

Inclining test report
Kreenikatse protokoll.
Tühja laeva kaalu ja
raskuskesme koordinaate arvutus

Workboat "HABE-1"

HABE-1 - 059 – M&S.1347



MSS Group Ltd.

Butorin Aleksander
07.04.2023

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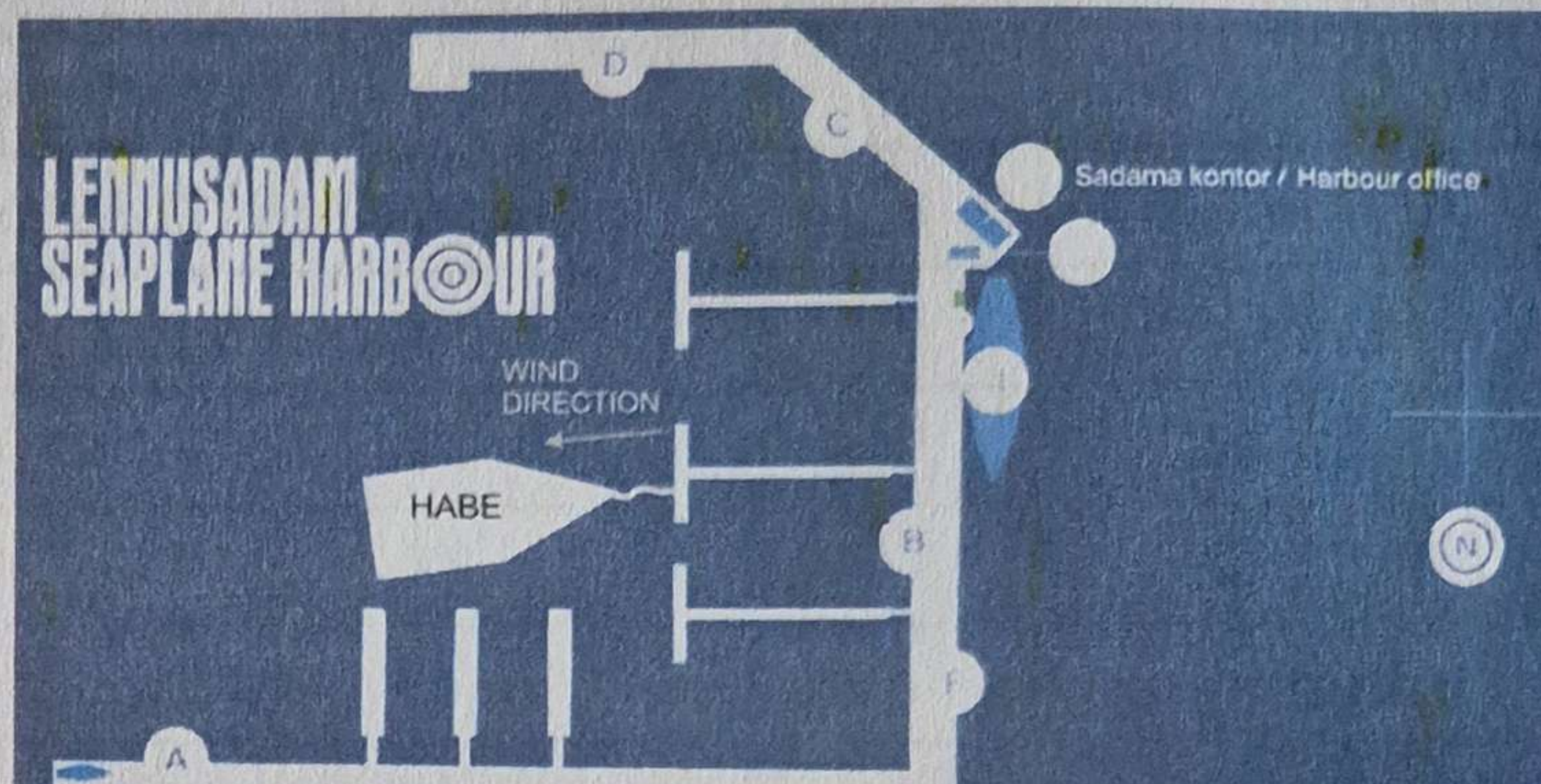
KOOSKÕLASTATUD
Transpordiamet
Laevade järelvalve üksus
18. aprill 2023.a.

Workboat "HABE-1"

1 GENERAL DATA:

Yard, date of keel laid : William Osbourne, GB
Name : "HABE-1"
Date of report : 07.04.2023
Date and place for the test : 06.04.2023, Port Lennusadam,
Started / Finished (the time) : Estonia 11.00 - 13.30
Mooring arr.during the test : Slack mooring fore, CL

Weather : Good
Air temperature : ~3°C
Sea water temperature : ~1°C
Sea depth : ab. 2.7 m
Sea water density : 1.004 t/m³
Wind : 3.5 m/s E
Current / Event : No



Person in charge: Yefimenko Olga, Butorin Aleksander, MSS Group Ltd

Attend.Ship Contr.Surveyor :
Strand Aleksander, Transport Administration, Estonia

2 SHIP DATA:

Main dimensions:

Length Over All	Loa (m)	15.86
Moulded Length	L (m)	14.19
Breadth	B (m)	5.19
Depth to Main Deck	D (m)	1.85

3 DEFINITIONS

Δ - Displacement, t
 ∇ - Volumetric displacement, cub.m
LCG - Longitudinal CG from middle, m
TCG - Ordinate of CG from CL, m
VCG - CG above BL, m
GM - Corrected transver. metac. height, m
GML - Longitudinal metacentric height, m
dm - Mean draft, m
dw - Draft at centre of WL, m
df - draft at forward perpendicular, m
da - draft at aft perpendicular, m
Mt - Trimming moment per 1 cm, tm
Mh - Heeling moment per 1 deg, tm
CG - Center of gravity
CL - Center line
BL - Base line
WL - Waterline

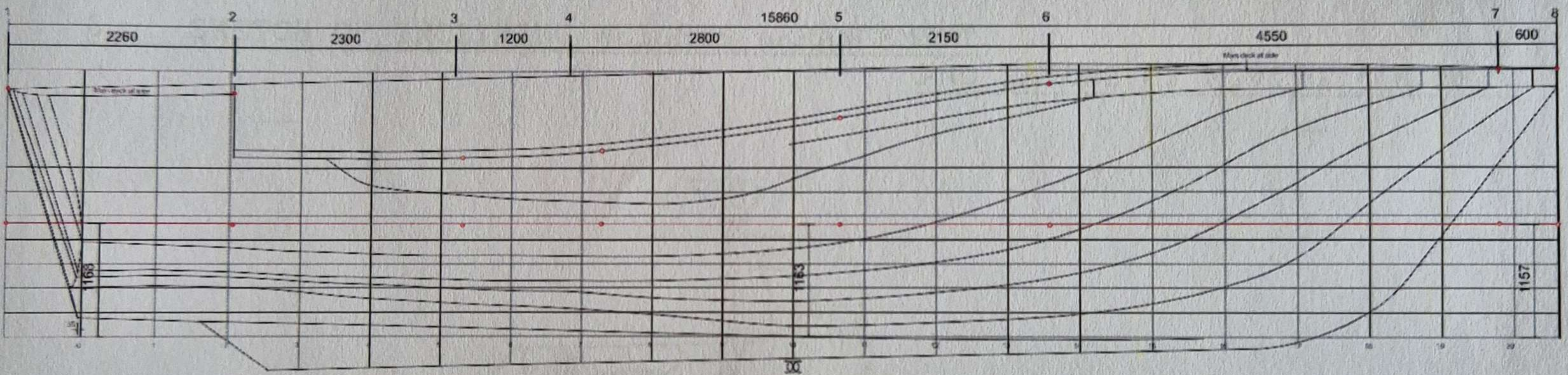
Workboat "HABE-1"

4 FREEBOARD DURING THE TEST

Measurement points:

Location, point	Immediately after the inclining test	Average
1	1.395 - CL	1.395
2	1.385 - SB; 1.365 - PS	1.375
3	0.725 - SB; 0.725 - PS	0.725
4	0.785 - SB; 0.775 - PS	0.780
5	1.115 - SB; 1.125 - PS	1.120
6	1.485 - SB; 1.475 - PS	1.480
7	1.585 - SB; 1.595 - PS	1.590
8	1.605 - CL	1.605

Deck thickness: $s=0.005$ m



In calculation are accepted followings draughts on perpendiculars:

Forward: $df=1.157$ m; Aft: $da=1.168$ m

Trim = $(df - da) = 1.157-1.168=0.011$ m

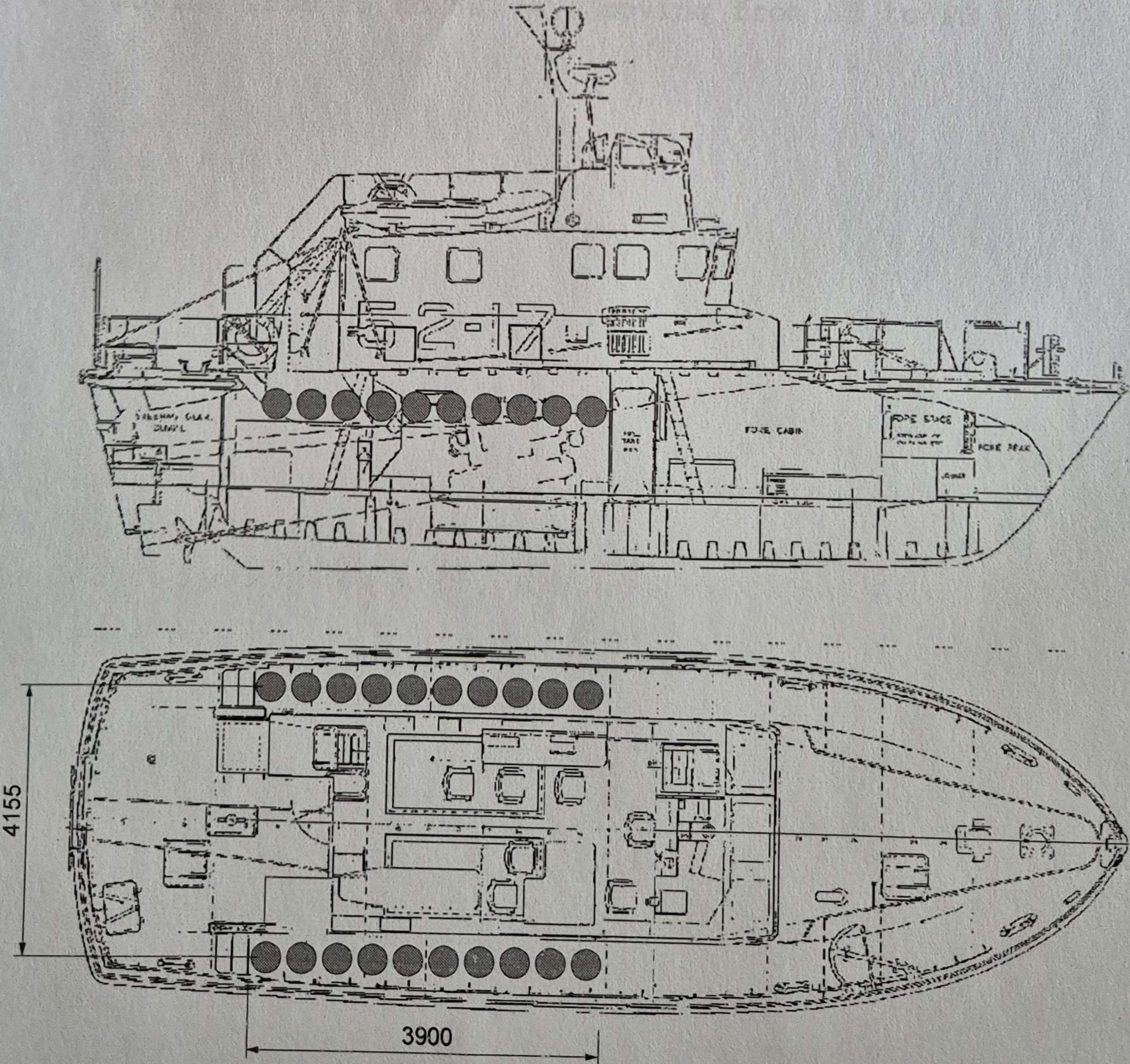
Angle of heel 0.0 dgr

Workboat "HABE-1"

5 INCLINING WEIGHTS (PEOPLE) :

N	Weight, kg
1	92.5
2	118.0
3	95.0
4	70.0
5	105.0
6	123.0
7	89.0
8	91.5
9	36.5
10	82.5
Total:	903.0

6 SKETCH OF INCLINING WEIGHTS ARRANGEMENT
AND LEVERS OF MOVING (IN MM) :



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Inclining weights moving:

Movement	Moment, tm
1 SB->PS	-3.752
2 PS->SB	3.752
3 SB->PS	-3.752
4 PS->SB	3.752
5 SB->PS	-3.752
6 PS->SB	3.752
7 SB->PS	-3.752
8 PS->SB	3.752
9 SB->PS	-3.752
10 PS->SB	3.752

Where: + - moving from PS to SB, - - moving from SB to PS

Workboat "HABE-1"

7 DESCRIPTION OF INCLINOMETERS :

Inclinometer 17

Location: Main deck, Fr.16

Inclinometer of Amaev system (upgraded) No17 recognized suitable for exploitation.

On the inclinometer is issued Certificate of the Register of USSR No H-141 from 19 detsember 1973.

Axis of a pendulum and the bearings for an axis, and also bench of the device, have an identification mark of the Register USSR and to replacement are not subject.

The technical data

- Quantity of scales of record of angles 3
- Sensitivity of device
 - scale 1 17.52 mm/dgr
(Calibration - See Annex A)
 - scale 2 not in use
 - scale 3 not in use
- Dimensions
 - Length 280 mm
 - Width 235 mm
 - Height 500 mm
- Weight of device in packaging no more than 13.5 kg.

Inclinometer 18

Location: Main deck, Fr.16

Inclinometer of Amaev system (upgraded) No18 recognized suitable for exploitation.

On the inclinometer is issued Certificate of the Register of USSR No H-142 from 19 detsember 1973.

Axis of a pendulum and the bearings for an axis, and also bench of the device, have an identification mark of the Register USSR and to replacement are not subject.

The technical data

- Quantity of scales of record of angles 3
- Sensitivity of device
 - scale 1 17.67 mm/dgr
(Calibration - See Annex A)
 - scale 2 not in use
 - scale 3 not in use
- Dimensions
 - Length 280 mm
 - Width 235 mm
 - Height 500 mm
- Weight of device in packaging no more than 13.5 kg.

Workboat "HABE-1"

8 INCLINOMETERS READINGS (SEE ANNEX B)

AND INCLINING ANGLE CALCULATION:

N	N17 deviation mm	Inclining angle, dgr	N18 deviation mm	Inclining angle, dgr
1	88.64	-5.06	91.48	-5.18
2	87.84	5.01	91.68	5.19
3	88.57	-5.06	91.72	-5.19
4	91.35	5.21	90.95	5.15
5	92.54	-5.28	91.17	-5.16
6	90.07	5.14	90.90	5.14
7	90.09	-5.14	91.04	-5.15
8	88.77	5.07	90.44	5.12
9	87.84	-5.01	89.36	-5.06
10	87.97	5.02	89.94	5.09

9 TRANSVERSE METACENTRIC HEIGHT CALCULATION

Movement	Heeling moment, tm	Average Inclining angle, dgr	Average Inclining angle, $\times 10^2$, rad	$GM_i = (2) \times 10^2 / (4) \times \Delta , m$
1	2	3	4	5
1	-3.752	-5.12	-8.9322	1.24
2	3.752	5.10	8.9022	1.25
3	-3.752	-5.12	-8.9406	1.24
4	3.752	5.18	9.0410	1.23
5	-3.752	-5.22	-9.1112	1.22
6	3.752	5.14	8.9748	1.24
7	-3.752	-5.15	-8.9827	1.24
8	3.752	5.09	8.8873	1.25
9	-3.752	-5.03	-8.7877	1.26
10	3.752	5.06	8.8228	1.26
Sum				12.44
$\Delta = 33.76 \text{ t}$				

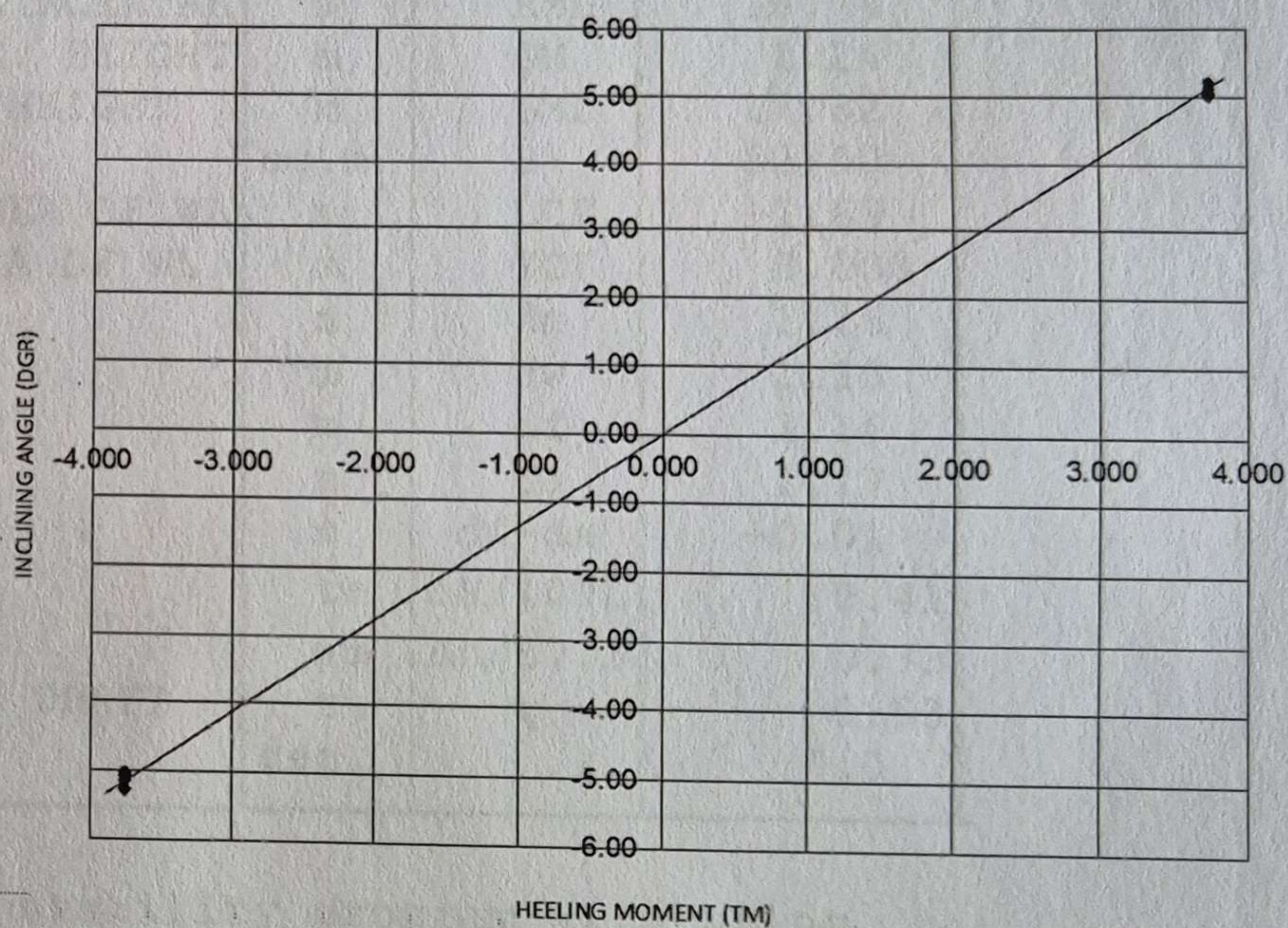
$GM = \Sigma GM_i / n = 12.44 / 10 = 1.24 \text{ m}$, where $n=10$ - number of tests

Workboat "HABE-1"

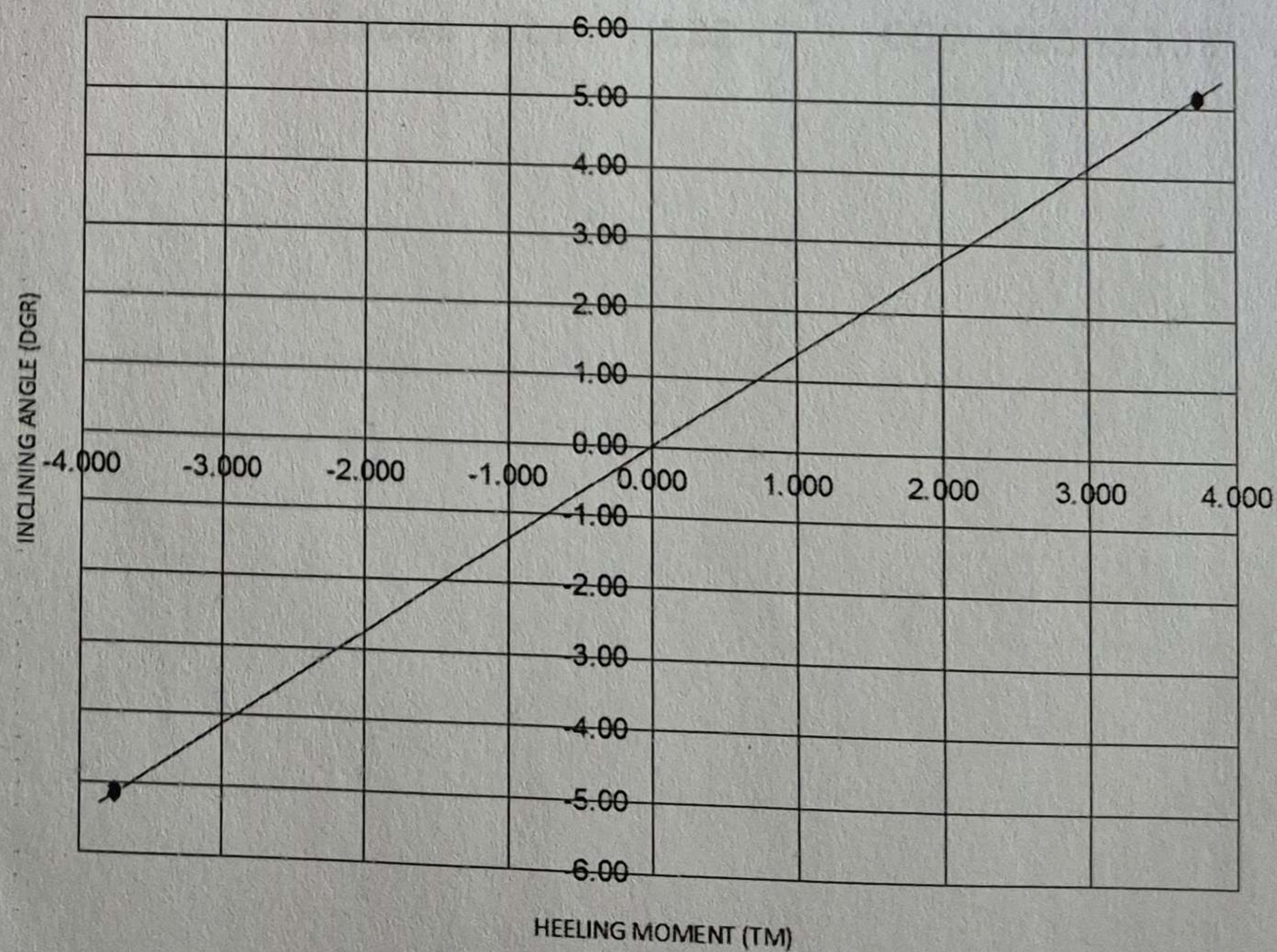
10 INCLINING TEST CONTROL:

Test №	Heeling moment, tm	Inclining angle (N17), dgr	Inclining angle (N18), dgr
1	-3.752	-5.06	-5.18
2	3.752	5.01	5.19
3	-3.752	-5.06	-5.19
4	3.752	5.21	5.15
5	-3.752	-5.28	-5.16
6	3.752	5.14	5.14
7	-3.752	-5.14	-5.15
8	3.752	5.07	5.12
9	-3.752	-5.01	-5.06
10	3.752	5.02	5.09

Inclinometer 17



Inclinometer 18



Workboat "HABE-1

11 CALCULATION OF TRIM AND INITIAL STABILITY

LENGTH BETWEEN PERPENDICULARS.....	14.65	M
BREATH.....	5.19	M
DEPTH UP TO MAIN DECK.....	1.85	M
SPECIFIC GRAVITY OF OUTSIDE WATER.....	1.004	T/CUB.M

CASE OF LOADING			Inclinig test
DISPLACEMENT	t	Δ	33.76
VOLUMETRIC DISPLACEMENT	cub.m	∇	33.63
LONGITUDINAL CG FROM MIDDLE	m	LCG	-1.45
ORDINATE OF CG FROM CL	m	TCG	0.00
CG ABOVE BL	m	VCG	1.92
LONGITUDINAL CENTRE OF BUOYANCY	m	LCB	-1.45
TRANSVERSAL CENTRE OF BUOYANCY	m	TCB	0.000
CENTRE OF BUOYANCY ABOVE BL	m	VCB	0.76
HEIGHT OF TRANSVERSE METACENTRE	m	KMT	3.16
HEIGHT OF LONGITUDINAL METACENTRE	m	KML	19.74
CORRECTED TRANSVER. METAC. HEIGHT	m	GM	1.24
LONGITUDINAL METACENTRIC HEIGHT	m	GML	17.82
AREA OF WATERPLANE	sq.m	S	52.50
LONGITUDINAL CENTRE OF AREA OF WL	m	LCF	-1.69
TRANSVERSAL CENTRE OF AREA OF WL	m	TCF	0.000
MEAN DRAFT	m	dm	1.16
DRAFT AT CENTRE OF WL	m	dw	1.16
FORWARD DRAFT	m	df	1.16
AFTER DRAFT	m	da	1.17
TRIM	m	df-da	-0.01
TRIMMING MOMENT PER 1 CM	tm	$\Delta H/100L$	0.41
HEELING MOMENT PER 1 DEG.	tm	$\Delta h/57.3$	0.73
AMOUNT OF TONS PER 1CM OF DRAFT	t	q	0.53
HEELING ANGLE	deg.		0.0

Note: calculations was made by stability program with using
Lines plan HABE-1 - 059-M&S-1338

Workboat "HABE-1"

12 LIST OF EXCESSIVE WEIGHTS

(ALL COORDINATES ARE DETERMINED ACCORDING GENERAL ARRANGEMENT DRAWING)

Name	Displac. T	LCG m	VCG m
Fuel oil	0.25	0.36	0.98
Bilge, forepeak	0.02	4.56	0.88
Bilge, ER	0.03	-3.36	0.20
Bilge, Tank room	0.01	-6.66	0.50
Incl.person & inclinometers	0.12	-0.31	2.90
Person on Main deck	0.09	-4.32	3.68
Inclining weight	0.90	-2.16	1.89
Mooring	0.03	-6.45	2.67
Mooring	0.03	6.03	2.87
Store	0.03	2.22	3.23
Mooring	0.03	2.22	3.23
Store	0.02	2.22	3.13
Store	0.03	-2.64	3.05
Store	0.02	2.66	1.10
Tools	0.05	-4.55	1.01
Battery	0.01	-6.89	1.32
Spare parts	0.02	-6.13	1.41
Lub.oil	0.03	-2.94	2.95
Total	1.72	-1.60	1.96

13 LIST OF MISSING WEIGHTS

Missing weights are absent

14 CALCULATING OF LIGHT SHIP

Name	Displac. T	LCG m	VCG m
Ship as inclined	33.76	-1.45	1.92
Excessive weights (See p.12)	1.72	-1.60	1.96
Sum:	32.04	-1.44	1.92
Total Light ship			
Displacement = 32.04 t; LCG=-1.44 m; VCG=1.92 m			

15 REFERENCE DOCUMENTS

- Lines plan HABE-1 - 059-M&S-1338
- General Arrangement w/o No

HABE-1 - 059-M&S.1347

CALIBRATION OF INCLINOMETERS №№ 17, 18

It is carried out according to the maintenance Instruction of inclinometers of Amaev systems (modernized).

Date of calibration: 05.04.2023
Place of calibration: Estonia, Tallinn
Who carried out: Yefimenko Olga, Butorin Aleksander.

1 Measuring of deviation

№	Device 17	Device 18
1	27.78	28.35
2	28.39	28.45
3	28.02	28.46
4	28.14	28.33
5	28.24	28.29
6	27.78	28.43
7	28.00	28.34
8	28.07	28.30
9	28.31	28.32
10	28.29	28.28
11	28.24	28.31
12	28.04	28.41
Average	28.11	28.36

2 Scale of devices

$M=X \times 1000 / (b \times 57.3)$, where
X – average deviation of device (table p.1);
b=28.0 mm (height of padding, measuring by trammel precision 0.1 mm)

Device №17
 $M = 28.11 \times 1000 / (28 \times 57.3) = 17.52 \text{ mm/dgr}$
Device №18
 $M = 28.36 \times 1000 / (28 \times 57.3) = 17.67 \text{ mm/dgr}$

REPORT OF INCLINOMETERS CALIBRATION

Inclinometer № 17

On basis of calibration the device is suitable to work and has the following technical datas:

Quantity of free fluctuations	- more than 30
Maximum measured angle	- 3 dgr
Scale	- 17.52 mm/dgr

14/09/2022

Inclinometer № 18

On basis of calibration the device is suitable to work and has the following technical datas:

Quantity of free fluctuations	- more than 30
Maximum measured angle	- 3 dgr
Scale	- 17.67 mm/dgr

14/09/2022

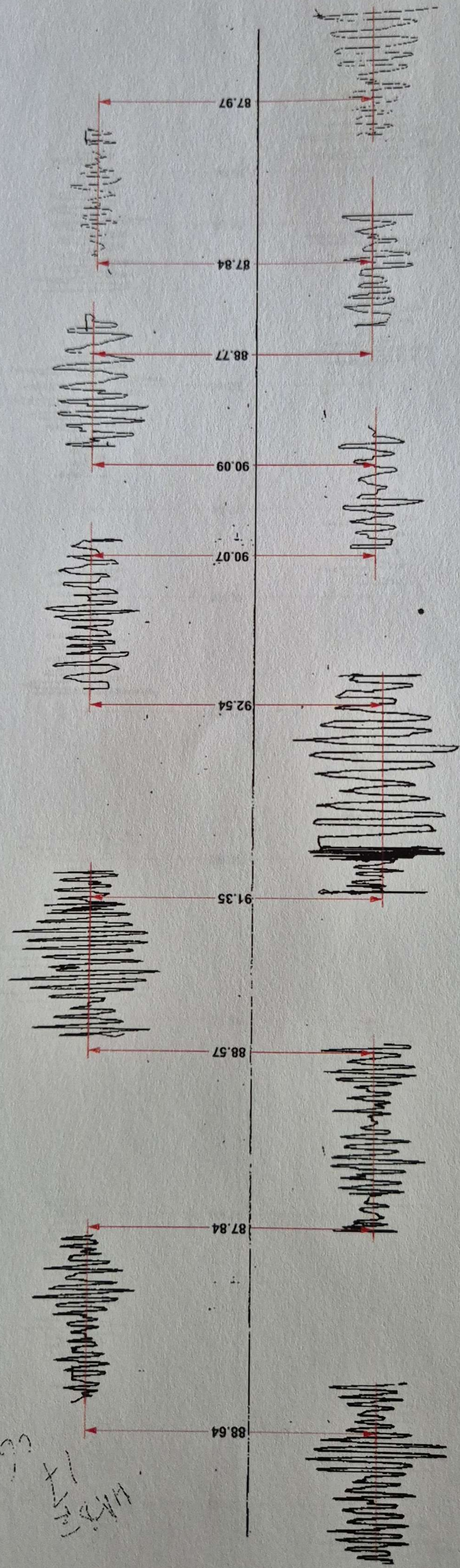
Naval architect

Butorin A.

SHIP'S HEELINGS RESULT. READINGS OF THE INCLINOMETER 17

ANNEX B

WSE
17
12/04/2023



SHIP'S HEELING RESULTS. READINGS OF THE INCLINOMETER 18

