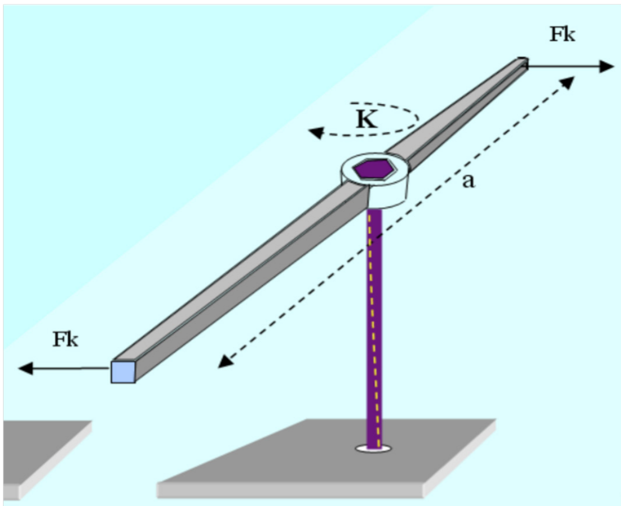
APPENDIX E

STABILITY

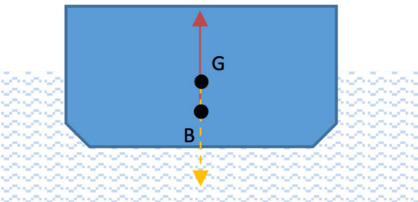
E.1 The stability of vessels

The rolling of a vessel is effectively a form of rotation. To be able to rotate an object, like a vessel, two forces are necessary, operating in opposing directions. If these forces act precisely in line with each other, nothing happens (the vessel remains still in the water and there is no roll). However, if these forces act in opposing directions and do not act in line with each other, a *torque* is generated. In this case, there is a separation between the *lines of action* of the opposing forces. This distance is known as the *arm*. The quantity of the moment, the so-called torque moment (K) is dependent on the force (F) and the length of the arm (a): K=F*a. In figure 1, two equal forces but acting in opposing directions 'Fk' cause the spindle to rotate. The distance 'a' creates a torque.



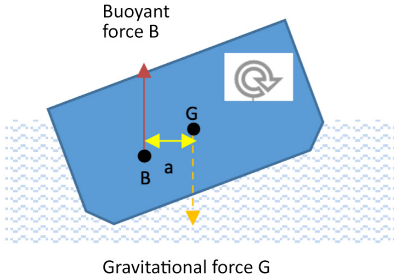
Appendix E, figure 1: Torque and rotation. (Source: Creative Commons).

The forces that cause rotation on the vessel are gravitational force or gravity on the one hand and the buoyant force, on the other. By definition, these forces (according to Archimedes' Principle) are equal in size and operate in precisely opposing directions. If the vessel is floating and at rest (not rolling), the point of application for gravity and *the point of application for the buoyant force* are immediately perpendicular to each other, as shown in figure 2. However, if as in figure 3, from its balanced situation, the vessel starts to heel, the point of application of the buoyant force is moved, resulting in an *arm*, which generates torque. The direction and degree of movement of the point of application of the buoyant force depend on the shape of the ship's hull, whereby above all the width of the submerged part of the hull (measured at the waterline) has a very large influence.



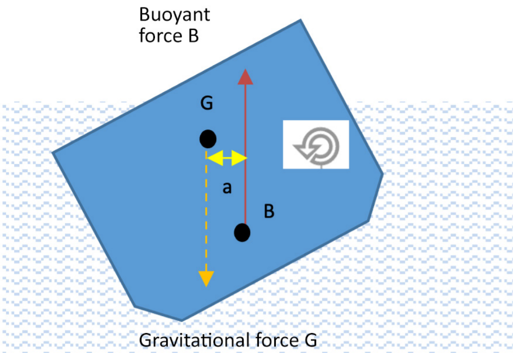
The point of application 'B' of the buoyant force is at the centre of buoyancy of the part of the ship's hull located beneath the water. At rest, the point of application of the gravitational force 'G' and point 'B' are perpendicular to one another, operating in opposing directions. There is no arm and therefore no torque. The vessel remains floating upright.

Appendix E, figure 2: Ship upright and in balance.



If the vessel adopts an angle, another part of the vessel is under water. The shape of the underwater part also changes. As a consequence, the application point 'B' of the buoyant force moves to a different position, and in respect of the gravitational force 'G', a torque is created with arm 'a', that wants to roll the vessel back upright. In general it can be stated that on vessels, 'B' continues to move in the direction of the heel until the deck is under water.

Appendix E, figure 3: Righting torque.



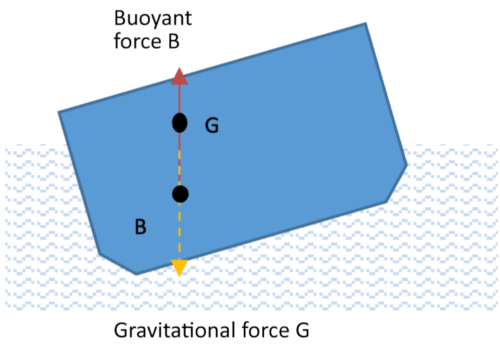
In this situation, the vessel is tilted at such an angle that the deck is under water. As a result, the shape of the underwater part of the vessel has changed to such an extent that the centre of buoyancy 'B' is no longer located to the left but now to the right of the centre of gravity 'G'. As a result, a torque is generated that wants to roll the vessel in the direction of the heel. The vessel capsizes.

Appendix E, figure 4: Heeling torque.

It is generally speaking the case that as long as the movement of the point of application of the buoyant force is in the same direction as the heel of the vessel, the torque generated will attempt to return the vessel to a balanced situation, as in figure 3. The torque wants to cause the vessel to right itself, and is therefore known as the righting torque. As long as there is still a righting torque, the accompanying stability arm is considered mathematically positive. However, if the point of application of the buoyant force moves in the opposite direction to the direction of the heel and, as in the situation in figure 4 for example, passes the point of application of the gravitational force, the stability arm becomes negative and a heeling torque is generated, that pushes the vessel in the other direction of rotation, with the heel, and the vessel capsizes.

A vessel can heel over for a number of reasons. There may for example be external factors such as wind and waves. Events on board can also result in a heel. An occurrence relevant to this report is the movement of heavy objects on board.

A movement of objects of this kind results in the moving of the point of application of the gravitational force 'G'. If the movement in question is in a lateral direction, this means that the vessel starts to heel, as shown in figure 5. As a result, the centre of buoyancy 'B' also moves, until 'G' and 'B' are once again perpendicular to one another. At that point the vessel is once again at rest, but heeling permanently. The vessel has adopted a list.

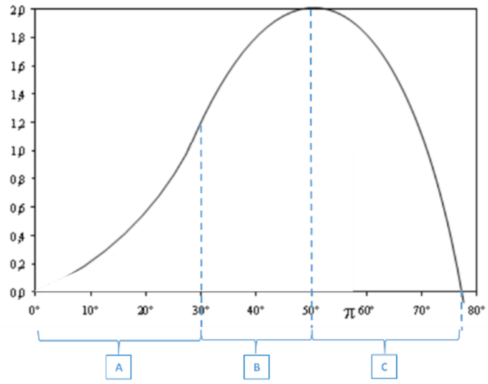


Appendix E, figure 5: Ship in balance but with a permanent list.

In effect, the situation in figure 5 does not yet represent a real problem. The vessel is floating and is at rest. It is listing but not capsizing. Nonetheless, this situation is more dangerous than the situation in which the vessel is floating in a level state. Due to the list, the vessel has far less leeway, on one side. In response to an external cause, for example, far less additional heeling is needed to put the deck under water, thereby increasing the risk of capsizing.

Any sudden substantial shift in the centre of gravity can also be dangerous in another way. The vessel will in fact first roll further, before the righting torque can become positive, and is able to return the vessel to rest in a new situation of balance (later in this text we will explain that *work* must first be done). If the roll advances to the point whereby the stability arm does become negative, then too, the vessel will capsize.

It is possible to calculate the stability arm for any angle of heel (in degrees °) from the situation of balance. If all these stability arms are reproduced in a graph, the result is the so-called *stability curve*, in which it is possible to see quickly and simply when the stability arm is positive, neutral and negative.



Appendix E, figure 6: Stability curve.

Figure 6 is an example of a random stability curve for a situation in which the vessel is floating upright. The horizontal axis shows the angle of heel and the Y-axis the stability arm.

As already stated, the direction and extent of movement of the point of application of the buoyant force depend on the shape of the ship's hull and the width of the submerged section of the hull, measured at the waterline. The shape of the ship's hull on almost all vessels ensures that the width of the submerged part of the hull increases ever further and ever faster, so that the stability arm also increases ever faster. This effect stops at the moment that the deck comes under water. From that moment, the width at the waterline of the submerged part of the vessel decreases ever faster. As a result, the increase in the stability arm first slows down and then decreases. At the moment that the arm becomes negative, the vessel capsizes.

The effect is clearly shown in the stability curve in figure 6. In section 'A' of the curve, the stability arm increases ever faster. The graph rises ever more steeply, until it reaches the end of section 'A'. In section 'B', the graph rises ever less steeply, and the stability arm accelerates more slowly. The dividing line between section 'A' and section 'B' is the point at which the deck comes under water.

In section 'C', the stability arm decreases, and then becomes negative.

One of the aspects that emerges from the above description is that the sooner the deck comes under water, the sooner the stability is negatively influenced. Because the distance between the deck and the waterline (known as the *freeboard*) determines how fast the deck comes under water in the event of heeling over, the freeboard is another important element in vessel design.

Whenever a force acts on an object, and causes it to move and/or rotate, this is known in physics as *work*. When a vessel rotates (heels over), work is applied to the vessel. The righting torque must deliver the same amount of work in order to halt the rotation of the vessel, and even more work in order to return the vessel to a balanced situation.

Merchant vessels and fishing vessels are subject to a number of stability requirements. These requirements are increased for beam trawlers. The reason is to make it possible to absorb the dynamic forces that occur for example when the fishing gear becomes snagged on an obstacle on the seabed. The extent to which these requirements are increased depends among others on the length of the vessel and the engine capacity/power. For the beam trawlers examined in this investigation, the requirements were increased by 20%:

Stability requirements	Merchant vessels and fishing vessels	Beam trawlers (+20%)
GM	≥ 0.15 metre	≥ 0.5 metre
Stability arm at 30° heel or more	≥ 0.2 metre	≥ 0.24 metre
Maximum stability arm	≥ At 25° list	≥ 23° list
Surface area below the stability curve between 0° and 30° heel	≥ 0.055 mrad	≥ 0.066 mrad
Surface area below the stability curve between 0° and 40° heel	≥ 0.09 mrad	≥ 0.108 mrad
Surface area below the stability curve between 30° and 40° heel	≥ 0.03 mrad	≥ 0.036 mrad

As previously stated, there are also external factors that apply work to the vessel, and that can cause the vessel to heel. Before a vessel can be sailed, it is therefore important to first determine whether the vessel can do enough work to overcome these external factors. To be certain of this, the law makers specify among others that a vessel must remain upright in the worst possible conditions, if exposed to a standardized amount of work caused by wind. This is laid down[1] in law, and put simply is as follows:

1. The vessel is exposed laterally to a mathematically constant wind at wind force 10 Bft[2] thereby taking on a calculated constant list.
2. Based on a specified formula, the number of degrees the vessel rolls around this list is calculated, as a consequence of a regular athwartships swell.
3. When, during such a rolling motion, the vessel is in the maximum wind position, the vessel is hit by a gust of wind of 1.5 x wind force 10 Bft.

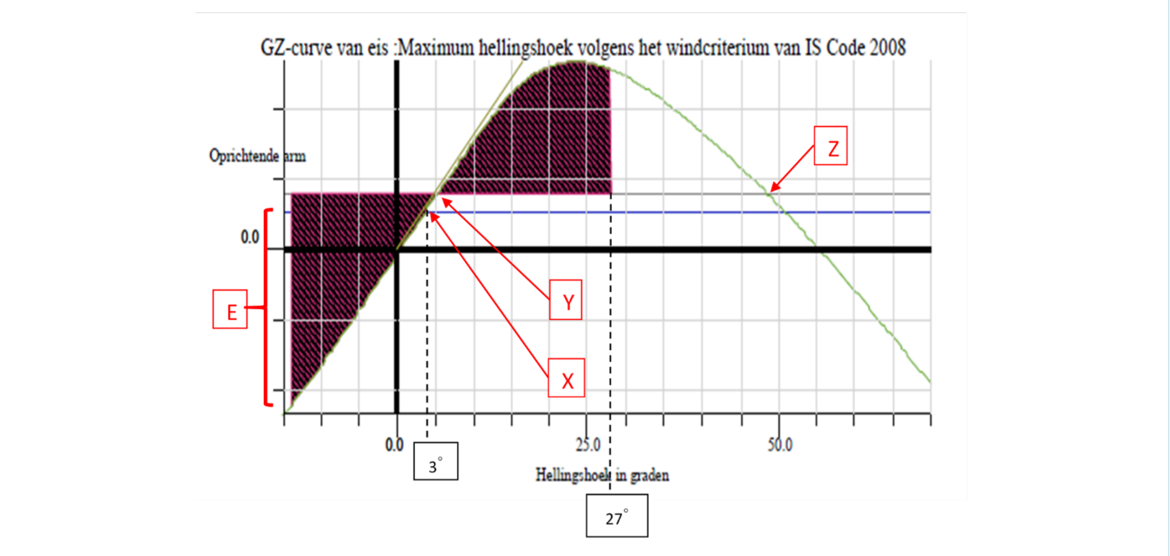
It is possible to calculate whether these requirements are satisfied, but compliance can also be relatively simply read off in the stability curve. This is because the surface area below the curve is the mathematical measurement for the *work* that is done. The example in figure 7 below includes a stability curve for the UK-165. The constant wind pressure from wind force 10 (shown by the blue horizontal line) causes the vessel to take on a static heel of approximately 3° (shown by point ‘X’). Now, the calculated angle of roll of

1 The requirement has its origin in the Intact Stability Code (IS code) of the IMO and is among others included in the Notification to the Deep Sea Fishing Industry 12/1989, in particular Article 3(6) and Annex III respectively.
2 Bft stands for Beaufort as unit for wind force. Strictly speaking, the vessel must be exposed to a constant wind force of 51.4 kgf/m^2, which equates to wind force 10.

the vessel as a consequence of the regular swell is marked on the horizontal axis, from the static angle of heel. In the example in figure 7, that angle is 17°. From there, a vertical line 'E' is drawn downwards to the point where the stability curve is intersected, and upwards to the grey horizontal line. This grey line shows the (dynamic) wind arm caused by the gust of wind measuring 1.5 x wind force 10. The grey line intersects the stability curve at point 'Y'.

In figure 7, this results in the determination of a red hatched area to the left of point 'Y', which is bounded by the stability curve, line 'E', the grey horizontal line.

In this case, the vessel can withstand the total applied work if the red hatched area to the left of point 'Y' is *smaller* than the red hatched section *to the right* of point 'Y', between 'Y' and point 'Z'. In the example in figure 7, the two red hatched areas are already equal in size at a heel of approximately 27°. The vessel remains upright and satisfies the requirement that the maximum heel, caused by the standard applied specified wind pressure may not be greater than 50° and may also not be greater than the list at 'Z'.



Appendix E, figure 7: Stability curve UK-165 with wind requirement +20%.

The final element that must be mentioned here is that the stability curve only applies for one specific situation for the vessel. If the vessel is laden more heavily or more lightly, for example because fish has been brought on board or because fuel has been bunkered or consumed, the centre of gravity will be higher or lower. At that point, the vessel will sit more or less deeply, so that the part of the vessel underwater is larger or smaller, and has a different shape. The stability curve also changes if for example as a result of an asymmetric loading condition, the vessel takes on a permanent list.

For this reason, the law makers require that the stability must first be tested in different loading conditions. For fishing vessels with a length of less than 24 metres[3], used for beam trawling, the different loading conditions appear in chapter 4 of this report.

3 Fishing Vessels Decree Article 61 and Notification to the Deep Sea Fishing Industry no. 12 1989 stability, Article 1(7).

E.2 Influence of the level of stores in fuel and drinking water tanks

The positions and weights of all objects present on board influence the stability of the vessel. Certain of these influences are variable such as the quantity of fuel and drinking water in the tanks. At the end of each journey, there is less fuel and drinking water on board than at the start, because of the amounts consumed during the journey. It proved impossible to determine how much fuel and drinking water was on board the UK-165 when she sank. The same applied for the UK-171. To determine whether the amount of fuel and drinking water could have been decisive, a number of calculations for the UK-165 were carried out twice, once with 10% and once with 50%. These calculations showed that the influence was so negligible that it was not a determining factor in whether the vessel capsized or not, in relation to the influence exercised by the various boom positions and positions of the gear. This report therefore only considers the situations with tanks filled to 10%, and for the calculations on the UK-171 and TX-21, calculations were only carried out with 10% filled tanks.

E.3 UK-165

E.3.1 Results of stability calculations UK-165 based on the course of events

Crew:	2 persons, 175 kg
Stores including food:	250 kg
Catch:	1000 kg
Ballast tanks (fore peak/after peak):	Empty
Spare net stowed in fore part:	160 kg
Fuel and drinking water tanks:	10%

<table>
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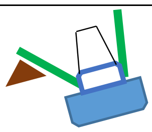
<tr><td>1</td><td></td><td>• Port boom at 45° setting
• Starboard boom vertical
• Port gear below boom tip</td><td colspan="2">
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<tr><td>Minimum metacentrumhoogte G'M</td><td>0.500</td><td>0.813</td><td>meter</td></tr>
<tr><td>Maximum GZ bij 30 graden of meer</td><td>0.240</td><td>0.074</td><td>meter</td></tr>
<tr><td>Top van de GZ kromme bij minstens</td><td>23.000</td><td>23.265</td><td>graden BB</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 30 graden</td><td>0.066</td><td>0.024</td><td>mrad</td></tr>
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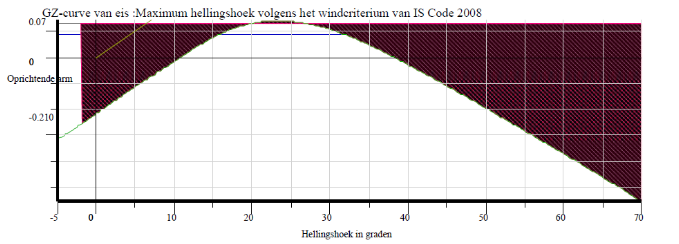
• Standard wind pressure according to IS code (51.4 kgf/m2)</td><td colspan="2">
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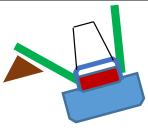
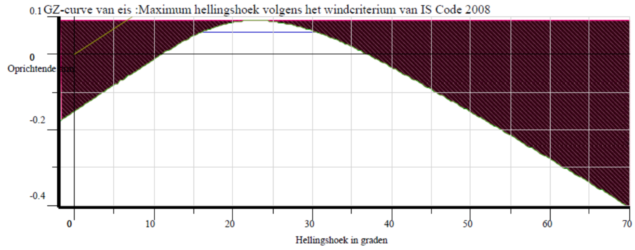


- Port boom at 45° setting
- Starboard boom vertical
- Port gear below boom tip
- Starboard gear missing
- Net reel with spare net mounted on stern part
- Standard wind pressure according to IS code (51.4 kgf/m2)

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.797	meter
Maximum GZ bij 30 graden of meer	0.240	0.063	meter
Top van de GZ kromme bij minstens	23.000	22.800	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.022	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.026	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.004	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	16.074	graden BB
Minimum vrijboord op 1/2L.	0.100	0.154	meter
Minimum vrijboord op 1/2 L (inclusief windmoment)	0.100	-0.074	meter



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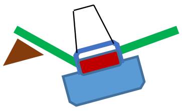
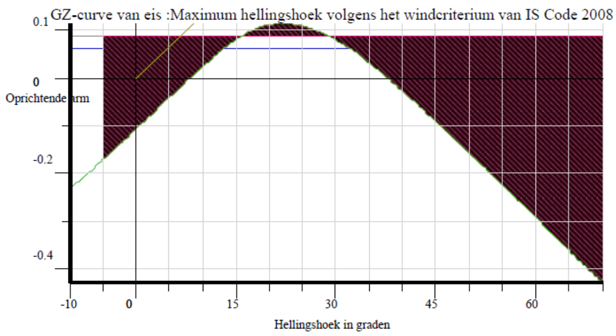


- Port boom at 45° setting
- Starboard boom horizontal
- Port gear below boom tip
- Starboard gear missing
- Net reel with spare net mounted on stern part
- Standard wind pressure according to IS code (51.4 kgf/m2)

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.754	meter
Maximum GZ bij 30 graden of meer	0.240	0.079	meter
Top van de GZ kromme bij minstens	23.000	21.993	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.032	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.037	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.006	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	12.995	graden BB
Minimum vrijboord op 1/2L.	0.100	0.281	meter
Minimum vrijboord op 1/2 L (inclusief windmoment)	0.100	0.065	meter



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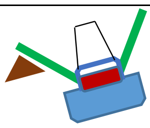
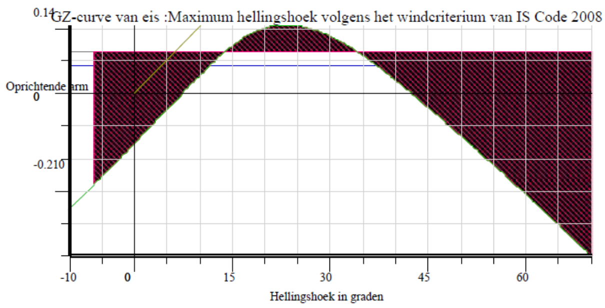


- Port boom at 45° setting
- Starboard boom at 45°
- Port gear below boom tip
- Starboard gear missing
- Net reel with spare net mounted on stern part
- Standard wind pressure according to IS code (51.4 kgf/m2)

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.840	meter
Maximum GZ bij 30 graden of meer	0.240	0.123	meter
Top van de GZ kromme bij minstens	23.000	23.130	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.042	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.056	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.014	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	11.555	graden BB
Minimum vrijboord op 1/2L.	0.100	0.320	meter
Minimum vrijboord op 1/2 L (inclusief windmoment)	0.100	0.129	meter



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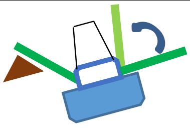
<td></td>
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• Starboard boom swings from horizontal to vertical
• Port gear below boom tip
• Starboard gear missing
• Wind force 6 Bft</td>
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<tr><td>Maximum statische hellingshoek t.g.v. wind</td><td>16.000</td><td>70.000</td><td>graden BB</td></tr>
<tr><td>Minimum vrijboord op 1/2L.</td><td>0.100</td><td>0.000</td><td>meter</td></tr>
<tr><td>Minimum vrijboord op 1/2 L (inclusief windmoment)</td><td>0.100</td><td>0.000</td><td>meter</td></tr>
</table>
The software (PIAS) used for the stability calculations is unable to generate a stability curve in this situation. In terms of stability, the results are too poor. There is no angle of heel to port whatsoever with a positive stability arm.
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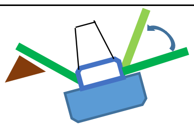
<td></td>
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• Starboard boom swings from horizontal to 45° setting
• Port gear below boom tip
• Starboard gear missing
• Wind force 6 Bft</td>
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<tr><td>Minimum vrijboord op 1/2 L (inclusief windmoment)</td><td>0.100</td><td>-0.263</td><td>meter</td></tr>
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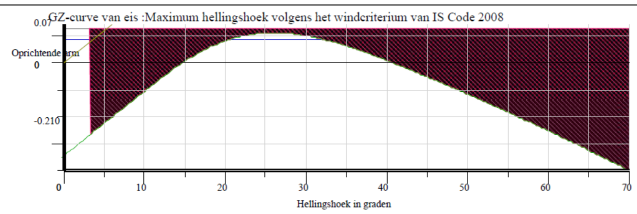

</td>
</tr>
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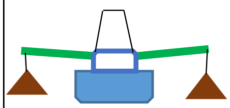
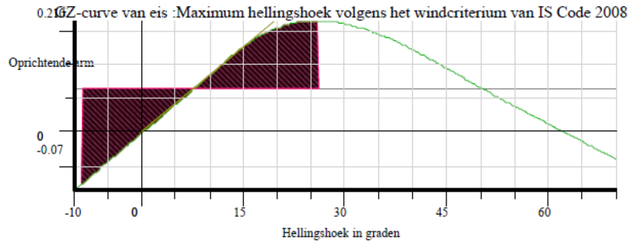
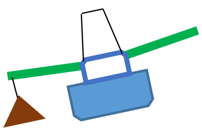
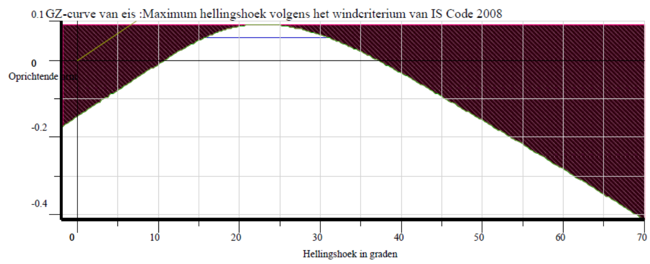
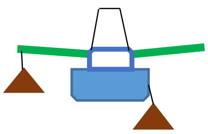
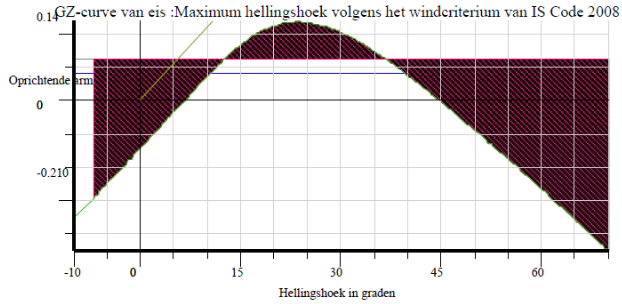
E.3.2 Results of stability calculations UK-165 for analysis

Crew:	2 persons, 175 kg, unless otherwise specified
Stores including food:	250 kg
Catch:	1000 kg, unless otherwise specified
Ballast tanks (fore peak/after peak):	Empty
Spare net stowed in fore part:	160 kg
Fuel and drinking water tanks:	10%

<table>
<tr><td colspan="3">Outrigger boom</td><td>Gear</td></tr>
<tr><td>No.</td><td>Situation drawing</td><td>Description</td><td></td></tr>
<tr><td>1</td><td></td><td>• Symmetric loading condition
• Crew 500 kg
• Catch 5000 kg</td><td>Berekend naar BB — Eis — Waarde
Minimum metacentrumhoogte GM — 0.500 — 0.677 meter
Maximum GZ bij 30 graden of meer — 0.200 — 0.223 meter
Top van de GZ kromme bij minstens — 24.000 — 25.811 graden BB
Oppervlak onder de GZ kromme tot 30 graden — 0.055 — 0.079 mrad
Oppervlak onder de GZ kromme tot 40 graden — 0.090 — 0.114 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.030 — 0.035 mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 — 25.996 graden BB
Maximum statische hellingshoek t.g.v. wind — 16.000 — 7.790 graden BB
</td></tr>
<tr><td>2</td><td></td><td>• Both outrigger booms horizontal
• Port gear raised to block
• Starboard fishing gear missing</td><td>Berekend naar BB — Eis — Waarde
Minimum metacentrumhoogte GM — 0.500 — 0.787 meter
Maximum GZ bij 30 graden of meer — 0.240 — 0.066 meter
Top van de GZ kromme bij minstens — 23.000 — 22.851 graden BB
Oppervlak onder de GZ kromme tot 30 graden — 0.066 — 0.023 mrad
Oppervlak onder de GZ kromme tot 40 graden — 0.108 — 0.027 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.036 — 0.004 mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 — 70.000 graden BB
Maximum statische hellingshoek t.g.v. wind — 16.000 — 15.937 graden BB
Minimum vrijboord op 1/2L. — 0.100 — 0.172 meter
Minimum vrijboord op 1/2 L (inclusief windmoment) — 0.100 — -0.059 meter
</td></tr>
<tr><td>3</td><td></td><td>• Both outrigger booms horizontal
• Port gear raised to block
• Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed</td><td>Berekend naar BB — Eis — Waarde
Minimum metacentrumhoogte GM — 0.500 — 0.869 meter
Maximum GZ bij 30 graden of meer — 0.240 — 0.143 meter
Top van de GZ kromme bij minstens — 23.000 — 23.508 graden BB
Oppervlak onder de GZ kromme tot 30 graden — 0.066 — 0.049 mrad
Oppervlak onder de GZ kromme tot 40 graden — 0.108 — 0.067 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.036 — 0.018 mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 — 70.000 graden BB
Maximum statische hellingshoek t.g.v. wind — 16.000 — 10.645 graden BB
Minimum vrijboord op 1/2L. — 0.100 — 0.346 meter
Minimum vrijboord op 1/2 L (inclusief windmoment) — 0.100 — 0.163 meter
</td></tr>
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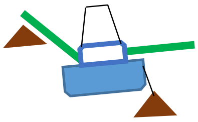
<td></td>
<td>

Port boom in 45° setting
Port gear raised to block
Starboard boom horizontal
Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed

</td>
<td>
<table>
<tr><th>Berekend naar BB</th><th>Eis</th><th>Waarde</th><th></th></tr>
<tr><td>Minimum metacentrumhoogte GM</td><td>0.500</td><td>0.788</td><td>meter</td></tr>
<tr><td>Maximum GZ bij 30 graden of meer</td><td>0.240</td><td>0.140</td><td>meter</td></tr>
<tr><td>Top van de GZ kromme bij minstens</td><td>23.000</td><td>22.203</td><td>graden BB</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 30 graden</td><td>0.066</td><td>0.055</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 40 graden</td><td>0.108</td><td>0.071</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tussen 30 en 40 graden</td><td>0.036</td><td>0.016</td><td>mrad</td></tr>
<tr><td>Maximum hellingshoek volgens het windcriterium van IS Code 2008</td><td>50.000</td><td>70.000</td><td>graden BB</td></tr>
<tr><td>Maximum statische hellingshoek t.g.v. wind</td><td>16.000</td><td>8.631</td><td>graden BB</td></tr>
<tr><td>Minimum vrijboord op 1/2L.</td><td>0.100</td><td>0.457</td><td>meter</td></tr>
<tr><td>Minimum vrijboord op 1/2 L (inclusief windmoment)</td><td>0.100</td><td>0.255</td><td>meter</td></tr>
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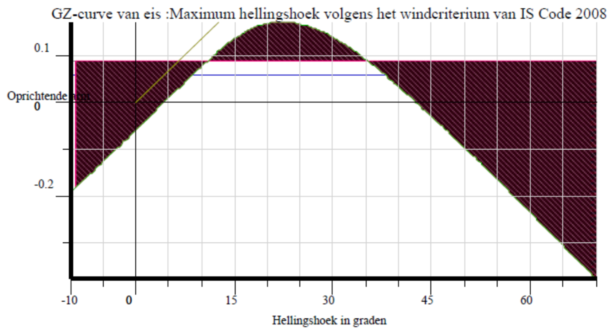

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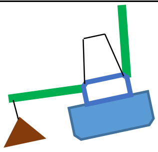
<td></td>
<td>

Port boom horizontal
Port gear raised to block
Starboard boom vertical
Starboard fishing gear missing

</td>
<td>
<table>
<tr><th>Berekend naar BB</th><th>Eis</th><th>Waarde</th><th></th></tr>
<tr><td>Minimum metacentrumhoogte GM</td><td>0.500</td><td>0.830</td><td>meter</td></tr>
<tr><td>Maximum GZ bij 30 graden of meer</td><td>0.240</td><td>0.050</td><td>meter</td></tr>
<tr><td>Top van de GZ kromme bij minstens</td><td>23.000</td><td>23.698</td><td>graden BB</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 30 graden</td><td>0.066</td><td>0.015</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 40 graden</td><td>0.108</td><td>0.018</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tussen 30 en 40 graden</td><td>0.036</td><td>0.003</td><td>mrad</td></tr>
<tr><td>Maximum hellingshoek volgens het windcriterium van IS Code 2008</td><td>50.000</td><td>70.000</td><td>graden BB</td></tr>
<tr><td>Maximum statische hellingshoek t.g.v. wind</td><td>16.000</td><td>19.819</td><td>graden BB</td></tr>
<tr><td>Minimum vrijboord op 1/2L.</td><td>0.100</td><td>0.057</td><td>meter</td></tr>
<tr><td>Minimum vrijboord op 1/2 L (inclusief windmoment)</td><td>0.100</td><td>-0.234</td><td>meter</td></tr>
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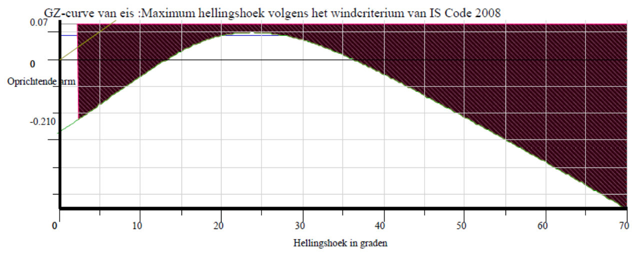

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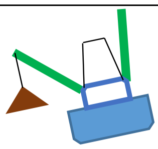
<td></td>
<td>

Port boom in 45° setting
Port gear raised to block
Starboard boom vertical
Starboard fishing gear missing

</td>
<td>
<table>
<tr><th>Berekend naar BB</th><th>Eis</th><th>Waarde</th><th></th></tr>
<tr><td>Minimum metacentrumhoogte GM</td><td>0.500</td><td>0.813</td><td>meter</td></tr>
<tr><td>Maximum GZ bij 30 graden of meer</td><td>0.240</td><td>0.057</td><td>meter</td></tr>
<tr><td>Top van de GZ kromme bij minstens</td><td>23.000</td><td>23.378</td><td>graden BB</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 30 graden</td><td>0.066</td><td>0.018</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 40 graden</td><td>0.108</td><td>0.022</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tussen 30 en 40 graden</td><td>0.036</td><td>0.004</td><td>mrad</td></tr>
<tr><td>Maximum hellingshoek volgens het windcriterium van IS Code 2008</td><td>50.000</td><td>70.000</td><td>graden BB</td></tr>
<tr><td>Maximum statische hellingshoek t.g.v. wind</td><td>16.000</td><td>17.917</td><td>graden BB</td></tr>
<tr><td>Minimum vrijboord op 1/2L.</td><td>0.100</td><td>0.102</td><td>meter</td></tr>
<tr><td>Vrijboord op 1/2L aan SB = 1253 m.</td><td></td><td></td><td></td></tr>
<tr><td>Minimum vrijboord op 1/2 L (inclusief windmoment)</td><td>0.100</td><td>-0.151</td><td>meter</td></tr>
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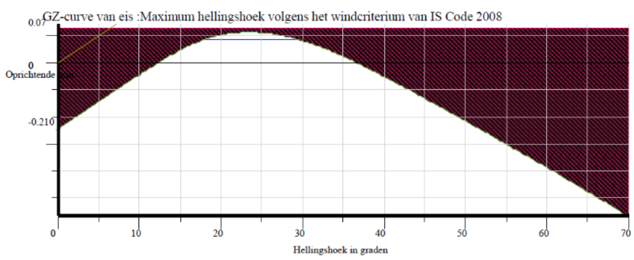

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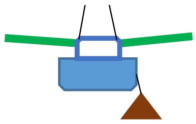
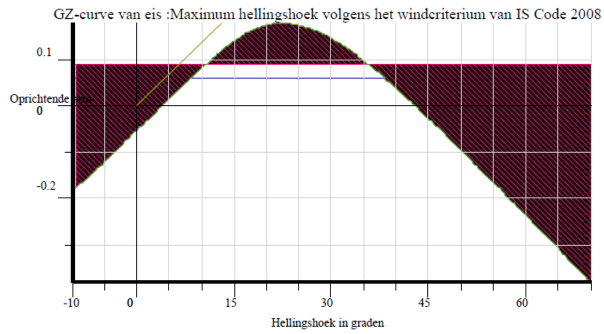


- Both outrigger booms horizontal
- Port gear missing
- Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed

Berekend naar SB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.787	meter
Maximum GZ bij 30 graden of meer	0.240	0.147	meter
Top van de GZ kromme bij minstens	23.000	22.349	graden SB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.058	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.075	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.017	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden SB
Maximum statische hellingshoek t.g.v. wind	16.000	8.337	graden SB
Minimum vrijboord op 1/2L.	0.100	0.492	meter
Minimum vrijboord op 1/2 L (inclusief windmoment)	0.100	0.284	meter



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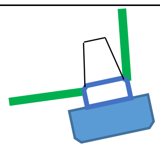
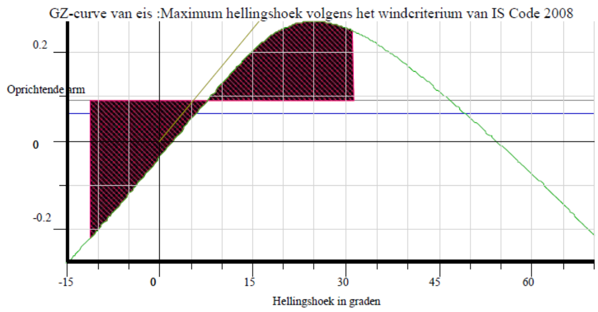


- Port boom horizontal
- Starboard boom vertical
- Both sets of gear missing

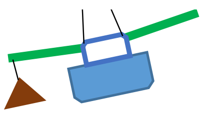
Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.967	meter
Maximum GZ bij 30 graden of meer	0.240	0.254	meter
Top van de GZ kromme bij minstens	23.000	24.807	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.090	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.127	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.038	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	31.149	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	5.810	graden BB
Minimum vrijboord op 1/2L.	0.100	0.587	meter
Minimum vrijboord op 1/2 L (inclusief windmoment)	0.100	0.417	meter



E.4 UK-171

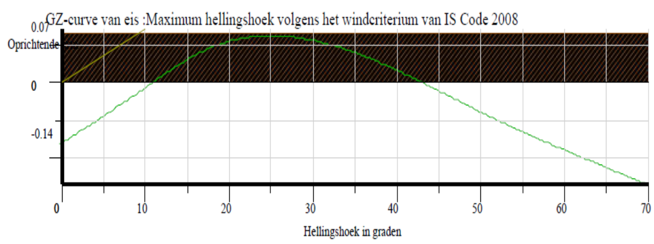
E.4.1 Results of stability calculations UK-171 based on the course of events

1

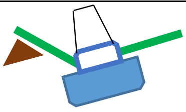


- Both outrigger booms horizontal
- Port gear raised to block
- Starboard fishing gear missing
- On the net reel on the stern part are 2 nets + cables for the twin-rig gear (2000 kg)
- Otter boards and skid are not on board.

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.578	meter
Maximum GZ bij 30 graden of meer	0.200	0.080	meter
Top van de GZ kromme bij minstens	24.000	24.941	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.022	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.032	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.010	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	70.000	graden BB

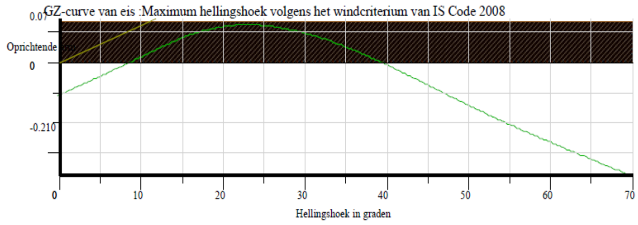


2



- Starboard boom horizontal
- Port boom 45°
- Port gear raised to block
- Starboard fishing gear missing
- On the net reel on the stern part are 2 nets + cables for the twin-rig gear (2000 kg)
- Otter boards and skid are not on board.

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte GM	0.500	0.487	meter
Maximum GZ bij 30 graden of meer	0.200	0.067	meter
Top van de GZ kromme bij minstens	24.000	22.879	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.024	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.030	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.006	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	70.000	graden BB



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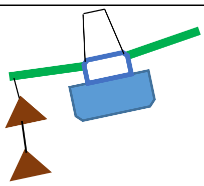
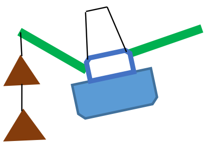


- Both outrigger booms horizontal
- Port gear raised to block
- Starboard gear suspended from port gear, clear of seabed
- On the net reel on the stern part are 2 nets + cables for the twin-rig gear (2000 kg)
- Otter boards and skid are not on board.

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte GM	0.500	0.602	meter
Maximum GZ bij 30 graden of meer	0.200	-0.009	meter
Top van de GZ kromme bij minstens	24.000	25.530	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.000	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.000	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.000	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	70.000	graden BB

The software (PIAS) used for the stability calculations is unable to generate a stability curve in this situation. The results are too poor, there is no angle of heel to port whatsoever with a positive stability arm.

4



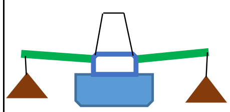
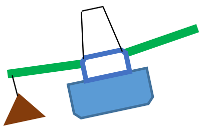
- Starboard boom horizontal
- Port boom 45°
- Port gear raised to block
- Starboard gear suspended from port gear, clear of seabed
- On the net reel on the stern part are 2 nets + cables for the twin-rig gear (2000 kg)
- Otter boards and skid are not on board.

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte GM	0.500	0.385	meter
Maximum GZ bij 30 graden of meer	0.200	-0.048	meter
Top van de GZ kromme bij minstens	24.000	21.511	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.000	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.000	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.000	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	70.000	graden BB

The software (PIAS) used for the stability calculations is unable to generate a stability curve in this situation. The results are too poor, there is no angle of heel to port whatsoever with a positive stability arm.

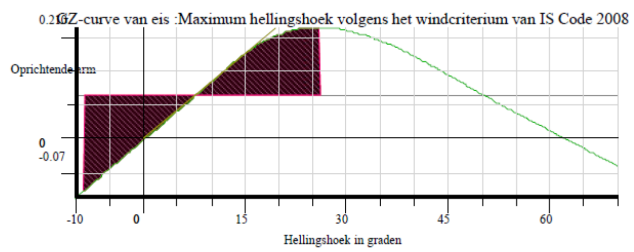
E.4.2 Results of stability calculations UK-171 for analysis

Crew:	2 persons, 175 kg, unless otherwise specified
Stores including food:	250 kg
Catch:	1000 kg, unless otherwise specified
Ballast tanks (fore peak/after peak):	Empty
Spare net stowed in fore part:	160 kg
Fuel and drinking water tanks:	10%

Outrigger boom			Gear
No.	Situation drawing	Description	
1		• Symmetric loading condition • Crew 500 kg • Catch 5000 kg	see results below
2		• Both outrigger booms horizontal • Port gear raised to block • Starboard fishing gear missing	see results below

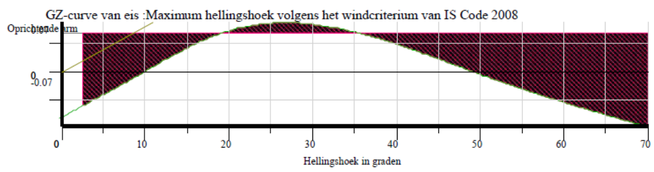
No. 1

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.677	meter
Maximum GZ bij 30 graden of meer	0.200	0.223	meter
Top van de GZ kromme bij minstens	24.000	25.811	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.079	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.114	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.035	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	25.996	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	7.790	graden BB



No. 2

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.639	meter
Maximum GZ bij 30 graden of meer	0.200	0.118	meter
Top van de GZ kromme bij minstens	24.000	26.711	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.030	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.047	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.017	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	19.002	graden BB



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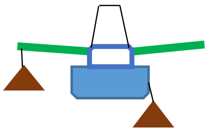
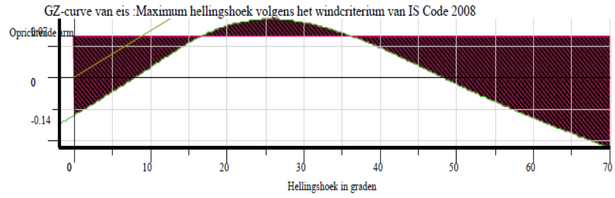


- Both outrigger booms horizontal
- Port gear raised to block
- Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte GM	0.500	0.605	meter
Maximum GZ bij 30 graden of meer	0.200	0.125	meter
Top van de GZ kromme bij minstens	24.000	25.603	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.036	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.054	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.018	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	16.578	graden BB



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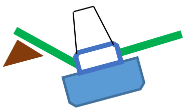
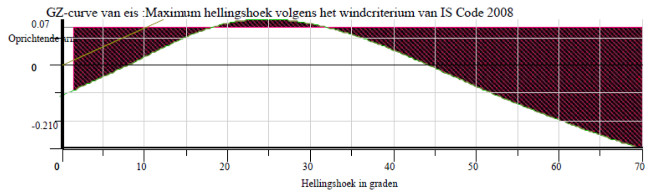


- Port boom in 45° setting
- Port gear raised to block
- Starboard boom horizontal
- Starboard fishing gear missing

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte GM	0.500	0.547	meter
Maximum GZ bij 30 graden of meer	0.200	0.105	meter
Top van de GZ kromme bij minstens	24.000	24.624	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.032	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.045	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.013	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	17.979	graden BB



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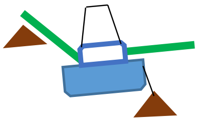
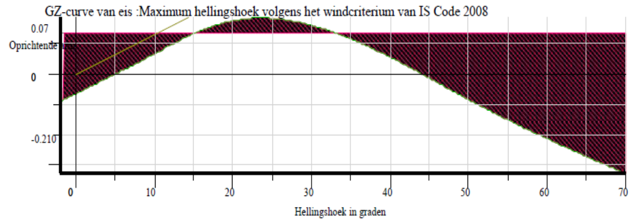


- Port boom in 45° setting
- Port gear raised to block
- Starboard boom horizontal
- Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte GM	0.500	0.514	meter
Maximum GZ bij 30 graden of meer	0.200	0.112	meter
Top van de GZ kromme bij minstens	24.000	23.606	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.039	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.053	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.014	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	15.207	graden BB



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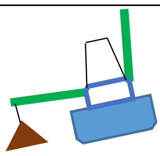
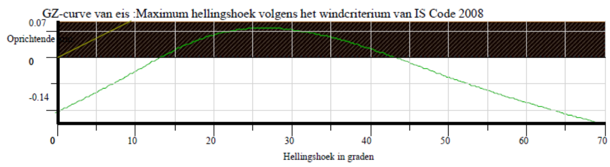
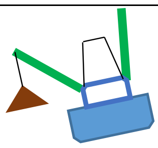
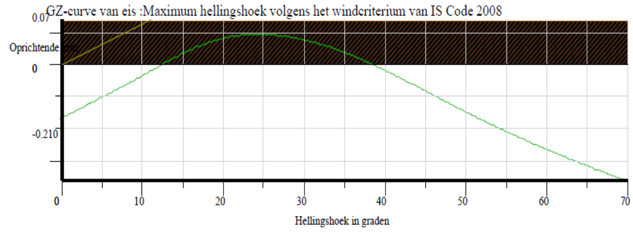
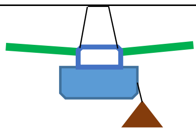
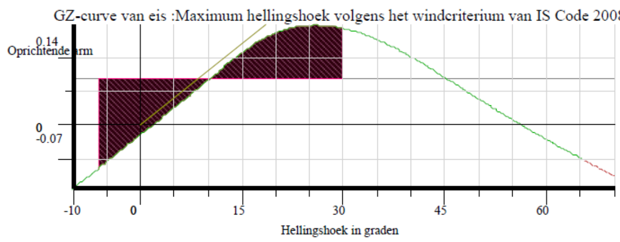
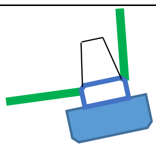
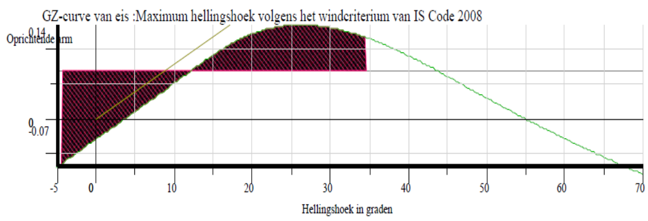


- Port boom horizontal
- Port gear raised to block
- Starboard boom vertical

- Starboard fishing gear missing

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte GM	0.500	0.607	meter
Maximum GZ bij 30 graden of meer	0.200	0.075	meter
Top van de GZ kromme bij minstens	24.000	26.398	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.055	0.017	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.090	0.026	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.030	0.009	mrad
Maximum hellingshoek volgens het windcriterium van IS Code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	70.000	graden BB



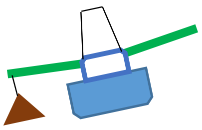
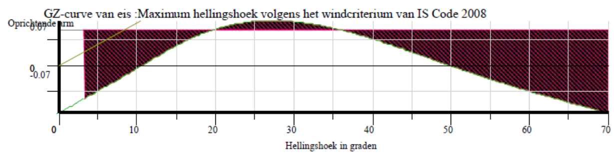
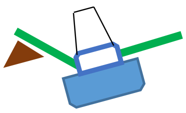
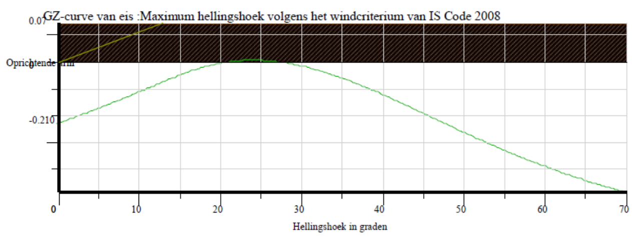
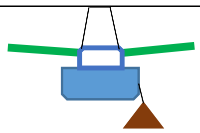
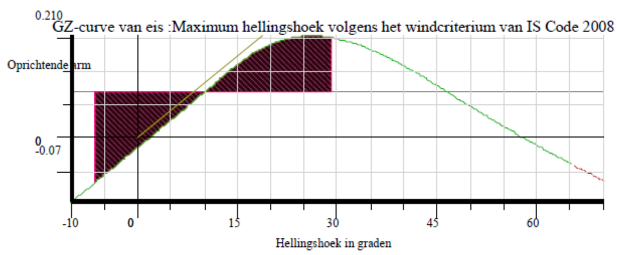
7		• Port boom in 45° setting • Port gear raised to block • Starboard boom vertical • Starboard fishing gear missing	Berekend naar BB — Eis / Waarde Minimum metacentrumhoogte G'M — 0.500 / 0.515 meter Maximum GZ bij 30 graden of meer — 0.200 / 0.054 meter Top van de GZ kromme bij minstens — 24.000 / 24.390 graden BB Oppervlak onder de GZ kromme tot 30 graden — 0.055 / 0.015 mrad Oppervlak onder de GZ kromme tot 40 graden — 0.090 / 0.020 mrad Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.030 / 0.004 mrad Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 / 70.000 graden BB Maximum statische hellingshoek t.g.v. wind — 16.000 / 70.000 graden BB 
8		• Both outrigger booms horizontal • Port gear missing • Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed	Berekend naar SB — Eis / Waarde Minimum metacentrumhoogte G'M — 0.500 / 0.639 meter Maximum GZ bij 30 graden of meer — 0.200 / 0.200 meter Top van de GZ kromme bij minstens — 24.000 / 25.824 graden SB Oppervlak onder de GZ kromme tot 30 graden — 0.055 / 0.068 mrad Oppervlak onder de GZ kromme tot 40 graden — 0.090 / 0.098 mrad Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.030 / 0.030 mrad Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 / 29.745 graden SB Maximum statische hellingshoek t.g.v. wind — 16.000 / 10.210 graden SB 
9		• Port boom horizontal • Starboard boom vertical • Both sets of gear missing	Berekend naar BB — Eis / Waarde Minimum metacentrumhoogte G'M — 0.500 / 0.642 meter Maximum GZ bij 30 graden of meer — 0.200 / 0.185 meter Top van de GZ kromme bij minstens — 24.000 / 26.217 graden BB Oppervlak onder de GZ kromme tot 30 graden — 0.055 / 0.059 mrad Oppervlak onder de GZ kromme tot 40 graden — 0.090 / 0.087 mrad Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.030 / 0.028 mrad Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 / 34.575 graden BB Maximum statische hellingshoek t.g.v. wind — 16.000 / 12.095 graden BB 

E.4.3 Results of stability calculations UK-171 for analysis, corrected boom length

After the stability calculations had been made for the UK-171 for analysis, it turned out that the outrigger booms had been replaced between the inclining test (2017) and the occurrence (December 2020). Each of the new outrigger booms were 8 kg heavier and 1 metre longer.

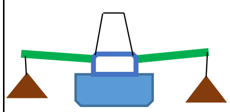
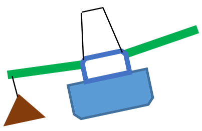
It could be argued based on theory that the stability of the vessel was not improved and was in fact worsened by these changes. To verify this, new calculations were made for three situations. The results of these calculations appear in the table below.

The results confirm the theory. The conclusions of the report are not changed as a consequence.

No.	Situation drawing	Description	
2		• Both outrigger booms horizontal • Port gear raised to block • Starboard fishing gear missing	Berekend naar BB — Eis — Waarde Minimum metacentrumhoogte G'M — 0.500 — 0.655 meter Maximum GZ bij 30 graden of meer — 0.200 — 0.117 meter Top van de GZ kromme bij minstens — 24.000 — 27.162 graden BB Oppervlak onder de GZ kromme tot 30 graden — 0.055 — 0.029 mrad Oppervlak onder de GZ kromme tot 40 graden — 0.090 — 0.046 mrad Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.030 — 0.017 mrad Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 — 70.000 graden BB Maximum statische hellingshoek t.g.v. wind — 16.000 — 19.705 graden BB 
4		• Port boom in 45° setting • Port gear raised to block • Starboard boom horizontal • Starboard fishing gear missing	Berekend naar BB — Eis — Waarde Minimum metacentrumhoogte G'M — 0.500 — 0.445 meter Maximum GZ bij 30 graden of meer — 0.200 — -0.012 meter Top van de GZ kromme bij minstens — 24.000 — 23.898 graden BB Oppervlak onder de GZ kromme tot 30 graden — 0.055 — 0.000 mrad Oppervlak onder de GZ kromme tot 40 graden — 0.090 — 0.000 mrad Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.030 — 0.000 mrad Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 — 70.000 graden BB Maximum statische hellingshoek t.g.v. wind — 16.000 — 70.000 graden BB 
8		• Both outrigger booms horizontal • Port gear missing • Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed	Berekend naar SB — Eis — Waarde Minimum metacentrumhoogte G'M — 0.500 — 0.655 meter Maximum GZ bij 30 graden of meer — 0.200 — 0.208 meter Top van de GZ kromme bij minstens — 24.000 — 26.130 graden SB Oppervlak onder de GZ kromme tot 30 graden — 0.055 — 0.070 mrad Oppervlak onder de GZ kromme tot 40 graden — 0.090 — 0.102 mrad Oppervlak onder de GZ kromme tussen 30 en 40 graden — 0.030 — 0.032 mrad Maximum hellingshoek volgens het windcriterium van IS Code 2008 — 50.000 — 29.054 graden SB Maximum statische hellingshoek t.g.v. wind — 16.000 — 9.969 graden SB 

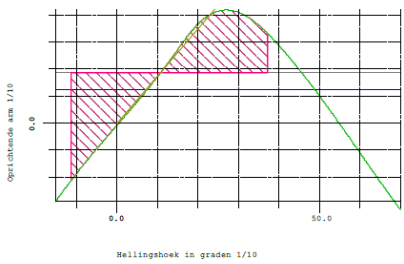
E.5 Results of stability calculations TX-21 for analysis

Crew:	2 persons, 175 kg, unless otherwise specified
Stores including food:	250 kg
Catch:	1000 kg, unless otherwise indicated
Ballast tanks (fore peak/after peak):	Empty
Spare net stowed in fore part:	160 kg
Fuel and drinking water tanks:	10%, unless otherwise indicated

Outrigger boom			Gear
No.	Situation drawing	Description	
1		• Symmetric loading condition • Crew 500 kg • Catch 6000 kg	see results 1 below
2		• Both outrigger booms horizontal • Port gear raised to block • Starboard fishing gear missing	see results 2 below

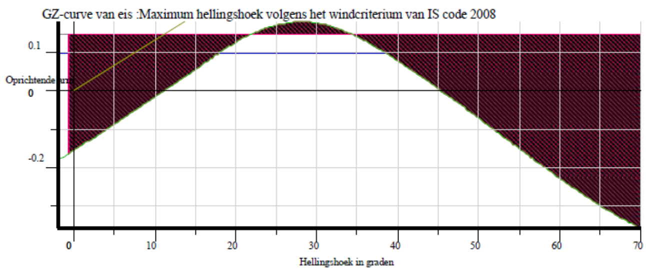
Results 1:

ILenT Boomkorviskotter Regels	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.691	meter
Maximum GZ bij 30 graden of meer	0.240	0.287	meter
Top van de GZ kromme bij minstens	25.000	27.089	graden
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.092	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.136	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.044	mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	37.259	graden
Maximum statische hellingshoek t.g.v. wind	16.000	7.573	graden



Results 2:

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.747	meter
Maximum GZ bij 30 graden of meer	0.240	0.176	meter
Top van de GZ kromme bij minstens	25.000	28.222	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.038	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.062	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.024	mrad
Maximum hellingshoek volgens het windcriterium van IS code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	17.879	graden BB



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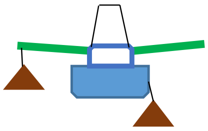
<td></td>
<td>

- Both outrigger booms horizontal
- Port gear raised to block
- Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed

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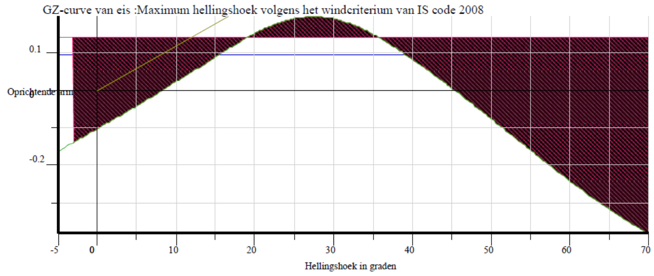
<td>

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.683	meter
Maximum GZ bij 30 graden of meer	0.240	0.192	meter
Top van de GZ kromme bij minstens	25.000	27.547	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.048	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.074	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.025	mrad
Maximum hellingshoek volgens het windcriterium van IS code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	15.485	graden BB



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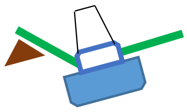
<td></td>
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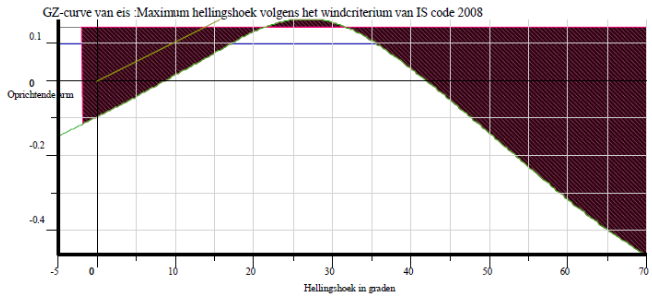
- Port boom in 45° setting
- Port gear raised to block
- Starboard boom horizontal
- Starboard fishing gear missing

</td>
<td>

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.608	meter
Maximum GZ bij 30 graden of meer	0.240	0.156	meter
Top van de GZ kromme bij minstens	25.000	26.680	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.041	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.058	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.018	mrad
Maximum hellingshoek volgens het windcriterium van IS code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	16.859	graden BB



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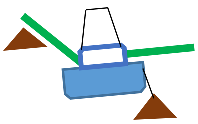
<td></td>
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- Port boom in 45° setting
- Port gear raised to block
- Starboard boom horizontal
- Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed

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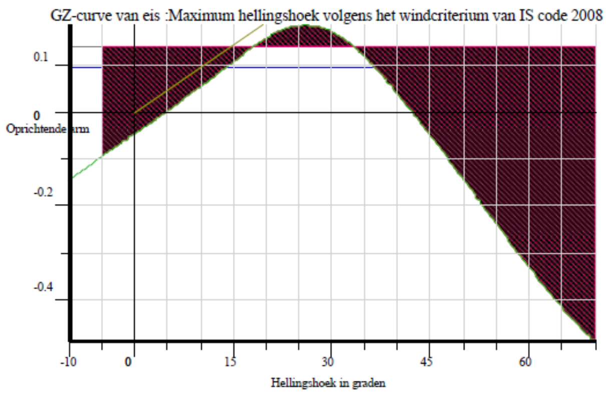
<td>

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.546	meter
Maximum GZ bij 30 graden of meer	0.240	0.172	meter
Top van de GZ kromme bij minstens	25.000	25.985	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.053	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.072	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.020	mrad
Maximum hellingshoek volgens het windcriterium van IS code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	13.796	graden BB



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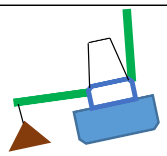
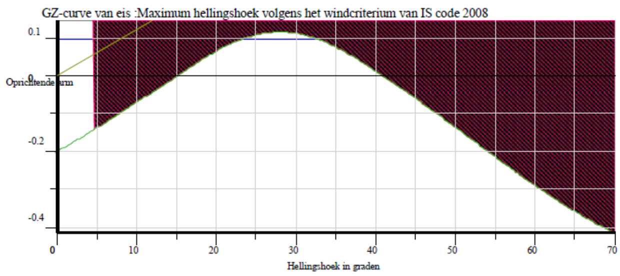


- Port boom horizontal
- Port gear raised to block
- Starboard boom vertical
- Starboard fishing gear missing

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.701	meter
Maximum GZ bij 30 graden of meer	0.240	0.112	meter
Top van de GZ kromme bij minstens	25.000	28.028	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.021	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.033	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.012	mrad
Maximum hellingshoek volgens het windcriterium van IS code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	23.216	graden BB



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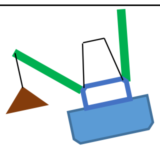
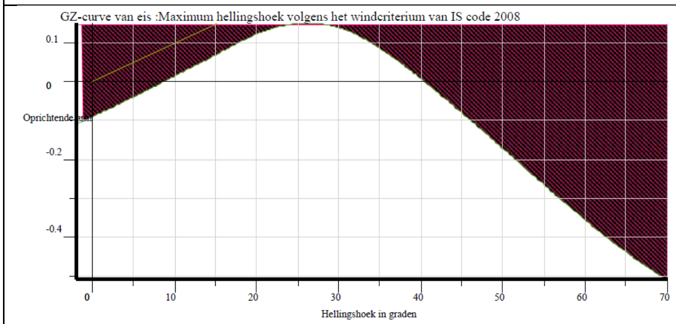
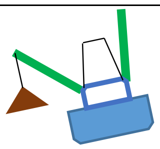


- Port boom in 45° setting
- Port gear raised to block
- Starboard boom vertical
- Starboard fishing gear missing

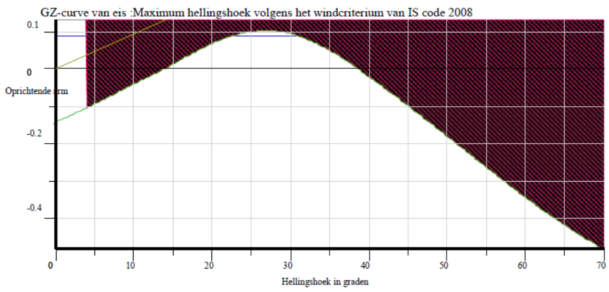
Berekend naar SB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.562	meter
Maximum GZ bij 30 graden of meer	0.240	0.137	meter
Top van de GZ kromme bij minstens	25.000	26.208	graden SB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.037	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.051	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.014	mrad
Maximum hellingshoek volgens het windcriterium van IS code 2008	50.000	70.000	graden SB
Maximum statische hellingshoek t.g.v. wind	16.000	17.615	graden SB





- Port boom in 45° setting
- Port gear raised to block
- Starboard boom vertical
- Starboard fishing gear missing
- tanks 50% filled

Berekend naar BB	Eis	Waarde	
Minimum metacentrumhoogte G'M	0.500	0.551	meter
Maximum GZ bij 30 graden of meer	0.240	0.096	meter
Top van de GZ kromme bij minstens	25.000	26.828	graden BB
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.021	mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.029	mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.008	mrad
Maximum hellingshoek volgens het windcriterium van IS code 2008	50.000	70.000	graden BB
Maximum statische hellingshoek t.g.v. wind	16.000	22.435	graden BB



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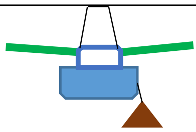
<td></td>
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Both outrigger booms horizontal
Port gear missing
Starboard fishing gear raised to gangway using slip construction and suspended there clear of seabed

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<table>
<tr><th>Berekend naar SB</th><th>Eis</th><th>Waarde</th><th></th></tr>
<tr><td>Minimum metacentrumhoogte GM</td><td>0.500</td><td>0.747</td><td>meter</td></tr>
<tr><td>Maximum GZ bij 30 graden of meer</td><td>0.240</td><td>0.260</td><td>meter</td></tr>
<tr><td>Top van de GZ kromme bij minstens</td><td>25.000</td><td>27.763</td><td>graden SB</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 30 graden</td><td>0.066</td><td>0.074</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 40 graden</td><td>0.108</td><td>0.111</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tussen 30 en 40 graden</td><td>0.036</td><td>0.037</td><td>mrad</td></tr>
<tr><td>Maximum hellingshoek volgens het windcriterium van IS code 2008</td><td>50.000</td><td>70.000</td><td>graden SB</td></tr>
<tr><td>Maximum statische hellingshoek t.g.v. wind</td><td>16.000</td><td>11.287</td><td>graden SB</td></tr>
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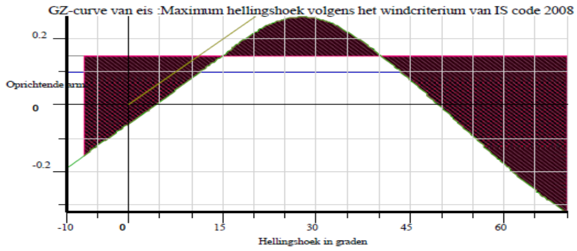

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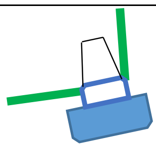
<td></td>
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Port boom horizontal
Starboard boom vertical
Both sets of gear missing

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<table>
<tr><th>Berekend naar BB</th><th>Eis</th><th>Waarde</th><th></th></tr>
<tr><td>Minimum metacentrumhoogte GM</td><td>0.500</td><td>0.767</td><td>meter</td></tr>
<tr><td>Maximum GZ bij 30 graden of meer</td><td>0.240</td><td>0.280</td><td>meter</td></tr>
<tr><td>Top van de GZ kromme bij minstens</td><td>25.000</td><td>27.690</td><td>graden BB</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 30 graden</td><td>0.066</td><td>0.083</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tot 40 graden</td><td>0.108</td><td>0.124</td><td>mrad</td></tr>
<tr><td>Oppervlak onder de GZ kromme tussen 30 en 40 graden</td><td>0.036</td><td>0.041</td><td>mrad</td></tr>
<tr><td>Maximum hellingshoek volgens het windcriterium van IS code 2008</td><td>50.000</td><td>70.000</td><td>graden BB</td></tr>
<tr><td>Maximum statische hellingshoek t.g.v. wind</td><td>16.000</td><td>10.010</td><td>graden BB</td></tr>
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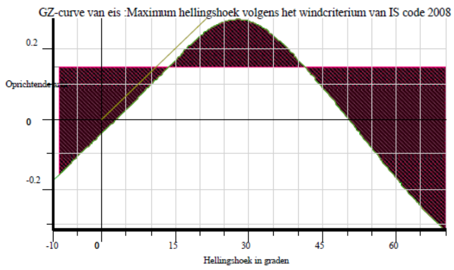

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