

# Расчёты элементов статики и устойчивости модели стального катера МО-VI при проектных случаях нагрузки

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## 1.Случай нагрузки №1 порожнем 43,05 тонн

### 1.1 Гидростатический расчёт

|    |  |         |
|----|--|---------|
| 1  | Draft Amidships m                        | 1,014   |
| 2  | Displacement t                           | 43,05   |
| 3  | Volume (displaced) m <sup>3</sup>        | 43,050  |
| 4  | Heel deg                                 | 0,0     |
| 5  | Draft at FP m                            | 0,918   |
| 6  | Draft at AP m                            | 1,109   |
| 7  | Trim (+ve by stern) m                    | 0,190   |
| 8  | WL Length m                              | 26,085  |
| 9  | Beam max on WL m                         | 3,756   |
| 10 | Wetted Area m <sup>2</sup>               | 91,471  |
| 11 | Waterpl. Area m <sup>2</sup>             | 74,736  |
| 12 | Waterpl. ltrans m <sup>4</sup>           | 68,483  |
| 13 | Waterpl. llong m <sup>4</sup>            | 2982,76 |
| 14 | Prismatic coeff. (Cp)                    | 0,652   |
| 15 | Block coeff. (Cb)                        | 0,433   |
| 16 | Midship Sect. area coeff. (Cm)           | 0,665   |
| 17 | Waterpl. area coeff. (Cwp)               | 0,763   |
| 18 | LCB from aft perp. (+ve fwd) m           | 11,751  |
| 19 | VCB m                                    | 0,674   |
| 20 | LCF from aft perp. (+ve fwd) m           | 11,066  |
| 21 | VCF m                                    | 1,028   |
| 22 | KG m                                     | 1,750   |
| 23 | BMt m                                    | 1,591   |
| 24 | BML m                                    | 69,286  |
| 25 | Gmt m                                    | 0,514   |
| 26 | GML m                                    | 68,209  |
| 27 | KMt m                                    | 2,264   |
| 28 | KML m                                    | 69,958  |
| 29 | Immersion (TPc) tonne/cm                 | 0,747   |
| 30 | MTc tonne.m                              | 1,123   |
| 31 | GZ m                                     | 0,000   |
| 32 | RM at 1deg = GMt.Disp.sin(1) tonne.m     | 0,386   |
| 33 | Max deck inclination deg                 | 0,4171  |
| 34 | Trim angle (+ve by stern) deg            | 0,4171  |
| 35 | Lat.proj. Underwater area m <sup>2</sup> | 22,211  |
| 36 | Lat.proj. Underwater VCA (world) m       | 0,556   |

## 1.2 Элементы статики при больших углах крена

|   | 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    |
|---|-----------------------|----------|-----------------|------------------|----------------------------|-----------------------------|---------------|--------------|--------------|-------------------|-------------|
| 1 | Lightship             | 1        | 43,050          | 43,050           |                            |                             | 11,757        | 0,000        | 1,750        | 0,000             | User Specif |
| 2 | <b>Total Loadcase</b> |          |                 | <b>43,050</b>    | <b>0,000</b>               | <b>0,000</b>                | <b>11,757</b> | <b>0,000</b> | <b>1,750</b> | <b>0,000</b>      |             |
| 3 | <b>FS correction</b>  |          |                 |                  |                            |                             |               |              | <b>0,000</b> |                   |             |
| 4 | <b>VCG fluid</b>      |          |                 |                  |                            |                             |               |              | <b>1,750</b> |                   |             |

|   | Name     | Long. Pos. m | Offset m | Height m | Type               | Linked to | Flood from | Intact (use for intact case)        | Damage (use for damage cases)       |
|---|----------|--------------|----------|----------|--------------------|-----------|------------|-------------------------------------|-------------------------------------|
| 1 | DF point | 6,62         | 1,59     | 2,82     | Downflooding point | None      | Sea        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | DF point | 6,62         | -1,59    | 2,82     | Downflooding point | None      | Sea        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

|   | Key point                              | Type               | Immersion angle deg            | Emergence angle deg |
|---|--|--------------------|--------------------------------|---------------------|
| 1 | Margin Line (immersion pos = 11,813 m) |                    | 45,1                           | n/a                 |
| 2 | Deck Edge (immersion pos = 12,671 m)   |                    | 46,8                           | n/a                 |
| 3 | DF point                               | Downflooding point | 60,8                           | 0                   |
| 4 | DF point                               | Downflooding point | Not immersed in positive range | 0                   |

| Heel to Starboard deg                    | -30,0   | -25,0   | -20,0   | -15,0   | -10,0   | -5,0   | 0,0    | 5,0    | 10,0    | 15,0    |
|--|---------|---------|---------|---------|---------|--------|--------|--------|---------|---------|
| GZ m                                     | -0,147  | -0,141  | -0,130  | -0,110  | -0,082  | -0,044 | 0,000  | 0,044  | 0,082   | 0,110   |
| Area under GZ curve from zero heel m.rad | 0,0510  | 0,0383  | 0,0265  | 0,0159  | 0,0075  | 0,0019 | 0,0000 | 0,0019 | 0,0075  | 0,0159  |
| Displacement t                           | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05  | 43,05  | 43,05  | 43,05   | 43,05   |
| Volume (displaced) m <sup>3</sup>        | 43,051  | 43,049  | 43,050  | 43,050  | 43,050  | 43,050 | 43,050 | 43,050 | 43,050  | 43,050  |
| Draft at FP m                            | 0,847   | 0,874   | 0,892   | 0,905   | 0,913   | 0,917  | 0,918  | 0,917  | 0,913   | 0,905   |
| Draft at AP m                            | 0,926   | 0,989   | 1,037   | 1,071   | 1,093   | 1,105  | 1,109  | 1,105  | 1,093   | 1,071   |
| Draft Amidships m                        | 0,887   | 0,931   | 0,965   | 0,988   | 1,003   | 1,011  | 1,014  | 1,011  | 1,003   | 0,988   |
| WL Length m                              | 26,178  | 26,172  | 26,162  | 26,147  | 26,129  | 26,106 | 26,085 | 26,106 | 26,129  | 26,147  |
| Beam max extents on WL m                 | 3,378   | 3,430   | 3,507   | 3,598   | 3,683   | 3,739  | 3,756  | 3,739  | 3,683   | 3,598   |
| Wetted Area m <sup>2</sup>               | 87,782  | 88,155  | 88,806  | 89,638  | 90,505  | 91,186 | 91,469 | 91,186 | 90,505  | 89,638  |
| Waterpl. Area m <sup>2</sup>             | 68,448  | 68,869  | 69,848  | 71,244  | 72,816  | 74,165 | 74,735 | 74,165 | 72,817  | 71,244  |
| Prismatic coeff. (Cp)                    | 0,653   | 0,653   | 0,653   | 0,652   | 0,652   | 0,652  | 0,652  | 0,652  | 0,652   | 0,652   |
| Block coeff. (Cb)                        | 0,549   | 0,515   | 0,486   | 0,463   | 0,446   | 0,436  | 0,434  | 0,436  | 0,446   | 0,463   |
| LCB from aft perp. (+ve fwd) m           | 11,754  | 11,753  | 11,751  | 11,750  | 11,750  | 11,749 | 11,749 | 11,749 | 11,750  | 11,750  |
| LCF from aft perp. (+ve fwd) m           | 11,737  | 11,614  | 11,486  | 11,354  | 11,224  | 11,114 | 11,066 | 11,114 | 11,224  | 11,354  |
| Max deck inclination deg                 | 30,0003 | 25,0010 | 20,0021 | 15,0040 | 10,0075 | 5,0169 | 0,4185 | 5,0169 | 10,0075 | 15,0040 |
| Trim angle (+ve by stern) deg            | 0,1721  | 0,2535  | 0,3175  | 0,3647  | 0,3959  | 0,4131 | 0,4185 | 0,4132 | 0,3960  | 0,3648  |

| 20,0    | 25,0    | 30,0    | 35,0    | 40,0    | 45,0    | 50,0    | 55,0    | 60,0    | 65,0    | 70,0    | 75,0    | 80,0    | 85,0    |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0,130   | 0,141   | 0,147   | 0,151   | 0,155   | 0,164   | 0,181   | 0,190   | 0,187   | 0,173   | 0,143   | 0,100   | 0,048   | -0,010  |
| 0,0265  | 0,0383  | 0,0510  | 0,0640  | 0,0773  | 0,0911  | 0,1062  | 0,1225  | 0,1390  | 0,1549  | 0,1688  | 0,1795  | 0,1860  | 0,1877  |
| 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   | 43,05   |
| 43,050  | 43,050  | 43,050  | 43,049  | 43,049  | 43,049  | 43,050  | 43,050  | 43,050  | 43,050  | 43,050  | 43,050  | 43,050  | 43,053  |
| 0,892   | 0,874   | 0,847   | 0,811   | 0,760   | 0,689   | 0,590   | 0,465   | 0,307   | 0,093   | -0,247  | -0,843  | -2,058  | -5,733  |
| 1,037   | 0,989   | 0,926   | 0,844   | 0,739   | 0,604   | 0,431   | 0,212   | -0,075  | -0,466  | -1,031  | -1,944  | -3,738  | -9,057  |
| 0,965   | 0,931   | 0,887   | 0,827   | 0,749   | 0,647   | 0,510   | 0,338   | 0,116   | -0,186  | -0,639  | -1,394  | -2,898  | -7,395  |
| 26,162  | 26,172  | 26,178  | 26,179  | 26,172  | 26,153  | 26,109  | 26,027  | 25,832  | 24,612  | 24,903  | 25,190  | 25,436  | 25,654  |
| 3,507   | 3,430   | 3,378   | 3,355   | 3,367   | 3,417   | 3,333   | 3,179   | 3,074   | 2,985   | 2,777   | 2,638   | 2,539   | 2,465   |
| 88,806  | 88,155  | 87,780  | 87,744  | 88,090  | 88,923  | 90,253  | 91,319  | 91,985  | 91,537  | 90,553  | 90,122  | 89,870  | 89,759  |
| 69,848  | 68,869  | 68,448  | 68,679  | 69,634  | 71,451  | 72,036  | 70,309  | 68,350  | 65,048  | 61,007  | 58,099  | 55,870  | 54,215  |
| 0,653   | 0,653   | 0,653   | 0,653   | 0,652   | 0,651   | 0,652   | 0,657   | 0,667   | 0,706   | 0,705   | 0,705   | 0,707   | 0,710   |
| 0,486   | 0,515   | 0,549   | 0,592   | 0,652   | 0,745   | 0,969   | 1,538   | 4,660   | 0,000   | 0,000   | 0,000   | 0,000   | 0,000   |
| 11,751  | 11,753  | 11,754  | 11,756  | 11,758  | 11,759  | 11,761  | 11,764  | 11,766  | 11,769  | 11,770  | 11,771  | 11,771  | 11,771  |
| 11,486  | 11,614  | 11,737  | 11,857  | 11,983  | 12,132  | 12,292  | 12,420  | 12,552  | 12,556  | 12,423  | 12,363  | 12,314  | 12,277  |
| 20,0021 | 25,0010 | 30,0003 | 35,0000 | 40,0000 | 45,0002 | 50,0004 | 55,0006 | 60,0009 | 65,0011 | 70,0011 | 75,0009 | 80,0006 | 85,0003 |
| 0,3176  | 0,2536  | 0,1722  | 0,0726  | -0,0460 | -0,1858 | -0,3477 | -0,5554 | -0,8370 | -1,2258 | -1,7167 | -2,4119 | -3,6761 | -7,2481 |

### 1.3 Характеристики диаграммы статической остойчивости. РС ПКПМС 2017,ч.IV,ост.,разд.2.2.1

|    | Code                           | Criteria                     | Value  | Units | Actual | Status | Margin % |
|----|--------------------------------|------------------------------|--------|-------|--------|--------|----------|
| 1  | 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 30          |        |       |        | Fail   |          |
| 2  |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 3  |                                | spec. heel angle             | 0,0    | deg   | 0,0    |        |          |
| 4  |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 5  |                                | spec. heel angle             | 30,0   | deg   | 30,0   |        |          |
| 6  |                                | angle of vanishing stability | 84,2   | deg   |        |        |          |
| 7  |                                | shall not be less than (>=)  | 0,0550 | m.rad | 0,0510 | Fail   | -7,35    |
| 8  |                                |                              |        |       |        |        |          |
| 9  | 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 40          |        |       |        | Fail   |          |
| 10 |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 11 |                                | spec. heel angle             | 0,0    | deg   | 0,0    |        |          |
| 12 |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 13 |                                | spec. heel angle             | 40,0   | deg   | 40,0   |        |          |
| 14 |                                | first downflooding angle     | 60,8   | deg   |        |        |          |
| 15 |                                | angle of vanishing stability | 84,2   | deg   |        |        |          |
| 16 |                                | shall not be less than (>=)  | 0,0900 | m.rad | 0,0773 | Fail   | -14,14   |
| 17 |                                |                              |        |       |        |        |          |
| 18 | 267(85) Ch2 - General Criteria | 2.2.1: Area 30 to 40         |        |       |        | Fail   |          |
| 19 |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 20 |                                | spec. heel angle             | 30,0   | deg   | 30,0   |        |          |
| 21 |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 22 |                                | spec. heel angle             | 40,0   | deg   | 40,0   |        |          |
| 23 |                                | first downflooding angle     | 60,8   | deg   |        |        |          |
| 24 |                                | angle of vanishing stability | 84,2   | deg   |        |        |          |
| 25 |                                | shall not be less than (>=)  | 0,0300 | m.rad | 0,0263 | Fail   | -12,28   |
| 26 |                                |                              |        |       |        |        |          |

## 2. Случай нагрузки №2 стандарт 52,15 тонн

### 2.1 Гидростатический расчёт

|    |  |         |
|----|--|---------|
| 1  | Draft Amidships m                        | 1,135   |
| 2  | Displacement t                           | 52,15   |
| 3  | Volume (displaced) m <sup>3</sup>        | 52,150  |
| 4  | Heel deg                                 | 0,0     |
| 5  | Draft at FP m                            | 1,050   |
| 6  | Draft at AP m                            | 1,220   |
| 7  | Trim (+ve by stern) m                    | 0,170   |
| 8  | WL Length m                              | 26,152  |
| 9  | Beam max on WL m                         | 3,783   |
| 10 | Wetted Area m <sup>2</sup>               | 98,424  |
| 11 | Waterpl. Area m <sup>2</sup>             | 77,213  |
| 12 | Waterpl. ltrans m <sup>4</sup>           | 73,340  |
| 13 | Waterpl. llong m <sup>4</sup>            | 3176,37 |
| 14 | Prismatic coeff. (Cp)                    | 0,669   |
| 15 | Block coeff. (Cb)                        | 0,464   |
| 16 | Midship Sect. area coeff. (Cm)           | 0,694   |
| 17 | Waterpl. area coeff. (Cwp)               | 0,780   |
| 18 | LCB from aft perp. (+ve fwd) m           | 11,683  |
| 19 | VCB m                                    | 0,746   |
| 20 | LCF from aft perp. (+ve fwd) m           | 11,134  |
| 21 | VCF m                                    | 1,147   |
| 22 | KG m                                     | 1,740   |
| 23 | BMt m                                    | 1,406   |
| 24 | BML m                                    | 60,908  |
| 25 | GMt m                                    | 0,412   |
| 26 | GML m                                    | 59,914  |
| 27 | KMt m                                    | 2,152   |
| 28 | KML m                                    | 61,653  |
| 29 | Immersion (TPc) tonne/cm                 | 0,772   |
| 30 | MTc tonne.m                              | 1,195   |
| 31 | GZ m                                     | 0,000   |
| 32 | RM at 1deg = GMt.Disp.sin(1) tonne.m     | 0,375   |
| 33 | Max deck inclination deg                 | 0,3718  |
| 34 | Trim angle (+ve by stern) deg            | 0,3718  |
| 35 | Lat.proj. Underwater area m <sup>2</sup> | 25,378  |
| 36 | Lat.proj. Underwater VCA (world) m       | 0,620   |

## 2.2 Элементы статики при больших углах крена

|   | 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    |
|---|----------------|----------|-----------------|------------------|----------------------------|-----------------------------|-------------|--------------|-------------|-------------------|-------------|
| 1 | Lightship      | 1        | 52,150          | 52,150           |                            |                             | 11,690      | 0,000        | 1,740       | 0,000             | User Specif |
| 2 | Total Loadcase |          |                 | 52,150           | 0,000                      | 0,000                       | 11,690      | 0,000        | 1,740       | 0,000             |             |
| 3 | FS correction  |          |                 |                  |                            |                             |             |              | 0,000       |                   |             |
| 4 | VCG fluid      |          |                 |                  |                            |                             |             |              | 1,740       |                   |             |

|   | Name     | Long. Pos. m | Offset m | Height m | Type               | Linked to | Flood from | Intact (use for intact case)        | Damage (use for damage cases)       |
|---|----------|--------------|----------|----------|--------------------|-----------|------------|-------------------------------------|-------------------------------------|
| 1 | DF point | 6,62         | 1,59     | 2,82     | Downflooding point | None      | Sea        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | DF point | 6,62         | -1,59    | 2,82     | Downflooding point | None      | Sea        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

|   | Key point                             | Type               | Immersion angle deg            | Emergence angle deg |
|---|---------------------------------------|--------------------|--------------------------------|---------------------|
| 1 | Margin Line (immersion pos = 9,287 m) |                    | 40,9                           | n/a                 |
| 2 | Deck Edge (immersion pos = 10,118 m)  |                    | 42,7                           | n/a                 |
| 3 | DF point                              | Downflooding point | 55,4                           | 0                   |
| 4 | DF point                              | Downflooding point | Not immersed in positive range | 0                   |

| Heel to Starboard deg                    | -30,0   | -25,0   | -20,0   | -15,0   | -10,0   | -5,0   | 0,0    | 5,0    | 10,0    | 15,0    |
|--|---------|---------|---------|---------|---------|--------|--------|--------|---------|---------|
| GZ m                                     | -0,145  | -0,134  | -0,118  | -0,096  | -0,068  | -0,036 | 0,000  | 0,036  | 0,068   | 0,096   |
| Area under GZ curve from zero heel m.rad | 0,0459  | 0,0337  | 0,0227  | 0,0133  | 0,0061  | 0,0016 | 0,0000 | 0,0016 | 0,0061  | 0,0133  |
| Displacement t                           | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15  | 52,15  | 52,15  | 52,15   | 52,15   |
| Volume (displaced) m <sup>3</sup>        | 52,151  | 52,150  | 52,150  | 52,150  | 52,150  | 52,150 | 52,150 | 52,150 | 52,150  | 52,150  |
| Draft at FP m                            | 0,977   | 1,003   | 1,021   | 1,034   | 1,043   | 1,048  | 1,050  | 1,048  | 1,043   | 1,034   |
| Draft at AP m                            | 1,090   | 1,140   | 1,176   | 1,199   | 1,212   | 1,218  | 1,219  | 1,218  | 1,212   | 1,199   |
| Draft Amidships m                        | 1,033   | 1,071   | 1,099   | 1,117   | 1,128   | 1,133  | 1,135  | 1,133  | 1,128   | 1,117   |
| WL Length m                              | 26,254  | 26,245  | 26,232  | 26,216  | 26,197  | 26,176 | 26,152 | 26,176 | 26,197  | 26,216  |
| Beam max extents on WL m                 | 3,553   | 3,595   | 3,657   | 3,720   | 3,764   | 3,781  | 3,783  | 3,781  | 3,764   | 3,720   |
| Wetted Area m <sup>2</sup>               | 96,193  | 96,400  | 96,889  | 97,479  | 98,007  | 98,348 | 98,426 | 98,348 | 98,007  | 97,479  |
| Waterpl. Area m <sup>2</sup>             | 73,127  | 73,361  | 74,102  | 75,147  | 76,210  | 76,962 | 77,214 | 76,962 | 76,210  | 75,147  |
| Prismatic coeff. (Cp)                    | 0,673   | 0,672   | 0,671   | 0,670   | 0,669   | 0,669  | 0,669  | 0,669  | 0,669   | 0,670   |
| Block coeff. (Cb)                        | 0,541   | 0,516   | 0,495   | 0,479   | 0,469   | 0,465  | 0,464  | 0,465  | 0,469   | 0,479   |
| LCB from aft perp. (+ve fwd) m           | 11,685  | 11,685  | 11,684  | 11,684  | 11,684  | 11,684 | 11,684 | 11,684 | 11,684  | 11,684  |
| LCF from aft perp. (+ve fwd) m           | 11,717  | 11,592  | 11,469  | 11,347  | 11,239  | 11,162 | 11,134 | 11,162 | 11,239  | 11,347  |
| Max deck inclination deg                 | 30,0007 | 25,0014 | 20,0024 | 15,0040 | 10,0066 | 5,0137 | 0,3710 | 5,0137 | 10,0066 | 15,0040 |
| Trim angle (+ve by stern) deg            | 0,2473  | 0,3001  | 0,3380  | 0,3610  | 0,3710  | 0,3724 | 0,3710 | 0,3724 | 0,3711  | 0,3611  |

|         | 20,0    | 25,0    | 30,0    | 35,0    | 40,0    | 45,0    | 50,0    | 55,0    | 60,0    | 65,0    | 70,0    | 75,0    | 80,0    | 85,0   |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0,118   | 0,134   | 0,145   | 0,155   | 0,166   | 0,182   | 0,190   | 0,186   | 0,172   | 0,149   | 0,119   | 0,078   | 0,028   | -0,026  |        |
| 0,0227  | 0,0337  | 0,0459  | 0,0590  | 0,0730  | 0,0882  | 0,1045  | 0,1210  | 0,1367  | 0,1508  | 0,1625  | 0,1712  | 0,1758  | 0,1759  |        |
| 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15   | 52,15  |
| 52,150  | 52,150  | 52,150  | 52,150  | 52,149  | 52,150  | 52,150  | 52,150  | 52,150  | 52,150  | 52,150  | 52,150  | 52,150  | 52,150  | 52,150 |
| 1,021   | 1,003   | 0,977   | 0,941   | 0,890   | 0,819   | 0,728   | 0,617   | 0,477   | 0,292   | 0,021   | -0,454  | -1,438  | -4,433  |        |
| 1,176   | 1,140   | 1,089   | 1,022   | 0,932   | 0,816   | 0,675   | 0,500   | 0,278   | -0,022  | -0,461  | -1,169  | -2,552  | -6,652  |        |
| 1,099   | 1,071   | 1,033   | 0,981   | 0,911   | 0,818   | 0,701   | 0,559   | 0,378   | 0,135   | -0,220  | -0,811  | -1,995  | -5,542  |        |
| 26,232  | 26,245  | 26,254  | 26,260  | 26,259  | 26,249  | 26,229  | 26,194  | 26,093  | 25,849  | 25,132  | 25,417  | 25,662  | 25,880  |        |
| 3,657   | 3,595   | 3,553   | 3,536   | 3,552   | 3,478   | 3,279   | 3,127   | 3,016   | 2,947   | 2,871   | 2,704   | 2,595   | 2,521   |        |
| 96,889  | 96,400  | 96,193  | 96,267  | 96,782  | 97,979  | 99,334  | 100,376 | 100,915 | 101,166 | 100,525 | 99,941  | 99,568  | 99,391  |        |
| 74,102  | 73,361  | 73,126  | 73,535  | 74,751  | 75,641  | 73,501  | 71,194  | 68,921  | 66,997  | 63,966  | 60,843  | 58,449  | 56,704  |        |
| 0,671   | 0,672   | 0,673   | 0,673   | 0,673   | 0,674   | 0,678   | 0,684   | 0,691   | 0,703   | 0,728   | 0,727   | 0,727   | 0,728   |        |
| 0,495   | 0,516   | 0,541   | 0,572   | 0,614   | 0,698   | 0,864   | 1,140   | 1,754   | 5,081   | 0,000   | 0,000   | 0,000   | 0,000   |        |
| 11,684  | 11,685  | 11,686  | 11,687  | 11,689  | 11,690  | 11,691  | 11,693  | 11,694  | 11,696  | 11,697  | 11,698  | 11,699  | 11,699  |        |
| 11,468  | 11,592  | 11,718  | 11,841  | 11,972  | 12,138  | 12,280  | 12,448  | 12,612  | 12,756  | 12,713  | 12,627  | 12,557  | 12,505  |        |
| 20,0024 | 25,0014 | 30,0007 | 35,0003 | 40,0001 | 45,0000 | 50,0000 | 55,0001 | 60,0002 | 65,0003 | 70,0004 | 75,0004 | 80,0003 | 85,0001 |        |
| 0,3381  | 0,3001  | 0,2464  | 0,1770  | 0,0919  | -0,0057 | -0,1155 | -0,2559 | -0,4365 | -0,6880 | -1,0568 | -1,5666 | -2,4398 | -4,8523 |        |

## 2.3 Характеристики диаграммы статической устойчивости. РС ПКПМС 2017, ч.IV, ост., разд.2.2.1

|    | Code                           | Criteria                     | Value  | Units | Actual | Status | Margin % |
|----|--------------------------------|------------------------------|--------|-------|--------|--------|----------|
| 1  | 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 30          |        |       |        | Fail   |          |
| 2  |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 3  |                                | spec. heel angle             | 0,0    | deg   | 0,0    |        |          |
| 4  |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 5  |                                | spec. heel angle             | 30,0   | deg   | 30,0   |        |          |
| 6  |                                | angle of vanishing stability | 82,6   | deg   |        |        |          |
| 7  |                                | shall not be less than (>=)  | 0,0550 | m.rad | 0,0459 | Fail   | -16,50   |
| 8  |                                |                              |        |       |        |        |          |
| 9  | 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 40          |        |       |        | Fail   |          |
| 10 |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 11 |                                | spec. heel angle             | 0,0    | deg   | 0,0    |        |          |
| 12 |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 13 |                                | spec. heel angle             | 40,0   | deg   | 40,0   |        |          |
| 14 |                                | first downflooding angle     | 55,4   | deg   |        |        |          |
| 15 |                                | angle of vanishing stability | 82,6   | deg   |        |        |          |
| 16 |                                | shall not be less than (>=)  | 0,0900 | m.rad | 0,0730 | Fail   | -18,88   |
| 17 |                                |                              |        |       |        |        |          |
| 18 | 267(85) Ch2 - General Criteria | 2.2.1: Area 30 to 40         |        |       |        | Fail   |          |
| 19 |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 20 |                                | spec. heel angle             | 30,0   | deg   | 30,0   |        |          |
| 21 |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 22 |                                | spec. heel angle             | 40,0   | deg   | 40,0   |        |          |
| 23 |                                | first downflooding angle     | 55,4   | deg   |        |        |          |
| 24 |                                | angle of vanishing stability | 82,6   | deg   |        |        |          |
| 25 |                                | shall not be less than (>=)  | 0,0300 | m.rad | 0,0271 | Fail   | -9,72    |
| 26 |                                |                              |        |       |        |        |          |

### 3.Случай нагрузки №3 при офиц. испытаниях 55,07т

#### 3.1 Гидростатический расчёт

|    |  |         |
|----|--|---------|
| 1  | Draft Amidships m                        | 1,172   |
| 2  | Displacement t                           | 55,07   |
| 3  | Volume (displaced) m <sup>3</sup>        | 55,070  |
| 4  | Heel deg                                 | 0,0     |
| 5  | Draft at FP m                            | 1,087   |
| 6  | Draft at AP m                            | 1,258   |
| 7  | Trim (+ve by stern) m                    | 0,170   |
| 8  | WL Length m                              | 26,171  |
| 9  | Beam max on WL m                         | 3,788   |
| 10 | Wetted Area m <sup>2</sup>               | 100,528 |
| 11 | Waterpl. Area m <sup>2</sup>             | 77,791  |
| 12 | Waterpl. ltrans m <sup>4</sup>           | 74,429  |
| 13 | Waterpl. llong m <sup>4</sup>            | 3224,65 |
| 14 | Prismatic coeff. (Cp)                    | 0,674   |
| 15 | Block coeff. (Cb)                        | 0,474   |
| 16 | Midship Sect. area coeff. (Cm)           | 0,703   |
| 17 | Waterpl. area coeff. (Cwp)               | 0,785   |
| 18 | LCB from aft perp. (+ve fwd) m           | 11,653  |
| 19 | VCB m                                    | 0,768   |
| 20 | LCF from aft perp. (+ve fwd) m           | 11,159  |
| 21 | VCF m                                    | 1,185   |
| 22 | KG m                                     | 1,750   |
| 23 | BMt m                                    | 1,352   |
| 24 | BML m                                    | 58,556  |
| 25 | GMt m                                    | 0,369   |
| 26 | GML m                                    | 57,574  |
| 27 | KMt m                                    | 2,119   |
| 28 | KML m                                    | 59,322  |
| 29 | Immersion (TPc) tonne/cm                 | 0,778   |
| 30 | MTc tonne.m                              | 1,213   |
| 31 | GZ m                                     | 0,000   |
| 32 | RM at 1deg = GMt.Disp.sin(1) tonne.m     | 0,355   |
| 33 | Max deck inclination deg                 | 0,3732  |
| 34 | Trim angle (+ve by stern) deg            | 0,3732  |
| 35 | Lat.proj. Underwater area m <sup>2</sup> | 26,363  |
| 36 | Lat.proj. Underwater VCA (world) m       | 0,640   |

## 4. Случай нагрузки №4 полная 58,0 т

### 4.1 Гидростатический расчёт

|    |  |         |
|----|--|---------|
| 1  | Draft Amidships m                        | 1,211   |
| 2  | Displacement t                           | 58,00   |
| 3  | Volume (displaced) m <sup>3</sup>        | 58,000  |
| 4  | Heel deg                                 | 0,0     |
| 5  | Draft at FP m                            | 1,137   |
| 6  | Draft at AP m                            | 1,286   |
| 7  | Trim (+ve by stern) m                    | 0,150   |
| 8  | WL Length m                              | 26,191  |
| 9  | Beam max on WL m                         | 3,791   |
| 10 | Wetted Area m <sup>2</sup>               | 102,690 |
| 11 | Waterpl. Area m <sup>2</sup>             | 78,348  |
| 12 | Waterpl. ltrans m <sup>4</sup>           | 75,398  |
| 13 | Waterpl. llong m <sup>4</sup>            | 3273,58 |
| 14 | Prismatic coeff. (Cp)                    | 0,677   |
| 15 | Block coeff. (Cb)                        | 0,482   |
| 16 | Midship Sect. area coeff. (Cm)           | 0,712   |
| 17 | Waterpl. area coeff. (Cwp)               | 0,789   |
| 18 | LCB from aft perp. (+ve fwd) m           | 11,674  |
| 19 | VCB m                                    | 0,790   |
| 20 | LCF from aft perp. (+ve fwd) m           | 11,198  |
| 21 | VCF m                                    | 1,222   |
| 22 | KG m                                     | 1,730   |
| 23 | BMt m                                    | 1,300   |
| 24 | BML m                                    | 56,441  |
| 25 | GMt m                                    | 0,360   |
| 26 | GML m                                    | 55,501  |
| 27 | KMt m                                    | 2,090   |
| 28 | KML m                                    | 57,230  |
| 29 | Immersion (TPC) tonne/cm                 | 0,783   |
| 30 | MTc tonne.m                              | 1,231   |
| 31 | GZ m                                     | 0,000   |
| 32 | RM at 1deg = GMt.Disp.sin(1) tonne.m     | 0,364   |
| 33 | Max deck inclination deg                 | 0,3282  |
| 34 | Trim angle (+ve by stern) deg            | 0,3282  |
| 35 | Lat.proj. Underwater area m <sup>2</sup> | 27,384  |
| 36 | Lat.proj. Underwater VCA (world) m       | 0,661   |

## 4.2 Элементы статики при больших углах крена

|   | Item Name      | Quantit | Unit Mass tonne | Total Mass tonne | Unit Volume m³ | Total Volume m³ | Long. Arm m | Trans. Arm m | Vert. Arm m | Total FSM tonne.m | FSM Type    |
|---|----------------|---------|-----------------|------------------|----------------|-----------------|-------------|--------------|-------------|-------------------|-------------|
| 1 | Lightship      | 1       | 58,000          | 58,000           |                |                 | 11,679      | 0,000        | 1,730       | 0,000             | User Specif |
| 2 | Total Loadcase |         |                 | 58,000           | 0,000          | 0,000           | 11,679      | 0,000        | 1,730       | 0,000             |             |
| 3 | FS correction  |         |                 |                  |                |                 |             |              | 0,000       |                   |             |
| 4 | VCG fluid      |         |                 |                  |                |                 |             |              | 1,730       |                   |             |

|   | Name     | Long. Pos. m | Offset m | Height m | Type               | Linked to | Flood from | Intact (use for intact case)        | Damage (use for damage cases)       |
|---|----------|--------------|----------|----------|--------------------|-----------|------------|-------------------------------------|-------------------------------------|
| 1 | DF point | 6,62         | 1,59     | 2,82     | Downflooding point | None      | Sea        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | DF point | 6,62         | -1,59    | 2,82     | Downflooding point | None      | Sea        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

|   | Key point                             | Type               | Immersion angle deg            | Emergence angle deg |
|---|---------------------------------------|--------------------|--------------------------------|---------------------|
| 1 | Margin Line (immersion pos = 9,287 m) |                    | 38,3                           | n/a                 |
| 2 | Deck Edge (immersion pos = 9,287 m)   |                    | 40,2                           | n/a                 |
| 3 | DF point                              | Downflooding point | 52,2                           | 0                   |
| 4 | DF point                              | Downflooding point | Not immersed in positive range | 0                   |

| Heel to Starboard deg                    | -30,0   | -25,0   | -20,0   | -15,0   | -10,0   | -5,0    | 0,0     | 5,0     | 10,0    | 15,0    | 20,0    |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| GZ m                                     | -0,146  | -0,131  | -0,112  | -0,089  | -0,061  | -0,031  | 0,000   | 0,031   | 0,061   | 0,089   | 0,112   |
| Area under GZ curve from zero heel m.rad | 0,0436  | 0,0315  | 0,0208  | 0,0120  | 0,0054  | 0,0014  | 0,0000  | 0,0014  | 0,0054  | 0,0120  | 0,0208  |
| Displacement t                           | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   |
| Volume (displaced) m³                    | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  |
| Draft at FP m                            | 1,063   | 1,089   | 1,107   | 1,120   | 1,129   | 1,134   | 1,136   | 1,134   | 1,129   | 1,120   | 1,107   |
| Draft at AP m                            | 1,184   | 1,226   | 1,256   | 1,273   | 1,282   | 1,286   | 1,287   | 1,286   | 1,282   | 1,273   | 1,256   |
| Draft Amidships m                        | 1,123   | 1,158   | 1,182   | 1,197   | 1,206   | 1,210   | 1,211   | 1,210   | 1,206   | 1,197   | 1,182   |
| WL Length m                              | 26,298  | 26,286  | 26,272  | 26,255  | 26,236  | 26,215  | 26,191  | 26,215  | 26,236  | 26,255  | 26,272  |
| Beam max extents on WL m                 | 3,655   | 3,690   | 3,738   | 3,780   | 3,798   | 3,795   | 3,791   | 3,795   | 3,798   | 3,780   | 3,738   |
| Wetted Area m²                           | 101,262 | 101,421 | 101,782 | 102,200 | 102,519 | 102,657 | 102,688 | 102,657 | 102,519 | 102,200 | 101,782 |
| Waterpl. Area m²                         | 75,889  | 75,971  | 76,510  | 77,264  | 77,934  | 78,275  | 78,345  | 78,275  | 77,934  | 77,264  | 76,510  |
| Prismatic coeff. (Cp)                    | 0,682   | 0,681   | 0,680   | 0,679   | 0,678   | 0,677   | 0,678   | 0,677   | 0,678   | 0,679   | 0,680   |
| Block coeff. (Cb)                        | 0,537   | 0,516   | 0,500   | 0,488   | 0,483   | 0,482   | 0,482   | 0,482   | 0,483   | 0,488   | 0,500   |
| LCB from aft perp. (+ve fwd) m           | 11,674  | 11,674  | 11,674  | 11,674  | 11,674  | 11,673  | 11,671  | 11,673  | 11,674  | 11,674  | 11,674  |
| LCF from aft perp. (+ve fwd) m           | 11,716  | 11,593  | 11,472  | 11,360  | 11,268  | 11,213  | 11,197  | 11,213  | 11,268  | 11,360  | 11,472  |
| Max deck inclination deg                 | 30,0008 | 25,0014 | 20,0022 | 15,0034 | 10,0054 | 5,0109  | 0,3306  | 5,0109  | 10,0054 | 15,0034 | 20,0022 |
| Trim angle (+ve by stern) deg            | 0,2645  | 0,3013  | 0,3251  | 0,3356  | 0,3357  | 0,3318  | 0,3306  | 0,3318  | 0,3357  | 0,3356  | 0,3251  |

| 25,0    | 30,0    | 35,0    | 40,0    | 45,0    | 50,0    | 55,0    | 60,0    | 65,0    | 70,0    | 75,0    | 80,0    | 85,0    |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0,131   | 0,146   | 0,161   | 0,177   | 0,192   | 0,194   | 0,184   | 0,164   | 0,137   | 0,104   | 0,066   | 0,019   | -0,033  |
| 0,0315  | 0,0436  | 0,0570  | 0,0717  | 0,0878  | 0,1048  | 0,1213  | 0,1366  | 0,1498  | 0,1603  | 0,1678  | 0,1715  | 0,1709  |
| 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   | 58,00   |
| 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  | 58,000  |
| 1,089   | 1,063   | 1,027   | 0,977   | 0,908   | 0,824   | 0,722   | 0,594   | 0,428   | 0,189   | -0,209  | -1,046  | -3,618  |
| 1,226   | 1,184   | 1,124   | 1,044   | 0,943   | 0,823   | 0,679   | 0,497   | 0,251   | -0,107  | -0,688  | -1,819  | -5,158  |
| 1,158   | 1,123   | 1,076   | 1,010   | 0,925   | 0,823   | 0,700   | 0,545   | 0,339   | 0,041   | -0,449  | -1,433  | -4,388  |
| 26,286  | 26,298  | 26,306  | 26,309  | 26,305  | 26,297  | 26,258  | 26,186  | 26,052  | 25,618  | 25,553  | 25,799  | 26,016  |
| 3,690   | 3,655   | 3,644   | 3,662   | 3,438   | 3,245   | 3,094   | 2,981   | 2,908   | 2,869   | 2,757   | 2,633   | 2,555   |
| 101,421 | 101,263 | 101,432 | 102,128 | 103,608 | 105,016 | 105,891 | 106,574 | 106,869 | 106,991 | 106,269 | 105,712 | 105,469 |
| 75,971  | 75,888  | 76,445  | 77,858  | 76,408  | 73,748  | 71,059  | 69,010  | 67,274  | 65,748  | 62,726  | 60,116  | 58,285  |
| 0,681   | 0,682   | 0,683   | 0,684   | 0,687   | 0,692   | 0,698   | 0,705   | 0,714   | 0,731   | 0,738   | 0,737   | 0,738   |
| 0,516   | 0,537   | 0,562   | 0,596   | 0,693   | 0,826   | 1,019   | 1,362   | 2,256   | 19,129  | 0,000   | 0,000   | 0,000   |
| 11,674  | 11,675  | 11,676  | 11,677  | 11,678  | 11,679  | 11,680  | 11,681  | 11,682  | 11,683  | 11,684  | 11,685  | 11,682  |
| 11,593  | 11,716  | 11,844  | 11,985  | 12,168  | 12,337  | 12,502  | 12,673  | 12,810  | 12,926  | 12,825  | 12,722  | 12,658  |
| 25,0014 | 30,0008 | 35,0004 | 40,0001 | 45,0000 | 50,0000 | 55,0000 | 60,0001 | 65,0001 | 70,0002 | 75,0002 | 80,0001 | 85,0001 |
| 0,3012  | 0,2637  | 0,2115  | 0,1461  | 0,0761  | -0,0021 | -0,0946 | -0,2139 | -0,3868 | -0,6483 | -1,0486 | -1,6933 | -3,3709 |

### 4.3 Характеристики диаграммы статической стойчивости. РС ПКПМС 2017, ч.IV, ост., разд.2.2.1

|    | Code                           | Criteria                     | Value  | Units | Actual | Status | Margin % |
|----|--------------------------------|------------------------------|--------|-------|--------|--------|----------|
| 1  | 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 30          |        |       |        | Fail   |          |
| 2  |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 3  |                                | spec. heel angle             | 0,0    | deg   | 0,0    |        |          |
| 4  |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 5  |                                | spec. heel angle             | 30,0   | deg   | 30,0   |        |          |
| 6  |                                | angle of vanishing stability | 81,9   | deg   |        |        |          |
| 7  |                                | shall not be less than (>=)  | 0,0550 | m.rad | 0,0436 | Fail   | -20,77   |
| 8  |                                |                              |        |       |        |        |          |
| 9  | 267(85) Ch2 - General Criteria | 2.2.1: Area 0 to 40          |        |       |        | Fail   |          |
| 10 |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 11 |                                | spec. heel angle             | 0,0    | deg   | 0,0    |        |          |
| 12 |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 13 |                                | spec. heel angle             | 40,0   | deg   | 40,0   |        |          |
| 14 |                                | first downflooding angle     | 52,2   | deg   |        |        |          |
| 15 |                                | angle of vanishing stability | 81,9   | deg   |        |        |          |
| 16 |                                | shall not be less than (>=)  | 0,0900 | m.rad | 0,0717 | Fail   | -20,35   |
| 17 |                                |                              |        |       |        |        |          |
| 18 | 267(85) Ch2 - General Criteria | 2.2.1: Area 30 to 40         |        |       |        | Fail   |          |
| 19 |                                | <i>from the greater of</i>   |        |       |        |        |          |
| 20 |                                | spec. heel angle             | 30,0   | deg   | 30,0   |        |          |
| 21 |                                | <i>to the lesser of</i>      |        |       |        |        |          |
| 22 |                                | spec. heel angle             | 40,0   | deg   | 40,0   |        |          |
| 23 |                                | first downflooding angle     | 52,2   | deg   |        |        |          |
| 24 |                                | angle of vanishing stability | 81,9   | deg   |        |        |          |
| 25 |                                | shall not be less than (>=)  | 0,0300 | m.rad | 0,0281 | Fail   | -6,30    |
| 26 |                                |                              |        |       |        |        |          |

#### 4.4 Определение амплитуды качки и кренящего момента. ПКПС 2015, ч. II, ост., разд. 2.4 и 2.2

| Определение амплитуды качки и кренящего момента Мкр на кл.М-ПР |                                |                 |           |
|--|--------------------------------|-----------------|-----------|
| Амплитуда качки, раздел 2.4                                    | Обознач. или формула           | Ед.             | МО-VI     |
| Водоизмещение в пресной воде полное                            | D                              | кН/т            | 568,8/ 58 |
| Водоизмещение объёмное   | V                              | м <sup>3</sup>  | 58        |
| Осадка средняя   | Tcp                            | м               | 1,21      |
| Длина судна по действующую ватерлинию                          | Lвл                            | м               | 26,19     |
| Ширина судна по действующую ватерлинию                         | Bвл                            | м               | 3,79      |
| Аппликата ЦТ   | Zg                             | м               | 1,73      |
| Поперечная метацентрическая высота                             | ho                             | м               | 0,36      |
| Отношение  | Zg/B                           |                 | 0,46      |
| Величина   | $n1 = ho * B / (Zg * V^{1/3})$ |                 | 0,204     |
| Величина (таблица 2.4.3-1)                                     | mo                             |                 | 0,66      |
| Множитель  | $m1 = mo / ho^{1/2}$           | с <sup>-1</sup> | 1,1       |
| Отношение  | B / T                          |                 | 3,13      |
| Множитель (таблица 2.4.3-2)                                    | m2                             |                 | 0,88      |
| Кoeffициент полноты водоизмещения                              | δ                              |                 | 0,48      |
| Множитель (таблица 2.4.3-3)                                    | m3                             |                 | 0,97      |
| Величина   | $m = m1 * m2 * m3$             | с <sup>-1</sup> | 0,94      |
| Амплитуда бортовой качки судна без киля (таблица 2.4.1)        | θm                             | град.           | 27        |
| Площадь брускового киля  | Sk                             | м <sup>2</sup>  | 0         |
| Множитель  | $r = (r1 + r2) * r3$           |                 |           |
| Кoeffициент полноты ватерлинии                                 | α                              |                 |           |
| Величина   | $q = r * α * Bвл^{1/2}$        |                 |           |
| Кoeffициент поправочный (таблица 2.4.5)                        | k                              |                 |           |
| Амплитуда бортовой качки судна с килем                         | $θk = k * θm$                  | град.           |           |
| <b>Кренящий момент Мкр.раздел 2.2</b>                          |                                |                 |           |
| Площадь парусности   | S                              | м <sup>2</sup>  | 60,5      |
| Отстояние центра парусности от ОП                              | zn                             | м               | 2,54      |
| Возвышение центра парусности над плоскостью ватерлинии         | $zT = zn - T$                  | м               | 1,33      |
| Условное расчётное давление ветра (таблица 2.2.2)              | p                              | Па              | 209       |
| Кoeffициент (таблица 2.2.6-1)                                  | a1                             |                 |           |
| Кoeffициент (таблица 2.2.6-2)                                  | a2                             |                 |           |
| Приведённое плечо кренящей пары                                | $z = zT + a1 * a2 * T$         | м               |           |
| Величина (формула 2.2.1)                                       | $Mкр = 0,001 * p * S * z$      | кНм             | 16,82     |

## 4.5 Определение предельно допустимого момента Мдоп по ДСО.ПКПС 2015, ч.II,ост.,разд. 2.3.1

|    | Code                | Criteria  | Value  | Units          | Actual  | Status | Margin % |
|----|---------------------|---|--------|----------------|---------|--------|----------|
| 1  | ISO 12217-1:2002(E) | 6.3.2 Wind heeling arm                                  |        |                |         |        |          |
| 2  |                     | Wind arm: $a P A (h - H) / (g disp.) \cos^n(\phi)$      |        |                |         |        |          |
| 3  |                     | constant: a =   | 1      |                |         |        |          |
| 4  |                     | wind pressure: P =                                      | 209,0  | Pa             |         |        |          |
| 5  |                     | area centroid height (from zero point): h =             | 1,330  | m              |         |        |          |
| 6  |                     | total area: A =   | 60,500 | m <sup>2</sup> |         |        |          |
| 7  |                     | height of lateral resistance: H =                       | 0,000  | m              |         |        |          |
| 8  |                     | cosine power: n =                                       | 0      |                |         |        |          |
| 9  |                     | gust ratio  | 1,8646 |                |         | K      |          |
| 10 |                     | Intermediate values                                     |        |                |         |        |          |
| 11 |                     | Heel arm amplitude                                      |        | m              | 0,030   |        |          |
| 12 |                     |   |        |                |         |        |          |
| 13 | ISO 12217-1:2002(E) | 6.3.2 Rolling in beam waves and wind                    |        |                |         |        |          |
| 14 |                     | 6.3.2 Wind heeling arm (steady)                         |        |                |         |        |          |
| 15 | расчёт площадей     | Area1 integrated from the greater of                    |        |                |         |        |          |
| 16 | ДСО A1-A2           | angle of equilibrium (with gust heel arm)               | 8,9    | deg            | 8,9     |        |          |
| 17 | при переменном      | to the lesser of  |        |                |         |        |          |
| 18 | gust ratio = K      | first downflooding angle                                | 52,2   | deg            | 52,2    |        |          |
| 19 |                     | Area2 integrated to the lesser of                       |        |                |         |        |          |
| 20 |                     | roll back angle from equilibrium (with steady heel arm) | 27,0   | deg            | -27,0   |        |          |
| 21 |                     | Area1 = Area2   | 100,00 | %              | 100,00  |        | 0,00     |
| 22 |                     | Intermediate values                                     |        |                |         |        |          |
| 23 |                     | Equilibrium angle with steady heel arm                  |        | deg            | 4,7     |        |          |
| 24 |                     | Equilibrium angle with gust heel arm                    |        | deg            | 8,9     |        |          |
| 25 |                     | Area1 (under GZ), from 8,9 to 52,2 deg.                 |        | m.rad          | 0,1080  |        |          |
| 26 |                     | Area1 (under HA), from 8,9 to 52,2 deg.                 |        | m.rad          | 0,0417  |        |          |
| 27 |                     | Area1, from 8,9 to 52,2 deg.                            |        | m.rad          | 0,0663  | A1=A2  |          |
| 28 |                     | Area2 (under GZ), from -27,0 to 8,9 deg.                |        | m.rad          | -0,0318 |        |          |
| 29 |                     | Area2 (under HA), from -27,0 to 8,9 deg.                |        | m.rad          | 0,0345  |        |          |
| 30 |                     | Area2, from -27,0 to 8,9 deg.                           |        | m.rad          | 0,0663  | A2=A1  |          |
| 31 |                     |   |        |                |         |        |          |

| Крен<br>deg. | lкр<br>m | lдоп<br>m |
|--------------|----------|-----------|
| -30,000000   | 0,029567 | 0,055130  |
| -25,000000   | 0,029567 | 0,055130  |
| -20,000000   | 0,029567 | 0,055130  |
| -15,000000   | 0,029567 | 0,055130  |
| -10,000000   | 0,029567 | 0,055130  |
| -5,000000    | 0,029567 | 0,055130  |
| 0,000000     | 0,029567 | 0,055130  |
| 5,000000     | 0,029567 | 0,055130  |
| 10,000000    | 0,029567 | 0,055130  |
| 15,000000    | 0,029567 | 0,055130  |
| 20,000000    | 0,029567 | 0,055130  |
| 25,000000    | 0,029567 | 0,055130  |
| 30,000000    | 0,029567 | 0,055130  |
| 35,000000    | 0,029567 | 0,055130  |
| 40,000000    | 0,029567 | 0,055130  |
| 45,000000    | 0,029567 | 0,055130  |
| 50,000000    | 0,029567 | 0,055130  |
| 55,000000    | 0,029567 | 0,055130  |
| 60,000000    | 0,029567 | 0,055130  |
| 65,000000    | 0,029567 | 0,055130  |
| 70,000000    | 0,029567 | 0,055130  |
| 75,000000    | 0,029567 | 0,055130  |
| 80,000000    | 0,029567 | 0,055130  |
| 85,000000    | 0,029567 | 0,055130  |

Вес судна  $\Delta = 568,8$  кН

$M_{доп} = \Delta * l_{доп} = 568,8 * 0,05513 = 31,3579$  кНм

$M_{кр} = \Delta * l_{кр} = 568,8 * 0,029567 = 16,8177$  кНм

$K = M_{доп} / M_{кр} = 1,8646$

