



STABILITY CHECK

BROWEMA

VESSEL "THIJS JR"
With Niftylift HR21

DOCUMENT NR. SE-24056-023-201-01

REV. B1

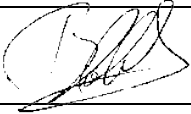

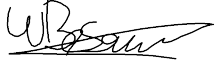
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REVISION HISTORY

REV.	DATE	REVISION STATUS	AMENDMENTS
A1	2024-06-21	Internal review, preliminary revision	-
B1	2024-06-24	First Issue	

REFERENCE DOCUMENTS

No.	DOCUMENT	DOCUMENT NUMBER	REVISION
1	THIJS JR Stabiliteitsberekening 2021-03-25 B gestempeld.pdf	-	-
2	HR21 Hybrid Specificaties.pdf	-	-
3			
4			
5			
6			



1 Introduction

1.1 General

The following booklet shows stability calculations for vessel Thijs Jr. The following items are included in this document:

- Main dimensions of the vessel
- Hydrostatic particulars of the vessel
- Six load cases
- Wind moment calculation data

All calculations are carried out for freshwater with a density of 1.000 ton/m³. The calculations have been completed using the program Excel.



2 Vessel particulars

2.1 General particulars

Name of vessel	:	THIJS JR.
Type of vessel	:	Work vessel
Owner	:	Browema International B.V.
Length overall	:	24.15 [m]
Length waterline	:	21.91 [m]
Breadth mould	:	5.70 [m]
Depth mould	:	1.60 [m]
Summer draft (mould)	:	1.09 [m]



Figure 1: THIJS JR.

2.2 Light ship weight

The light ship weight and center of gravity used as provided by Browema can be found in Table 1.

Light ship weight			
Weight [ton]	LCG [m]	TCG [m]	VCG [m]
73.42	10.82	-0.03	1.28

Table 1: Light ship weight and center of gravity

There is a compensation weight of 1.8t installed on PS

2.3 Hydrostatics

The hydrostatic data as provided by Browema can be found in Table 2.

Draught [m]	Carene [m³]	KMt [m]	KMI [m]	KB [m]	LCB [m]	LCF [m]
0.6	50.50	5.52	39.76	0.32	11.38	10.99
0.7	61.00	4.83	40.74	0.38	11.31	10.93
0.8	72.50	4.28	41.03	0.43	11.20	10.86
0.9	84.00	3.89	41.84	0.49	11.04	10.76
1	95.00	3.60	42.99	0.55	10.94	10.67
1.1	106.00	3.35	44.01	0.60	10.88	10.59
1.2	117.50	3.16	44.62	0.66	10.83	10.52
1.3	129.50	3.01	44.94	0.71	10.79	10.16
1.4	142.00	2.90	44.83	0.77	10.76	10.40

Table 2 Hydrostatic data provided by Browema



2.4 Load cases

A total of eight load cases were investigated. Table 3 displays a description on the differences between the load cases.

Case IA:
Vessel in operation ready condition Crane in stored position Niftylift in stored position fwd CL Wind Beauf 7-8 (perpendicular)
Case IB:
Vessel in operation ready condition Crane in stored position Niftylift in raised position fwd CL Wind Beauf 7-8 (perpendicular)
Case IIA:
Crane max reach to SB without load Niftylift in stored position fwd CL Wind Beauf 5-6 (perpendicular)
Case IIB:
Crane max reach to SB without load Niftylift in raised position fwd CL Wind Beauf 5-6 (perpendicular)
Case IIIA:
Crane max reach to SB with 0.95t load Niftylift in stored position fwd CL Wind Beauf 5-6 (perpendicular)



Case IIIB:
Crane max reach to SB with 0.90t load Niftylift in raised position fwd CL Wind Beauf 5-6 (perpendicular)
Case IVA:
Crane max reach to PS with 0.85t load Niftylift in stored position fwd CL Wind Beauf 5-6 (perpendicular)
Case IVB:
Crane max reach to PS with 0.75t load Niftylift in raised position fwd CL Wind Beauf 5-6 (perpendicular)
Case VA:
Crane reach 4.60m to bow with 3.67t load Niftylift in stored position fwd CL Wind Beauf 5-6 (perpendicular)
Case VB:
Crane reach 4.60m to bow with 3.67t load Niftylift in raised position fwd CL Wind Beauf 5-6 (perpendicular)
Case VIA:
Crane reach 4.60m to SB with 2.70t load Niftylift in stored position fwd CL Wind Beauf 5-6 (perpendicular)
Case VIB:
Crane reach 4.60m to SB with 2.50t load Niftylift in raised position fwd CL Wind Beauf 5-6 (perpendicular)

Table 3 Description on load cases



2.5 Conclusion

For each loading condition (if required) the crane load is adjusted to comply with the regulations. In most cases, the actual condition is limited by the heeling angle of maximum 5 degrees.

For each condition there is an A and B version. A having the Niftylift in stored position, B having the Niftylift to maximum operational height.

For both A and B conditions the additional heeling angle is evaluated with the maximum outreach to both sides. Where the initial angle is already 5 degrees, the angle becomes too large if the lift is rotated to that same side. Angles to upto 7 degrees can occur.

3 Appendices

3.1 Appendix A – Load case I





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IA - Ship ready for operation	Revision :	A1

Loading table

Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 stored pos	6.50	15.31	0.00	3.00		99.52	0.00	19.50
						0.00	0.00	0.00
						0.00	0.00	0.00
						0.00	0.00	0.00
Total	81.72	11.29	0.03	1.42	0.00	922.72	2.49	115.64

Floating position

Draught	0.88 [m]
Trim	0.14 [m]
Freeboard midships	0.72 [m]
Static heeling angle	0.68 [deg]

Critical angles

Max. angle water entrance deck	14.2 degrees
Max. angle for bilge	17.2 degrees

Transverse stability

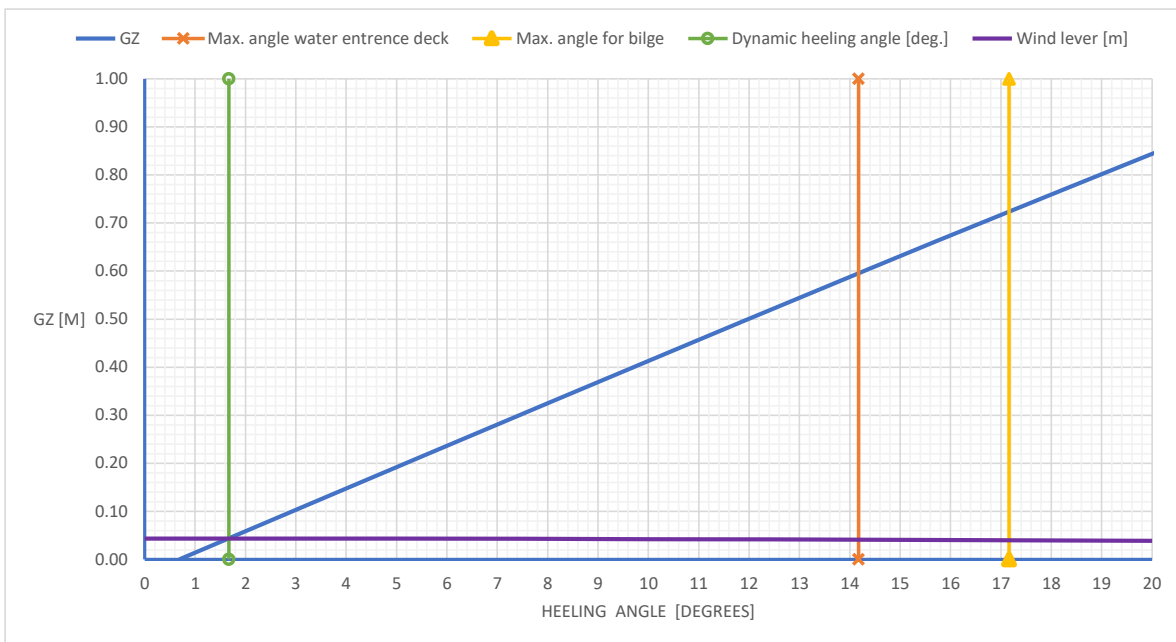
KG =	1.42 [m]
GG' =	0.000 [m]
KG' =	1.42 [m]
KMt =	3.97 [m]
GM' =	2.55 [m]

GZ values

Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.22
10	0.44
15	0.66
20	0.87

Longitudinal stability

LCB	11.07 [m]
MCTC	131.68 [m]
LCG-LCB	0.22 [m]
Trim mom	17.9383 [t*m]





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IA - Ship ready for operation	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	1.60
Factor C	1.6
Wind force	Bf. 7-8
Wind pressure [t/m2]	0.025
M II [t*m]	3.58

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.044	0.044	0.043	0.041	0.039

Summary	
Dynamic heeling angle [deg.]	1.67
T Aft	0.81
T Forward	0.95
T max. [m]	0.95
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.08
Minimum freeboard	0.57

Criteria evaluation	Actual	Requirement
Staic heeling angle	0.68 deg	5.00 deg
Freeboard	0.72 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.79

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	2.47
Maximum static angle [deg]	-1.10

Angle with basket max to PS

Angle with basket max to SB

Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case IB - Ship ready for operation	Revision :	A1

Loading table

Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 raised pos	6.50	15.31	0.00	5.10		99.52	0.00	33.15
						0.00	0.00	0.00
						0.00	0.00	0.00
						0.00	0.00	0.00
Total	81.72	11.29	0.03	1.58	0.00	922.72	2.49	129.29

Floating position

Draught	0.88 [m]
Trim	0.14 [m]
Freeboard midships	0.72 [m]
Static heeling angle	0.73 [deg]

Critical angles

Max. angle water entrance deck	14.2 degrees
Max. angle for bilge	17.2 degrees

Transverse stability

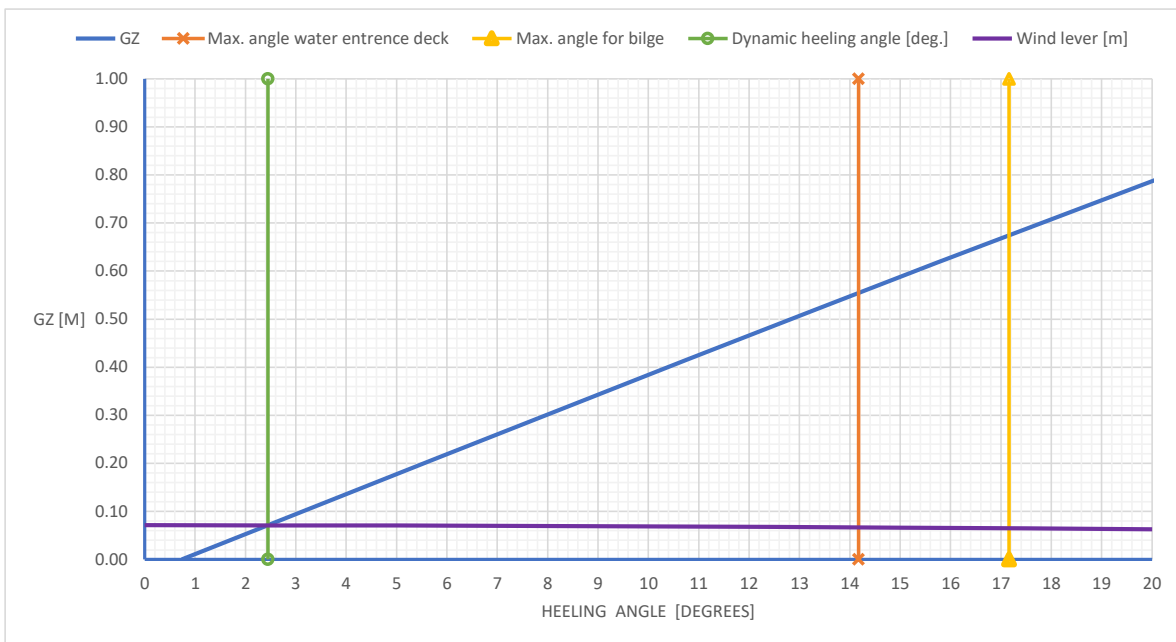
KG =	1.58 [m]
GG' =	0.000 [m]
KG' =	1.58 [m]
KMt =	3.97 [m]
GM' =	2.39 [m]

GZ values

Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.21
10	0.41
15	0.62
20	0.82

Longitudinal stability

LCB	11.07 [m]
MCTC	131.13 [m]
LCG-LCB	0.22 [m]
Trim mom	17.9383 [t*m]





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case IB - Ship ready for operation	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	2.60
Factor C	1.6
Wind force	Bf. 7-8
Wind pressure [t/m2]	0.025
M II [t*m]	5.82

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.071	0.071	0.069	0.066	0.063

Summary	
Dynamic heeling angle [deg.]	2.44
T Aft	0.81
T Forward	0.95
T max. [m]	0.95
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.12
Minimum freeboard	0.53

Criteria evaluation	Actual	Requirement
Static heeling angle	0.73 deg	5.00 deg
Freeboard	0.72 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.91

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	2.64
Maximum static angle [deg]	-1.18

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IIA - Crane to SB 14.5m without load	Revision :	A1

Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 stored pos	6.50	15.31	0.00	3.00		99.52	0.00	19.50
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane transv.max outreach	2.50	18.52	-3.37	3.80		46.30	-8.43	9.50
						0.00	0.00	0.00
Total	81.72	11.29	-0.02	1.42	0.00	922.72	-1.88	115.64

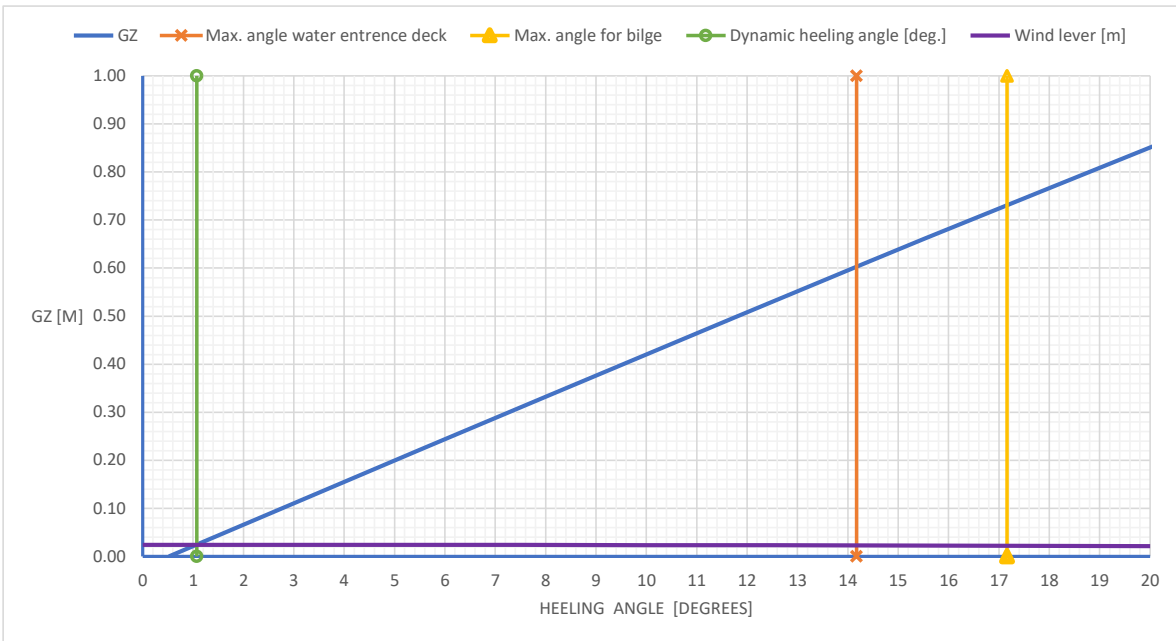
Floating position	
Draught	0.88 [m]
Trim	0.14 [m]
Freeboard midships	0.72 [m]
Static heeling angle	-0.52 [deg]

Critical angles	
Max. angle water entrance deck	14.2 degrees
Max. angle for bilge	17.2 degrees

Transverse stability	
KG =	1.42 [m]
GG' =	0.000 [m]
KG' =	1.42 [m]
KMt =	3.97 [m]
GM' =	2.55 [m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.22
10	0.44
15	0.66
20	0.87

Longitudinal stability	
LCB	11.07 [m]
MCTC	131.68 [m]
LCG-LCB	0.22 [m]
Trim mom	17.9383 [t*m]





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IIA - Crane to SB 14.5m without load	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	1.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	2.01

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.025	0.024	0.024	0.023	0.022

Summary	
Dynamic heeling angle [deg.]	1.07
T Aft	0.81
T Forward	0.95
T max. [m]	0.95
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.05
Minimum freeboard	0.60

Criteria evaluation	Actual	Requirement
Static heeling angle	0.52 deg	5.00 deg
Freeboard	0.72 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.79

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	1.27
Maximum static angle [deg]	-2.30

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case IIB - Crane to SB 14.5m without load	Revision :	A1

Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 raised pos	6.50	15.31	0.00	5.10		99.52	0.00	33.15
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane transv.max outreach	2.50	18.52	-3.37	3.80		46.30	-8.43	9.50
						0.00	0.00	0.00
Total	81.72	11.29	-0.02	1.58	0.00	922.72	-1.88	129.29

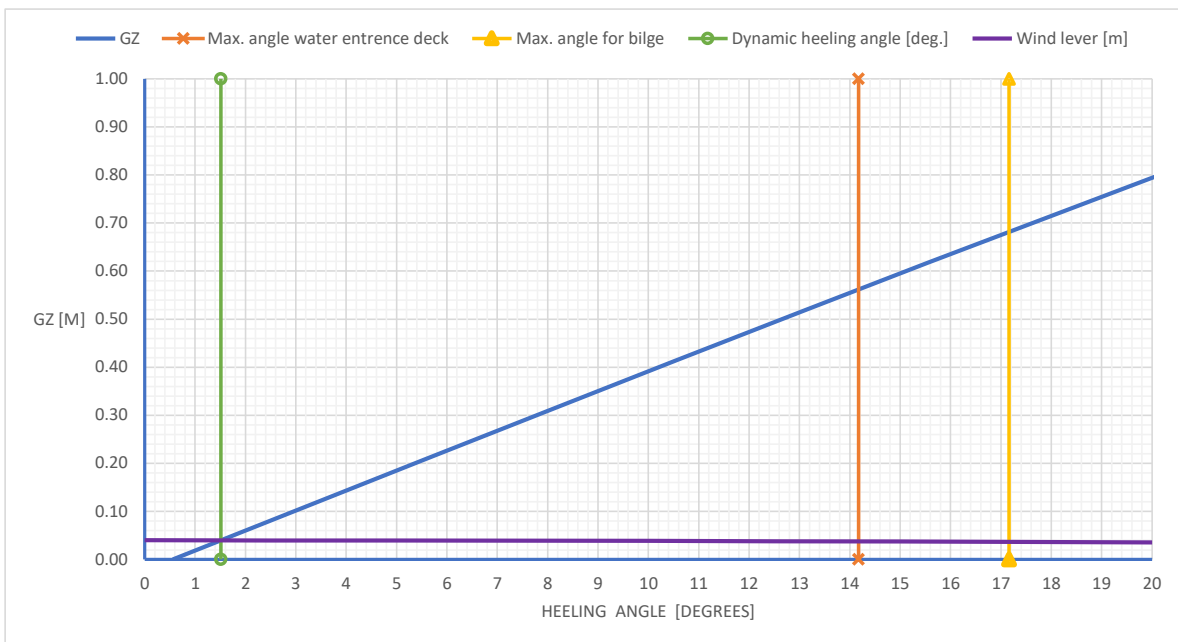
Floating position	
Draught	0.88 [m]
Trim	0.14 [m]
Freeboard midships	0.72 [m]
Static heeling angle	-0.55 [deg]

Critical angles	
Max. angle water entrance deck	14.2 degrees
Max. angle for bilge	17.2 degrees

Transverse stability	
KG =	1.58 [m]
GG' =	0.000 [m]
KG' =	1.58 [m]
KMt =	3.97 [m]
GM' =	2.39 [m]

Longitudinal stability	
LCB	11.07 [m]
MCTC	131.13 [m]
LCG-LCB	0.22 [m]
Trim mom	17.9383 [t*m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.21
10	0.41
15	0.62
20	0.82





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case IIB - Crane to SB 14.5m without load	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	2.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	3.26

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.040	0.040	0.039	0.037	0.035

Summary	
Dynamic heeling angle [deg.]	1.51
T Aft	0.81
T Forward	0.95
T max. [m]	0.95
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.08
Minimum freeboard	0.58

Criteria evaluation	Actual	Requirement
Static heeling angle	0.55 deg	5.00 deg
Freeboard	0.72 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.91

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	1.36
Maximum static angle [deg]	-2.46

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IIIA - Crane to SB 14.5m with 0.95t	Revision :	A1

Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 stored pos	6.50	15.31	0.00	3.00		99.52	0.00	19.50
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane transv.max outreach	2.50	18.52	-3.37	3.80		46.30	-8.43	9.50
Load at 14.5m	0.95	18.52	-16.12	4.60		17.59	-15.31	4.37
Total	82.67	11.37	-0.21	1.45	0.00	940.31	-17.20	120.01

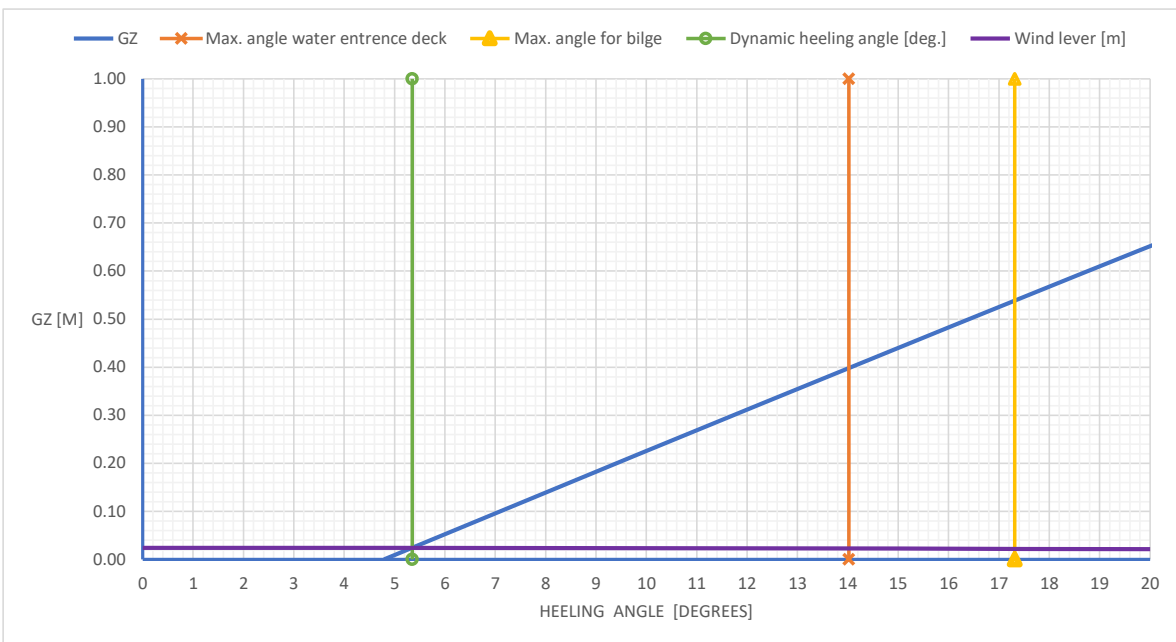
Floating position	
Draught	0.89 [m]
Trim	0.20 [m]
Freeboard midships	0.71 [m]
Static heeling angle	-4.79 [deg]

Critical angles	
Max. angle water entrance deck	14.0 degrees
Max. angle for bilge	17.3 degrees

Transverse stability	
KG =	1.45 [m]
GG' =	0.000 [m]
KG' =	1.45 [m]
KMt =	3.94 [m]
GM' =	2.48 [m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.22
10	0.43
15	0.64
20	0.85

Longitudinal stability	
LCB	11.06 [m]
MCTC	133.28 [m]
LCG-LCB	0.32 [m]
Trim mom	26.10685 [t*m]





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IIIA - Crane to SB 14.5m with 0.95t	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	1.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	2.01

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.024	0.024	0.024	0.023	0.021

Summary	
Dynamic heeling angle [deg.]	5.35
T Aft	0.79
T Forward	0.99
T max. [m]	0.99
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.27
Minimum freeboard	0.35

Criteria evaluation	Actual	Requirement
Static heeling angle	4.79 deg	5.00 deg
Freeboard	0.71 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.81

Maximum shift of COG is unknown.
 Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	-2.97
Maximum static angle [deg]	-6.60

Angle with basket max to PS
 Angle with basket max to SB

Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position		Checked :
Subject/Remarks :	Case IIIB - Crane to SB 14.5m with 0.90t load	Revision :	A1

Loading table

Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 raised pos	6.50	15.31	0.00	5.10		99.52	0.00	33.15
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane transv.max outreach	2.50	18.52	-3.37	3.80		46.30	-8.43	9.50
Load at 14.5m	0.90	18.52	-16.12	4.60		16.67	-14.51	4.14
Total	82.62	11.37	-0.20	1.61	0.00	939.39	-16.39	133.43

Floating position

Draught	0.89 [m]
Trim	0.19 [m]
Freeboard midships	0.71 [m]
Static heeling angle	-4.88 [deg]

Critical angles

Max. angle water entrance deck	14.0 degrees
Max. angle for bilge	17.3 degrees

Transverse stability

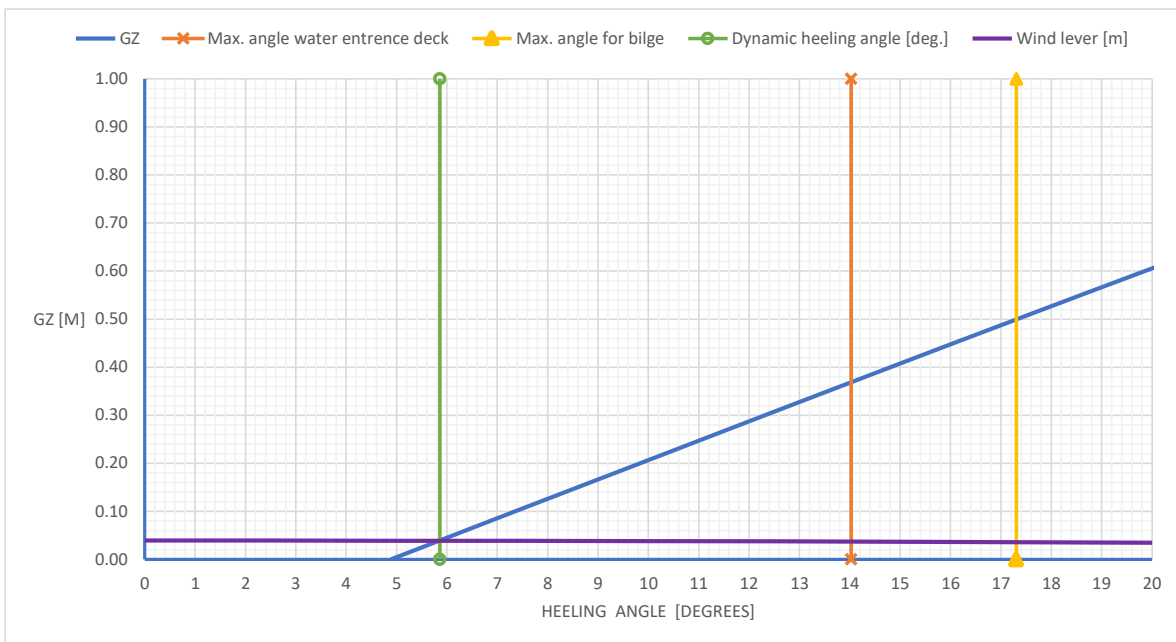
KG =	1.61 [m]
GG' =	0.000 [m]
KG' =	1.61 [m]
KMt =	3.94 [m]
GM' =	2.32 [m]

Longitudinal stability

LCB	11.06 [m]
MCTC	132.65 [m]
LCG-LCB	0.31 [m]
Trim mom	25.6763 [t*m]

GZ values

Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.20
10	0.40
15	0.60
20	0.79





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case IIIB - Crane to SB 14.5m with 0.90t load	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	2.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	3.26

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.039	0.039	0.038	0.037	0.035

Summary	
Dynamic heeling angle [deg.]	5.86
T Aft	0.79
T Forward	0.98
T max. [m]	0.98
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.29
Minimum freeboard	0.32

Criteria evaluation	Actual	Requirement
Static heeling angle	4.88 deg	5.00 deg
Freeboard	0.71 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.94

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	-2.94
Maximum static angle [deg]	-6.82

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IVA - Crane to PS 14.5m with 0.85t	Revision :	A1

Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 stored pos	6.50	15.31	0.00	3.00		99.52	0.00	19.50
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane transv.max outreach	2.50	18.52	0.13	3.80		46.30	0.33	9.50
Load at 14.5m	0.85	18.52	12.88	4.60		15.74	10.95	3.91
Total	82.57	11.37	0.22	1.45	0.00	938.46	17.81	119.55

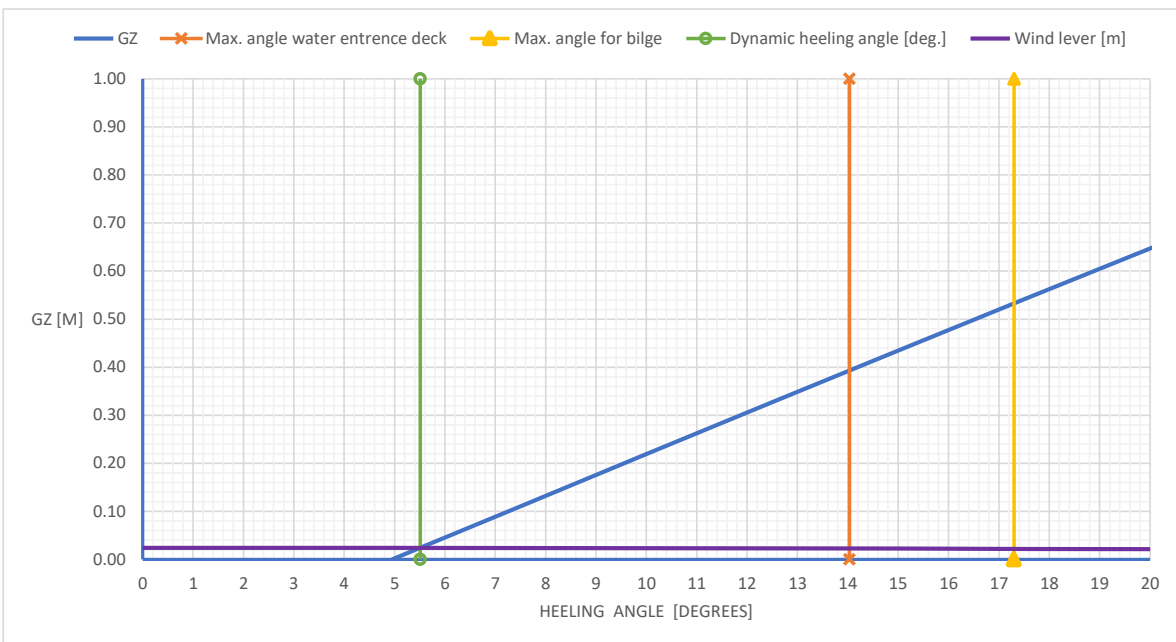
Floating position	
Draught	0.89 [m]
Trim	0.19 [m]
Freeboard midships	0.71 [m]
Static heeling angle	4.95 [deg]

Critical angles	
Max. angle water entrance deck	14.0 degrees
Max. angle for bilge	17.3 degrees

Transverse stability	
KG =	1.45 [m]
GG' =	0.000 [m]
KG' =	1.45 [m]
KMt =	3.94 [m]
GM' =	2.49 [m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.22
10	0.43
15	0.64
20	0.85

Longitudinal stability	
LCB	11.06 [m]
MCTC	133.12 [m]
LCG-LCB	0.31 [m]
Trim mom	25.24582 [t*m]



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case IVA - Crane to PS 14.5m with 0.85t	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	1.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	2.01

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.024	0.024	0.024	0.023	0.021

Summary	
Dynamic heeling angle [deg.]	5.51
T Aft	0.79
T Forward	0.98
T max. [m]	0.98
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.27
Minimum freeboard	0.34

Criteria evaluation	Actual	Requirement
Static heeling angle	4.95 deg	5.00 deg
Freeboard	0.71 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.81

Maximum shift of COG is unknown.

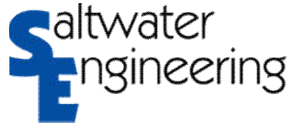
Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	6.76
Maximum static angle [deg]	3.14

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No. :	Niftylift HR21 Hybrid in raised position		Checked :
Subject/Remarks :	Case IVB - Crane to PS 14.5m with 0.75t	Revision :	A1

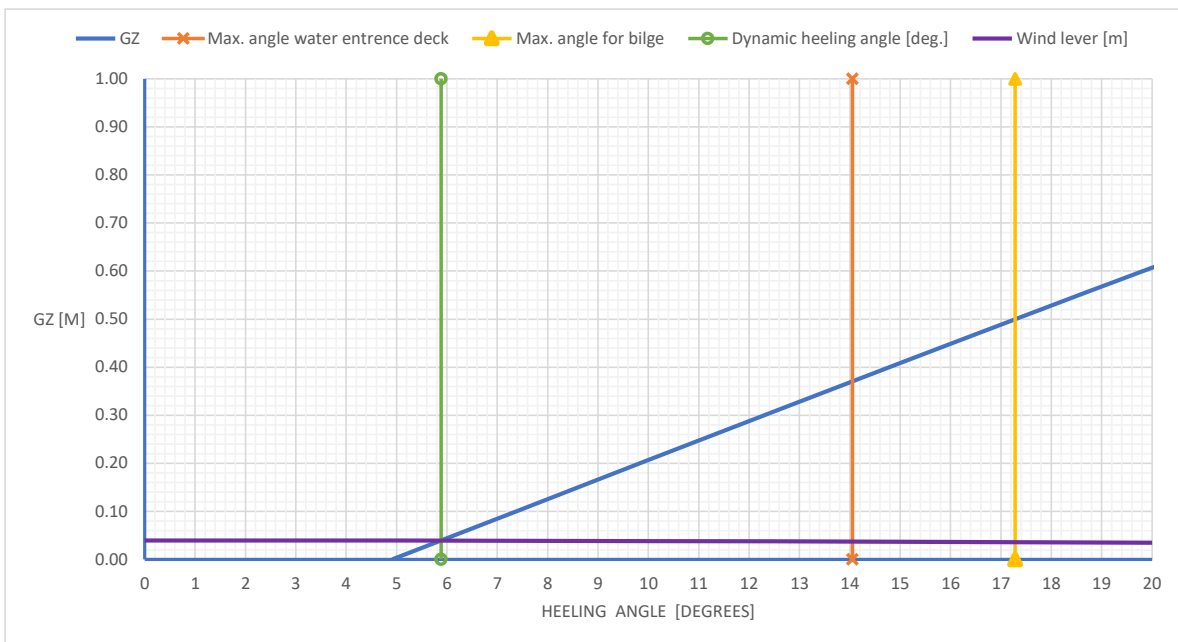
Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 raised pos	6.50	15.31	0.00	5.10		99.52	0.00	33.15
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane transv.max outreach	2.50	18.52	0.13	3.80		46.30	0.33	9.50
Load at 14.5m	0.75	18.52	12.88	4.60		13.89	9.66	3.45
Total	82.47	11.36	0.20	1.61	0.00	936.61	16.53	132.74

Floating position	
Draught	0.89 [m]
Trim	0.18 [m]
Freeboard midships	0.71 [m]
Static heeling angle	4.91 [deg]

Critical angles	
Max. angle water entrance deck	14.1 degrees
Max. angle for bilge	17.3 degrees

Transverse stability	
KG =	1.61 [m]
GG' =	0.000 [m]
KG' =	1.61 [m]
KMt =	3.94 [m]
GM' =	2.33 [m]
Longitudinal stability	
LCB	11.06 [m]
MCTC	132.40 [m]
LCG-LCB	0.30 [m]
Trim mom	24.38506 [t*m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.20
10	0.41
15	0.60
20	0.80





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case IVB - Crane to PS 14.5m with 0.75t	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	2.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	3.26

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.040	0.039	0.038	0.037	0.035

Summary	
Dynamic heeling angle [deg.]	5.88
T Aft	0.79
T Forward	0.98
T max. [m]	0.98
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.29
Minimum freeboard	0.33

Criteria evaluation	Actual	Requirement
Static heeling angle	4.91 deg	5.00 deg
Freeboard	0.71 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.94

Maximum shift of COG is unknown.

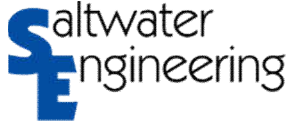
Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	6.85
Maximum static angle [deg]	2.98

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case VA - Crane to bow 4.6m with 3.67t	Revision :	A1

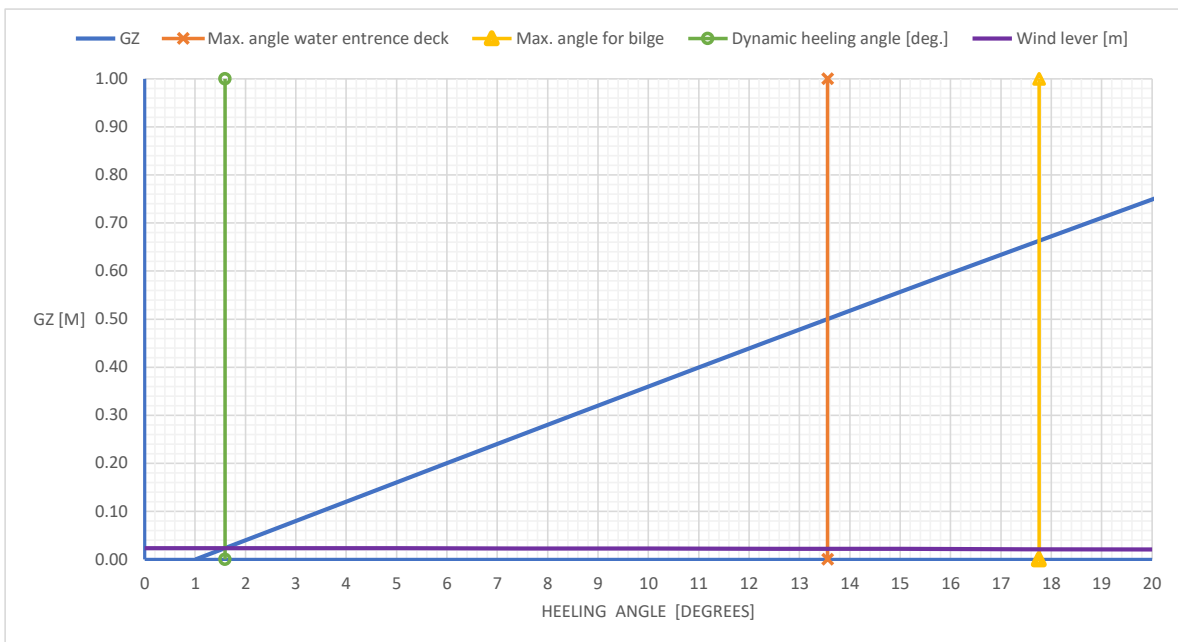
Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 stored pos	6.50	15.31	0.00	3.00		99.52	0.00	19.50
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane fwd 4.60m	2.50	19.72	-1.62	3.80		49.30	-4.05	9.50
Load at 4.60m	3.67	24.32	-1.62	4.60		89.25	-5.95	16.88
Total	85.39	11.89	-0.04	1.55	0.00	1014.97	-3.45	132.52

Floating position	
Draught	0.91 [m]
Trim	0.53 [m]
Freeboard midships	0.69 [m]
Static heeling angle	-1.01 [deg]

Critical angles	
Max. angle water entrance deck	13.6 degrees
Max. angle for bilge	17.8 degrees

Transverse stability	
KG =	1.55 [m]
GG' =	0.000 [m]
KG' =	1.55 [m]
KMt =	3.85 [m]
GM' =	2.30 [m]
Longitudinal stability	
LCB	11.03 [m]
MCTC	138.16 [m]
LCG-LCB	0.86 [m]
Trim mom	73.34722 [t*m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.20
10	0.40
15	0.60
20	0.79





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case VA - Crane to bow 4.6m with 3.67t	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	1.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	2.01

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.024	0.023	0.023	0.022	0.021

Summary	
Dynamic heeling angle [deg.]	1.59
T Aft	0.65
T Forward	1.18
T max. [m]	1.18
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.08
Minimum freeboard	0.34

Criteria evaluation	Actual	Requirement
Static heeling angle	1.01 deg	5.00 deg
Freeboard	0.69 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.89

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	0.89
Maximum static angle [deg]	-2.90

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case VB - Crane to bow 4.6m with 3.67t	Revision :	A1

Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 raised pos	6.50	15.31	0.00	5.10		99.52	0.00	33.15
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane fwd 4.60m	2.50	19.72	-1.62	3.80		49.30	-4.05	9.50
Load at 4.60m	3.67	24.32	-1.62	4.60		89.25	-5.95	16.88
Total	85.39	11.89	-0.04	1.71	0.00	1014.97	-3.45	146.17

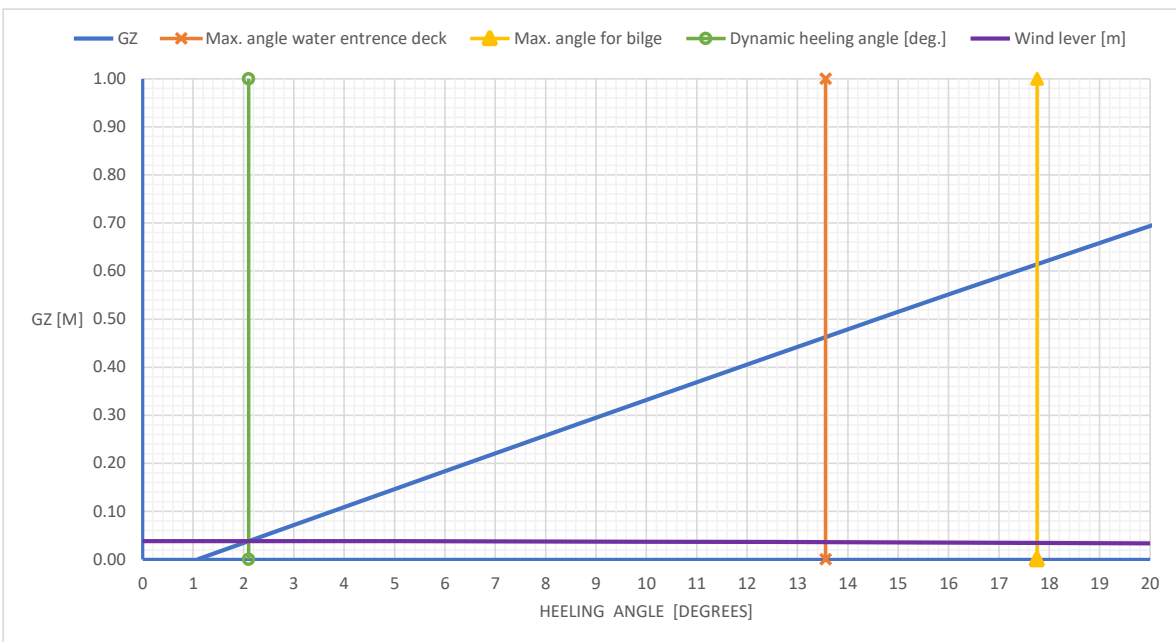
Floating position	
Draught	0.91 [m]
Trim	0.53 [m]
Freeboard midships	0.69 [m]
Static heeling angle	-1.08 [deg]

Critical angles	
Max. angle water entrance deck	13.6 degrees
Max. angle for bilge	17.8 degrees

Transverse stability	
KG =	1.71 [m]
GG' =	0.000 [m]
KG' =	1.71 [m]
KMt =	3.85 [m]
GM' =	2.14 [m]

Longitudinal stability	
LCB	11.03 [m]
MCTC	137.61 [m]
LCG-LCB	0.86 [m]
Trim mom	73.34722 [t*m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.19
10	0.37
15	0.55
20	0.73





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case VB - Crane to bow 4.6m with 3.67t	Revision :	A1

Wind load	
Total surface [m2]	50.00
Wind lever [m]	1.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	1.79

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.021	0.021	0.020	0.020	0.019

Summary	
Dynamic heeling angle [deg.]	1.64
T Aft	0.65
T Forward	1.18
T max. [m]	1.18
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.08
Minimum freeboard	0.34

Criteria evaluation	Actual	Requirement
Static heeling angle	1.08 deg	5.00 deg
Freeboard	0.69 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	2.04

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	0.95
Maximum static angle [deg]	-3.12

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case VIA - Crane to SB 4.6m with 2.7t	Revision :	A1

Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 stored pos	6.50	15.31	0.00	3.00		99.52	0.00	19.50
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane to SB 4.60m	2.50	18.52	-2.82	3.80		46.30	-7.05	9.50
Load at 4.60m	2.70	18.52	-6.22	4.60		50.00	-16.79	12.42
Total	84.42	11.52	-0.20	1.52	0.00	972.72	-17.30	128.06

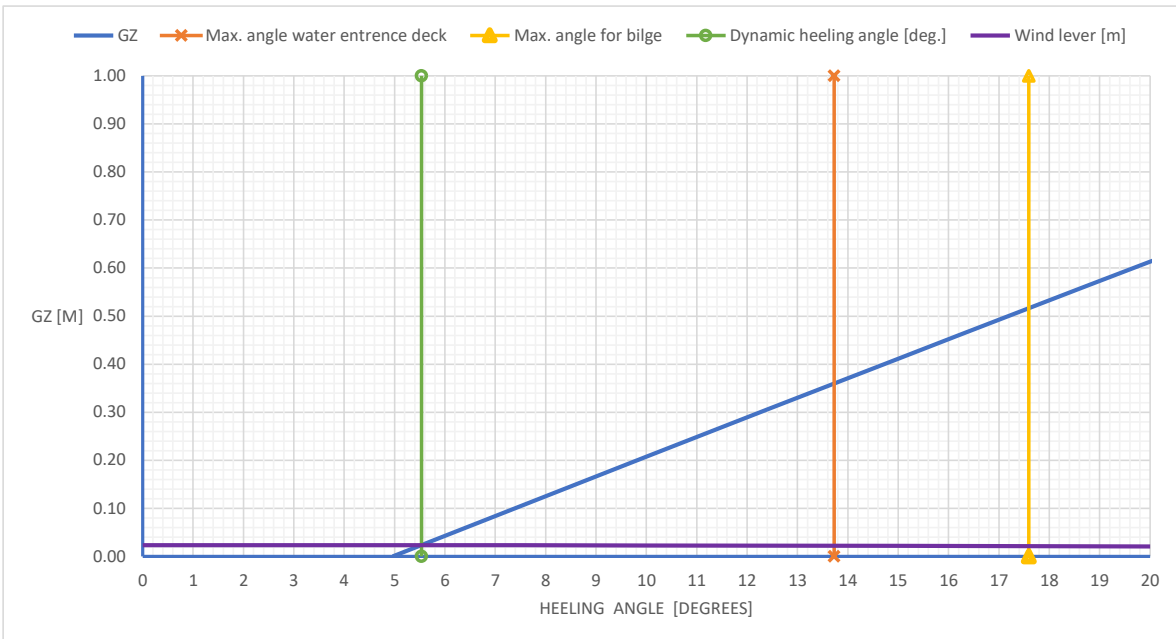
Floating position	
Draught	0.90 [m]
Trim	0.30 [m]
Freeboard midships	0.70 [m]
Static heeling angle	-4.96 [deg]

Critical angles	
Max. angle water entrance deck	13.7 degrees
Max. angle for bilge	17.6 degrees

Transverse stability	
KG =	1.52 [m]
GG' =	0.000 [m]
KG' =	1.52 [m]
KMt =	3.88 [m]
GM' =	2.36 [m]

Longitudinal stability	
LCB	11.04 [m]
MCTC	136.33 [m]
LCG-LCB	0.49 [m]
Trim mom	41.04893 [t*m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.21
10	0.41
15	0.61
20	0.81





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in stored position	Checked :	
Subject/Remarks :	Case VIA - Crane to SB 4.6m with 2.7t	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	1.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	2.01

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.024	0.024	0.023	0.022	0.021

Summary	
Dynamic heeling angle [deg.]	5.54
T Aft	0.75
T Forward	1.05
T max. [m]	1.05
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.28
Minimum freeboard	0.27

Criteria evaluation	Actual	Requirement
Static heeling angle	4.96 deg	5.00 deg
Freeboard	0.70 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	1.87

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	-3.09
Maximum static angle [deg]	-6.83

Angle with basket max to PS

Angle with basket max to SB



Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case VIB - Crane to SB 4.6m with 2.5t	Revision :	A1

Loading table								
Description	Weight [ton]	LCG [m]	TCG [m to PS]	VCG [m]	FS.corr	X MOM [tonm]	Y MOM [tonm]	Z MOM [tonm]
Lightship	73.42	10.82	-0.02	1.28		794.40	-1.47	93.98
Ballast weight	1.80	16.00	2.20	1.20		28.80	3.96	2.16
Niftylift HR21 raised pos	6.50	15.31	0.00	5.10		99.52	0.00	33.15
Crane in start pos	-2.50	18.52	-1.62	3.80		-46.30	4.05	-9.50
Crane to SB 4.60m	2.50	18.52	-2.82	3.80		46.30	-7.05	9.50
Load at 4.60m	2.50	18.52	-6.22	4.60		46.30	-15.55	11.50
Total	84.22	11.51	-0.19	1.67	0.00	969.02	-16.06	140.79

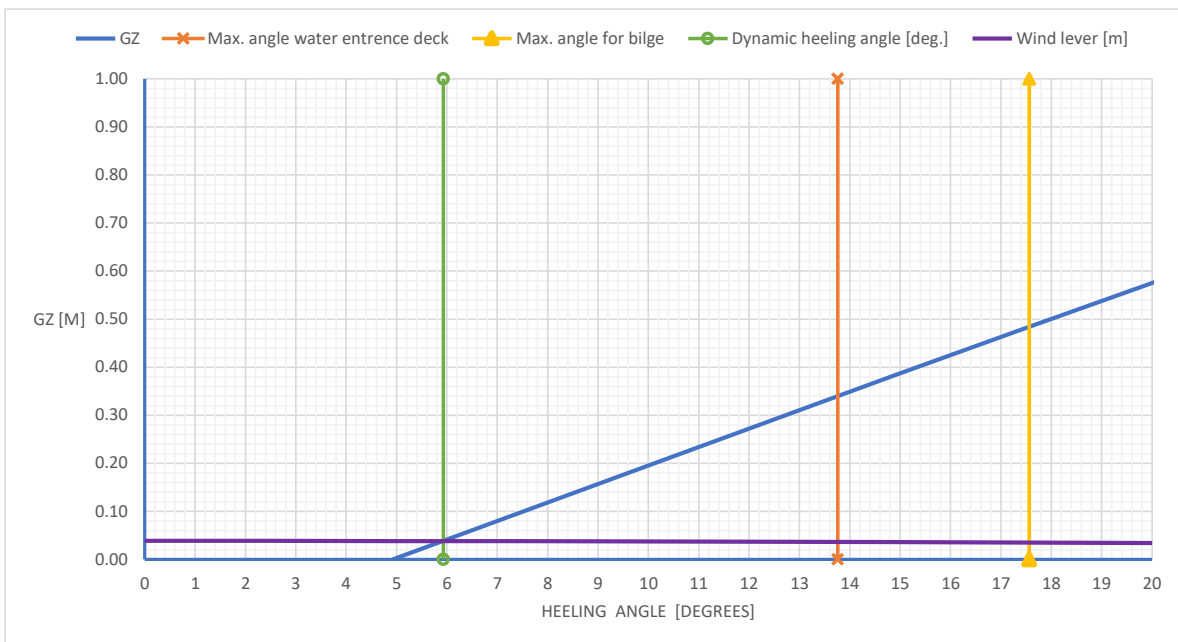
Floating position	
Draught	0.90 [m]
Trim	0.29 [m]
Freeboard midships	0.70 [m]
Static heeling angle	-4.93 [deg]

Critical angles	
Max. angle water entrance deck	13.8 degrees
Max. angle for bilge	17.6 degrees

Transverse stability	
KG =	1.67 [m]
GG' =	0.000 [m]
KG' =	1.67 [m]
KMt =	3.88 [m]
GM' =	2.21 [m]

Longitudinal stability	
LCB	11.04 [m]
MCTC	135.41 [m]
LCG-LCB	0.47 [m]
Trim mom	39.39904 [t*m]

GZ values	
Heeling Angle [degrees]	GZ [m]
0.00	0.00
5	0.19
10	0.38
15	0.57
20	0.76





Stability Calculation

Project :	se-24056	Originator :	BL
Doc. No :	Niftylift HR21 Hybrid in raised position	Checked :	
Subject/Remarks :	Case VIB - Crane to SB 4.6m with 2.5t	Revision :	A1

Wind load	
Total surface [m2]	56.00
Wind lever [m]	2.60
Factor C	1.6
Wind force	Bf. 5-6
Wind pressure [t/m2]	0.014
M II [t*m]	3.26

Phi	0.00	5.00	10.00	15.00	20.00
Lever	0.039	0.038	0.038	0.036	0.034

Summary	
Dynamic heeling angle [deg.]	5.93
T Aft	0.76
T Forward	1.05
T max. [m]	1.05
Depth [m]	1.60
Width [m]	5.70
Loss of freeboard	0.30
Minimum freeboard	0.26

Criteria evaluation	Actual	Requirement
Static heeling angle	4.93 deg	5.00 deg
Freeboard	0.70 m	0.50 m

Transverse shift of basket	
Weight shift [t]	6.50
Distance (1/2 wheelbase) [m]	1.00
M I [t*m]	6.50
Inclination angle [deg.]	2.00

Maximum shift of COG is unknown.

Due to this, the Cog shift of the whole unit is taken as half the wheelbase width, centreline of unit to centre of the wheels

This additional angle can occur to both sides

Maximum static angle [deg]	-2.93
Maximum static angle [deg]	-6.92

Angle with basket max to PS

Angle with basket max to SB