Sjøfartsdirektoratet
Norwegian Maritime Authority

Vår dato	Vår referanse	Vår saksbehandler
05.08.2019	2017/94869-8	John T. Furseth
Deres referanse	**Arkivkode**	**Direkte telefon**
08.07.2019	57/029049	52 74 54 66

Møre Maritime AS
Dalegata 137
6518 KRISTIANSUND N

IDEAL LFGP - Godkjent krengeprøve utført 17.08.2018

Vi viser til brevet fra dere datert 08.07.2019 vedlagt:

- Rapport KS-0179, Krengeprøverapport.

Krengeprøverapporten er innsendt etter utført krengeprøve ved Kristiansund Mekaniske AS.

I henhold til rapporten er følgende lettskipsverdier godkjent:

Lettskip:	133,361 tonn
Vertikalt tyngdepunkt KG:	2,297 m over basislinje
Langskips tyngdepunkt LCG:	12,302 m fra A.P
Metasenterhøyde $GMT_{(lettskip)}$	0,985 m

Bakgrunn og begrunnelse for vedtaket

Krengeprøven er utført som nybygg skonnert for passasjersertifikat.

FOR-2014-07-01-1072 Forskrift om bygging av skip §§ 3-6, § 18 (1) og §23 (5) er lagt til grunn for gjennomføring av krengeprøven. Kriteriene er gitt ved «The International Code on Intact Stability 2008» (2008 IS CODE), trått i kraft 1 juli 2010.

Rederiets ansvar

Et eksemplar av den godkjente krengeprøverapporten og dette brevet skal oppbevares om bord.
Rederiet skal sende endelige stabilitetsberegninger til Sjøfartsdirektoratet innen en måned fra mottagelse av dette brevet.

Vedlagt følger 1 stemplet og godkjent eksemplar av rapporten fra krengeprøven.

Med hilsen

John T Furseth
regionsjef

Dette dokumentet er godkjent elektronisk, og har derfor ikke håndskrevne signaturer

Norwegian Maritime Directorate

Report on inclining test
and
light ship survey

Name of ship (Yard no. and yard): **Skonnert Ideal**
1, Saltkaia Båtbyggeri

Signal letters:

Carried out, place and date:
Kristiansund Mek. Verksted, 17 AUG 2018

Summary of results:

Lightship weight:			133.361 tonnes
Longitudinal centre of gravity	LCG:		12.302 m from AP
Vertical centre of gravity(corrected)	VCG:		2.297 m above baseline
Transverse centre of gravity	TCG:		-0.002 m from CL
Metacentric height	GMt:	KMT(lightship)[3.282] - VCG_corrected(lightship)[2.297]	0.985 m
Lightship draught: DA in AP (Used sp.gr. 1.0220 t/m3)			2.088 m from BL
DM in LBP/2			1.532 m from BL
DF in FP			0.977 m from BL
Trim(DA - DF)			1.111 m AFT
Heel angle			-0.2 ° to PS

Person responsible
(Name and company): Vidar Johnsen, Møre Maritime AS

Marte T. Kamphus
Signature

Stamp

Norwegian Maritime Authority

Approved, date 05.08.2019

Time used 4 hours

John T. Fenseth
Surveyor

1. GENERAL INFORMATION

Owners (name and address): Skonnert Ideal av Kristiansund

If existing ship, state reason for new inclining test: Nybygg

Report date: 4 JUL 2019

Last revision of the report, date: 25 FEB 2019

Test commenced 9:00 (hrs.) Finished 13:00 (hrs.)

Weather conditions in general: Pent

Sea state: Rolig Wind: Stille Current: Ingen strøm

Specific gravity of seawater: 1.0220 t/m3 measured? ☒ Yes ☐ No

Mooring arrangement: Slakke fortøyninger

Attending surveyor: John T. Furseth

NMD station in: Kristiansund

2. SHIP PARTICULARS

Length over all: 35.550 (m)

Length between perpendiculars (LBP): 28.200 (m)

Breadth moulded[1] amidships: 6.718 (m)

Depth moulded amidships (D): 3.587 (m)

Ship without shell plating: Is deck thickness included in D? ☒ Yes ☐ No 0 (mm)

Design trim (rake of keel) over LBP: 0.432 (m)

Height / thickness of bar keel / keel plate: 769 (mm)

3. OTHER INFORMATION

Sister ships if any (Y/No, name, signal letters):

Last hull extension or other modification: (year)

Permanent ballast during test:

Permanent ballast taken on board *after* the test:

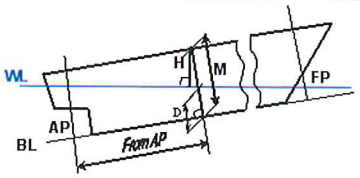
[1] For vessels without shell plating (wooden hulls, GPR etc.) measured to outside hull

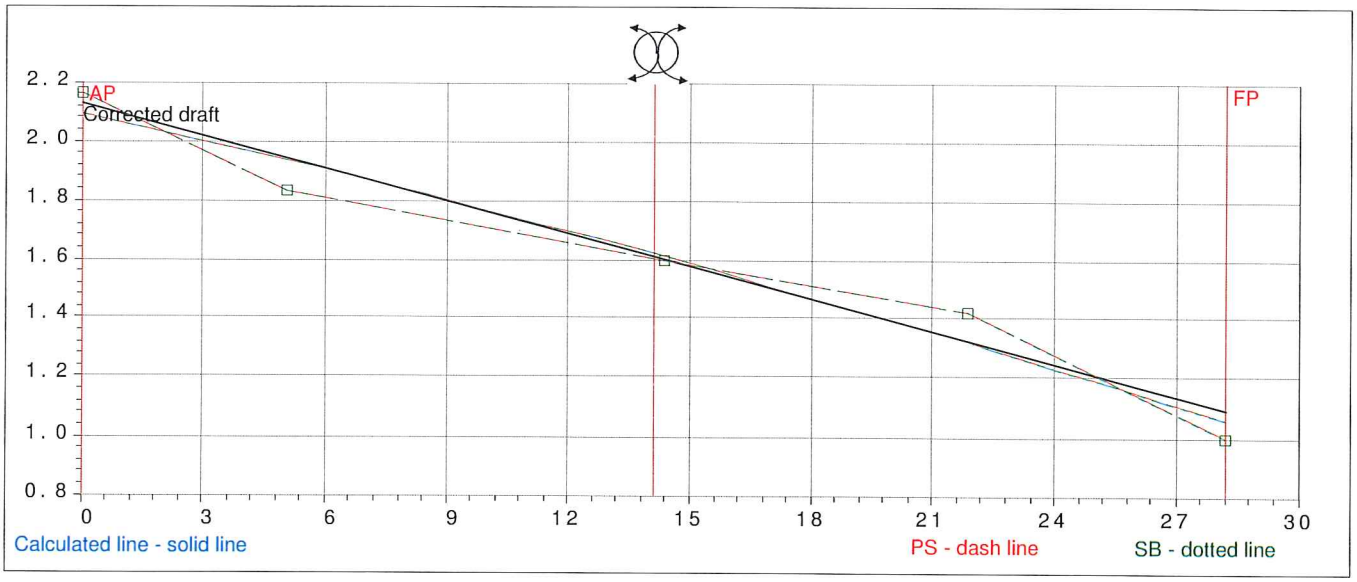
5. HYDROSTATIC PARTICULARS FOR THE INCLINING TEST CONDITION

DRAFT INPUT

No	From AP(m)	Draft PS (input)	Draft PS (m)	Draft SB (input)	Draft SB (m)	Unused
1	0.000	2.158	2.158	2.158	2.158	
2	5.055	1.833	1.833	1.833	1.833	
3	28.200	0.999	0.999	0.999	0.999	
4	14.355	1.594	1.594	1.594	1.594	
5	21.855	1.425	1.425	1.425	1.425	

Input for "Draft PS(input)" and "Draft SB(input)" can be like this: D or M, H
D = Distance from WL to BASE, normal to BASE for given distance from AP
M = Distance from DECK to BASE, normal to BASE for given distance from AP
H = Distance from DECK to WL, normal to WL for given distance from AP
D = M - H/Cos(TrimAngle)
D, M and H can be expression like example: 2.55 | 2.55-25 | 10.25+0.45, 2.95+0.01 etc.





	CALCULATED DRAFT			CORRECTED DRAFT	FREEBOARD		
Draft at place	PS	MEAN	SB	MEAN	PS	MEAN	SB
DA at AP(m):	2.093	2.093	2.093	2.126			
DM at LBP/2 (m):	1.618	1.618	1.618	1.607	1.969	1.969	1.969
DF at FP(m):	1.055	1.055	1.055	1.089			

To find "Calculated" DA, DM and DF, the program uses approximation function y=a + bx +cx^2
To find the approximation function the program uses the least squares method
To find "Corrected" DA, DM and DF, the program uses following formulas:
Corrected DM = (DA + 6*DM + DF)/8
Corrected DA = Corrected DM + (DA - DF)/2
Corrected DF = Corrected DM - (DA - DF)/2

HYDROSTATIC DATA FOR TRIMMED WATERLINE (ship as inclined)

DA	(m)	2.126
DF	(m)	1.089
Trim (DA-DF)	(m)	1.037
Heel angle	(°)	0.000
Density of water	(t/m3)	1.0220
Extreme volume displacement	(m3)	139.409
Extreme displacement in tonnes (corrected)	(t)	142.476
Longitudinal centre of buoyancy from AP	LCB (m)	12.382
Vertical centre of buoyancy above BASE	VCB (m)	0.928
Transverse centre of buoyancy from CL	TCB (m)	0.000
Metacentrical height above BASE	KMT (m)	3.282

The ship data used for hydrostatic calculation:

Appe1 (Boxes):

Appe2(V.Sections): 1-14

Shell addition	(°/oo)	0
TPC	(t/cm)	1.29
MCT1CM	(t*m/cm)	1.79
IT	(m4)	328.2
BMT	(m)	2.354
IL	(m4)	4935.1
BML	(m)	35.400

4. DRAUGHT READINGS (ship as inclined)

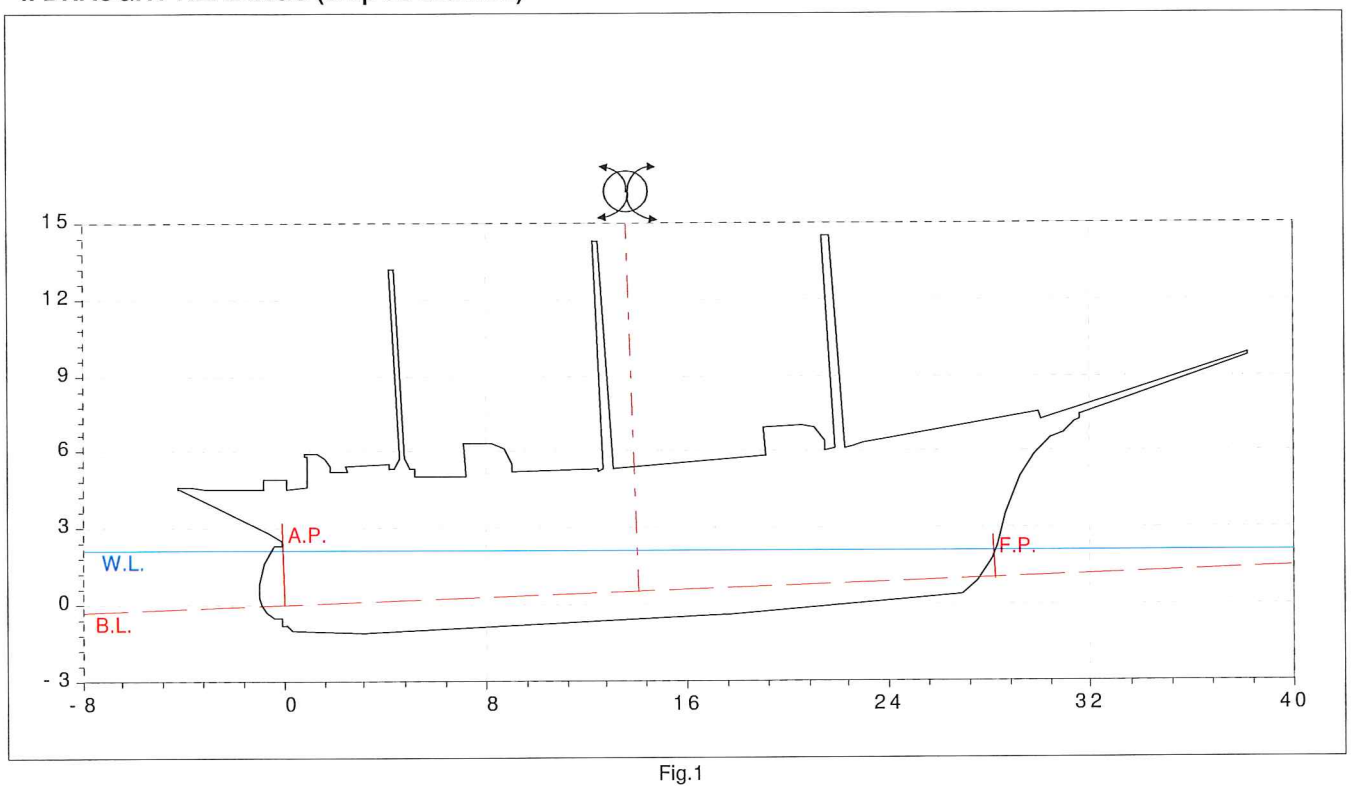


Fig.1

Please indicate the following information on the sketches:

1. Base line and longitudinal reference point used in the hydrostatic particulars
2. Location of draught marks for and aft (Fig.1)
3. Draft readings at marks
4. Freeboard readings, starboard and port side (Fig.2 or fig.3)
5. Longitudinal transverse and vertical location of other refernce points used, if any
6. Readings at other reference points, if any

NOTE:

If the ship has trim during the test, care must be taken to ensure that the readings are correct according to how "draught" is defined. in the hydrostatic data used. (Perpendicular to the base line or perpendicular to the waterline.)

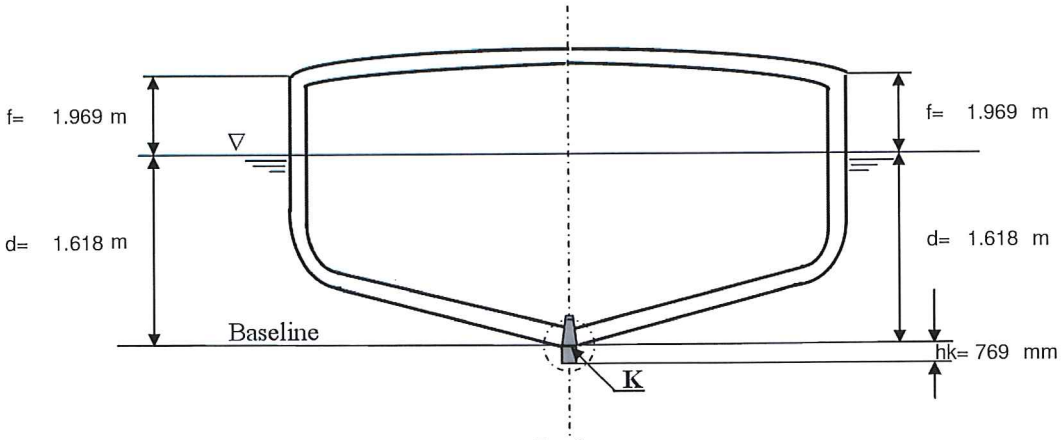


Fig. 3

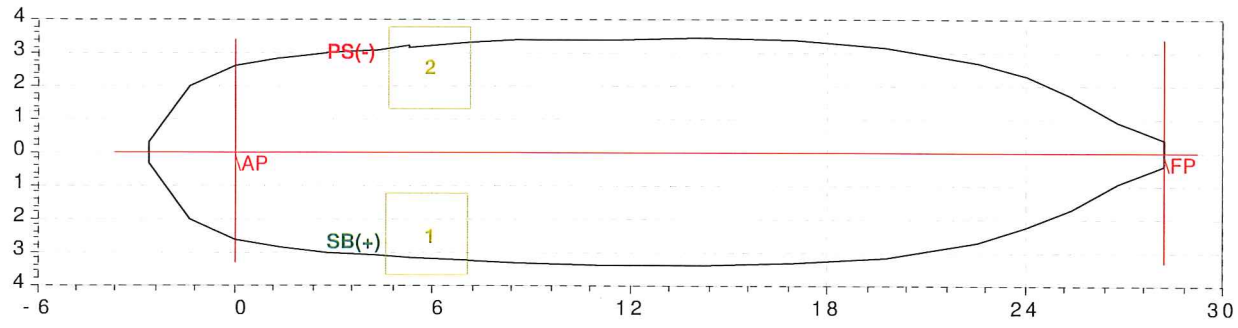
Ship without shell plating (wooden hulls etc.) **Longitudinal position of this section is at LBP/2**

t = Deck thickness
d = Calculated draft at LBP/2
f = Freeboard = Depth moulded amidships + t - d

6. DESCRIPTION OF INCLINING WEIGHTS

Weight no.	Mass (tonnes)	Material/Description	Verification	
			Date	Surveyor
1	1.140	Steel	18 AUG 2018	John Furseth
2	1.130	Steel	18 AUG 2018	John Furseth

Placement of weights prior to first movement



No	Weight (t)	From AP (input)	LCG (m)	VCG (m)	TCG (m)	No	Weight (t)	From AP (input)	LCG (m)	VCG (m)	TCG (m)
1	1.140	5.91	5.910	4.290	2.570	2	1.13	5.85	5.850	4.290	-2.520

7. PENDULUMS

Pend. no.	Length	Location
1	2705	Under dekk akter
2	2660	Under dekk forut

Note: If a pendulum is replaced by a U-tube or similar device the transverse distance between the measuring posts is indicated as "length" in above table. A sketch of the arrangement shall be enclosed with the report.

9. SUCCESSION OF WEIGHT MOVEMENTS

Movement no.	Total Heeling	Direction, indicate with arrows			Weight No(Arm) moved
		PS(-)	C.L.	SB(+)	
1	0.5°PS		0.5°PS|<--	<--|	1(1.532)
2	1.3°PS		|0.8°PS|<--		1(1.417)
3	2.1°PS	0.8°PS|<--	<--|		1(1.751)
4	0.0°SB	|-->		-->|2.1°SB	1(4.698)
5	0.7°SB	|-->	-->|0.7°SB		2(1.485)
6	1.5°SB		-->|0.8°SB|		2(1.565)
7	2.2°SB		|-->	-->|0.7°SB	2(1.560)
8	0.1°SB	2.1°PS|<--		<--|	2(4.610)

10. GENERAL REQUIREMENTS FOR CONDUCTION OF THE TEST:

The following items shall be checked and found in order by the person in charge of the test before this report is submitted to the surveyor for approval:

1. The deflections shall be measured at least two (2) stations, of which at least one shall be a pendulum.
2. List before first movement shall be as small as possible. The results will not be acceptable without exact calculation of the righting moment(s) if the sum of list and inclination exceeds 5° to one side.
3. The test will not be approved if, due to list, the ship has not been inclined beyond the upright position.
4. Maximum deflection to both sides shall be 2°-4° . For large ships (tankers, bulk carriers etc.) 1,5° may be accepted. For unconventional designs and ships with especially large initial stability (GMT) other values may be permitted subject to acceptance prior to the test.
5. Pendulum length and maximum heeling moment applied shall be so adjusted that maximum deflection read is not less than 150 mm.
6. For the test to be approved, at least eight (8) successful readings, including the starting point, shall be obtained and these readings shall lie on an approximately straight line for all measuring stations.
7. The difference between actual trim and the trim in the hydrostatic data used shall not exceed 0,01*LBP.

11. MEASURED METASENTRIC HEIGHT (ship as inclined)

Displacement during the test D= 142.476 (tonnes)

Pendulum # 1 , Length L= 2705 (mm)

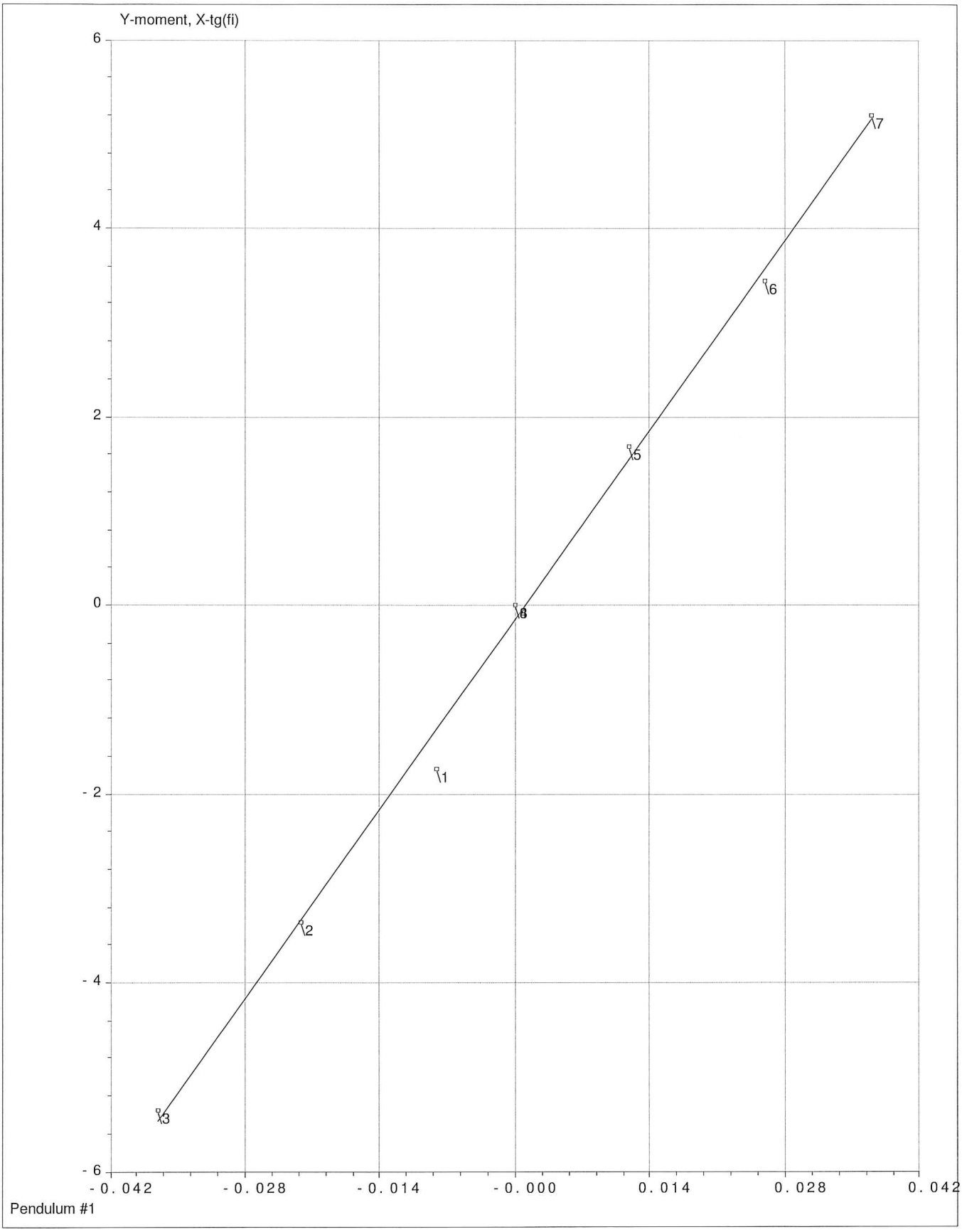
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Mov. nr.	Mass (t)	Transv. distance +/- (m)	Single moment =(2)*(3) (tm)	Accum. moment =sum(4) (tm)	Single pendulum deflection +/- (mm)	Accum. pendulum deflection =sum(6) (mm)	Accum. Tan Fi =(7)/L	Single GMt (4)*L / D*(6) (m)
1	1.140	-1.532	-1.746	-1.746	-22.00	-22.00	-0.00813	1.507
2	1.140	-1.417	-1.615	-3.362	-38.00	-60.00	-0.02218	0.807
3	1.140	-1.751	-1.996	-5.358	-40.00	-100.00	-0.03697	0.947
4	1.140	4.698	5.356	-0.002	100.00	0.00	0.00000	1.017
5	1.130	1.485	1.678	1.676	32.00	32.00	0.01183	0.996
6	1.130	1.565	1.768	3.444	38.00	70.00	0.02588	0.884
7	1.130	1.560	1.763	5.207	30.00	100.00	0.03697	1.116
8	1.130	-4.610	-5.209	-0.002	-100.00	0.00	0.00000	0.989

Pendulum # 2 , Length L= 2660 (mm)

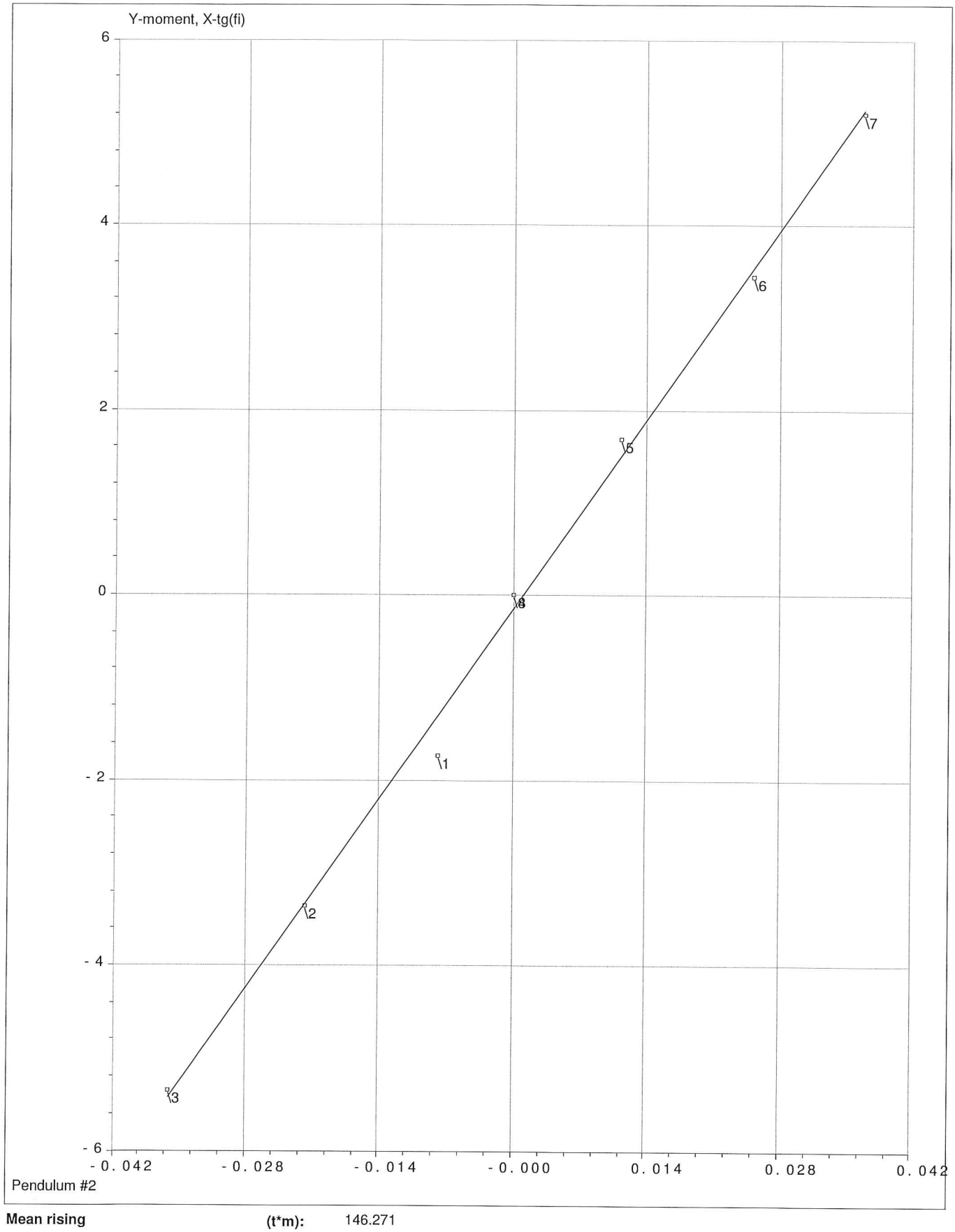
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Mov. nr.	Mass (t)	Transv. distance +/- (m)	Single moment =(2)*(3) (tm)	Accum. moment =sum(4) (tm)	Single pendulum deflection +/- (mm)	Accum. pendulum deflection =sum(6) (mm)	Accum. Tan Fi =(7)/L	Single GMt (4)*L / D*(6) (m)
1	1.140	-1.532	-1.746	-1.746	-21.00	-21.00	-0.00789	1.553
2	1.140	-1.417	-1.615	-3.362	-37.00	-58.00	-0.02180	0.815
3	1.140	-1.751	-1.996	-5.358	-38.00	-96.00	-0.03609	0.981
4	1.140	4.698	5.356	-0.002	96.00	0.00	0.00000	1.042
5	1.130	1.485	1.678	1.676	30.00	30.00	0.01128	1.044
6	1.130	1.565	1.768	3.444	37.00	67.00	0.02519	0.892
7	1.130	1.560	1.763	5.207	31.00	98.00	0.03684	1.062
8	1.130	-4.610	-5.209	-0.002	-98.00	0.00	0.00000	0.992

Use positive sign for (3) and (6) when moving weights towards SB. Negative sign when moving towards PS.

Accumulated Tan Fi shall be plotted continuously during the test, as a function of accumulated moment.



Mean rising **(t*m):** 143.721
Extreme displacement as inclined **(t):** 142.476
GM (m): =(143.721/142.476)=1.009
To calculate this line the least squares method was used.



Mean rising **(t*m):** 146.271
Extreme displacement as inclined **(t):** 142.476
GM (m): =(146.271/142.476)=1.027
To calculate this line the least squares method was used.

13. CALCULATION OF LIGHT SHIP

Ship as inclined Displac.(t): 142.476 **LCG (m):** 12.431 **VCG (m):** 2.264 **TCG (m):** 0.000 **FSM-corr.(m):** 0.018 **VCG_corr. (m):** 2.246

Light ship table: weights to be removed

Pos	Description	TNo	TCode	DWc	Vol. (m3)	Spg. (t/m3)	Weight (t)	LCG (m)	VCG (m)	TCG (m)	IT (m4)	Length (m)	L.Moment (tm)	V.Moment (tm)	T.Moment (tm)	I.Moment (tm)
1	Total inclining weights			TIW	2.270	1.0000	2.270	5.880	4.290	0.036	0.0	0.00	13.3	9.7	0.1	0.0
2	Dagtank Diesel	1	T 0.47V	MDO	0.465	0.8600	0.400	0.555	3.500	0.457	0.0	1.00	0.2	1.4	0.2	0.0
3	Brennstofftank Babord	2	T 0.2V	MDO	0.200	0.8600	0.172	6.900	0.842	-0.336	0.0	2.40	1.2	0.1	-0.1	0.0
4	Brennstofftank Styrbord	3	T 0.2V	MDO	0.200	0.8600	0.172	6.900	0.842	0.336	0.0	2.40	1.2	0.1	0.1	0.0
5	Ferskvannstank	8	T 7.5V	FV	7.501	1.0000	7.501	17.863	1.126	0.000	2.6	4.00	134.0	8.4	0.0	2.6
6	Personell utstyr			CRE	0.600	1.0000	0.600	11.000	3.000	0.000	0.0	0.00	6.6	1.8	0.0	0.0

Sub total: Weight (t): 11.115 **LCG (m):** 14.083 **VCG (m):** 1.950 **TCG (m):** 0.024 **sum(IT*Spg)(t*m):** 2.62

Light ship table: weights to be added

Pos	Description	TNo	TCode	DWc	Vol. (m3)	Spg. (t/m3)	Weight (t)	LCG (m)	VCG (m)	TCG (m)	IT (m4)	Length (m)	L.Moment (tm)	V.Moment (tm)	T.Moment (tm)	I.Moment (tm)
1	Diverse vekter etter prøve			STO	2.000	1.0000	2.000	13.000	4.000	0.000	0.0	0.00	26.0	8.0	0.0	0.0

Sub total: Weight (t): 2.000 **LCG (m):** 13.000 **VCG (m):** 4.000 **TCG (m):** 0.000 **sum(IT*Spg)(t*m):** 0.00

Light ship Displac. (t): 133.361 **LCG (m):** 12.302 **VCG (m):** 2.297 **TCG (m):** -0.002
Used Spec. Gravity (t/m3): 1.0220
DA(m): 2.088 **DF(m):** 0.977 **DM(m):** 1.532 **Trim(m):** 1.111 **Heel angle(°):** -0.2 to PS **KMT(m):** 3.282

15.COMMENTS ON THE INCLINING TEST

Teknisk tegnearbeid på båten er gjort på dugnad, det har derfor tatt så lang tid med rapporten.

Skonnert Ideal

Condition: Light ship

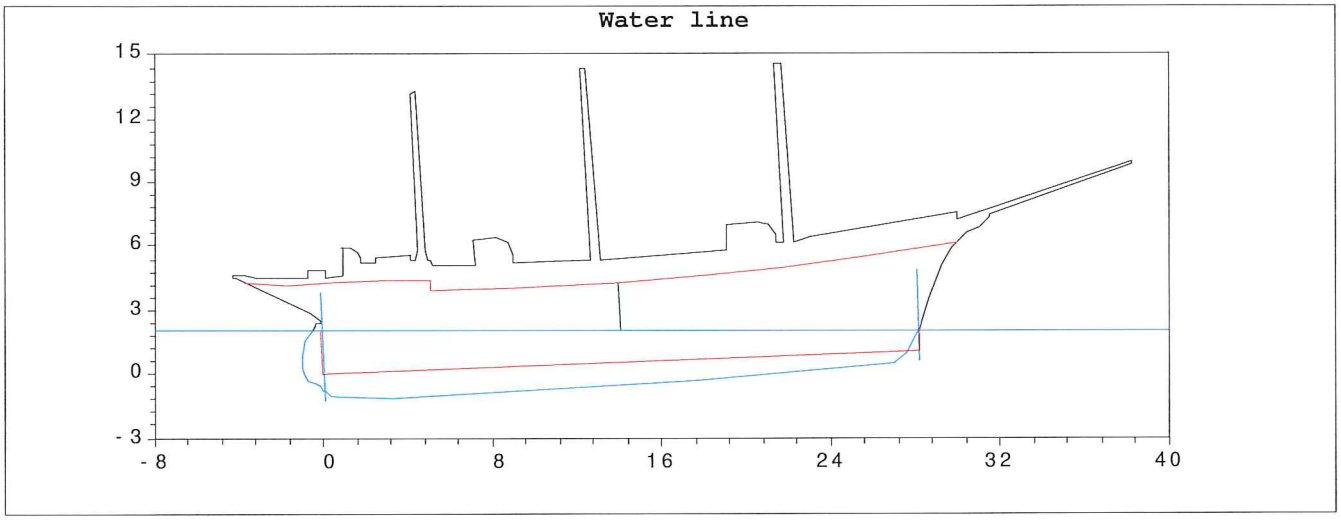
Water sp.gravity (t/m3) 1.0220 Intact ship

Date: 4 JUL 2019

Light ship: Displacement(t): 133.361 LCG(m) 12.302 VCG(m): 2.297 TCG(m): -0.002

WATERLINE	DA (M)	DF (M)	MEAN	TRIM	HEELING	TPC	MCT1CM	Wet Surf
Draft at MARK:	3.430	1.478	(DA+DF)/2	(DA-DF)	(°SB/PS)	(T/CM)	(TM/CM)	(M2)
Draft above BASE:	2.088	0.977	1.532	1.111	-0.16	1.26	1.73	225.70

Disp.i/SHELL (T):	133.362	Area (M2):	123.19	IT (M4):	313	IL (M4):	4765
Vol.i/SHELL (M3):	130.491	LCF (M):	12.922	BMT (M):	2.398	BML (M):	36.514
LCB (M):	12.247	TCF (M):	-0.005	KMT (M):	3.282	KML (M):	37.399
VCB (M):	0.884	IP (M3):	0.26	GMT (M):	0.985	GML (M):	35.102
TCB (M):	-0.007						



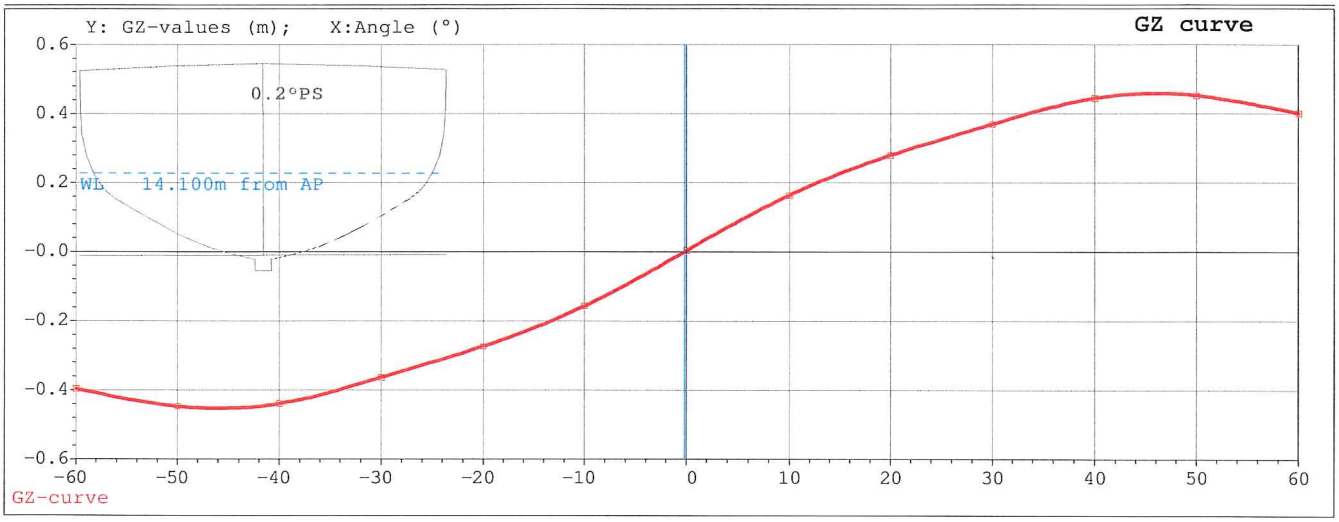
DA= 2.088M MD= 2.900M(N.S)
DF= 0.977M TR= 1.111M
DM= 1.532M Freeboard= 2.231M
Margin draft= 1.368M [Moulded max. draft - Mean draft]

Skonnert Ideal

Condition: Light ship

Water sp.gravity (t/m3) 1.0220 Intact ship

Date: 4 JUL 2019



Displ.=133.361T \LCG=12.302M \VCG=2.297M \TCG=-0.002M

GMt = 0.985M

Angles(-PS°)	GZ(M)	Angles(+SB°)	GZ(M)
0.0	0.002	0.0	0.002
-0.2	Equilibrium	10.0	0.162
-10.0	-0.158	20.0	0.278
-20.0	-0.275	30.0	0.368
-30.0	-0.365	40.0	0.444
-40.0	-0.441	45.8	0.458*Max*
-45.9	-0.455*Max*	50.0	0.452
-50.0	-0.449	60.0	0.400
-60.0	-0.398		

Flood angles: Used points:1-5

PS/SB	Angles(°)	GZ(M)	Ab.WL(M)	Type	No:Description
PS	> 60.0	3.131	T2	1:Dør til dekk forut SB si	
SB	> 60.0	3.131	T2	1:Dør til dekk forut SB si	

Angles(-PS°)			Area(MR)
-0.2	>	-20	0.053
-0.2	>	-30	0.108
-0.2	>	-40	0.179
-30.0	>-	40.0	0.071
-0.2	>-	45.9	0.226

Angles(+SB°)			Area(MR)
-0.2	>	20	0.054
-0.2	>	30	0.110
-0.2	>	40	0.182
30.0	>	40.0	0.071
-0.2	>	45.8	0.228