,000                          | 69,300         | -1,760          | 1,500          | 0,000                | Maximum        |
| Tripulación      | 1        | 6,300              | 6,300               |                               |                                | 55,000         | 0,000           | 6,300          | 0,000                | User Specified |

| Item Name             | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|-----------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Pasaje                | 1        | 10,000             | 10,000              |                               |                                | 55,000         | 0,000           | 16,000         | 0,000                | User Specified |
| Pertrechos            | 1        | 80,000             | 80,000              |                               |                                | 55,000         | 0,000           | 6,020          | 0,000                | User Specified |
| Elementos Garaje      | 1        | 11,353             | 11,353              |                               |                                | 36,000         | 0,000           | 11,000         | 0,000                | User Specified |
| Piscina               | 1        | 142,000            | 142,000             |                               |                                | 31,580         | 0,000           | 9,470          | 0,000                | User Specified |
| Helicóptero           | 1        | 2,720              | 2,720               |                               |                                | 8,670          | 0,000           | 8,170          | 0,000                | User Specified |
| <b>Total Loadcase</b> |          |                    | <b>5414,065</b>     | <b>695,113</b>                | <b>563,971</b>                 | <b>54,406</b>  | <b>-0,002</b>   | <b>6,270</b>   | <b>81,090</b>        |                |
| FS correction         |          |                    |                     |                               |                                |                |                 | <b>0,015</b>   |                      |                |
| VCG fluid             |          |                    |                     |                               |                                |                |                 | <b>6,284</b>   |                      |                |



| Heel to Starboard deg                    | -30,0   | -20,0   | -10,0  | 0,0    | 10,0   | 20,0    | 30,0    | 40,0    | 50,0     | 60,0     | 70,0     | 80,0     | 90,0     |
|--|---------|---------|--------|--------|--------|---------|---------|---------|----------|----------|----------|----------|----------|
| GZ m                                     | -2,722  | -2,275  | -1,287 | 0,002  | 1,292  | 2,279   | 2,726   | 2,542   | 2,058    | 1,429    | 0,714    | -0,043   | -0,804   |
| Area under GZ curve from zero heel m.deg | 50,0616 | 24,7694 | 6,5405 | 0,0042 | 6,5982 | 24,8105 | 50,3711 | 77,1137 | 100,2653 | 117,7937 | 128,5578 | 131,9256 | 127,6895 |
| Displacement t                           | 5414    | 5414    | 5414   | 5414   | 5414   | 5414    | 5414    | 5414    | 5414     | 5414     | 5415     | 5415     | 5414     |

MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Heel to Starboard deg         | -30,0    | -20,0    | -10,0    | 0,0      | 10,0     | 20,0     | 30,0     | 40,0     | 50,0     | 60,0     | 70,0     | 80,0     | 90,0     |
|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Draft at FP m                 | 4,739    | 4,640    | 4,548    | 4,510    | 4,547    | 4,641    | 4,738    | 4,868    | 4,980    | 4,996    | 4,928    | 4,613    | n/a      |
| Draft at AP m                 | 3,233    | 4,166    | 4,696    | 4,839    | 4,697    | 4,165    | 3,233    | 2,112    | 0,662    | -1,460   | -5,388   | -16,604  | n/a      |
| WL Length m                   | 111,179  | 111,303  | 111,420  | 111,469  | 111,422  | 111,302  | 111,180  | 111,030  | 110,909  | 110,887  | 110,935  | 111,153  | 112,997  |
| Beam max extents on WL m      | 16,422   | 20,636   | 21,544   | 21,596   | 21,544   | 20,637   | 16,422   | 13,215   | 13,321   | 12,876   | 12,339   | 11,944   | 11,713   |
| Wetted Area m <sup>2</sup>    | 2145,994 | 2128,156 | 2212,147 | 2241,830 | 2212,148 | 2128,156 | 2145,926 | 2183,459 | 2206,090 | 2223,246 | 2235,666 | 2240,351 | 2228,168 |
| Waterpl. Area m <sup>2</sup>  | 1399,180 | 1676,278 | 1801,904 | 1844,583 | 1801,942 | 1676,247 | 1399,181 | 1163,064 | 1033,084 | 961,555  | 922,668  | 908,887  | 909,223  |
| Prismatic coeff. (Cp)         | 0,592    | 0,581    | 0,572    | 0,569    | 0,572    | 0,581    | 0,592    | 0,606    | 0,618    | 0,631    | 0,643    | 0,653    | 0,653    |
| Block coeff. (Cb)             | 0,429    | 0,388    | 0,435    | 0,474    | 0,435    | 0,388    | 0,429    | 0,478    | 0,437    | 0,427    | 0,431    | 0,439    | 0,436    |
| LCB from zero pt. (+ve fwd) m | 54,457   | 54,419   | 54,408   | 54,393   | 54,403   | 54,422   | 54,457   | 54,503   | 54,540   | 54,553   | 54,586   | 54,596   | 54,595   |
| LCF from zero pt. (+ve fwd) m | 52,058   | 49,874   | 47,843   | 46,860   | 47,841   | 49,876   | 52,058   | 54,213   | 56,374   | 58,469   | 60,276   | 61,847   | 62,795   |
| Max deck inclination deg      | 30,0070  | 20,0013  | 10,0003  | 0,1715   | 10,0003  | 20,0013  | 30,0070  | 40,0126  | 50,0153  | 60,0142  | 70,0107  | 80,0057  | 90,0000  |
| Trim angle (+ve by stern) deg | -0,7841  | -0,2470  | 0,0772   | 0,1715   | 0,0782   | -0,2480  | -0,7837  | -1,4354  | -2,2476  | -3,3590  | -5,3574  | -10,9175 | n/a      |

| Key point                              | Type                         | Immersion angle deg            | Emergence angle deg |
|--|------------------------------|--------------------------------|---------------------|
| Margin Line (immersion pos = 60,726 m) |                              | 21,8                           | n/a                 |
| Deck Edge (immersion pos = 60,726 m)   |                              | 22,2                           | n/a                 |
| Garaje 1                               | Potential downflooding point | 27,5                           | 0                   |
| Garaje 2                               | Downflooding point           | Not immersed in positive range | 0                   |

| Code                           | Criteria                 | Value | Units | Actual | Status | Margin % |
|--------------------------------|--------------------------|-------|-------|--------|--------|----------|
| 267(85) Ch2 - General Criteria | 2.3: IMO roll back angle | 20,8  | deg   |        |        |          |

| Code                           | Criteria  | Value  | Units | Actual  | Status | Margin % |
|--------------------------------|---|--------|-------|---------|--------|----------|
| 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 30   | 3,1513 | m.deg | 50,3711 | Pass   | +1498,42 |
| 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 40   | 5,1566 | m.deg | 77,1137 | Pass   | +1395,44 |
| 267(85) Ch2 - General Criteria | 2.2.1: Area 30 to 40  | 1,7189 | m.deg | 26,7426 | Pass   | +1455,80 |
| 267(85) Ch2 - General Criteria | 2.2.2: Max GZ at 30 or greater  | 0,200  | m     | 2,733   | Pass   | +1266,50 |
| 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ  | 25,0   | deg   | 31,8    | Pass   | +27,27   |
| 267(85) Ch2 - General Criteria | 2.2.4: Initial GMt  | 0,150  | m     | 7,605   | Pass   | +4970,00 |
| 267(85) Ch2 - General Criteria | 2.3: Severe wind and rolling  |        |       |         | Pass   |          |
|                                | Angle of steady heel shall not be greater than ( $\leq$ )                             | 16,0   | deg   | 0,3     | Pass   | +97,84   |
|                                | Angle of steady heel / Deck edge immersion angle shall not be greater than ( $\leq$ ) | 80,00  | %     | 1,55    | Pass   | +98,06   |
|                                | Area1 / Area2 shall not be less than ( $\geq$ )                                       | 100,00 | %     | 355,17  | Pass   | +255,17  |
|                                |   |        |       |         |        |          |

## 7.2 SITUACIÓN INTERMEDIA

### Stability calculation - Yate Rosa Pérez Ramón

Stability 22.01.00.131, build: 131

Model file: C:\Users\Rosa\Desktop\Después de ir donde Vicente\MAXSURF DISEÑO\MOD\Yate Rosa Pérez Ramón (Highest precision, 213 sections, Trimming on, 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)

#### Loadcase - SITUACIÓN MEDIA

##### Damage Case - Intact

Free to Trim

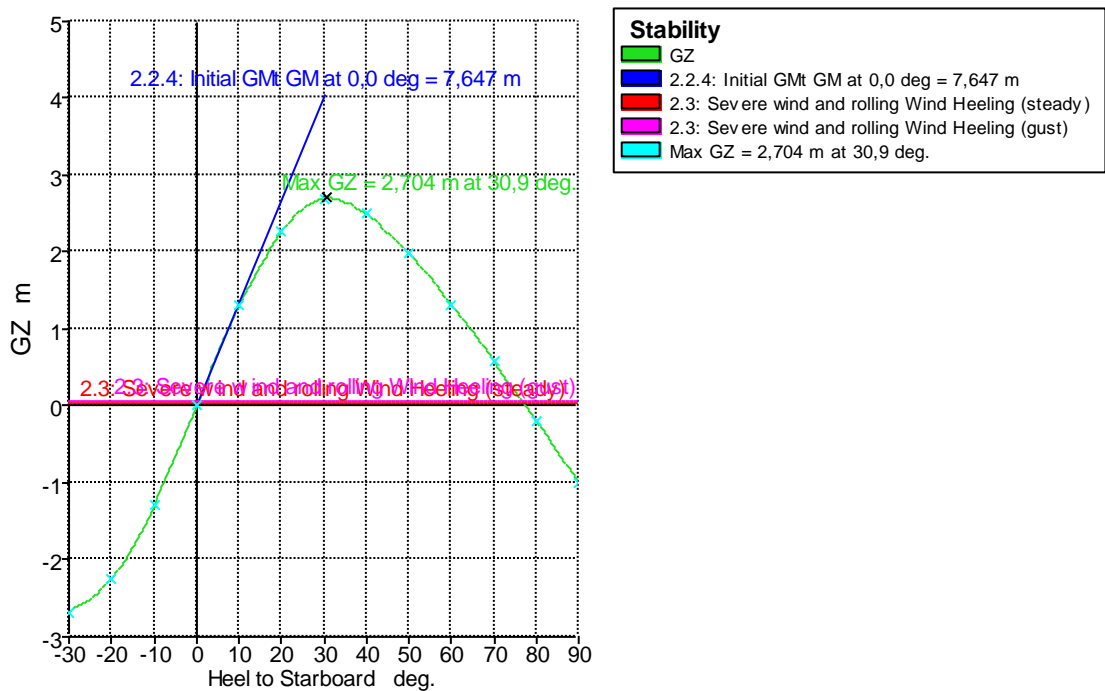
Specific gravity = 1,025; (Density = 1,025 tonne/m<sup>3</sup>)

Fluid analysis method: Use corrected VCG

| Item Name        | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Lightship        | 1        | 4653,600           | 4653,600            |                               |                                | 55,220         | 0,000           | 6,650          | 0,000                | User Specified |
| Tank1Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | 1,717           | 0,885          | 0,000                | Maximum        |
| Tank2Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | -1,717          | 0,885          | 0,000                | Maximum        |
| Tank3Combustible | 0%       | 28,812             | 0,000               | 34,300                        | 0,000                          | 62,811         | 2,393           | 0,248          | 0,000                | Maximum        |
| Tank4Combustible | 0%       | 28,812             | 0,000               | 34,300                        | 0,000                          | 62,811         | -2,393          | 0,248          | 0,000                | Maximum        |
| Tank5Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank6Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank7Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | 0,047           | 0,003          | 0,000                | Maximum        |
| Tank8Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | -0,047          | 0,003          | 0,000                | Maximum        |
| Tank1CGE         | 100%     | 5,040              | 5,040               | 6,000                         | 6,000                          | 99,514         | -2,150          | 9,520          | 0,000                | Maximum        |
| Tank1AguasNegras | 50%      | 27,188             | 13,594              | 27,188                        | 13,594                         | 47,102         | 1,620           | 0,963          | 42,798               | Maximum        |
| Tank1Uso Diario  | 50%      | 10,424             | 5,212               | 10,424                        | 5,212                          | 28,100         | 1,639           | 2,110          | 15,768               | Maximum        |
| Tank2UsoDiario   | 50%      | 10,424             | 5,212               | 10,424                        | 5,212                          | 28,100         | -1,639          | 2,110          | 15,768               | Maximum        |
| Tank1AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank2AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank3AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | 5,090           | 1,500          | 0,000                | Maximum        |
| Tank4AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | -5,090          | 1,500          | 0,000                | Maximum        |
| TankAceite       | 50%      | 1,104              | 0,552               | 1,200                         | 0,600                          | 38,581         | -1,412          | 1,299          | 4,145                | Maximum        |
| TankLodos        | 50%      | 1,611              | 0,806               | 1,611                         | 0,806                          | 39,959         | -1,495          | 1,236          | 4,505                | Maximum        |
| Tank2AguasGrises | 100%     | 24,377             | 24,377              | 24,377                        | 24,377                         | 46,599         | -1,689          | 1,134          | 0,000                | Maximum        |
| Tank1AguasGrises | 0%       | 41,642             | 0,000               | 41,642                        | 0,000                          | 69,300         | 1,760           | 1,500          | 0,000                | Maximum        |
| Tank3AguasGrises | 50%      | 41,642             | 20,821              | 41,642                        | 20,821                         | 69,300         | -1,760          | 1,775          | 36,040               | Maximum        |
| Tripulación      | 1        | 6,300              | 6,300               |                               |                                | 55,000         | 0,000           | 6,300          | 0,000                | User Specified |
| Pasaje           | 1        | 10,000             | 10,000              |                               |                                | 55,000         | 0,000           | 16,000         | 0,000                | User Specified |
| Pertrechos       | 1        | 80,000             | 80,000              |                               |                                | 55,000         | 0,000           | 6,020          | 0,000                | User Specified |
| Elementos Garaje | 1        | 11,353             | 11,353              |                               |                                | 36,000         | 0,000           | 11,000         | 0,000                | User Specified |



| Item Name      | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|----------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Piscina        | 1        | 142,000            | 142,000             |                               |                                | 31,580         | 0,000           | 9,470          | 0,000                | User Specified |
| Helicóptero    | 1        | 2,720              | 2,720               |                               |                                | 8,670          | 0,000           | 8,170          | 0,000                | User Specified |
| Total Loadcase |          |                    | 5212,557            | 695,113                       | 334,461                        | 54,362         | -0,013          | 6,457          | 119,023              |                |
| FS correction  |          |                    |                     |                               |                                |                |                 | 0,023          |                      |                |
| VCG fluid      |          |                    |                     |                               |                                |                |                 | 6,480          |                      |                |



| Heel to Starboard deg                    | -30,0   | -20,0   | -10,0   | 0,0     | 10,0    | 20,0    | 30,0    | 40,0    | 50,0    | 60,0     | 70,0     | 80,0     | 90,0     |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| GZ m                                     | -2,675  | -2,241  | -1,278  | 0,013   | 1,304   | 2,265   | 2,698   | 2,495   | 1,980   | 1,318    | 0,574    | -0,208   | -0,989   |
| Area under GZ curve from zero heel m.deg | 49,3538 | 24,4769 | 6,4588  | 0,0240  | 6,7336  | 24,9443 | 50,2906 | 76,6738 | 99,2083 | 115,7898 | 125,2973 | 127,1419 | 121,1541 |
| Displacement t                           | 5213    | 5213    | 5213    | 5213    | 5213    | 5213    | 5212    | 5213    | 5213    | 5213     | 5213     | 5213     | 5213     |
| Draft at FP m                            | 4,532   | 4,453   | 4,360   | 4,320   | 4,359   | 4,454   | 4,531   | 4,627   | 4,700   | 4,667    | 4,467    | 3,771    | n/a      |
| Draft at AP m                            | 3,112   | 4,091   | 4,644   | 4,795   | 4,645   | 4,090   | 3,111   | 1,912   | 0,349   | -1,957   | -6,211   | -18,374  | n/a      |
| WL Length m                              | 111,422 | 111,525 | 111,644 | 111,694 | 111,645 | 111,524 | 111,422 | 111,306 | 111,217 | 111,241  | 111,418  | 111,944  | 112,739  |

## MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Heel to Starboard deg         | -30,0    | -20,0    | -10,0    | 0,0      | 10,0     | 20,0     | 30,0     | 40,0     | 50,0     | 60,0     | 70,0     | 80,0     | 90,0     |
|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Beam max extents on WL m      | 16,504   | 20,460   | 21,474   | 21,578   | 21,474   | 20,460   | 16,504   | 13,252   | 13,178   | 13,002   | 12,394   | 11,951   | 11,680   |
| Wetted Area m <sup>2</sup>    | 2092,963 | 2091,407 | 2179,708 | 2212,943 | 2179,711 | 2091,406 | 2092,798 | 2127,848 | 2149,205 | 2165,854 | 2177,618 | 2182,014 | 2165,030 |
| Waterpl. Area m <sup>2</sup>  | 1401,041 | 1656,390 | 1787,497 | 1835,352 | 1787,539 | 1656,359 | 1401,049 | 1163,350 | 1031,685 | 960,727  | 922,585  | 909,464  | 894,351  |
| Prismatic coeff. (Cp)         | 0,587    | 0,577    | 0,569    | 0,565    | 0,569    | 0,577    | 0,587    | 0,599    | 0,611    | 0,622    | 0,632    | 0,640    | 0,646    |
| Block coeff. (Cb)             | 0,419    | 0,385    | 0,430    | 0,470    | 0,430    | 0,385    | 0,419    | 0,469    | 0,434    | 0,416    | 0,422    | 0,430    | 0,432    |
| LCB from zero pt. (+ve fwd) m | 54,412   | 54,372   | 54,360   | 54,343   | 54,355   | 54,376   | 54,413   | 54,463   | 54,504   | 54,531   | 54,554   | 54,566   | 54,565   |
| LCF from zero pt. (+ve fwd) m | 51,998   | 49,902   | 47,849   | 46,816   | 47,847   | 49,904   | 51,998   | 54,152   | 56,282   | 58,424   | 60,299   | 61,943   | 62,129   |
| Max deck inclination deg      | 30,0062  | 20,0008  | 10,0010  | 0,2473   | 10,0011  | 20,0008  | 30,0062  | 40,0122  | 50,0155  | 60,0150  | 70,0115  | 80,0062  | 90,0000  |
| Trim angle (+ve by stern) deg | -0,7394  | -0,1884  | 0,1477   | 0,2473   | 0,1488   | -0,1895  | -0,7396  | -1,4140  | -2,2650  | -3,4463  | -5,5444  | -11,3826 | n/a      |

| Key point                              | Type                         | Immersion angle deg            | Emergence angle deg |
|--|------------------------------|--------------------------------|---------------------|
| Margin Line (immersion pos = 60,726 m) |                              | 22,6                           | n/a                 |
| Deck Edge (immersion pos = 60,726 m)   |                              | 23                             | n/a                 |
| Garaje 1                               | Potential downflooding point | 28,3                           | 0                   |
| Garaje 2                               | Downflooding point           | Not immersed in positive range | 0                   |

| Code                           | Criteria                 | Value  | Units | Actual  | Status | Margin % |
|--------------------------------|--------------------------|--------|-------|---------|--------|----------|
| 267(85) Ch2 - General Criteria | 2.3: IMO roll back angle | 21,1   | deg   |         |        |          |
| 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 30      | 3,1513 | m.deg | 50,2906 | Pass   | +1495,87 |
| 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 40      | 5,1566 | m.deg | 76,6738 | Pass   | +1386,91 |

## MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Code                              | Criteria  | Value  | Units | Actual  | Status | Margin<br>% |
|-----------------------------------|---|--------|-------|---------|--------|-------------|
| 267(85) Ch2 -<br>General Criteria | 2.2.1: Area 30 to 40  | 1,7189 | m.deg | 26,3832 | Pass   | +1434,89    |
| 267(85) Ch2 -<br>General Criteria | 2.2.2: Max GZ at 30 or greater  | 0,200  | m     | 2,704   | Pass   | +1252,00    |
| 267(85) Ch2 -<br>General Criteria | 2.2.3: Angle of maximum GZ  | 25,0   | deg   | 30,9    | Pass   | +23,64      |
| 267(85) Ch2 -<br>General Criteria | 2.2.4: Initial GMt  | 0,150  | m     | 7,647   | Pass   | +4998,00    |
| 267(85) Ch2 -<br>General Criteria | 2.3: Severe wind and rolling  |        |       |         | Pass   |             |
|                                   | Angle of steady heel shall not be greater than ( $\leq$ )                             | 16,0   | deg   | 0,3     | Pass   | +98,22      |
|                                   | Angle of steady heel / Deck edge immersion angle shall not be greater than ( $\leq$ ) | 80,00  | %     | 1,23    | Pass   | +98,46      |
|                                   | Area1 / Area2 shall not be less than ( $\geq$ )                                       | 100,00 | %     | 341,51  | Pass   | +241,51     |
|                                   |   |        |       |         |        |             |

## 7.3 LLEGADA A PUERTO

Stability calculation - Yate Rosa Pérez Ramón

Stability 22.01.00.131, build: 131

Model file: C:\Users\Rosa\Desktop\Después de ir donde Vicente\MAXSURF DISEÑO\MOD\Yate Rosa Pérez Ramón (Highest precision, 213 sections, Trimming on, 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)

### Loadcase - LLEGADA A PUERTO

#### Damage Case - Intact

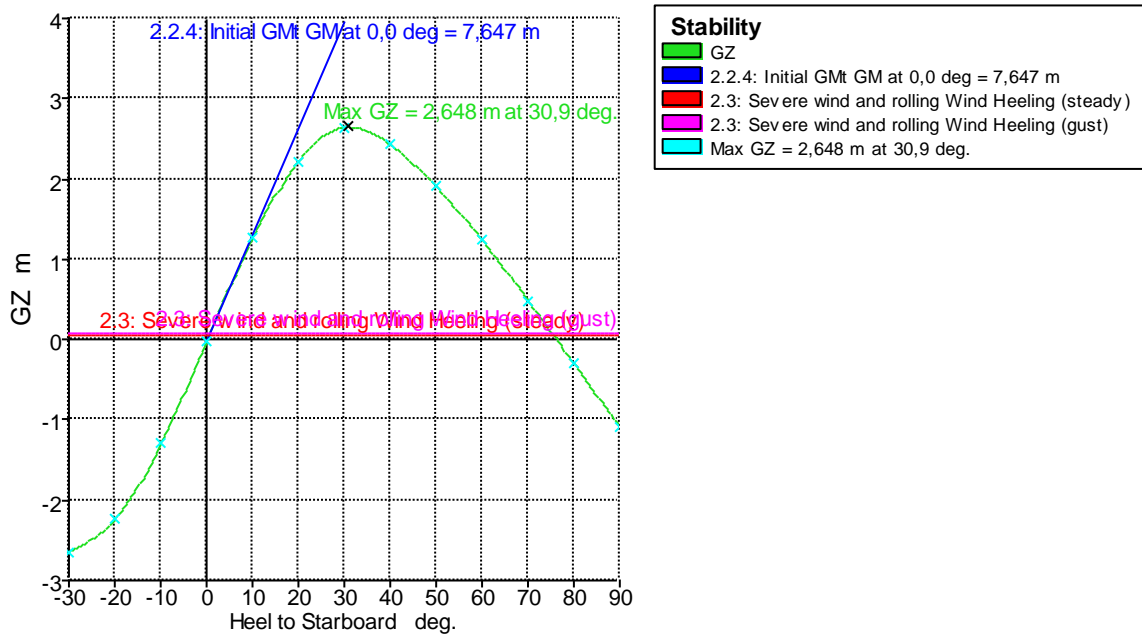
Free to Trim

Specific gravity = 1,025; (Density = 1,025 tonne/m<sup>3</sup>)

Fluid analysis method: Use corrected VCG

| Item Name        | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Lightship        | 1        | 4653,600           | 4653,600            |                               |                                | 55,220         | 0,000           | 6,650          | 0,000                | User Specified |
| Tank1Combustible | 10%      | 38,732             | 3,873               | 46,110                        | 4,611                          | 59,687         | 1,424           | 0,290          | 30,274               | Maximum        |
| Tank2Combustible | 10%      | 38,732             | 3,873               | 46,110                        | 4,611                          | 59,687         | -1,424          | 0,290          | 30,274               | Maximum        |
| Tank3Combustible | 0%       | 28,812             | 0,000               | 34,300                        | 0,000                          | 62,811         | 2,393           | 0,248          | 0,000                | Maximum        |
| Tank4Combustible | 0%       | 28,812             | 0,000               | 34,300                        | 0,000                          | 62,811         | -2,393          | 0,248          | 0,000                | Maximum        |
| Tank5Combustible | 0%       | 31,799             | 0,000               | 37,856                        | 0,000                          | 57,400         | 1,760           | 1,600          | 0,000                | Maximum        |
| Tank6Combustible | 0%       | 31,799             | 0,000               | 37,856                        | 0,000                          | 57,400         | -1,760          | 1,600          | 0,000                | Maximum        |
| Tank7Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | 0,047           | 0,003          | 0,000                | Maximum        |
| Tank8Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | -0,047          | 0,003          | 0,000                | Maximum        |
| Tank1CGE         | 100%     | 5,040              | 5,040               | 6,000                         | 6,000                          | 99,514         | -2,150          | 9,520          | 0,000                | Maximum        |
| Tank1AguasNegras | 100%     | 27,188             | 27,188              | 27,188                        | 27,188                         | 45,848         | 1,681           | 1,155          | 0,000                | Maximum        |
| Tank1Uso Diario  | 10%      | 10,424             | 1,042               | 10,424                        | 1,042                          | 29,054         | 1,395           | 1,929          | 15,768               | Maximum        |
| Tank2UsoDiario   | 10%      | 10,424             | 1,042               | 10,424                        | 1,042                          | 29,054         | -1,395          | 1,929          | 15,768               | Maximum        |
| Tank1AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank2AguaPotable | 10%      | 44,954             | 4,495               | 44,954                        | 4,495                          | 44,450         | -1,760          | 1,650          | 42,798               | Maximum        |
| Tank3AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | 5,090           | 1,500          | 0,000                | Maximum        |
| Tank4AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | -5,090          | 1,500          | 0,000                | Maximum        |
| TankAceite       | 10%      | 1,104              | 0,110               | 1,200                         | 0,120                          | 38,731         | -0,839          | 1,222          | 4,145                | Maximum        |
| TankLodos        | 100%     | 1,611              | 1,611               | 1,611                         | 1,611                          | 39,930         | -1,628          | 1,326          | 0,000                | Maximum        |
| Tank2AguasGrises | 100%     | 24,377             | 24,377              | 24,377                        | 24,377                         | 46,599         | -1,689          | 1,134          | 0,000                | Maximum        |
| Tank1AguasGrises | 100%     | 41,642             | 41,642              | 41,642                        | 41,642                         | 69,300         | 1,760           | 2,050          | 0,000                | Maximum        |
| Tank3AguasGrises | 100%     | 41,642             | 41,642              | 41,642                        | 41,642                         | 69,300         | -1,760          | 2,050          | 0,000                | Maximum        |
| Tripulación      | 1        | 6,300              | 6,300               |                               |                                | 55,000         | 0,000           | 6,300          | 0,000                | User Specified |
| Pasaje           | 1        | 10,000             | 10,000              |                               |                                | 55,000         | 0,000           | 16,000         | 0,000                | User Specified |
| Pertrechos       | 1        | 80,000             | 80,000              |                               |                                | 55,000         | 0,000           | 6,020          | 0,000                | User Specified |
| Elementos Garaje | 1        | 11,353             | 11,353              |                               |                                | 36,000         | 0,000           | 11,000         | 0,000                | User Specified |

| Item Name      | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|----------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Piscina        | 1        | 142,000            | 142,000             |                               |                                | 31,580         | 0,000           | 9,470          | 0,000                | User Specified |
| Helicóptero    | 1        | 2,720              | 2,720               |                               |                                | 8,670          | 0,000           | 8,170          | 0,000                | User Specified |
| Total Loadcase |          |                    | 5106,864            | 695,113                       | 203,336                        | 54,560         | 0,012           | 6,561          | 139,025              |                |
| FS correction  |          |                    |                     |                               |                                |                |                 | 0,027          |                      |                |
| VCG fluid      |          |                    |                     |                               |                                |                |                 | 6,589          |                      |                |



| Heel to Starboard deg                    | -30,0       | -20,0       | -10,0       | 0,0         | 10,0        | 20,0        | 30,0        | 40,0        | 50,0        | 60,0         | 70,0         | 80,0         | 90,0         |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|
| GZ m                                     | -2,664      | -2,242      | -1,299      | -0,012      | 1,275       | 2,219       | 2,643       | 2,434       | 1,908       | 1,235        | 0,482        | -0,306       | -1,091       |
| Area under GZ curve from zero heel m.deg | 49,645<br>1 | 24,828<br>4 | 6,7001      | -0,0221     | 6,4707      | 24,302<br>7 | 49,130<br>1 | 74,933<br>7 | 96,803<br>1 | 112,60<br>67 | 121,23<br>75 | 122,12<br>87 | 115,13<br>64 |
| Displacement t                           | 5107        | 5107        | 5107        | 5107        | 5107        | 5107        | 5106        | 5107        | 5107        | 5107         | 5107         | 5107         | 5107         |
| Draft at FP m                            | 4,495       | 4,416       | 4,318       | 4,274       | 4,317       | 4,417       | 4,495       | 4,590       | 4,663       | 4,630        | 4,422        | 3,694        | n/a          |
| Draft at AP m                            | 2,983       | 4,000       | 4,573       | 4,731       | 4,574       | 3,999       | 2,983       | 1,719       | 0,069       | -2,372       | -6,879       | -19,766      | n/a          |
| WL Length m                              | 111,46<br>4 | 111,56<br>7 | 111,69<br>2 | 111,74<br>7 | 111,69<br>4 | 111,56<br>6 | 111,46<br>4 | 111,34<br>8 | 111,26<br>0 | 111,28<br>4  | 111,46<br>5  | 112,00<br>2  | 112,73<br>1  |
| Beam max                                 | 16,538      | 20,380      | 21,440      | 21,570      | 21,440      | 20,381      | 16,538      | 13,268      | 13,149      | 13,034       | 12,407       | 11,951       | 11,668       |

MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Heel to Starboard deg         | -30,0    | -20,0    | -10,0    | 0,0      | 10,0     | 20,0     | 30,0     | 40,0     | 50,0     | 60,0     | 70,0     | 80,0     | 90,0     |
|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| extents on WL m               |          |          |          |          |          |          |          |          |          |          |          |          |          |
| Wetted Area m <sup>2</sup>    | 2064,614 | 2071,713 | 2162,155 | 2198,767 | 2162,162 | 2071,712 | 2064,500 | 2098,684 | 2119,755 | 2136,332 | 2148,127 | 2152,633 | 2135,258 |
| Waterpl. Area m <sup>2</sup>  | 1402,311 | 1643,887 | 1777,568 | 1829,635 | 1777,616 | 1643,854 | 1402,317 | 1163,884 | 1031,575 | 960,560  | 922,338  | 909,019  | 892,120  |
| Prismatic coeff. (Cp)         | 0,583    | 0,573    | 0,565    | 0,562    | 0,565    | 0,573    | 0,583    | 0,595    | 0,606    | 0,617    | 0,628    | 0,635    | 0,642    |
| Block coeff. (Cb)             | 0,414    | 0,382    | 0,427    | 0,466    | 0,427    | 0,382    | 0,414    | 0,463    | 0,431    | 0,411    | 0,417    | 0,426    | 0,429    |
| LCB from zero pt. (+ve fwd) m | 54,614   | 54,571   | 54,558   | 54,541   | 54,553   | 54,576   | 54,615   | 54,669   | 54,713   | 54,741   | 54,766   | 54,777   | 54,776   |
| LCF from zero pt. (+ve fwd) m | 51,983   | 50,021   | 47,949   | 46,855   | 47,947   | 50,022   | 51,983   | 54,147   | 56,275   | 58,433   | 60,325   | 61,976   | 62,087   |
| Max deck inclination deg      | 30,0070  | 20,0010  | 10,0008  | 0,2382   | 10,0009  | 20,0010  | 30,0070  | 40,0136  | 50,0173  | 60,0167  | 70,0129  | 80,0069  | 90,0000  |
| Trim angle (+ve by stern) deg | -0,7872  | -0,2168  | 0,1327   | 0,2382   | 0,1339   | -0,2179  | -0,7875  | -1,4950  | -2,3918  | -3,6422  | -5,8658  | -12,0394 | n/a      |

| Key point                              | Type                         | Immersion angle deg            | Emergence angle deg |
|--|------------------------------|--------------------------------|---------------------|
| Margin Line (immersion pos = 60,726 m) |                              |                                | 23                  |
| Deck Edge (immersion pos = 61,293 m)   |                              |                                | 23,4                |
| Garaje 1                               | Potential downflooding point |                                | 28,9                |
| Garaje 2                               | Downflooding point           | Not immersed in positive range | 0                   |

| Code                           | Criteria                 | Value  | Units | Actual  | Status | Margin % |
|--------------------------------|--------------------------|--------|-------|---------|--------|----------|
| 267(85) Ch2 - General Criteria | 2.3: IMO roll back angle | 21,2   | deg   |         |        |          |
| 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 30      | 3,1513 | m.deg | 49,1301 | Pass   | +1459,04 |
| 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 40      | 5,1566 | m.deg | 74,9337 | Pass   | +1353,16 |
| 267(85) Ch2 - General Criteria | 2.2.1: Area 30 to 40     | 1,7189 | m.deg | 25,8036 | Pass   | +1401,17 |

## MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Code                              | Criteria  | Value         | Units      | Actual        | Status      | Margin %        |
|-----------------------------------|---|---------------|------------|---------------|-------------|-----------------|
| 267(85) Ch2 -<br>General Criteria | <b>2.2.2: Max GZ at 30 or greater</b>   | <b>0,200</b>  | <b>m</b>   | <b>2,648</b>  | <b>Pass</b> | <b>+1224,00</b> |
| 267(85) Ch2 -<br>General Criteria | <b>2.2.3: Angle of maximum GZ</b>   | <b>25,0</b>   | <b>deg</b> | <b>30,9</b>   | <b>Pass</b> | <b>+23,64</b>   |
| 267(85) Ch2 -<br>General Criteria | <b>2.2.4: Initial GMt</b>   | <b>0,150</b>  | <b>m</b>   | <b>7,647</b>  | <b>Pass</b> | <b>+4998,00</b> |
| 267(85) Ch2 -<br>General Criteria | <b>2.3: Severe wind and rolling</b>   |               |            |               | <b>Pass</b> |                 |
|                                   | <b>Angle of steady heel shall not be greater than (&lt;=)</b>                             | <b>16,0</b>   | <b>deg</b> | <b>0,5</b>    | <b>Pass</b> | <b>+96,97</b>   |
|                                   | <b>Angle of steady heel / Deck edge immersion angle shall not be greater than (&lt;=)</b> | <b>80,00</b>  | <b>%</b>   | <b>2,07</b>   | <b>Pass</b> | <b>+97,41</b>   |
|                                   | <b>Area1 / Area2 shall not be less than (&gt;=)</b>                                       | <b>100,00</b> | <b>%</b>   | <b>330,28</b> | <b>Pass</b> | <b>+230,28</b>  |
|                                   |   |               |            |               |             |                 |

## 8 LÍMITES KG

Model file: C:\Users\Rosa\Desktop\Después de ir donde Vicente\MAXSURF DISEÑO\MOD\Yate Rosa Pérez Ramón (Highest precision, 213 sections, Trimming on, 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

Initial Trim = 0 m (+ve by stern)

Specific gravity = 1,025; (Density = 1,025 tonne/m<sup>3</sup>)

Heel to starboard; heel range: from -30 deg to 30 deg in steps of 10 deg.

### Criteria tested:

267(85) Ch2 - General Criteria 2.2.1: Area 0 to 30

267(85) Ch2 - General Criteria 2.2.1: Area 0 to 40

267(85) Ch2 - General Criteria 2.2.2: Max GZ at 30 or greater

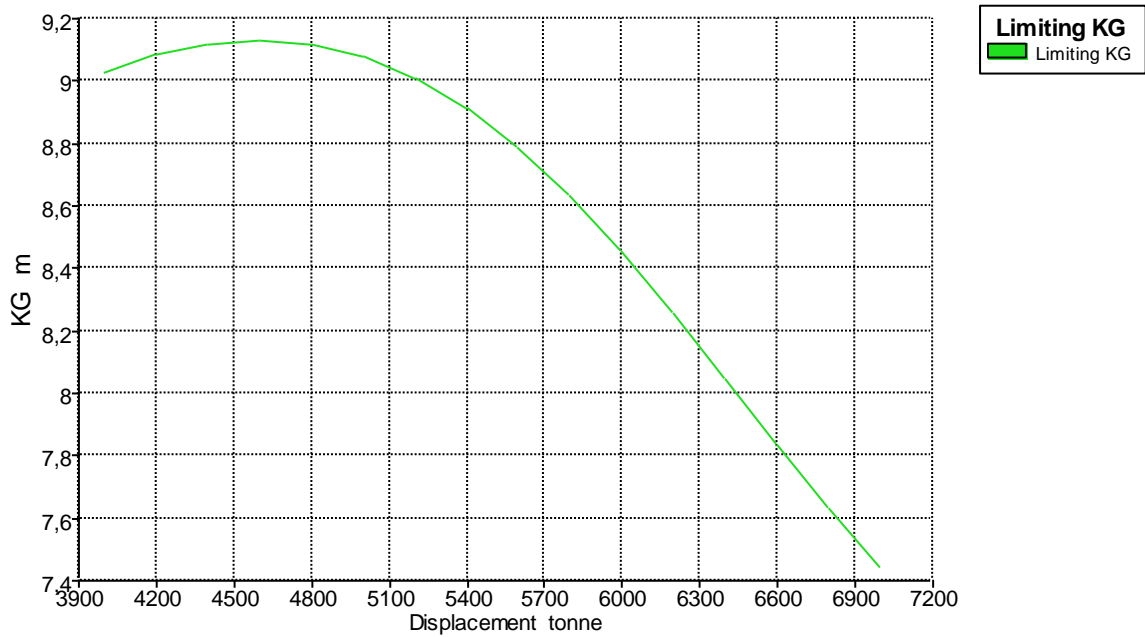
267(85) Ch2 - General Criteria 2.2.3: Angle of maximum GZ

267(85) Ch2 - General Criteria 2.2.4: Initial GMt

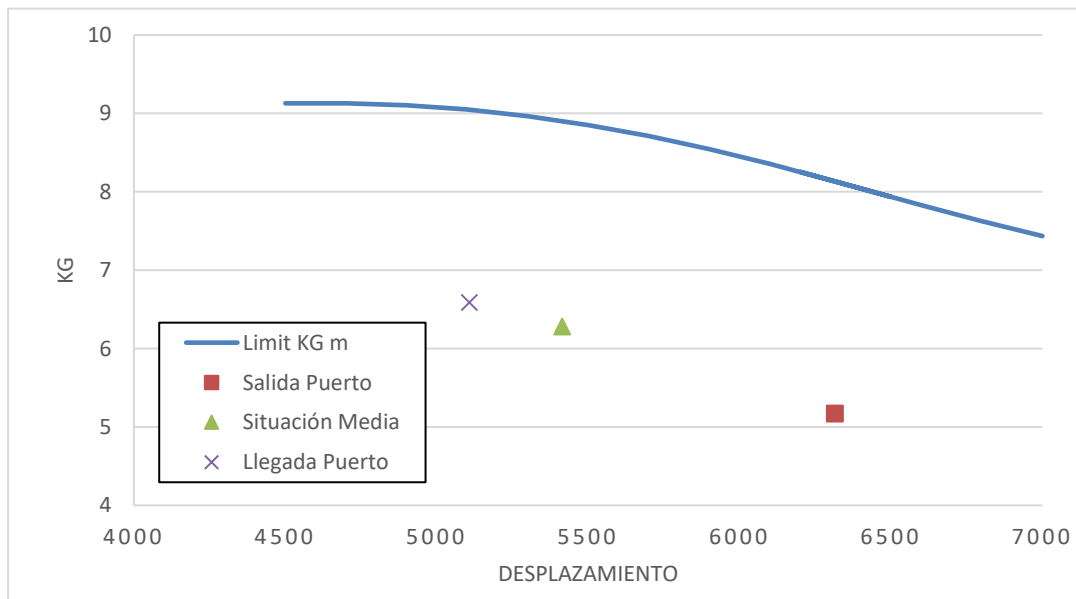
267(85) Ch2 - General Criteria 2.3: Severe wind and Rolling

| Displacement (intact) tonne | Draft Amidships m | Trim (+ve by stern) m | LCG m  | TCG m | VCG m | Limit KG m | min. GM m | Criterion                      | Name                       |
|-----------------------------|-------------------|-----------------------|--------|-------|-------|------------|-----------|--------------------------------|----------------------------|
| 4000                        | 3,932             | 0,000                 | 57,890 | 0,000 | 9,029 | 9,029      | 6,378     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 4200                        | 4,043             | 0,000                 | 57,408 | 0,000 | 9,085 | 9,085      | 6,099     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 4400                        | 4,153             | 0,000                 | 56,961 | 0,000 | 9,120 | 9,120      | 5,811     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 4600                        | 4,262             | 0,000                 | 56,547 | 0,000 | 9,132 | 9,132      | 5,548     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 4800                        | 4,371             | 0,000                 | 56,162 | 0,000 | 9,120 | 9,120      | 5,324     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 5000                        | 4,478             | 0,000                 | 55,805 | 0,000 | 9,081 | 9,081      | 5,142     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 5200                        | 4,585             | 0,000                 | 55,473 | 0,000 | 9,012 | 9,012      | 5,006     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 5400                        | 4,691             | 0,000                 | 55,163 | 0,000 | 8,912 | 8,912      | 4,912     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 5600                        | 4,797             | 0,000                 | 54,874 | 0,000 | 8,784 | 8,784      | 4,859     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 5800                        | 4,902             | 0,000                 | 54,602 | 0,000 | 8,630 | 8,630      | 4,844     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 6000                        | 5,007             | 0,000                 | 54,348 | 0,000 | 8,453 | 8,453      | 4,861     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 6200                        | 5,111             | 0,000                 | 54,109 | 0,000 | 8,254 | 8,254      | 4,910     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 6400                        | 5,214             | 0,000                 | 53,885 | 0,000 | 8,042 | 8,042      | 4,978     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 6600                        | 5,317             | 0,000                 | 53,673 | 0,000 | 7,831 | 7,831      | 5,054     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 6800                        | 5,420             | 0,000                 | 53,475 | 0,000 | 7,627 | 7,627      | 5,129     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |
| 7000                        | 5,522             | 0,000                 | 53,287 | 0,000 | 7,436 | 7,436      | 5,196     | 267(85) Ch2 - General Criteria | 2.2.3: Angle of maximum GZ |





Para poder visualizar mejor los resultados con el software Maxsurf, se van a representar en la siguiente gráfica los valores límite de KG para cada desplazamiento calculado; además de los KG obtenidos para cada condición de carga:



|                 | Total Loadcase | KG   | Calado Popa | Calado Medio | Calado Proa |
|-----------------|----------------|------|-------------|--------------|-------------|
| Salida Puerto   | 6314           | 5,17 | 5,17        | 5,17         | 5,17        |
| Situación Media | 5414           | 6,28 | 4,84        | 4,70         | 4,51        |
| Llegada Puerto  | 5107           | 6,60 | 4,73        | 4,54         | 3,28        |

## 9 EQUILIBRIUM CALCULATION

### 9.1 SALIDA DE PUERTO

Stability 22.01.00.131, build: 131

Model file: C:\Users\Rosa\Desktop\Después de ir donde Vicente\MAXSURF DISEÑO\MOD\Yate Rosa Pérez Ramón (Highest precision, 213 sections, Trimming on, 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)

#### Loadcase - SALIDA PUERTO Damage Case - Intact

Free to Trim

Specific gravity = 1,025; (Density = 1,025 tonne/m<sup>3</sup>)

Fluid analysis method: Use corrected VCG

| Item Name        | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Lightship        | 1        | 4653,600           | 4653,600            |                               |                                | 55,220         | 0,000           | 6,650          | 0,000                | User Specified |
| Tank1Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | 1,717           | 0,885          | 0,000                | Maximum        |
| Tank2Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | -1,717          | 0,885          | 0,000                | Maximum        |
| Tank3Combustible | 100%     | 28,812             | 28,812              | 34,300                        | 34,300                         | 57,782         | 5,098           | 1,032          | 0,000                | Maximum        |
| Tank4Combustible | 100%     | 28,812             | 28,812              | 34,300                        | 34,300                         | 57,782         | -5,098          | 1,032          | 0,000                | Maximum        |
| Tank5Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank6Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank7Combustible | 100%     | 44,569             | 44,569              | 53,058                        | 53,058                         | 69,318         | 1,721           | 0,798          | 0,000                | Maximum        |
| Tank8Combustible | 100%     | 44,569             | 44,569              | 53,058                        | 53,058                         | 69,318         | -1,721          | 0,798          | 0,000                | Maximum        |
| Tank1CGE         | 100%     | 5,040              | 5,040               | 6,000                         | 6,000                          | 99,514         | -2,150          | 9,520          | 0,000                | Maximum        |
| Tank1AguasNegras | 10%      | 27,188             | 2,719               | 27,188                        | 2,719                          | 49,191         | 1,429           | 0,714          | 42,798               | Maximum        |
| Tank1Uso Diario  | 100%     | 10,424             | 10,424              | 10,424                        | 10,424                         | 27,875         | 1,700           | 2,276          | 0,000                | Maximum        |
| Tank2Uso Diario  | 100%     | 10,424             | 10,424              | 10,424                        | 10,424                         | 27,875         | -1,700          | 2,276          | 0,000                | Maximum        |
| Tank1AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank2AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank3AguaPotable | 100%     | 49,025             | 49,025              | 49,025                        | 49,025                         | 44,525         | 5,232           | 2,057          | 0,000                | Maximum        |
| Tank4AguaPotable | 100%     | 49,025             | 49,025              | 49,025                        | 49,025                         | 44,525         | -5,232          | 2,057          | 0,000                | Maximum        |
| TankAceite       | 100%     | 1,104              | 1,104               | 1,200                         | 1,200                          | 38,540         | -1,586          | 1,368          | 0,000                | Maximum        |
| TankLodos        | 10%      | 1,611              | 0,161               | 1,611                         | 0,161                          | 40,093         | -0,912          | 1,144          | 4,505                | Maximum        |
| Tank2AguasGrises | 10%      | 24,377             | 2,438               | 24,377                        | 2,438                          | 49,281         | -1,410          | 0,702          | 33,788               | Maximum        |
| Tank1AguasGrises | 0%       | 41,642             | 0,000               | 41,642                        | 0,000                          | 69,300         | 1,760           | 1,500          | 0,000                | Maximum        |
| Tank3AguasGrises | 0%       | 41,642             | 0,000               | 41,642                        | 0,000                          | 69,300         | -1,760          | 1,500          | 0,000                | Maximum        |
| Tripulación      | 1        | 6,300              | 6,300               |                               |                                | 55,000         | 0,000           | 6,300          | 0,000                | User Specified |
| Pasaje           | 1        | 10,000             | 10,000              |                               |                                | 55,000         | 0,000           | 16,000         | 0,000                | User Specified |
| Pertrechos       | 1        | 80,000             | 80,000              |                               |                                | 55,000         | 0,000           | 6,020          | 0,000                | User Specified |

## MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Item Name             | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|-----------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Elementos Garaje      | 1        | 11,353             | 11,353              |                               |                                | 36,000         | 0,000           | 11,000         | 0,000                | User Specified |
| Piscina               | 1        | 142,000            | 142,000             |                               |                                | 31,580         | 0,000           | 9,470          | 0,000                | User Specified |
| Helicóptero           | 1        | 2,720              | 2,720               |                               |                                | 8,670          | 0,000           | 8,170          | 0,000                | User Specified |
| <b>Total Loadcase</b> |          |                    | <b>5414,065</b>     | <b>695,113</b>                | <b>563,971</b>                 | <b>54,406</b>  | <b>-0,002</b>   | <b>6,270</b>   | <b>81,090</b>        |                |
| <b>FS correction</b>  |          |                    |                     |                               |                                |                |                 | <b>0,015</b>   |                      |                |
| <b>VCG fluid</b>      |          |                    |                     |                               |                                |                |                 | <b>6,284</b>   |                      |                |

|                                      |          |
|--------------------------------------|----------|
| Draft Amidships m                    | 4,675    |
| Displacement t                       | 5414     |
| Heel deg                             | 0,0      |
| Draft at FP m                        | 4,510    |
| Draft at AP m                        | 4,840    |
| Draft at LCF m                       | 4,699    |
| Trim (+ve by stern) m                | 0,330    |
| WL Length m                          | 111,469  |
| Beam max extents on WL m             | 21,596   |
| Wetted Area m <sup>2</sup>           | 2241,826 |
| Waterpl. Area m <sup>2</sup>         | 1844,586 |
| Prismatic coeff. (Cp)                | 0,569    |
| Block coeff. (Cb)                    | 0,474    |
| Max Sect. area coeff. (Cm)           | 0,841    |
| Waterpl. area coeff. (Cwp)           | 0,766    |
| LCB from zero pt. (+ve fwd) m        | 54,392   |
| LCF from zero pt. (+ve fwd) m        | 46,860   |
| KB m                                 | 2,970    |
| KG fluid m                           | 6,284    |
| BMt m                                | 10,919   |
| BML m                                | 250,331  |
| GMt corrected m                      | 7,605    |
| GML m                                | 247,017  |
| KMt m                                | 13,890   |
| KML m                                | 253,301  |
| Immersion (TPc) tonne/cm             | 18,907   |
| MTc tonne.m                          | 121,579  |
| RM at 1deg = GMt.Disp.sin(1) tonne.m | 718,604  |
| Max deck inclination deg             | 0,1718   |

|                               |        |
|-------------------------------|--------|
|                               |        |
| Trim angle (+ve by stern) deg | 0,1718 |

| Key point                              | Type                         | Freeboard<br>m |
|--|------------------------------|----------------|
| Margin Line (freeboard pos = -0,001 m) |                              | 3,854          |
| Deck Edge (freeboard pos = -0,001 m)   |                              | 3,93           |
| Garaje 1                               | Potential downflooding point | 4,726          |
| Garaje 2                               | Downflooding point           | 4,726          |

## 9.2 SITUACIÓN INTERMEDIA

Stability 22.01.00.131, build: 131

Model file: C:\Users\Rosa\Desktop\Después de ir donde Vicente\MAXSURF DISEÑO\MOD\Yate Rosa Pérez Ramón (Highest precision, 213 sections, Trimming on, 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)

### Loadcase - SITUACIÓN MEDIA

#### Damage Case - Intact

Free to Trim

Specific gravity = 1,025; (Density = 1,025 tonne/m<sup>3</sup>)

Fluid analysis method: Use corrected VCG

| Item Name        | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Lightship        | 1        | 4653,600           | 4653,600            |                               |                                | 55,220         | 0,000           | 6,650          | 0,000                | User Specified |
| Tank1Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | 1,717           | 0,885          | 0,000                | Maximum        |
| Tank2Combustible | 100%     | 38,732             | 38,732              | 46,110                        | 46,110                         | 57,680         | -1,717          | 0,885          | 0,000                | Maximum        |
| Tank3Combustible | 0%       | 28,812             | 0,000               | 34,300                        | 0,000                          | 62,811         | 2,393           | 0,248          | 0,000                | Maximum        |
| Tank4Combustible | 0%       | 28,812             | 0,000               | 34,300                        | 0,000                          | 62,811         | -2,393          | 0,248          | 0,000                | Maximum        |
| Tank5Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank6Combustible | 100%     | 31,799             | 31,799              | 37,856                        | 37,856                         | 57,400         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank7Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | 0,047           | 0,003          | 0,000                | Maximum        |
| Tank8Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | -0,047          | 0,003          | 0,000                | Maximum        |
| Tank1CGE         | 100%     | 5,040              | 5,040               | 6,000                         | 6,000                          | 99,514         | -2,150          | 9,520          | 0,000                | Maximum        |
| Tank1AguasNegras | 50%      | 27,188             | 13,594              | 27,188                        | 13,594                         | 47,102         | 1,620           | 0,963          | 42,798               | Maximum        |
| Tank1Uso Diario  | 50%      | 10,424             | 5,212               | 10,424                        | 5,212                          | 28,100         | 1,639           | 2,110          | 15,768               | Maximum        |
| Tank2Uso Diario  | 50%      | 10,424             | 5,212               | 10,424                        | 5,212                          | 28,100         | -1,639          | 2,110          | 15,768               | Maximum        |
| Tank1AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank2AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | -1,760          | 2,100          | 0,000                | Maximum        |
| Tank3AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | 5,090           | 1,500          | 0,000                | Maximum        |
| Tank4AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | -5,090          | 1,500          | 0,000                | Maximum        |

## MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Item Name             | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|-----------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| TankAceite            | 50%      | 1,104              | 0,552               | 1,200                         | 0,600                          | 38,581         | -1,412          | 1,299          | 4,145                | Maximum        |
| TankLodos             | 50%      | 1,611              | 0,806               | 1,611                         | 0,806                          | 39,959         | -1,495          | 1,236          | 4,505                | Maximum        |
| Tank2AguasGrises      | 100%     | 24,377             | 24,377              | 24,377                        | 24,377                         | 46,599         | -1,689          | 1,134          | 0,000                | Maximum        |
| Tank1AguasGrises      | 0%       | 41,642             | 0,000               | 41,642                        | 0,000                          | 69,300         | 1,760           | 1,500          | 0,000                | Maximum        |
| Tank3AguasGrises      | 50%      | 41,642             | 20,821              | 41,642                        | 20,821                         | 69,300         | -1,760          | 1,775          | 36,040               | Maximum        |
| Tripulación           | 1        | 6,300              | 6,300               |                               |                                | 55,000         | 0,000           | 6,300          | 0,000                | User Specified |
| Pasaje                | 1        | 10,000             | 10,000              |                               |                                | 55,000         | 0,000           | 16,000         | 0,000                | User Specified |
| Pertrechos            | 1        | 80,000             | 80,000              |                               |                                | 55,000         | 0,000           | 6,020          | 0,000                | User Specified |
| Elementos Garaje      | 1        | 11,353             | 11,353              |                               |                                | 36,000         | 0,000           | 11,000         | 0,000                | User Specified |
| Piscina               | 1        | 142,000            | 142,000             |                               |                                | 31,580         | 0,000           | 9,470          | 0,000                | User Specified |
| Helicóptero           | 1        | 2,720              | 2,720               |                               |                                | 8,670          | 0,000           | 8,170          | 0,000                | User Specified |
| <b>Total Loadcase</b> |          |                    | <b>5212,557</b>     | <b>695,113</b>                | <b>334,461</b>                 | <b>54,362</b>  | <b>-0,013</b>   | <b>6,457</b>   | <b>119,023</b>       |                |
| <b>FS correction</b>  |          |                    |                     |                               |                                |                |                 | <b>0,023</b>   |                      |                |
| <b>VCG fluid</b>      |          |                    |                     |                               |                                |                |                 | <b>6,480</b>   |                      |                |

|                               |          |
|-------------------------------|----------|
| Draft Amidships m             | 4,558    |
| Displacement t                | 5213     |
| Heel deg                      | -0,1     |
| Draft at FP m                 | 4,323    |
| Draft at AP m                 | 4,792    |
| Draft at LCF m                | 4,592    |
| Trim (+ve by stern) m         | 0,469    |
| WL Length m                   | 111,691  |
| Beam max extents on WL m      | 21,579   |
| Wetted Area m <sup>2</sup>    | 2213,005 |
| Waterpl. Area m <sup>2</sup>  | 1835,312 |
| Prismatic coeff. (Cp)         | 0,565    |
| Block coeff. (Cb)             | 0,470    |
| Max Sect. area coeff. (Cm)    | 0,838    |
| Waterpl. area coeff. (Cwp)    | 0,762    |
| LCB from zero pt. (+ve fwd) m | 54,356   |
| LCF from zero pt. (+ve fwd) m | 46,820   |
| KB m                          | 2,907    |
| KG fluid m                    | 6,480    |
| BMt m                         | 11,219   |

|                                      |         |
|--------------------------------------|---------|
| BML m                                | 257,469 |
| GMt corrected m                      | 7,646   |
| GML m                                | 253,896 |
| KMt m                                | 14,126  |
| KML m                                | 260,374 |
| Immersion (TPc) tonne/cm             | 18,812  |
| MTc tonne.m                          | 120,313 |
| RM at 1deg = GMt.Disp.sin(1) tonne.m | 695,563 |
| Max deck inclination deg             | 0,2644  |
| Trim angle (+ve by stern) deg        | 0,2445  |

| Key point                              | Type                         | Freeboard m |
|--|------------------------------|-------------|
| Margin Line (freeboard pos = -0,001 m) |                              | 3,883       |
| Deck Edge (freeboard pos = -0,001 m)   |                              | 3,959       |
| Garaje 1                               | Potential downflooding point | 4,833       |
| Garaje 2                               | Downflooding point           | 4,795       |

### 9.3 LLEGADA A PUERTO

Stability 22.01.00.131, build: 131

Model file: C:\Users\Rosa\Desktop\Después de ir donde Vicente\MAXSURF DISEÑO\MOD\Yate Rosa Pérez Ramón (Highest precision, 213 sections, Trimming on, 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)

#### Loadcase - LLEGADA A PUERTO

##### Damage Case - Intact

Free to Trim

Specific gravity = 1,025; (Density = 1,025 tonne/m<sup>3</sup>)

Fluid analysis method: Use corrected VCG

| Item Name        | Quantity | Unit Mass tonne | Total Mass tonne | Unit Volume m <sup>3</sup> | Total Volume m <sup>3</sup> | Long. Arm m | Trans. Arm m | Vert. Arm m | Total FSM tonne.m | FSM Type       |
|------------------|----------|-----------------|------------------|----------------------------|-----------------------------|-------------|--------------|-------------|-------------------|----------------|
| Lightship        | 1        | 4653,600        | 4653,600         |                            |                             | 55,220      | 0,000        | 6,650       | 0,000             | User Specified |
| Tank1Combustible | 10%      | 38,732          | 3,873            | 46,110                     | 4,611                       | 59,687      | 1,424        | 0,290       | 30,274            | Maximum        |
| Tank2Combustible | 10%      | 38,732          | 3,873            | 46,110                     | 4,611                       | 59,687      | -1,424       | 0,290       | 30,274            | Maximum        |
| Tank3Combustible | 0%       | 28,812          | 0,000            | 34,300                     | 0,000                       | 62,811      | 2,393        | 0,248       | 0,000             | Maximum        |

| Item Name        | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Tank4Combustible | 0%       | 28,812             | 0,000               | 34,300                        | 0,000                          | 62,811         | -2,393          | 0,248          | 0,000                | Maximum        |
| Tank5Combustible | 0%       | 31,799             | 0,000               | 37,856                        | 0,000                          | 57,400         | 1,760           | 1,600          | 0,000                | Maximum        |
| Tank6Combustible | 0%       | 31,799             | 0,000               | 37,856                        | 0,000                          | 57,400         | -1,760          | 1,600          | 0,000                | Maximum        |
| Tank7Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | 0,047           | 0,003          | 0,000                | Maximum        |
| Tank8Combustible | 0%       | 44,569             | 0,000               | 53,058                        | 0,000                          | 74,716         | -0,047          | 0,003          | 0,000                | Maximum        |
| Tank1CGE         | 100%     | 5,040              | 5,040               | 6,000                         | 6,000                          | 99,514         | -2,150          | 9,520          | 0,000                | Maximum        |
| Tank1AguasNegras | 100%     | 27,188             | 27,188              | 27,188                        | 27,188                         | 45,848         | 1,681           | 1,155          | 0,000                | Maximum        |
| Tank1Uso Diario  | 10%      | 10,424             | 1,042               | 10,424                        | 1,042                          | 29,054         | 1,395           | 1,929          | 15,768               | Maximum        |
| Tank2UsoDiario   | 10%      | 10,424             | 1,042               | 10,424                        | 1,042                          | 29,054         | -1,395          | 1,929          | 15,768               | Maximum        |
| Tank1AguaPotable | 100%     | 44,954             | 44,954              | 44,954                        | 44,954                         | 44,450         | 1,760           | 2,100          | 0,000                | Maximum        |
| Tank2AguaPotable | 10%      | 44,954             | 4,495               | 44,954                        | 4,495                          | 44,450         | -1,760          | 1,650          | 42,798               | Maximum        |
| Tank3AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | 5,090           | 1,500          | 0,000                | Maximum        |
| Tank4AguaPotable | 0%       | 49,025             | 0,000               | 49,025                        | 0,000                          | 45,171         | -5,090          | 1,500          | 0,000                | Maximum        |
| TankAceite       | 10%      | 1,104              | 0,110               | 1,200                         | 0,120                          | 38,731         | -0,839          | 1,222          | 4,145                | Maximum        |
| TankLodos        | 100%     | 1,611              | 1,611               | 1,611                         | 1,611                          | 39,930         | -1,628          | 1,326          | 0,000                | Maximum        |
| Tank2AguasGrises | 100%     | 24,377             | 24,377              | 24,377                        | 24,377                         | 46,599         | -1,689          | 1,134          | 0,000                | Maximum        |
| Tank1AguasGrises | 100%     | 41,642             | 41,642              | 41,642                        | 41,642                         | 69,300         | 1,760           | 2,050          | 0,000                | Maximum        |
| Tank3AguasGrises | 100%     | 41,642             | 41,642              | 41,642                        | 41,642                         | 69,300         | -1,760          | 2,050          | 0,000                | Maximum        |
| Tripulación      | 1        | 6,300              | 6,300               |                               |                                | 55,000         | 0,000           | 6,300          | 0,000                | User Specified |
| Pasaje           | 1        | 10,000             | 10,000              |                               |                                | 55,000         | 0,000           | 16,000         | 0,000                | User Specified |
| Pertrechos       | 1        | 80,000             | 80,000              |                               |                                | 55,000         | 0,000           | 6,020          | 0,000                | User Specified |
| Elementos Garaje | 1        | 11,353             | 11,353              |                               |                                | 36,000         | 0,000           | 11,000         | 0,000                | User Specified |
| Piscina          | 1        | 142,000            | 142,000             |                               |                                | 31,580         | 0,000           | 9,470          | 0,000                | User Specified |

## MEGAYATE DE LUJO C5

Rosa Pérez Ramón

| Item Name             | Quantity | Unit Mass<br>tonne | Total Mass<br>tonne | Unit Volume<br>m <sup>3</sup> | Total Volume<br>m <sup>3</sup> | Long. Arm<br>m | Trans. Arm<br>m | Vert. Arm<br>m | Total FSM<br>tonne.m | FSM Type       |
|-----------------------|----------|--------------------|---------------------|-------------------------------|--------------------------------|----------------|-----------------|----------------|----------------------|----------------|
| Helicóptero           | 1        | 2,720              | 2,720               |                               |                                | 8,670          | 0,000           | 8,170          | 0,000                | User Specified |
| <b>Total Loadcase</b> |          |                    | <b>5106,864</b>     | <b>695,113</b>                | <b>203,336</b>                 | <b>54,560</b>  | <b>0,012</b>    | <b>6,561</b>   | <b>139,025</b>       |                |
| <b>FS correction</b>  |          |                    |                     |                               |                                |                |                 | <b>0,027</b>   |                      |                |
| <b>VCG fluid</b>      |          |                    |                     |                               |                                |                |                 | <b>6,589</b>   |                      |                |

|                                      |          |
|--------------------------------------|----------|
| Draft Amidships m                    | 4,503    |
| Displacement t                       | 5107     |
| Heel deg                             | 0,1      |
| Draft at FP m                        | 4,277    |
| Draft at AP m                        | 4,728    |
| Draft at LCF m                       | 4,536    |
| Trim (+ve by stern) m                | 0,452    |
| WL Length m                          | 111,743  |
| Beam max extents on WL m             | 21,570   |
| Wetted Area m <sup>2</sup>           | 2198,826 |
| Waterpl. Area m <sup>2</sup>         | 1829,588 |
| Prismatic coeff. (Cp)                | 0,562    |
| Block coeff. (Cb)                    | 0,466    |
| Max Sect. area coeff. (Cm)           | 0,836    |
| Waterpl. area coeff. (Cwp)           | 0,759    |
| LCB from zero pt. (+ve fwd) m        | 54,553   |
| LCF from zero pt. (+ve fwd) m        | 46,859   |
| KB m                                 | 2,872    |
| KG fluid m                           | 6,589    |
| BMt m                                | 11,361   |
| BML m                                | 261,306  |
| GMt corrected m                      | 7,645    |
| GML m                                | 257,590  |
| KMt m                                | 14,234   |
| KML m                                | 264,176  |
| Immersion (TPc) tonne/cm             | 18,753   |
| MTc tonne.m                          | 119,589  |
| RM at 1deg = GMt.Disp.sin(1) tonne.m | 681,399  |
| Max deck inclination deg             | 0,2530   |
| Trim angle (+ve by stern) deg        | 0,2354   |



| Key point                              | Type                            | Freeboard<br>m |
|--|---------------------------------|----------------|
| Margin Line (freeboard pos = -0,001 m) |                                 | 3,948          |
| Deck Edge (freeboard pos = -0,001 m)   |                                 | 4,024          |
| Garaje 1                               | Potential downflooding<br>point | 4,855          |
| Garaje 2                               | Downflooding point              | 4,890          |