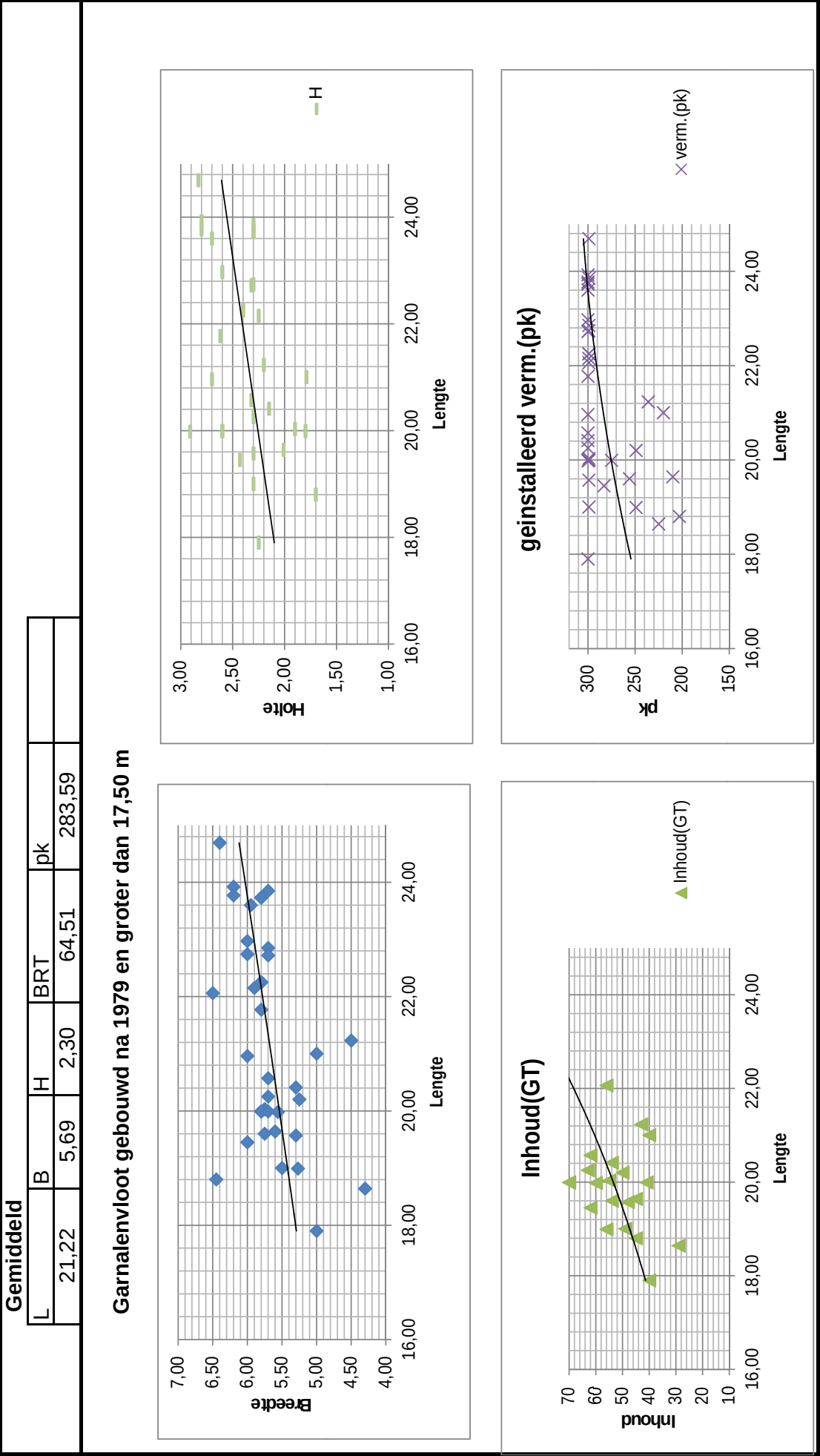


Aktieve garnalenvloot noord nederland									
Visserij nr	L	B	H	Inhoud(GT)	verm.(pk)	b.jaar	vorm	werf	
LO 10	23.24	4.00	1.72	39	210	1930	rond		
LO 13	20.20	5.25	1.80	50	249	1988	knik	volharding	
LO 137	19.05	5.19	2.36	41	300	1964	rond		
LO 14	21.61	3.71	1.80	35	172	1921	rond		
LO 15	18.20	4.20	1.78	25	238	1979	knik	welgelegen zk	
LO 17	22.04	4.80	1.70	48	300	1899	rond		
LO 20	19.60	5.75	1.92	54	256	1987	knik	Fred vd Broek	
LO 4	13.50	3.87	1.50	13	120	1960	rond		
LO 44	21.41	5.10	2.30	48	300	1945	rond		
LO 5	19.42	4.00	1.28	25	170	1927	rond		
LO 8	22.06	6.50	1.42	56	299	1995	knik	sandfirden	
LO 9	14.99	7.00	1.06	19	152	2001	knik		
OL 12	19.15	5.30	2.45	43	299	1966	rond		
OL37	20.54	4.52	2.00	42	299	1910	rond		
OL5	20.85	4.85	2.08	36	240	1961	rond		
TS 10	17.20	4.00	1.85	22	180	1959	rond		
TS 2	18.64	4.30	2.10	29	225	1983	knik		
TS 6	18.99	5.27	2.25	56	249	1988	knik		
TS 7	19.86	4.00	1.79	28	215	1951	rond		
TS 9	19.00	4.04	1.62	27	180	1958	rond		
TX 21	22.85	5.70	2.32	78	299	1990	knik		
TX 24	18.80	6.45	1.70	45	203	2002	knik	fred vd broek	
TX 25	20.03	5.75	1.90	55	299	1989	knik	fred vd broek	
UK 165	19.57	5.30	2.30	48	299	1986	knik	van der molen	
UQ 18	23.95	5.35	1.70	55	300	1989	knik		
UQ 21	23.99	4.78	1.62	51	300	1911	rond		
WL 10	19.09	4.01	0.96	22	180	1976	rond		
WL 15	20.53	3.75	1.15	26	272	1924	rond		
WL 18	17.90	5.00	2.25	40	300	1987	knik		
WL 2	19.33	3.92	1.35	27	272	1927	rond	stam	
WL 20	18.14	4.70	2.15	34	208	1961	rond		
WL 22	21.23	4.50	2.20	43	236	1990	knik	kunst	
WL 23	18.56	5.04	2.36	34	300	1964	rond		
WL 25	19.80	4.23	1.43	30	220	1910	rond		
WL 28	21.48	4.13	1.39	34	300	1924	rond		
WL 3	24.25	4.47	2.25	43	300	1908	rond		
WL 8	23.92	6.52	2.38	86	300	1909	rond	paans	
WON 43	20.41	5.30	2.15	54	300	1996	knik	Luyt	
WON 50	20.19	4.35	1.84	39	256	1960	rond		
WR 108	22.97	6.00	2.60	83	300	1985	knik	padmos	
WR 109	19.99	5.80	2.60	70	299	2000	knik	welgelegen lo	
WR 111	19.99	5.80	2.60	70	299	2000	knik	welgelegen lo	
WR 12	23.73	5.80	2.30	73	300	2002			
WR 122	24.66	5.40	2.55	63	299	1962	rond		
WR 124	20.57	5.70	2.32	62	300	1990	knik	prins	
WR 17	22.47	5.60	2.53	72	299	1968			
WR 181	23.73	5.80	2.30	75	300	2000	knik	Luyt	
WR 2	19.99	5.70	1.80	41	275	2000		Made	
WR 21	23.92	6.20	2.80	86	300	1982	knik		
WR 212	19.45	6.00	2.43	62	283	2008	knik		
Wr 213	22.72	5.70	2.32	78	300	1992	knik	welgelegen ZK	
WR 22	22.15	5.90	2.25	77	299	2003	knik		
WR 23	24.69	6.40	2.83	108	299	1987	knik		
WR 27	22.55	5.58	2.50	66	299	1970	knik		
WR 291	21.06	5.39	2.55	57	299	1963	rond		
WR 3	22.25	5.80	2.40	75	299	2001		Visser	
WR 35	12.20	3.90	1.20	9	120	1978	knik		
WR 36	21.25	4.70	2.15	39	299	1960	rond		
WR 389	22.74	6.00	2.30	82	299	2001	knik	Luyt	
WR 4	18.37	3.58	1.39	18	132	1914			
WR 40	20.25	5.70	2.30	63	300	1988	knik	welgelegen zk	
WR 42	20.50	4.70	2.14	40	300	1953	rond		
WR 50	22.25	5.80	2.40	75	299	2001	knik	visser	
WR 54	19.00	5.50	2.30	49	299	1984	rond		
WR 57	23.85	5.70	2.30	73	299	1989	knik	welgelegen zk	
WR 68	22.46	5.60	2.51	63	299	1969	knik	padmos	
WR 71	19.08	5.00	2.36	40	299	1960	rond		
WR 75	19.14	4.85	2.28	35	240	1960	rond		
WR 77	20.68	5.15	1.94	41	256	1966	rond		
WR 80	19.64	5.60	2.01	45	210	1988	knik	jumelet	
WR 98	23.70	5.80	2.84	75	300	1960	rond		
WR9	17.76	4.00	1.80	27	182	1951			
Zk 17	17.74	4.70	2.18	33	300	1958	rond	visser	
Zk 18	18.80	4.50	2.26	33	188	1971	knik	oostende	
Zk 2	20.96	6.00	2.70	82	300	2008	knik		
Zk 21	21.96	5.00	2.30	46	300	1962	rond	bodewes	
Zk 23	21.72	4.75	2.28	43	256	1963	rond	laan&kooij	
Zk 37	20.34	5.10	2.31	43	209	1946	rond	ndsm	
Zk 43	21.77	5.80	2.62	83	300	2001	knik	Fred vd Broek	
Zk 46	21.36	3.71	1.27	29	165	1923	rond		
Zk 47	20.61	4.80	2.20	39	299	1961	rond	haak	
Zk 48	19.75	5.30	2.70	51	283	1957	rond	laan&kooij	
Zk 5	19.00	5.00	2.31	38	240	1964	rond		
Zk 54	17.88	5.15	2.00	34	188	1984	knik	welgelegen zk	
Zk 65	23.77	6.20	2.80	78	300	1985	knik		
Zk 67	18.00	4.75	2.25	34	300	1959	rond	amels	
Zk 7	18.40	3.57	1.80	24	131	1925	rond		
Zk 8	19.75	4.75	2.26	39	300	1959	rond	amels	
Zk 9	21.00	5.00	1.79	40	220	1982	knik	welgelegen zk	
Zk11	20.85	3.85	1.27	28	182	1926	rond	amels	
Zk12	21.54	5.10	2.45	47	291	1969	rond		
Zk13	23.60	5.95	2.70	89	300	2002	knik	luyt	
Zk14	19.98	5.56	2.91	60	300	1983	knik	welgelegen zk	

L gem	Bgem	H gem	BRT	PK's	bouwjr
20.56	5.09	2.10	49	262	1968
gemiddelde leeftijd					43

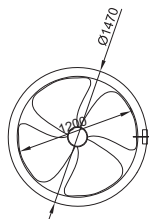
Garnalenvloot gebouwd na 1979 en groter dan 17,50 m

Visserij nr	L	B	H	Inhoud(GT)	verm.(pk)	b.jaar	vorm	ontwerp	visserij	werf
LO 13	20,20	5,25	1,80	50	249	1988	knik		Garnalen	volharding
LO 20	19,60	5,75	1,92	54	256	1987	knik		Garnalen	Fred vd Broek
LO 8	22,06	6,50	1,42	56	299	1995	knik		Garnalen	sandfirden
TS 2	18,64	4,30	2,10	29	225	1983	knik		Garnalen	
TS 6	18,99	5,27	2,25	56	249	1988	knik		Garnalen	
TX 21	22,85	5,70	2,32	78	299	1990	knik		Garnalen	
TX 24	18,80	6,45	1,70	45	203	2002	knik		Garnalen	fred vd broek
TX 25	20,03	5,75	1,90	55	299	1989	knik		Garnalen	fred vd broek
UK 165	19,57	5,30	2,30	48	299	1986	knik		Garnalen	van der molen
WL 18	17,90	5,00	2,25	40	300	1987	knik		Garnalen	
WL 22	21,23	4,50	2,20	43	236	1990	knik		Garnalen	kunst
WON 43	20,41	5,30	2,15	54	300	1996	knik		Garnalen	Luytt
WR 108	22,97	6,00	2,60	83	300	1985	knik		Garnalen	padmos
WR 109	19,99	5,80	2,60	70	299	2000	knik		Garnalen	welgelegen lo
WR 111	19,99	5,80	2,60	70	299	2000	knik		Garnalen	welgelegen lo
WR 22	22,15	5,90	2,25	77	299	2003	knik		Garnalen	Werff&Visser
WR 12	23,73	5,80	2,30	73	300	2002	knik		Garnalen	
WR 124	20,57	5,70	2,32	62	300	1990	knik		Garnalen	prins
WR 181	23,73	5,80	2,30	75	300	2000	knik		Garnalen	Luyt
WR 2	19,99	5,70	1,80	41	275	2000			Garnalen	Made
WR 21	23,92	6,20	2,80	86	300	1982	knik		Garnalen	
WR 212	19,45	6,00	2,43	62	283	2008	knik		Garnalen	
WR 213	22,72	5,70	2,32	78	300	1992	knik		Garnalen	welgelegen ZK
WR 23	24,69	6,40	2,83	108	299	1987	knik		Garnalen	
WR 3	22,25	5,80	2,40	75	299	2001			Garnalen	Visser
WR 389	22,74	6,00	2,30	82	299	2001	knik		Garnalen	Luyt
WR 40	20,25	5,70	2,30	63	300	1988	knik		Garnalen	welgelegen zk
WR 50	22,25	5,80	2,40	75	299	2001	knik		Garnalen	visser
WR 54	19,00	5,50	2,30	49	299	1984	rond		Garnalen	
WR 57	23,85	5,70	2,30	73	299	1989	knik		Garnalen	welgelegen zk
WR 80	19,64	5,60	2,01	45	210	1988	knik		Garnalen	jumelet
Zk 2	20,96	6,00	2,70	82	300	2008	knik		Garnalen	
Zk 43	21,77	5,80	2,62	83	300	2001	knik		Garnalen	Fred vd Broek
Zk 65	23,77	6,20	2,80	78	300	1985	knik		Garnalen	
Zk 9	21,00	5,00	1,79	40	220	1982	knik		Garnalen	welgelegen zk
Zk13	23,60	5,95	2,70	89	300	2002	knik		Garnalen	luyt
Zk14	19,98	5,56	2,91	60	300	1983	knik		Garnalen	welgelegen zk
Gemiddeld										
	L	B	H	BRT	pk	bouwjaar				
	21,22	5,69	2,30	64,51	283,59	1993				



Bepaling gewicht LCG en VCG referentie kotter op basis stabiliteitboek en gewichtberekening WL 27

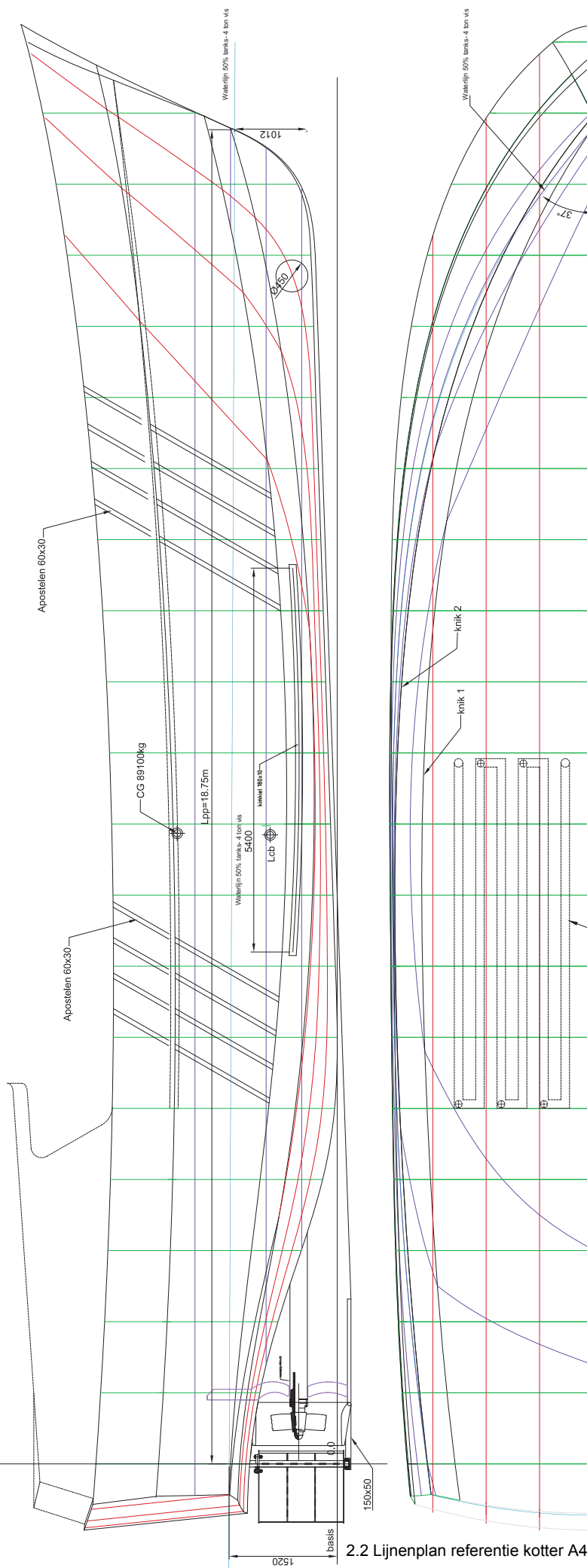
Naam	LOA =	Lpp	B SPT=	H=	Volume	Casco gewicht	Techniek&uitrusting	Totaal	50 % tanks- 4 ton vis	totaal	Z hoogte	Z lengte
	m.	m	m.	m.	m³	ton	ton	ton	ton	ton	m.	m.
WI 27	22,35	19,50	5,90	2,25	297	52,8	30,6	83,4	12,5	95,9	2,30	9,35
Referentie kotter	21,20	18,50	5,70	2,20	266	47,3	30,6	77,9	11,2	89,1	2,25	8,87



Hoofdmotor	Scania D-12-41M	300kw	1800 rpm
Koppeling	Twin Disc AG 5901		4,96-1
Schroef	merk v Voorde		
	bladen	4	
	max. draagverm.	1200	
	max. draagverm.	1356	
	pitch 0,28	1356	
	pitch 0,6	1356	
	pitch basis	1356	
	Au/A0	0,6	
	Design Speed	5 kn	
	Design Rotation rate	370 RPM	

Hoofdafmetingen	
Lengte o.a.	21.20 m.
Lengte l.l.	18.65 m.
Breedte mal	5.70 m.
Holte	2.20 m.

Hydroplaning Test Vehicle: 14.03.2011 OFF		Date: 16-6-2011 Time: 9:40:12	
Made by MSL67 from Model REF: KOTTER 14, 16-Sep-2011, 09:20:10			
Position		Center of Gravity	Speed, Weight
Gsk: 1.57 m Tires: 4.250 deg Head: 0.000 deg		X: 8.870 m Y: 0.000 m Z: 0.000 m	1026.500000 kg/m ³
Characteristical		Waterplane	Wetted Surface
Vol: 66.58 m ³ Area: 10.28 m ² CGZ (NWL): -52.66 m		W/F Area: 95.96 m ² LCF (NWL): -55.89 m Center of Flotation	W/S Area: 1175.64 m ² Center of W/S Area X: 8.241 m Y: 0.000 m Z: 0.617 m
Center of Buoyancy		Center of Flotation	
X: 8.874 m Y: 0.000 m Z: 0.006 m		X: 8.252 m Y: 0.000 m Z: 1.449 m	
Dimensions		Initial Stability	
WL Length: 10.747 m WL Beam: 3.744 m WL Draft: 0.100 m WL Steer: 5.626 m Draft: 1.722 m		Moment of Inertia Hydrostatic Height 10 m per degree	Longitudinal 2216.02 m ⁴ 26.618 m 417173.31 kg/m
Coefficients		Critical Depth	Height
Waterplane: 0.961 Prismatic: 0.667 Block: 0.477 Motionless: 0.716 Drag/L: 316.357		20 m 0 m	-1.527 -1.536



2.2 Lijnenplan referentie kotter A4

Koel-kanalen buitenzijde vlak BB & SB U120x55 –
gelast tegen vlak.



Hydrostatics: groene kotter 20.9.2011.OFE Date: 22-9-2011 Time: 14:34:53 Made by MSURF from model 0140 L01 20-Sep-2011 16:32:31			
<u>Position</u> Sink: 1,487 m Trim: 0,398 deg Heel: 0,000 deg	<u>Center of Gravity</u> X: 8,330 m Y: 0,000 m Z: 2,310 m	<u>Specific Weight</u> 1026,500000 kg/m ³	
<u>Displacement</u> Volume: 82,42 m ³ Displ't: 84605,60 kg LCB (%WL): -52,19 % Center of Buoyancy X: 8,338 m Y: 0,000 m Z: 0,950 m	<u>Waterplane</u> W.P. Area: 80,78 m ² LCF (%WL): -56,84 % Center of Flotation X: 7,527 m Y: 0,000 m Z: 1,539 m	<u>Wetted Surface</u> W.S. Area: 150,80 m ² Center of W.S. Area X: 6,558 m Y: 0,000 m Z: 0,598 m	
<u>Dimensions</u> WL Length: 17,442 m WL Fwd X: 17,442 m WL Aft X: 0,000 m WL Beam: 5,364 m Draft: 1,649 m	<u>Initial Stability</u> Moment of Inertia Metacentric Height R.M. per degree	Transverse 162,49 m ⁴ 0,612 m 903,18 kg-m	Longitudinal 1713,05 m ⁴ 19,424 m 28682,70 kg-m
<u>Coefficients</u> Waterplane: 0,863 Prismatic: 0,647 Block: 0,534 Midsection: 0,825 Disp/L: 443,814	<u>Critical Points</u> hak	Height -1,687	

The background of the top section is a photograph of a vast ocean with white-capped waves under a clear sky. The image is split horizontally, with the top half showing the horizon and the bottom half showing a closer view of the waves.

Challenging wind and waves

Linking hydrodynamic research to the maritime industry

SHRIMP CUTTER (19M); SPEED POWER AND REVIEW OF HULLFORM IMPROVEMENTS

Final Report

Project No. : 25081
Date : December 2, 2011

SHRIMP CUTTER (19M); SPEED POWER AND REVIEW OF HULL FORM IMPROVEMENTS

MARIN order No. : 25081

Ordered by : Visserij Cooperatie Urk
Vliestroom 18
8321 EG Urk

Reference : Email dated July 29, 2011

Reported by : Harry Willemsen
Reviewed by : Ir. K.H. van der Meij

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3	RESULTS OF CALM WATER PERFORMANCE CALCULATIONS	4
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APPENDIX I:	List of symbols	A1 – A6
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Documentation sheets: DESP

1 INTRODUCTION

By e-mail dated 29-07-2011 Visserij Cooperatie Urk (VCU), ordered the Maritime Research Institute Netherlands (MARIN) to perform a calculation program for a shrimp cutter.

VCU is developing an energy efficient shrimp cutter and asked MARIN to perform a speed power prediction calculation for a reference vessel including a review of hull form improvements. Based on this report Gaastmeer Design will develop new hull lines for an energy efficient shrimp cutter. For the new hull lines MARIN will perform a second speed power prediction to determine the improvements, which will be presented in a future report.

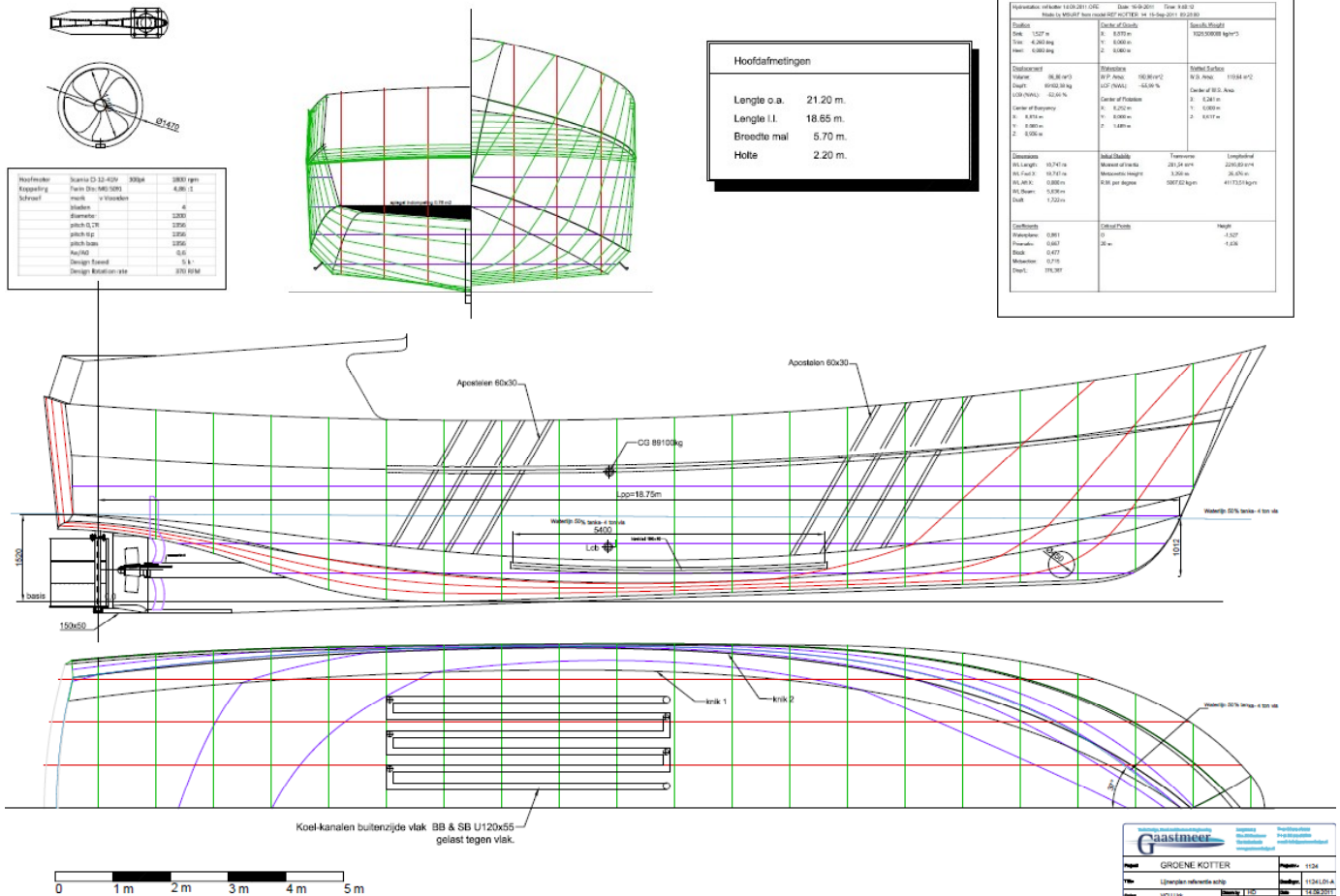
Throughout this report SI units are used unless indicated otherwise, and a list of symbols is given in Appendix I.

2 MAIN PARTICULARS OF SHIP

LENGTH ON WL	(M)	19.450
LENGTH PP	(M)	18.750
BREADTH	(M)	5.636
DRAUGHT FWD	(M)	1.012
DRAUGHT AFT	(M)	1.722
VOLUME OF DISPLACEMENT	(M3)	86.8
CM	(-)	0.7590
LCB FWD OF 1/2 LPP	(% LPP)	-2.66
HALF ENTR ANGLE (0-->STAT VALUE)	(DEGR)	37.00
APPENDAGE AREA	(M2)	11.71
TRANSOM AREA/MIDSHIP SECTION	(-)	0.130

APPENDAGES:

- 1 BOW THRUSTER TUNNEL
- 2 BILGE KEELS
- 2 GRID COOLERS
- 1 SKEG
- 1 RUDDER



3 RESULTS OF CALM WATER PERFORMANCE CALCULATIONS

The calm water performance calculations are performed with our computer program DESP and in correlation with model test data of similar vessels available at MARIN.

This method is based not only on the results of model test experiments, but also on numerous measurements on full scale ships during acceptance trials. The method uses a larger number of variables. Therefore, it is possible to determine, to some extent, effects of changes of major design parameters on the resistance and propulsion properties.

With regard to the level of accuracy of the presented resistance and power calculations, it has to be emphasised that speed power estimates based on statistical data are less accurate compared to speed power predictions determined by means of model tests. In general we use a value of about +/-10 per cent ⁽¹⁾ in power for calculations based on statistics only and of about +/-5 per cent ⁽¹⁾ in power for speed power predictions based on model test results.

The calculated results are for ideal trial conditions; trial conditions implying unrestricted deep water of 15 degrees Celsius with a mass density of 1025.0 kg*m⁻³, a clean hull and propeller blades and no effects of wind, waves and current.

RESULTS RESISTANCE CALCULATIONS

V	FN	R	PE
KT		KN	KW
1	0.037	0.126	0.06
2	0.074	0.459	0.47
3	0.112	0.980	1.51
4	0.149	1.692	3.48
5	0.186	2.629	6.76
6	0.223	4.137	12.77
7	0.261	7.212	25.97
8	0.298	14.0	57.62
9	0.335	22.1	102
10	0.372	28.8	148
11	0.410	36.6	207

RESULTS OF PROPULSOR DESIGN CALCULATIONS

TYPE: KA-SERIES PROPELLER IN NOZZLE 19A;

PVIRT/D= 1.248

PROP DIAMETER 1.200 M
 PITCH/DIAMETER 1.130
 NO.OF PROPELLER BLADES 4
 BLADE AREA RATIO 0.550

¹ Numbers are based on studies by the ITTC

CALCULATED PROPULSIVE PERFORMANCE

V	N	Ps	T-TOT	THTD	W	ETAH	ETA0	ETAD
KT	RPM	KW	KN					
1	32.2	0.108	0.160	0.217	0.226	1.012	0.595	0.606
2	63.1	0.793	0.588	0.219	0.219	1.000	0.598	0.602
3	93.6	2.550	1.258	0.221	0.216	0.994	0.599	0.599
4	124.0	5.890	2.175	0.222	0.214	0.990	0.600	0.597
5	154.9	11.463	3.379	0.222	0.212	0.988	0.600	0.596
6	190.6	21.688	5.300	0.219	0.209	0.987	0.599	0.595
7	238.6	44.457	9.144	0.211	0.205	0.992	0.591	0.590
8	308.0	101	17.4	0.195	0.199	1.006	0.567	0.574
9	372.7	185	27.1	0.183	0.194	1.014	0.549	0.560
10	422.1	270	35.1	0.180	0.191	1.013	0.545	0.555
11	472.5	380	44.5	0.178	0.188	1.013	0.541	0.551
12	589.5	700	67.9	0.162	0.185	1.027	0.490	0.507

CALCULATED PULLING PERFORMANCE

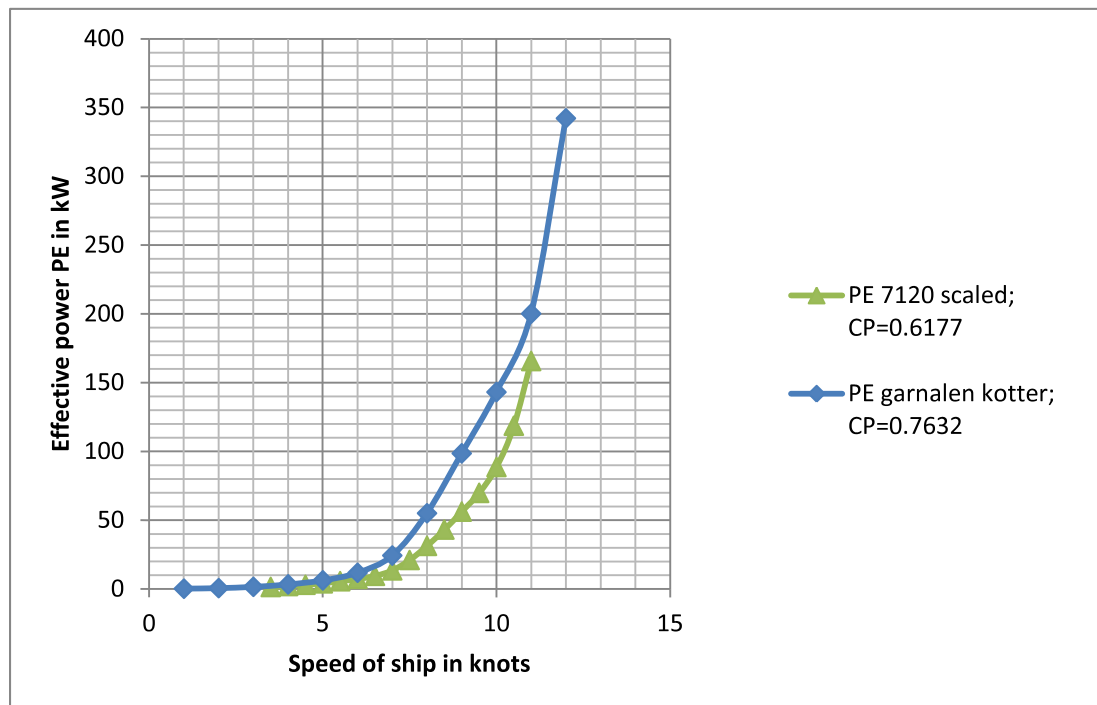
<-----Ps/N= 218.0 KW/ 393.6 RPM----->								
V	R	N	PS	T	PULL	THTD	CAV	CAV
KT	KN	RPM	KW	KN	KN		P	N
0	0.0	360.9	200	46.9	44.5	0.050	1.000	1.000
1	0.1	363.2	201	44.8	42.3	0.052	1.000	1.000
2	0.5	365.6	202	42.7	39.8	0.058	1.000	1.000
3	1.0	368.0	204	40.8	37.0	0.068	1.000	1.000
4	1.7	370.7	205	38.9	34.0	0.083	1.000	1.000
5	2.6	373.6	207	37.1	30.8	0.100	1.000	1.000
6	4.1	376.9	209	35.4	27.0	0.119	1.000	1.000

4 REVIEW OF HULLFORM IMPROVEMENTS

4.1 Reduce prismatic coefficient

Reducing the prismatic coefficient will smoothen the fore- and aftshoulders, which has a positive effect on the resistance of the ship. By increasing the midship coefficient, without increasing the displacement, the prismatic coefficient will become smaller. The recommended midship coefficient is 0.9.

In the figure below the effective power of the shrimp cotter is plotted against a similar vessel from MARIN's database with a lower prismatic coefficient. You can see that reducing the prismatic coefficient will reduce the resistance of the ship.



4.2 Reduce transom depth

The transom depth has influence on the resistance on of the hull, a large transom depth has a negative effect on the resistance of the hull. The recommended transom depth is 0.03 m.

4.3 Hogner shaped skeg

The shrimp cotter has a skeg and propeller arrangement similar as presented in Figure 1. This will result in a wake field as presented in Figure 2. This wake field has an extreme wake peak in the top of the propeller and also a wake peak in the lower propeller disk. This has a negative influence on the efficiency of the propeller and will increase the probability of cavitation and vibration.

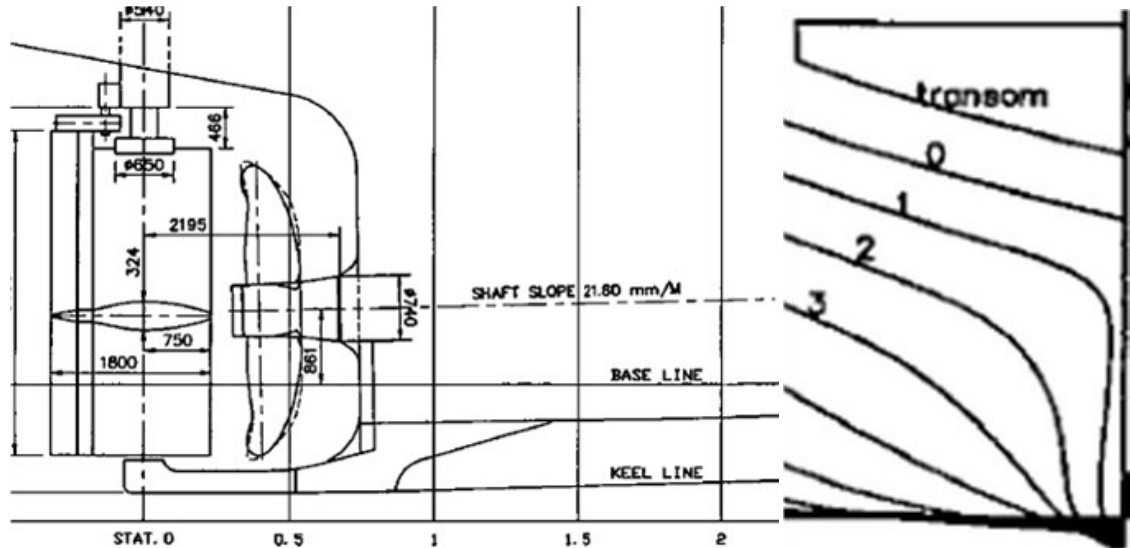


Figure 1: Skeg and propeller arrangement similar as the shrimp cotter

RADIUS IN MM	TYPE OF LINE
520	_____
817	_____
1114	_____
1411	_____
1708	_____

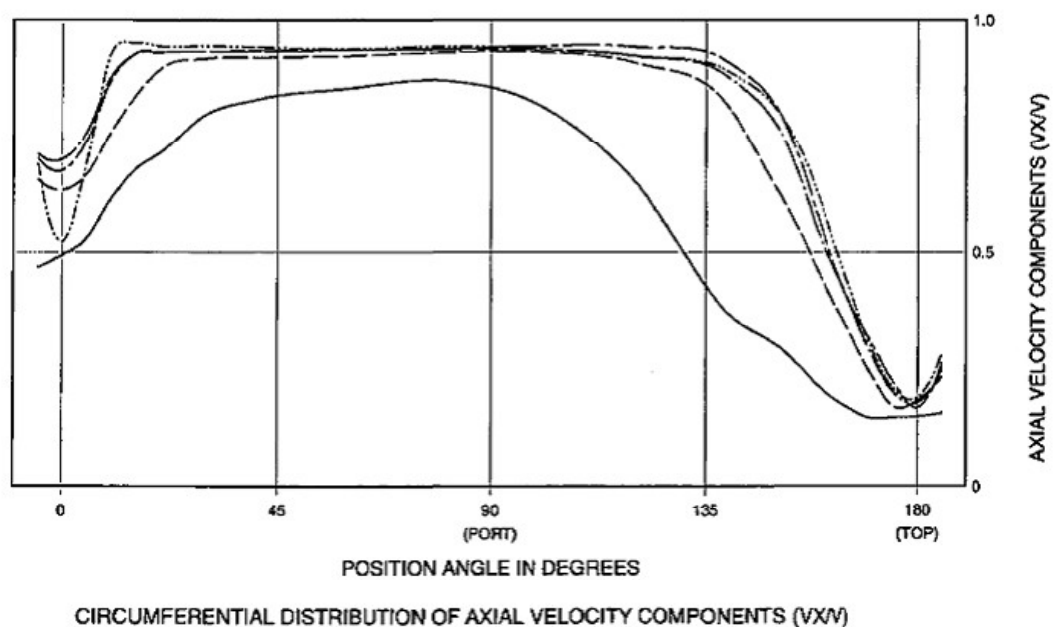


Figure 2: Wake field for skeg and propeller arrangement as presented in Figure 1

Giving the skeg an hogner shaped aftbody, as shown in Figure 3, will significantly improve the uniformity of the wake field. As you can see in Figure 4 the wake peak in the top of the propeller has reduced and the wake peak in the lower propeller disk is eliminated. Expected is that 3% can be gained on the shaft power and the probability of vibrations is less.

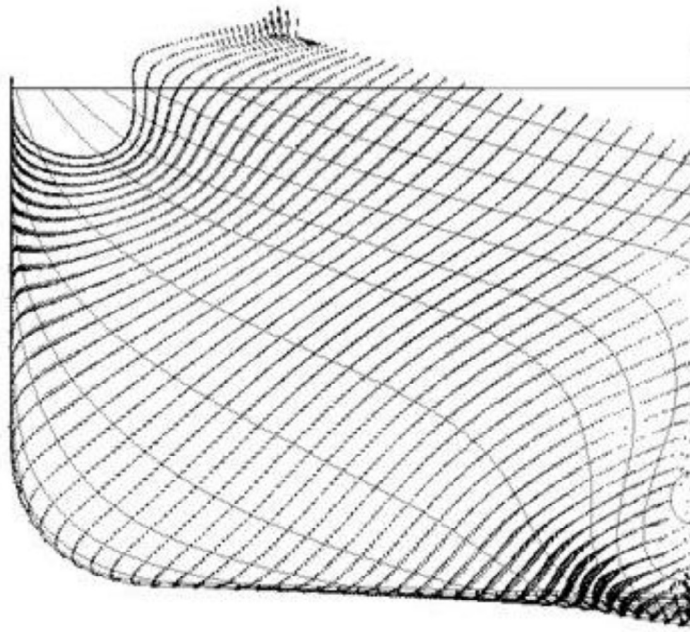


Figure 3: Example of an hogner shaped aftbody

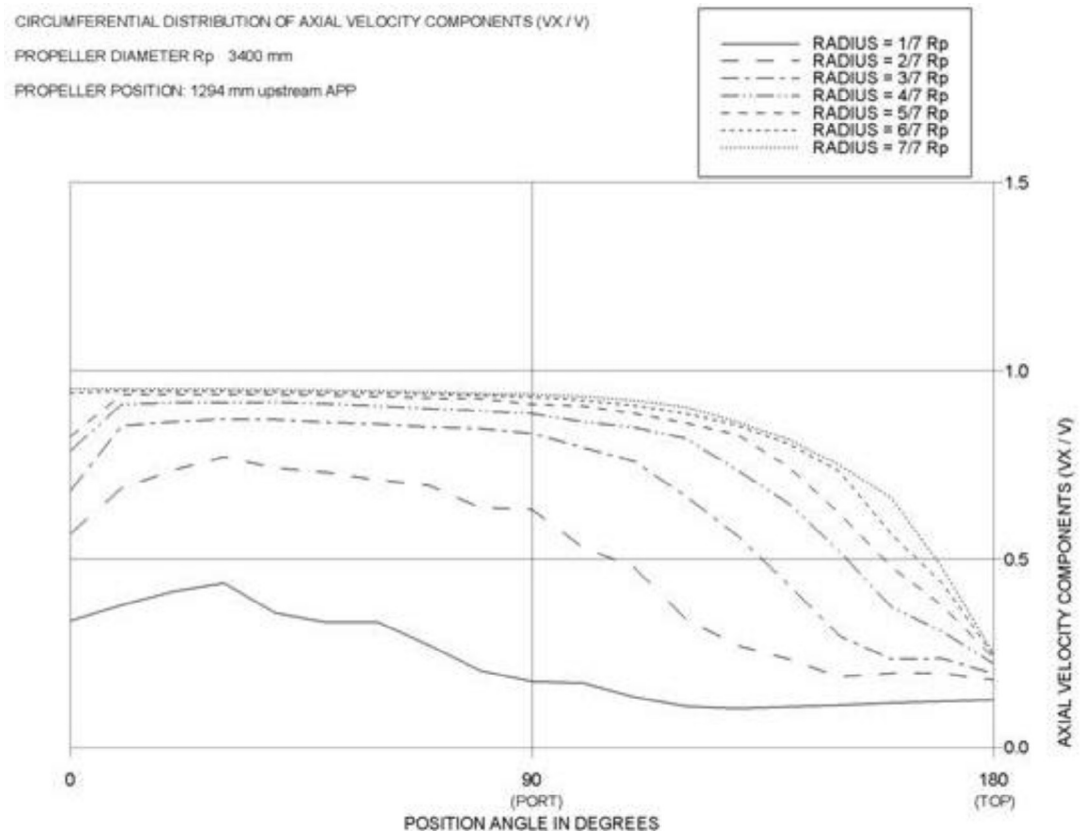


Figure 4: Example of a wake field of an hogner shaped aftbody

4.4 Lengthen waterlines foreship

By lengthening the waterlines in the fore ship the fore shoulders will reduce, which has a positive effect on the resistance of the ship.

4.5 Hard chine frame

The shrimp cutter has hard chine frame, if the knuckle lines are aligned with the streamlines, they will not have a negative influence on the resistance of the hull, compared to a round bilge frame.

4.6 Scallop around bow thrusters tunnel

To reduce the resistance of the bow thrusters tunnel it is recommended to make a scallop aft of the bow thrusters tunnel.

4.7 Propeller design

The larger the diameter, the larger is the pulling force produced by the propeller for a given power. This is true only if the rotative speed of the propeller can be freely chosen. The following rule of thumb apply to zero-speed pulling performance:

- $\text{Pull} = 1.22 [\text{DP}_D]^{2/3}$ (ducted propellers)

For optimal performance of the propeller a wake adapted propeller design should be made.

5 CONCLUSIONS

The following conclusions summarise the findings of the present project:

- Speed power calculations at average draught of 1.367 m with a propeller in nozzle with a diameter of 1.20 meter show a bollard pull of 44.5 kN in deep water at a total maximum engine power of 218 kW under ideal trial conditions in fresh water, temperature of 15 degrees Celsius and a density of 1025 kg/m^3 , with a freshly painted and clean hull and propeller blades and no effects of wind, current and waves.
- The recommended hull line improvements are:
 - o Reducing the prismatic coefficient
 - o Reducing the transom depth
 - o Hogner shaped aftbody
 - o Lengthening waterlines in the forebody
 - o Make a scallop around the bow thrusters tunnel
 - o Enlarge propeller diameter
 - o Design a propeller

The above conclusions do not in any way supersede the more detailed statements made in the previous chapters and in the tables and figures with results

Wageningen, 2 December 2011
MARITIME RESEARCH INSTITUTE NETHERLANDS

APPENDIX I

LIST OF SYMBOLS

Symbol	Symbol in computer print	Title
GEOMETRY OF SHIP AND PROPELLER		
A_{BT}		Transverse cross-section area of bulbous bow
A_E		Expanded propeller blade area
A_E/A_O		Expanded propeller blade area ratio
A_M		Midship sectional area below still waterline
A_O		Propeller disc area
A_T		Transom area below still waterline
A_T/A_M		Transom area ratio
A_W		Waterplane area
A_X		Maximum transverse sectional area below still waterline
B		Maximum breadth moulded at or below still waterline
B_M		Maximum breadth moulded at mid ship
B_{WL}		Maximum breadth moulded at still waterline
c		Chord length of propeller blade section
c/D		Chord length-diameter ratio
C_{REF}		Chord length between reference line and leading edge
c_t		Chord length between maximum thickness point and leading edge
C_B		Block coefficient
C_M		Midship section coefficient
C_P		Longitudinal prismatic coefficient
C_{WP}		Waterplane area coefficient
d		Hub diameter
d/D		Hub-diameter ratio
D		Propeller diameter
FB		Position of centre of buoyancy aft of FP
f		Camber of propeller blade section
h_o		Submergence of propeller shaft axis measured from still water-plane
h_B		Height of centroid of A_{BT} above keel
i_E		Half angle of entrance
L_{OA}		Length overall
L_{OS}		Length overall submerged
L_{PP}		Length between perpendiculars
L_{WL}		Length on still waterline
LCB		Longitudinal position of centre of buoyancy

- continued -

- continued -

Symbol	Symbol in computer print	Title
P		Propeller pitch
P/D		Pitch-diameter ratio
r		Radius of propeller blade section
R		Radius of propeller
S, S_{HULL}		Projected wetted surface bare hull
S_{APP}		Wetted surface area appendages
S_1, S_{TOT}		Total wetted surface area
t		Maximum thickness of propeller blade section
t/c		Maximum thickness-chord length ratio
T		Mean draught moulded
T_A		Moulded draught at aft perpendicular
T_F		Moulded draught at forward perpendicular
Z		Number of blades
λ		Scale ratio
Φ		Pitch angle of propeller section
∇	DISV	Displacement volume moulded
τ_m	τ_M	Subscript for model
τ_s	τ_S	Subscript for ship

- continued -

- continued -

Symbol	Symbol in computer print	Title
RESISTANCE, OPEN WATER AND PROPULSION		
B_P		Taylor's propeller coefficient
C_A	CA	Incremental resistance coefficient for model-ship correlation
C_{AA}	CAA	Air resistance coefficient
C_{AD}	CAD	Admiralty coefficient for propulsion
$CAV N$	CAV N	Cavitation influensation factor on rotation rate
$CAV P$	CAV P	Cavitation influensation factor on power
C_D		Drag coefficient
$C_{D\Delta}$		Power-displacement coefficient
C_E	CE	Admiralty coefficient for resistance
C_F	CF	Specific frictional resistance coefficient
ΔC_F		Roughness allowance coefficient
C_L	CL	Lift coefficient
C_P		Power loading coefficient
C_R	CRES	Specific residual resistance coefficient
C_T	CT	Specific total resistance coefficient
C_{Th}		Thrust loading coefficient
C_T		Resistance-displacement coefficient
C_V	CV	Specific total viscous resistance coefficient
$\dot{C}_W$	CW	Specific wavemaking resistance coefficient
$\textcircled{C}$	CIRCC	R.E. Froude's resistance coefficient
F	F	Towing force in propulsion test
F_D	FD	Viscous scale effect on resistance
F_n	FN	Froude number
F_P	PULL	Pull of ship
F_{PO}	PULL	Pull of ship in bollard condition
$\textcircled{F}$	CIRCF	R.E. Froude's frictional resistance coefficient
g		Acceleration due to gravity
J	J	Advance coefficient
J_V	JV	Apparent advance coefficient
$1+k$	1+K	Three-dimensional form factor on flat plate friction
k_p		Equivalent sandroughness of propeller blade surface
k_s		Roughness height of hull surface
K_Q	KQ	Torque coefficient
K_T	KT	Thrust coefficient
K_{TD}	KT-D	Duct thrust coefficient
K_{TP}	KT-P	Propeller thrust coefficient

- continued -

- continued -

Symbol	Symbol in computer print	Title
$\textcircled{K}$	CIRCK	R.E. Froude's speed-displacement coefficient
n	N	Rate of revolutions
P_B		Brake power
P_D	PD	Power delivered to the propeller(s)
P_E	PE	Effective power
P_I		Indicated power
P_S	PS	Shaft power
P_T		Thrust power
Q	Q	Torque
R	R	Resistance in general
R_n	RN	Reynolds number
R_A		Model-ship correlation resistance
R_F	RF	Frictional resistance
R_V	RV	Total viscous resistance
R_W	RW	Wave making resistance
S_A		Apparent slip ratio
S_R		Real slip ratio
t	THDF	Thrust deduction fraction
T	TH	Thrust
T_D	TH-D	Duct thrust
T_P	TH-P	Propeller thrust
T_{THR}		Thrust of azimuthing thruster unit
V	V	Speed of ship or model
V_A	VA	Advance speed of propeller relative to water flow
w_T	WT	Effective wake fraction on thrust identity
z_V		Sinkage due to speed
β		Advance angle of propeller blade section
η_B		Propeller efficiency behind ship
η_D	ETA-D	Propulsive efficiency
η_G		Gearing efficiency
η_H	ETA-H	Hull efficiency
η_M		Mechanical efficiency
η_o	ETA-O	Propeller efficiency in open water
η_R	ETA-R	Relative-rotative efficiency on thrust identity
η_S		Shafting efficiency

- continued -

- continued -

Symbol	Symbol in computer print	Title
ν		Coefficient of kinematic viscosity
ρ		Mass density
τ		Ratio propeller thrust and total thrust of ducted propeller system
τ_m	τ_M	Subscript for model
τ_o	τ_O	Subscript for open water
τ_s	τ_S	Subscript for ship

The background of the top section is a photograph of a vast ocean with white-capped waves under a clear sky. The horizon line is visible in the upper third of the image. The overall color palette is dominated by various shades of blue.

Challenging wind and waves

Linking hydrodynamic research to the maritime industry

NEW DESIGN SHRIMP CUTTER (19M); SPEED POWER PREDICTION

Final Report - 2

Project No. : 25081

Date : October 15, 2012

NEW DESIGN SHRIMP CUTTER (19M); SPEED POWER PREDICTION

Final Report - 2

MARIN order No. : 25081

Ordered by : Visserij Cooperatie Urk
Vliestroom 18
8321 EG Urk

Reference : Email dated July 29, 2011

Reported by : Harry Willemsen
Reviewed by : Ir. K.H. van der Meij

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2	MAIN PARTICULARS OF SHIP	3
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APPENDIX I:	List of symbols	A1 – A6
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Documentation sheets: DESP

1 INTRODUCTION

By e-mail dated 29-07-2011 Visserij Cooperatie Urk (VCU), ordered the Maritime Research Institute Netherlands (MARIN) to perform a calculation program for a shrimp cutter.

VCU is developing an energy efficient shrimp cutter and asked MARIN to perform a speed power prediction calculation for a reference vessel including a review of hull form improvements. The speed power prediction for the reference vessel is presented in MARIN report 'Speed power_25081', dated December 2, 2011. Based on this report Gaastmeer Design has developed new hull lines for an energy efficient shrimp cutter. In this report the speed power prediction for the new shrimp cutter design is presented.

Throughout this report SI units are used unless indicated otherwise, and a list of symbols is given in Appendix I.

2 MAIN PARTICULARS OF SHIP

LENGTH ON WL	(M)	19.917
LENGTH PP	(M)	19.130
BREADTH	(M)	5.398
DRAUGHT FWD	(M)	1.118
DRAUGHT AFT	(M)	1.525
VOLUME OF DISPLACEMENT	(M3)	75.0
CM	(-)	0.932
LCB FWD OF 1/2 LPP	(% LPP)	-5.55
HALF ENTR ANGLE (0-->STAT VALUE)	(DEGR)	22.00
APPENDAGE AREA	(M2)	14.40
TRANSOM AREA/MIDSHIP SECTION	(-)	0.106

APPENDAGES:

- 1 BOW THRUSTER TUNNEL
- 2 BILGE KEELS
- 1 SKEG
- 1 RUDDER

3 RESULTS OF CALM WATER PERFORMANCE CALCULATIONS

The calm water performance calculations are performed with our computer program DESP and in correlation with model test data of similar vessels available at MARIN.

This method is based not only on the results of model test experiments, but also on numerous measurements on full scale ships during acceptance trials. The method uses a larger number of variables. Therefore, it is possible to determine, to some extent, effects of changes of major design parameters on the resistance and propulsion properties.

With regard to the level of accuracy of the presented resistance and power calculations, it has to be emphasised that speed power estimates based on statistical data are less accurate compared to speed power predictions determined by means of model tests. In general we use a value of about +/-10 per cent ⁽¹⁾ in power for calculations based on statistics only and of about +/-5 per cent ⁽¹⁾ in power for speed power predictions based on model test results.

The calculated results are for ideal trial conditions; trial conditions implying unrestricted deep water of 15 degrees Celsius with a mass density of 1025.0 kg*m⁻³, a clean hull and propeller blades and no effects of wind, waves and current.

3.1 Resistance calculation results

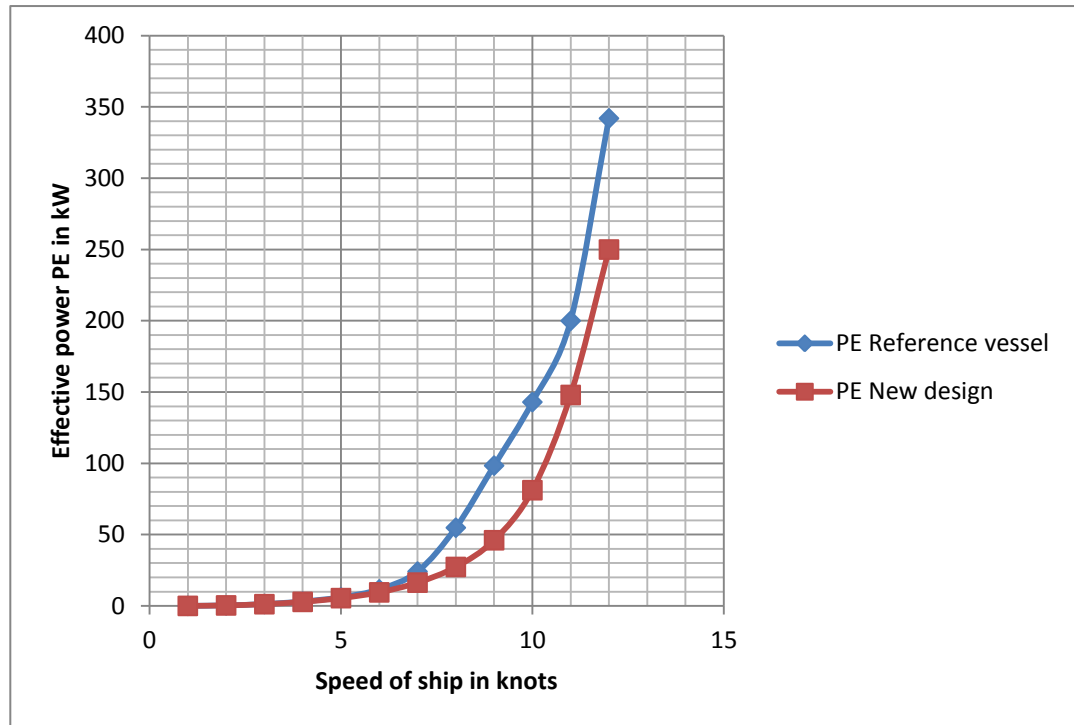
RESULTS RESISTANCE CALCULATIONS

V	FN	R	PE
KT		KN	KW
1	0.037	0.104	0.05
2	0.074	0.382	0.39
3	0.110	0.814	1.26
4	0.147	1.397	2.88
5	0.184	2.139	5.50
6	0.221	3.093	9.55
7	0.258	4.552	16.39
8	0.294	6.648	27.36
9	0.331	9.957	46.10
10	0.368	15.787	81.21
11	0.405	26.2	148
12	0.442	40.5	250

In the graph below the calculated resistance of the new design is compared to the resistance calculated for the reference vessel presented in MARIN report 'Speed power_25081', dated December 2, 2011.

In the graph is shown that the resistance of the new hull lines has significantly been reduced compared to the reference vessel.

¹ Numbers are based on studies by the ITTC



3.2 Propulsive performance

For optimal propeller efficiency and maximal pulling force, it is advised to apply a propeller with a large diameter and low number of revolutions. First a propeller design was made for a propeller diameter of 1.4 m. Thereafter a main engine and gearbox was selected by the client. Due to the higher rotation rate of the propeller, the optimal propeller diameter reduced and thereby the efficiency of the propeller. Therefore a new main engine and gearbox were selected with a lower number of revolutions.

In paragraph 3.2.1 the initial propeller design is presented, in paragraph 3.2.2 the propeller design Volvo D7A TA engine and Twin Disc 5091 DC gearbox is presented. And in the last paragraph the propeller design of the Deutz B6M1013MCP engine and the ZF W350 gearbox is shown.

3.2.1 Initial propeller design

To calculate the propulsive performance of the shrimp cutter a initial propeller design needs to be made. The requirements of the client were as follows:

Propeller diameter 1400 mm in nozzle
Engine 145 kW @ 1900 RPM
Reduction to be advised by MARIN
Pulling force at 5 knots > 16.95 kN
Free sailing speed > 9 knots

Based on these requirements the following propeller design was made:

RESULTS OF PROPULSOR DESIGN CALCULATIONS

TYPE: KA-SERIES PROPELLER IN HR NOZZLE

PROP DIAMETER	1.400 M
PITCH/DIAMETER	1.050
NO.OF PROPELLER BLADES	4
BLADE AREA RATIO	0.550
ROTATION RATE	275.6 RPM
REQUIRED SHAFT POWER	100.0 KW
PREDICTED SPEED	9.40 KNOTS

CALCULATED PULLING PERFORMANCE

V	R	N	PS	T	PULL	THTD
KT	KN	RPM	KW	KN	KN	
5	2.1	275.6	141	29.3	24.5	0.090

For optimal efficiency in the fishing condition the advised reduction is $1900/275.6 = 6.894$. At 9.4 knots free sailing, the maximum number of revolutions will be achieved, because the propeller design is optimised for fishing condition at 5 knots.

CALCULATED PROPULSIVE PERFORMANCE

V	N	Ps	T-TOT	THTD	W	ETAH	ETAO	ETAD
KT	RPM	KW	KN					
1	27.3	0.089	0.123	0.153	0.152	0.999	0.612	0.608
2	53.9	0.662	0.452	0.155	0.149	0.993	0.607	0.600
3	80.1	2.136	0.966	0.157	0.148	0.989	0.603	0.594
4	106.2	4.919	1.659	0.158	0.147	0.987	0.601	0.590
5	132.3	9.452	2.541	0.158	0.146	0.985	0.599	0.588
6	159.0	16.413	3.674	0.158	0.145	0.984	0.599	0.587
7	188.3	27.912	5.394	0.156	0.144	0.986	0.604	0.593
8	220.1	46.048	7.851	0.153	0.142	0.987	0.610	0.600
9	256.6	76.618	11.705	0.149	0.141	0.990	0.616	0.608
10	302.1	134	18.4	0.144	0.139	0.994	0.619	0.613

3.2.2 Propeller design – Volvo D7A TA engine

Based on these result the a main engine was selected (Volvo D7A TA) by the client with following characteristics:

130 kW at 1900 RPM
 Max torque 688 Nm at 1500 RPM, 650 Nm at 1900 RPM
 Twin Disc 5091 DC reduction 1: 5.10

The reduction selected by the client is lower than advised by MARIN. Therefore the propeller design presented above is not optimal anymore. Due to the increased propeller

RPM, the optimal propeller diameter will be lower. This results in the following propeller design:

RESULTS OF PROPULSOR DESIGN CALCULATIONS

TYPE: KA-SERIES PROPELLER IN HR NOZZLE

PROP DIAMETER	1.145 M
PITCH/DIAMETER	1.036
NO.OF PROPELLER BLADES	4
BLADE AREA RATIO	0.550
ROTATION RATE	372.5 RPM
REQUIRED SHAFT POWER	97.5 KW
PREDICTED SPEED	9.43 KNOTS

CALCULATED PULLING PERFORMANCE

V	R	N	PS	T	PULL	THTD
KT	KN	RPM	KW	KN	KN	
5	2.1	372.5	126	24.9	20.6	0.084

At 9.43 knots free sailing, the maximum number of revolutions will be achieved, because the propeller design is optimised for fishing at 5 knots. The optimal propeller diameter is 1145mm at 372.5 RPM, which is much smaller than the original 1400 mm propeller diameter. For this new design the pulling force has reduced, but does still comply with the requirement.

CALCULATED PROPULSIVE PERFORMANCE

V	N	Ps	T-TOT	THTD	W	ETAH	ETAO	ETAD
KT	RPM	KW	KN					
1	36.5	0.085	0.122	0.146	0.174	1.033	0.617	0.636
2	71.6	0.628	0.448	0.148	0.170	1.026	0.618	0.632
3	106.2	2.016	0.957	0.149	0.168	1.023	0.618	0.630
4	140.6	4.626	1.644	0.150	0.167	1.020	0.618	0.628
5	175.0	8.871	2.518	0.150	0.166	1.018	0.617	0.626
6	210.3	15.410	3.640	0.150	0.165	1.017	0.617	0.626
7	250.0	26.427	5.347	0.149	0.163	1.017	0.618	0.626
8	293.7	44.096	7.787	0.146	0.162	1.018	0.618	0.627
9	345.0	74.530	11.614	0.143	0.160	1.020	0.615	0.625
10	410.5	133	18.3	0.137	0.157	1.024	0.605	0.617

3.2.3 Propeller design – Deutz B6M1013MCP

To be able to fit a propeller with a larger propeller diameter and thereby increase the pulling performance, a different main engine and gearbox were selected. The characteristics are:

145 kW at 1900 RPM ZF W350 reduction 1: 6.409
--

This results in the following propeller design:

RESULTS OF PROPULSOR DESIGN CALCULATIONS

TYPE: KA-SERIES PROPELLER IN HR NOZZLE

PROP DIAMETER	1.350 M
PITCH/DIAMETER	1.029
NO.OF PROPELLER BLADES	4
BLADE AREA RATIO	0.550
ROTATION RATE	296.5 RPM
REQUIRED SHAFT POWER	100.0 KW
PREDICTED SPEED	9.45 KNOTS

CALCULATED PULLING PERFORMANCE

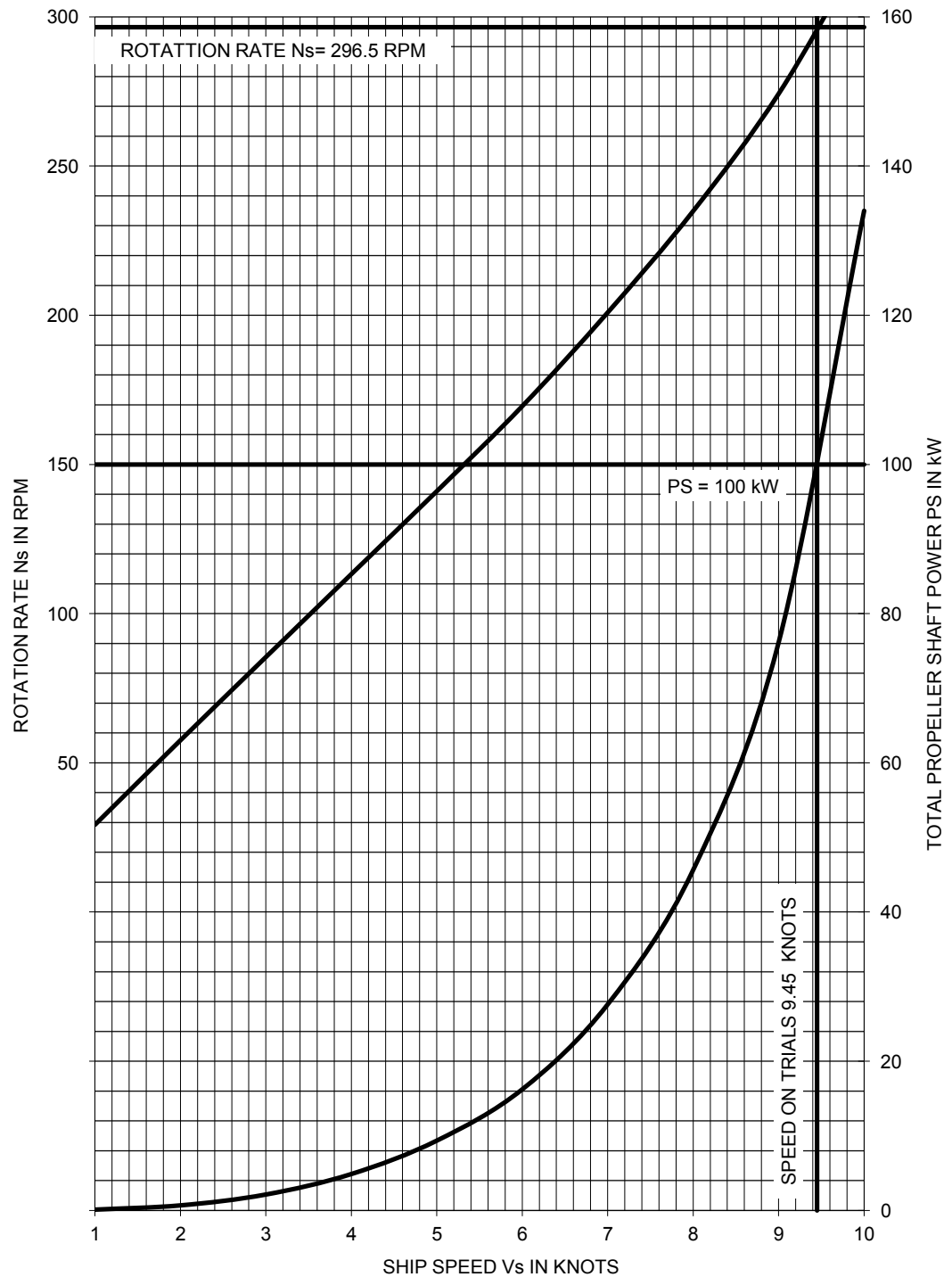
V	R	N	PS	T	PULL	THTD
KT	KN	RPM	KW	KN	KN	
5	2.1	296.6	141	28.9	24.2	0.088

At 9.45 knots free sailing, the maximum number of revolutions will be achieved, because the propeller design is optimised for fishing at 5 knots.

CALCULATED PROPULSIVE PERFORMANCE

V	N	Ps	T-TOT	THTD	W	ETAH	ETAO	ETAD
KT	RPM	KW	KN					
1	29.2	0.088	0.123	0.152	0.156	1.005	0.613	0.614
2	57.5	0.655	0.451	0.154	0.153	0.999	0.609	0.606
3	85.4	2.112	0.964	0.155	0.151	0.995	0.606	0.601
4	113.2	4.860	1.656	0.156	0.150	0.993	0.604	0.598
5	141.0	9.336	2.536	0.157	0.149	0.991	0.603	0.595
6	169.5	16.212	3.667	0.157	0.148	0.990	0.603	0.595
7	200.9	27.609	5.384	0.155	0.147	0.991	0.607	0.600
8	234.9	45.636	7.838	0.152	0.146	0.993	0.612	0.606
9	274.2	76.139	11.688	0.148	0.144	0.996	0.617	0.612
10	323.4	134	18.4	0.143	0.142	1.000	0.617	0.614

CALCULATED SPEED POWER PREDICTION



4 CONCLUSIONS

The following conclusions summarise the findings of the present project:

- The resistance of the new design has reduced significantly compared to the reference vessel. At 9 knots the effective power of the new design is 47% of the resistance of the reference vessel.
- For optimal propeller efficiency and maximal pulling force, it is advised to apply a propeller with a large diameter and low number of revolutions. However applying a large propeller diameter with high number of revolutions will have a negative effect. For optimal performance the propeller diameter and number of revolutions should be matched.
- Speed power calculations at draught of $T_F/T_A = 1.118/1.525$ m with a main engine Deutz B6M1013MCP with a propeller in nozzle with a diameter of 1.35 meter show a pull of 24.2 kN at 5 knots in deep water at an engine power of 141 kW and a rotation rate of 296.6 RPM under ideal trial conditions in fresh water, temperature of 15 degrees Celsius and a density of 1025 kg/m^3 , with a freshly painted and clean hull and propeller blades and no effects of wind, current and waves. At 9.45 knots free sailing, the maximum number of revolutions will be achieved, because the propeller design is optimised for fishing at 5 knots.

The above conclusions do not in any way supersede the more detailed statements made in the previous chapters and in the tables and figures with results

Wageningen, 15 October 2012
MARITIME RESEARCH INSTITUTE NETHERLANDS

APPENDIX I

LIST OF SYMBOLS

Symbol	Symbol in computer print	Title
GEOMETRY OF SHIP AND PROPELLER		
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A_E/A_O		Expanded propeller blade area ratio
A_M		Midship sectional area below still waterline
A_O		Propeller disc area
A_T		Transom area below still waterline
A_T/A_M		Transom area ratio
A_W		Waterplane area
A_X		Maximum transverse sectional area below still waterline
B		Maximum breadth moulded at or below still waterline
B_M		Maximum breadth moulded at mid ship
B_{WL}		Maximum breadth moulded at still waterline
c		Chord length of propeller blade section
c/D		Chord length-diameter ratio
C_{REF}		Chord length between reference line and leading edge
c_t		Chord length between maximum thickness point and leading edge
C_B		Block coefficient
C_M		Midship section coefficient
C_P		Longitudinal prismatic coefficient
C_{WP}		Waterplane area coefficient
d		Hub diameter
d/D		Hub-diameter ratio
D		Propeller diameter
FB		Position of centre of buoyancy aft of FP
f		Camber of propeller blade section
h_o		Submergence of propeller shaft axis measured from still water-plane
h_B		Height of centroid of A_{BT} above keel
i_E		Half angle of entrance
L_{OA}		Length overall
L_{OS}		Length overall submerged
L_{PP}		Length between perpendiculars
L_{WL}		Length on still waterline
LCB		Longitudinal position of centre of buoyancy

- continued -

- continued -

Symbol	Symbol in computer print	Title
P		Propeller pitch
P/D		Pitch-diameter ratio
r		Radius of propeller blade section
R		Radius of propeller
S, S_{HULL}		Projected wetted surface bare hull
S_{APP}		Wetted surface area appendages
S_1, S_{TOT}		Total wetted surface area
t		Maximum thickness of propeller blade section
t/c		Maximum thickness-chord length ratio
T		Mean draught moulded
T_A		Moulded draught at aft perpendicular
T_F		Moulded draught at forward perpendicular
Z		Number of blades
λ		Scale ratio
Φ		Pitch angle of propeller section
∇	DISV	Displacement volume moulded
τ_m	τ_M	Subscript for model
τ_s	τ_S	Subscript for ship

- continued -

- continued -

Symbol	Symbol in computer print	Title
RESISTANCE, OPEN WATER AND PROPULSION		
B_P		Taylor's propeller coefficient
C_A	CA	Incremental resistance coefficient for model-ship correlation
C_{AA}	CAA	Air resistance coefficient
C_{AD}	CAD	Admiralty coefficient for propulsion
CAV N	CAV N	Cavitation influensation factor on rotation rate
CAV P	CAV P	Cavitation influensation factor on power
C_D		Drag coefficient
$C_{D\bar{\nabla}}$		Power-displacement coefficient
C_E	CE	Admiralty coefficient for resistance
C_F	CF	Specific frictional resistance coefficient
ΔC_F		Roughness allowance coefficient
C_L	CL	Lift coefficient
C_P		Power loading coefficient
C_R	CRES	Specific residual resistance coefficient
C_T	CT	Specific total resistance coefficient
C_{Th}		Thrust loading coefficient
C_T		Resistance-displacement coefficient
C_V	CV	Specific total viscous resistance coefficient
C_W	CW	Specific wavemaking resistance coefficient
$\textcircled{C}$	CIRCC	R.E. Froude's resistance coefficient
F	F	Towing force in propulsion test
F_D	FD	Viscous scale effect on resistance
F_n	FN	Froude number
F_P	PULL	Pull of ship
F_{PO}	PULL	Pull of ship in bollard condition
$\textcircled{F}$	CIRCF	R.E. Froude's frictional resistance coefficient
g		Acceleration due to gravity
J	J	Advance coefficient
J_V	JV	Apparent advance coefficient
1+k	1+K	Three-dimensional form factor on flat plate friction
k_p		Equivalent sandroughness of propeller blade surface
k_s		Roughness height of hull surface
K_Q	KQ	Torque coefficient
K_T	KT	Thrust coefficient
K_{TD}	KT-D	Duct thrust coefficient
K_{TP}	KT-P	Propeller thrust coefficient

- continued -

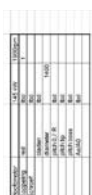
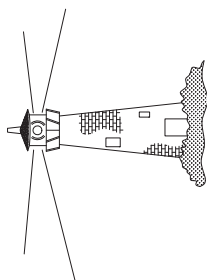
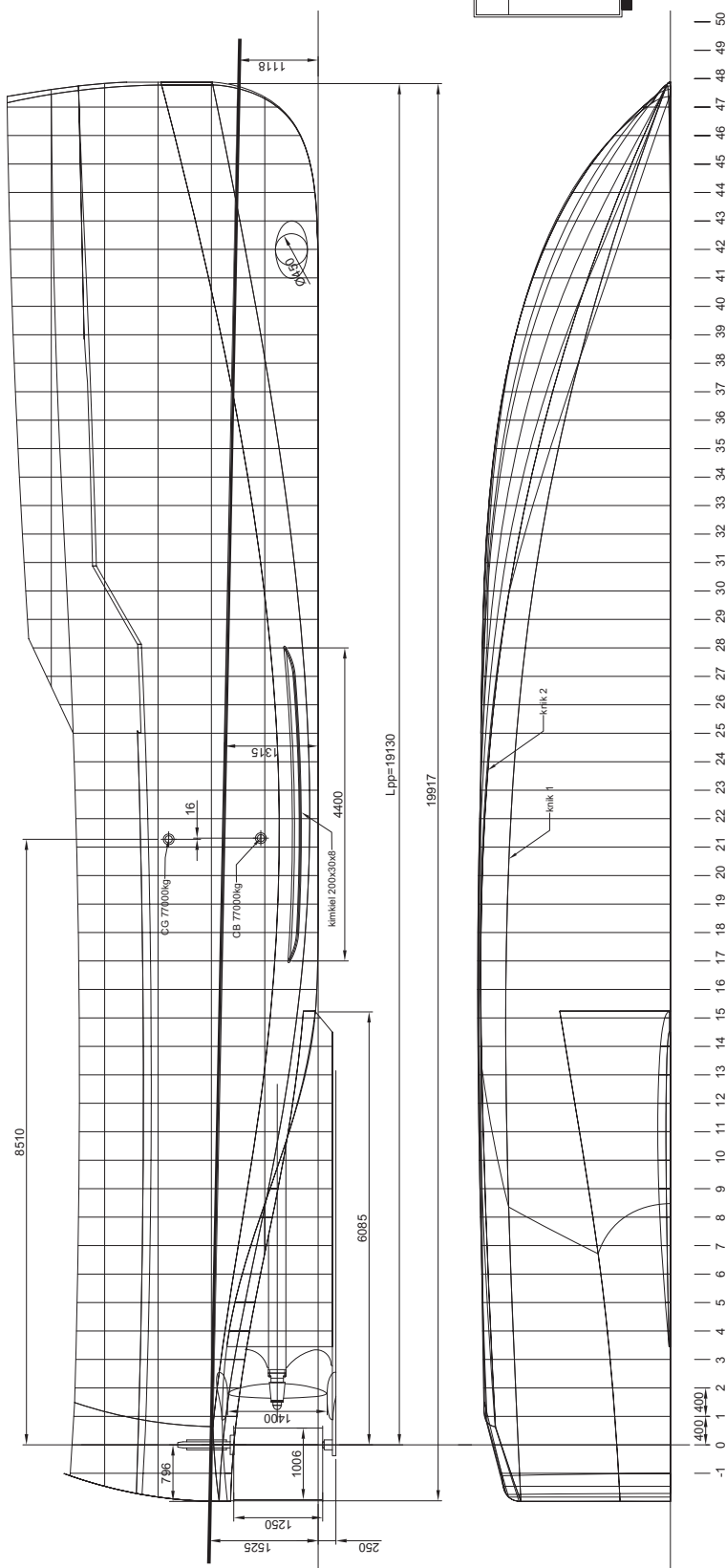
- continued -

Symbol	Symbol in computer print	Title
$\textcircled{K}$	CIRCK	R.E. Froude's speed-displacement coefficient
n	N	Rate of revolutions
P_B		Brake power
P_D	PD	Power delivered to the propeller(s)
P_E	PE	Effective power
P_I		Indicated power
P_S	PS	Shaft power
P_T		Thrust power
Q	Q	Torque
R	R	Resistance in general
R_n	RN	Reynolds number
R_A		Model-ship correlation resistance
R_F	RF	Frictional resistance
R_V	RV	Total viscous resistance
R_W	RW	Wave making resistance
S_A		Apparent slip ratio
S_R		Real slip ratio
t	THDF	Thrust deduction fraction
T	TH	Thrust
T_D	TH-D	Duct thrust
T_P	TH-P	Propeller thrust
T_{THR}		Thrust of azimuthing thruster unit
V	V	Speed of ship or model
V_A	VA	Advance speed of propeller relative to water flow
w_T	WT	Effective wake fraction on thrust identity
z_V		Sinkage due to speed
β		Advance angle of propeller blade section
η_B		Propeller efficiency behind ship
η_D	ETA-D	Propulsive efficiency
η_G		Gearing efficiency
η_H	ETA-H	Hull efficiency
η_M		Mechanical efficiency
η_o	ETA-O	Propeller efficiency in open water
η_R	ETA-R	Relative-rotative efficiency on thrust identity
η_S		Shafting efficiency

- continued -

- continued -

Symbol	Symbol in computer print	Title
ν		Coefficient of kinematic viscosity
ρ		Mass density
τ		Ratio propeller thrust and total thrust of ducted propeller system
τ_m	τ_M	Subscript for model
τ_o	τ_O	Subscript for open water
τ_s	τ_S	Subscript for ship



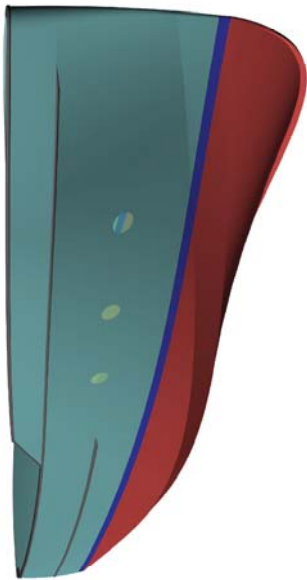
Hoofdatmetingen	
Lengte o.a.	19.95 m
Lengte i.i.	19.15 m
Breedte mal	5.4 m
Holte	2.35 m

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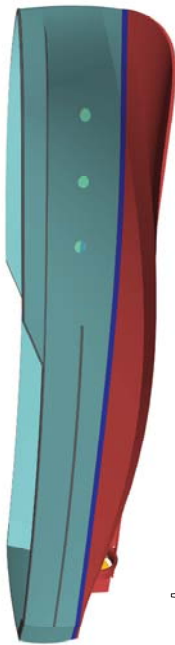
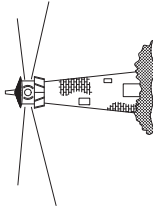
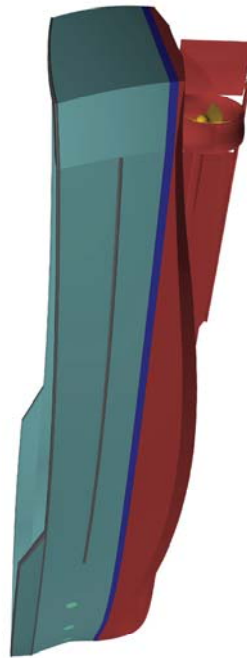
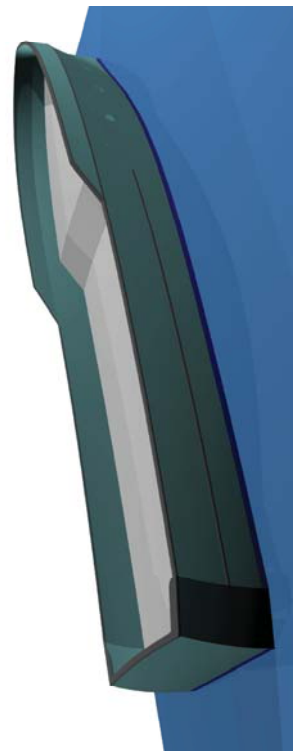
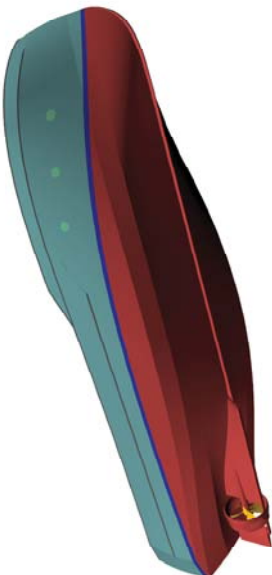
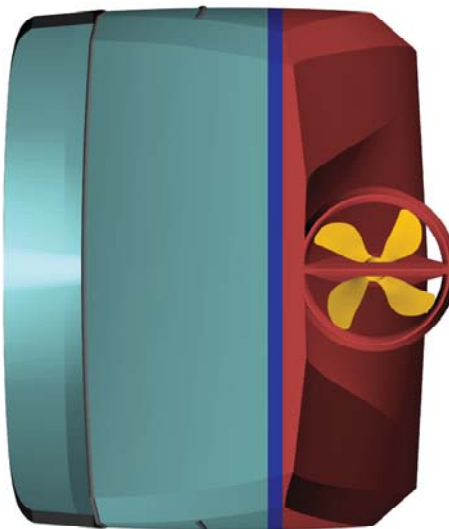
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Project:	20m Kottor	Projectnr.:	1124
Omschrijving:	Lijnenplan	Tekeningnr.	L01
Opmachtgever:	GD	AvdM fit	25/04/12
		Gekend Schaal	SBG
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			A2



20m Korter



Hoofdafmetingen	
Lengte o.a.	19.95 m
Lengte t.t.	19.15 m
Breedte mal	5.4 m
Holte	2.35 m

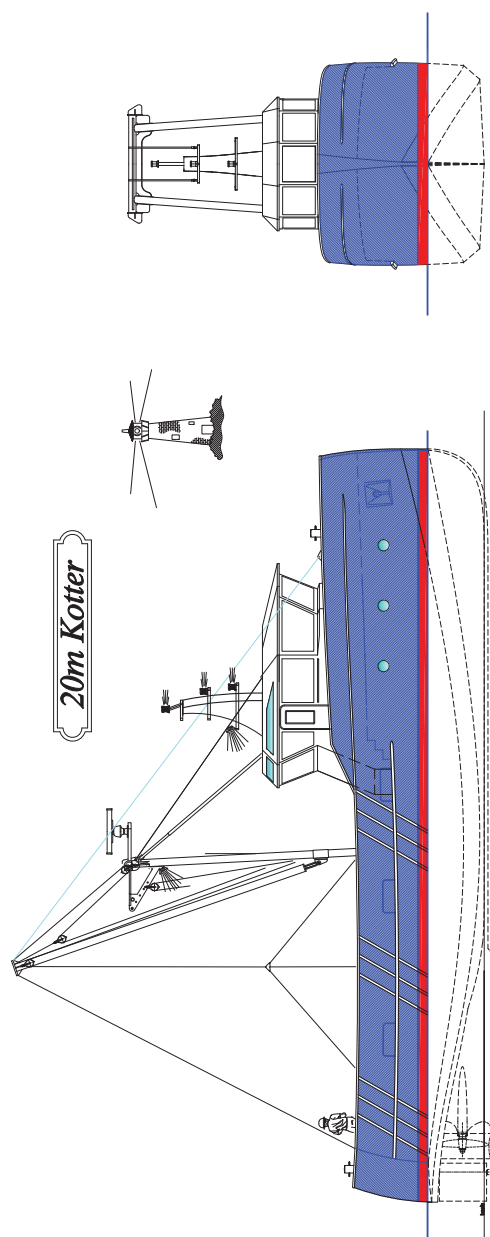
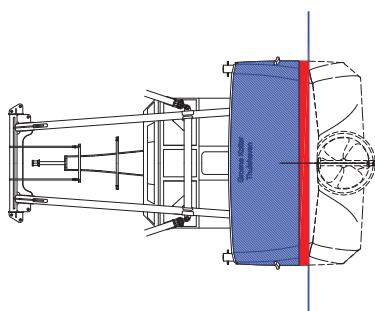
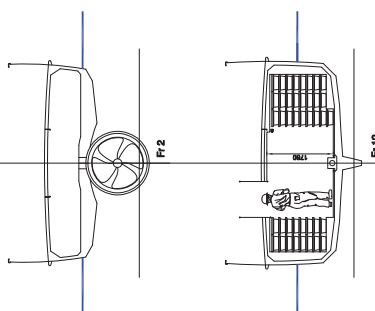
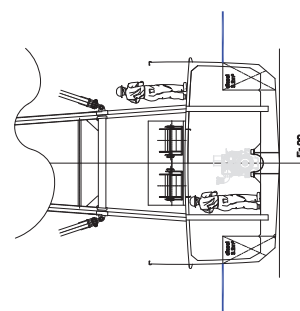
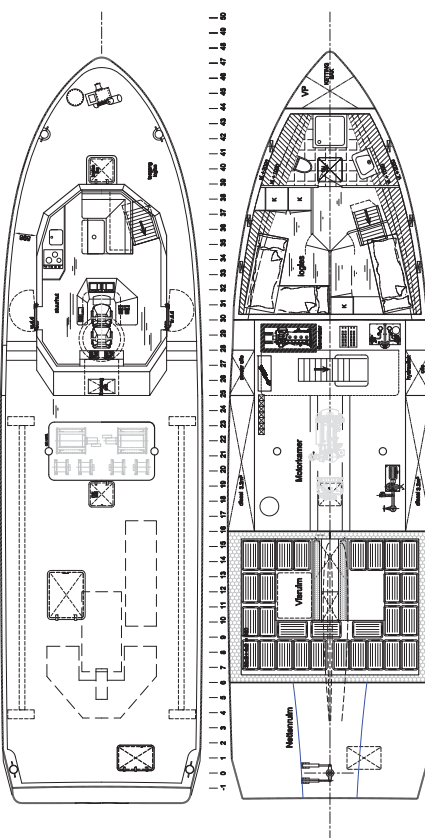
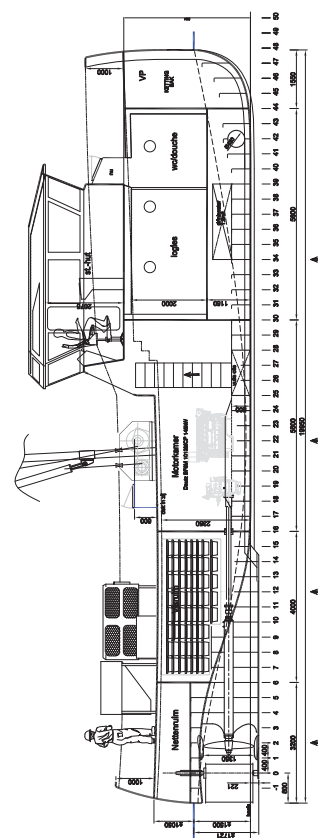


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Project:	20m Korter	Projectnr:	1124
Ontwerper:	3D presentatie Rompvorm	Tekening:	P01
Opdrachtgever:	GD	Datum:	25/04/2012
		Revisie:	SBG

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3.2 Groene Korter 3D presentatie rompvorm



Hoofdmastlengte
 18,85 m
 Lengte o.s.
 19,15 m
 Breedte m.b.
 5,4 m
 Hoofdmast
 2,35 m

- Kotter van de Toekomst -



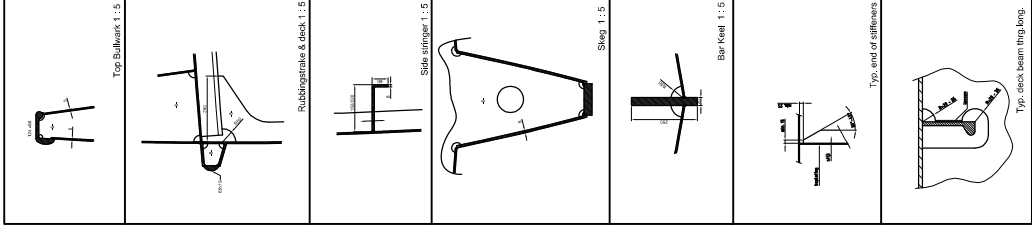
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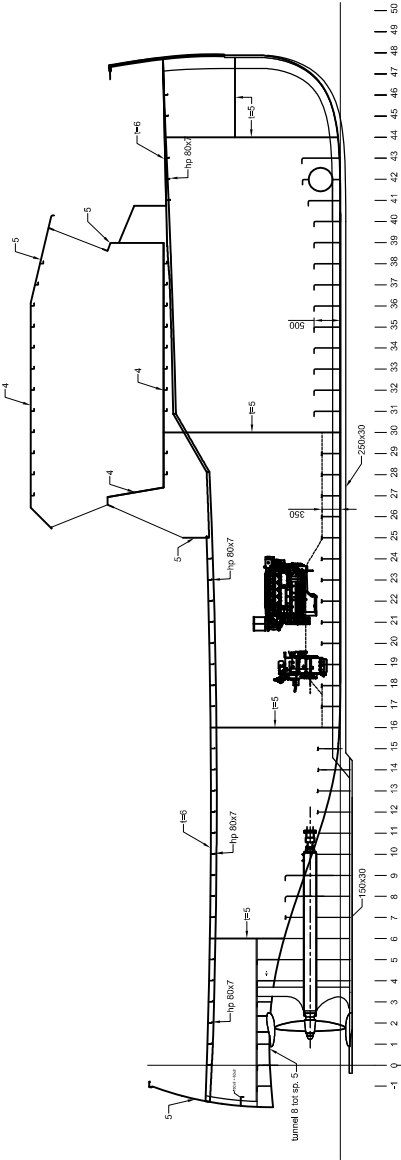
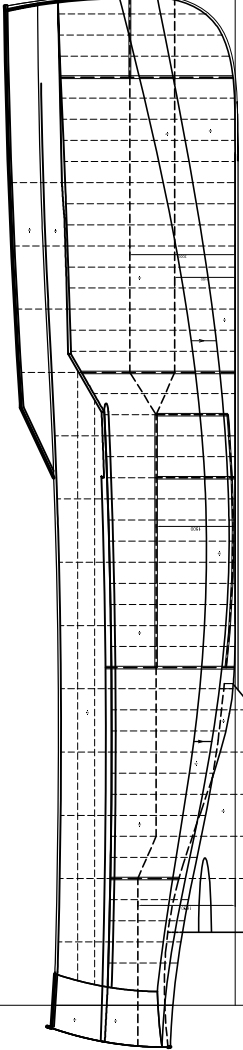


MAN PARTICULARS		
Length over all	20.00	m
Length Perpendiculars	19.15	m
Length summer waterline	19.85	m
Length over all	20.00	m
Breadth	5.40	m
Breadth over all	5.85	m
Summer draught	1.50	m
Moulded Displacement	75.00	tons
Maximum speed	11.00	kn
Draft centre	1.75	m
MATERIALS		
Steel pating	Grade A	
Yield Stress	235	N/mm2
Ultimate Tensile Strenght	400	N/mm2
Profiles	Grade A	
	235	N/mm2
	400	N/mm2
SCANTLING		
Frame spacing hull	400	mm
Longitudal girder sides	1150	mm
	1850	mm
	1850	mm
	2000	mm
Frame spacing deck	400	mm
Longitudal girder deck	1800	mm
Stiffeners spacing bulkheads	400	mm
PLATING		
HULL		
Bottom Shell	6	mm
Tunnel Plating aft - # 5	8	mm
Bilges fr 12-31	8	mm
Bilges fr 12-47	6	mm
Stem plating	8	mm
Bow plating	8	mm
Stem plating	6	mm
Bulkheads(double)	5	mm
Deck (tearplate)	6 / 8	mm
SUPERS TRUCTURES		
Wheelhouse Sides	5	mm
Wheelhouse Front	6	mm
Wheelhouse top	4	mm
Wheelhouse floor	5	mm
BULKHEADS		
	5	mm
INTERALS		
Bar Keel	250x30	mm
Bar Stem	150x10	mm
Bottom frames front	500x70x6	mm
Bottom frames mid	375 x60x6	mm
Side frames	150x10	mm
Longitudal girder sides fore	220x6x8	mm
Longitudal girder sides aft	150x6x8	mm
Deck beams	bul 80x7	mm
Longitudal girder main deck	bul 140x7	mm
Wheelhouse frames side	L 65x50x7	mm
Wheelhouse frames top	L 65x50x7	mm
Wheelhouse frames floor	L 65x50x7	mm
ENGINE SEATING		
Flange plate	660x10	mm
Topplate	150x20	mm
MISCELLANY		
Rubbing Strake	65x19+ 200x6	mm
Bulkwork top	12x4x58	mm
Notes:		
All sharp edges to be rounded before painting		
Sufficient Lighting and ventilations		

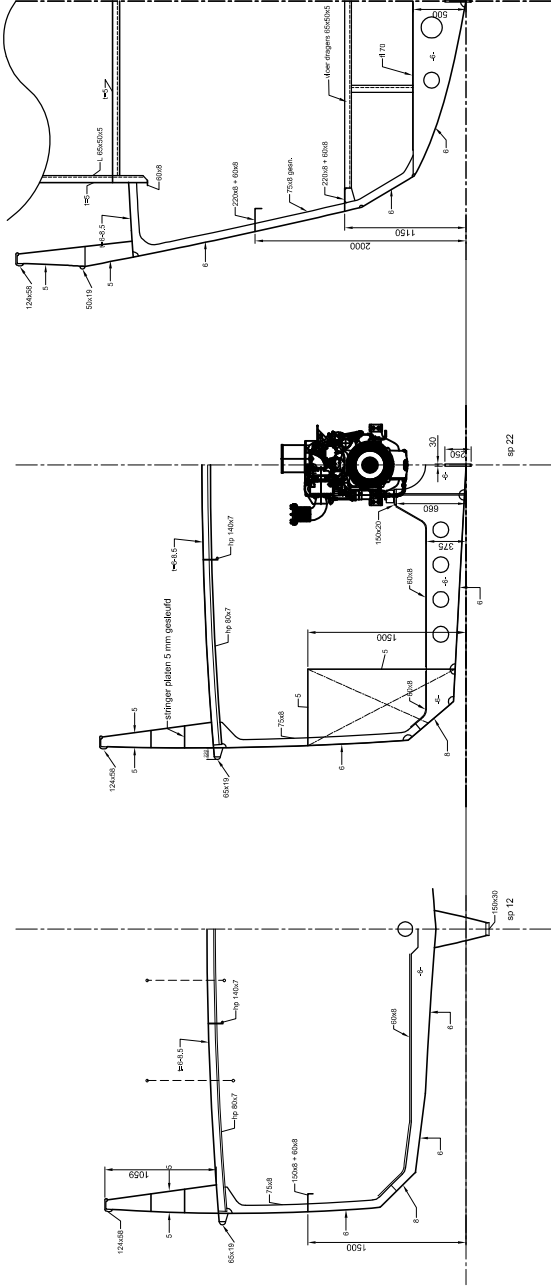
De Groene koter	
Equipment number	1124
Date	Sept. 2012
Projectnummer:	1124
Loa	20 m
Lwl	19.85 m
Displacement	75 ton
Area	53 m2 (draachschuif oppervlakt)
A = Orl	53 m2 (lateraal opp. bovenwater)
Berekening ultirustingsgetal INW	
ENr	D" + 2 x bh + 0.1 x Orl
ENr	68.1
Zanchors	150 kg
Total chain length	110 m
One Anchor in pocket	12.5 mm(O1) - dunkwelling
One Anchor lot plate	32.5 mm (O2)



Hooftafmetingen
Lengte o.a. 19.95 m
Lengte LL 19.15 m
Breedte mal 5.4 m
Holle 2.35 m



1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50



sp 34

sp 22

sp 12

Technische Tekening van de Groene koter

Gaastmeer

Technische Tekening van de Groene koter

Project: De groene koter

Projectnr.: 1124

Omschrijving: Initial construction overview

Tekeningnr.: C01

Opdrachtgever: VCU

Geleverd: 11/5/10/50

Daum: 11/5/10/50

Naam: 11/5/10/50

Alle rechten van dit ontwerp en de details zijn voorbehouden.

Project: De groene koter

Projectnr.: 1124

Omschrijving: Initial construction overview

Tekeningnr.: C01

Opdrachtgever: VCU

Geleverd: 11/5/10/50

Daum: 11/5/10/50

Naam: 11/5/10/50

Alle rechten van dit ontwerp en de details zijn voorbehouden.

Project: De groene koter

Projectnr.: 1124

Omschrijving: Initial construction overview

Tekeningnr.: C01

Opdrachtgever: VCU

Geleverd: 11/5/10/50

Daum: 11/5/10/50

Naam: 11/5/10/50

Alle rechten van dit ontwerp en de details zijn voorbehouden.

Gewichtsberekening groene Kotter 20 m.						
datum: 28,08,2012						
plaatvelden (staal)						
post	oppervl.	dikte	S.G.	gewicht	gew. zwpt.	L.C.G.
Romp	314	6,5	7,8	15920	1,75	8,16
Opbouw	80	4,5	7,8	2808	4,48	12,74
Schot 6	5,00	5	7,80	195	1,50	2,40
Schot 16	14,00	5	7,80	546	1,50	6,40
Schot 30	14,00	6	7,80	655	1,50	12,00
Schot 44	3,50	5	7,80	137	1,50	17,60
Langsschot diesel	20,00	6	7,80	936	1,50	9,20
MK ingangschacht	5,00	6	7,80	234	1,50	10,50
Lieren hok	10,00	6	7,80	468	3,00	8,40
Luikhoofden	2,52	6	7,80	118	2,60	6,40
diversen				1500	1,70	8,25
				23516	2,07	8,85
profielen (staal)						
post	lengte			gewicht	gew. zwpt.	L.C.G.
Binnen werk romp	35%			7248	1,50	8,24
Binnenwerk opbouw	30%			842	4,50	13,20
Motor fundatie				600	0,65	8,00
Romp afwerking				1250	2,45	8,80
				9940	1,99	8,72
diversen ijzerwerk						
post				gewicht	gew. zwpt.	L.C.G.
Hulpfundaties-relingen-bolders	8%			2509	2,35	8,40
Portaal mast				1400	6,62	8,40
Laswerk en schilderwerk	2%			502	2,01	8,25
diversen				1500	2,00	8,50
				5911	3,24	8,41
Betimmering						
post	oppervl.	dikte	S.G.	gewicht	gew. zwpt.	L.C.G.
Betimmering logies	76,00	0,03	650,00	1235	2,40	14,40
Stuurhut	64,00	0,01	650,00	416	4,50	13,50
Visruim betimmering	70,00	0,02	650,00	910	1,50	4,50
Isolatie visruim	70,00	0,15	75,00	788	1,50	4,50
Betimmering nettenruim	10,00	0,02	750,00	113	1,30	0,50
Ramen stuurhut				250	5,00	13,50
Bekleding				250	3,50	14,00
Diverse				250	2,50	15,00
				4211	2,44	9,91
techniek						
post	oppervl.	dikte	S.G.	gewicht	gew. zwpt.	L.C.G.
Hoofdmotor Deutz 1013 M	1,00	1,00	740,00	740	1,00	8,50
Koppeling ZF 350	1,00	1,00	525,00	525	0,50	7,50
Aggregaat	1,00	1,00	1100,00	1100	1,20	11,50
Beunkoeler	1,00	1,00	350,00	350	0,40	11,50
Schroefas+lagering	1,00	1,00	1000,00	1000	0,55	3,50
Schroef en straalbuis	1,00	1,00	1250,00	1250	0,55	0,65
Verwarmingsketel+boiler	1,00	1,00	500,00	500	1,20	10,00

Lenssysteem	1,00	1,00	250,00	250	0,85	9,00
Uitlaten en leidingwerk	1,00	1,00	500,00	500	3,40	10,00
Accu's	6,00	1,00	45,00	270	1,25	11,50
Elec.Installatie	1,00	1,00	1000,00	1000	2,00	10,00
Elec.armaturen	1,00	1,00	100,00	100	3,60	14,00
Hydrofoors	1,00	1,00	100,00	100	1,50	10,00
Drinkwater en afvoeren	1,00	1,00	75,00	75	2,40	3,00
Hydraulische installatie	1,00	1,00	500,00	500	1,50	11,00
Roer	1,00	1,00	275,00	275	0,70	0,00
Stuurmachine	1,00	1,00	300,00	300	2,00	0,00
Boegschroef	1,00	1,00	500,00	500	2,00	16,80
Ankerlier	1,00	1,00	350,00	350	3,20	18,00
Anker en ketting	1,00	1,00	750,00	750	1,80	18,00
Diversen	1,00	1,00	1000,00	500	2,00	9,00
				10935	1,24	8,91
visserij						
post	oppervl.	dikte	S.G.	gewicht	gew. zwpt.	L.C.G.
Vistuig	2,00	1,00	850,00	1700	2,85	6,50
Gieken	2,00	1,00	365,00	730	4,30	7,00
Vislier	6,00	1,00	200,00	1200	2,80	8,50
Draden	1,00	1,00	500,00	500	5,00	8,50
Blokken	1,00	1,00	200,00	200	10,00	8,50
Kookpot	2,00	1,00	250,00	500	3,20	4,00
Spoelmachine	1,00	1,00	120,00	120	3,20	4,00
Opvoer bandjes	1,00	1,00	150,00	150	3,20	4,00
Naspoelen	1,00	1,00	100,00	100	3,20	4,00
Bak	1,00	1,00	100,00	100	3,20	4,00
Reserve spullen	1,00	1,00	500,00	500	4,00	2,00
				5800	3,61	6,41
diversen						
post	oppervl.	dikte	S.G.	gewicht	gew. zwpt.	L.C.G.
nautische uitrusting	1,00		450,00	450	6,00	11,00
Uitrusting	1,00		500,00	500	6,00	11,00
Diversen	1,00		3500,00	3500	2,50	11,00
				4450	3,25	
Totaal leeg scheepsgewicht		64764				
Gewicht Zwaartepunt		2,28				
L.C.G.		8,80				
belading						
post	oppervl.	dikte	S.G.	gewicht	gew. zwpt.	L.C.G.
Diesel olie	50%	6400	0,85	2720	1,1	8,2
Drinkwater	50%	1500	1	750	0,7	15,6
Ballast	0%	2950	1	0	1,78	16,68
Vangst	50%	4000	1	2000	1,5	4,4
Voorraden	100%	1500	1	1500	2	13
				6970	1,37	8,44
Totaal gewicht varend		71734				
Gewicht Zwaartepunt		2,19				
L.C.G.		8,76				

Hydrostatics: 0140 L01 V7 holte 2350.ofe Date: 29-8-2012 Time: 9:23:56
 Made by MSURF from model 0140 L01 31-May-2012 13:54:02

<u>Position</u> Sink: 1,398 m Trim: -0,801 deg Heel: 0,000 deg	<u>Center of Gravity</u> X: 8,760 m Y: 0,000 m Z: 0,000 m	<u>Specific Weight</u> 1026,500000 kg/m^3								
<u>Displacement</u> Volume: 70,33 m^3 Displ't: 72197,64 kg LCB (%WL): -54,04 % Center of Buoyancy X: 8,772 m Y: 0,000 m Z: 0,768 m	<u>Waterplane</u> W.P. Area: 84,04 m^2 LCF (%WL): -60,12 % Center of Flotation X: 7,611 m Y: 0,000 m Z: 1,292 m	<u>Wetted Surface</u> W.S. Area: 114,24 m^2 Center of W.S. Area X: 7,831 m Y: 0,000 m Z: 0,521 m								
<u>Dimensions</u> WL Length: 19,086 m WL Fwd X: 19,086 m WL Aft X: 0,000 m WL Beam: 5,393 m Draft: 1,576 m	<u>Initial Stability</u> Moment of Inertia Metacentric Height R.M. per degree	<table><tr><th>Transverse</th><th>Longitudinal</th></tr><tr><td>164,30 m^4</td><td>2012,11 m^4</td></tr><tr><td>3,104 m</td><td>29,376 m</td></tr><tr><td>3911,51 kg-m</td><td>37016,38 kg-m</td></tr></table>	Transverse	Longitudinal	164,30 m^4	2012,11 m^4	3,104 m	29,376 m	3911,51 kg-m	37016,38 kg-m
Transverse	Longitudinal									
164,30 m^4	2012,11 m^4									
3,104 m	29,376 m									
3911,51 kg-m	37016,38 kg-m									
<u>Coefficients</u> Waterplane: 0,816 Prismatic: 0,588 Block: 0,434 Midsection: 0,738 Disp/L: 289,035	<u>Critical Points</u>	Height								

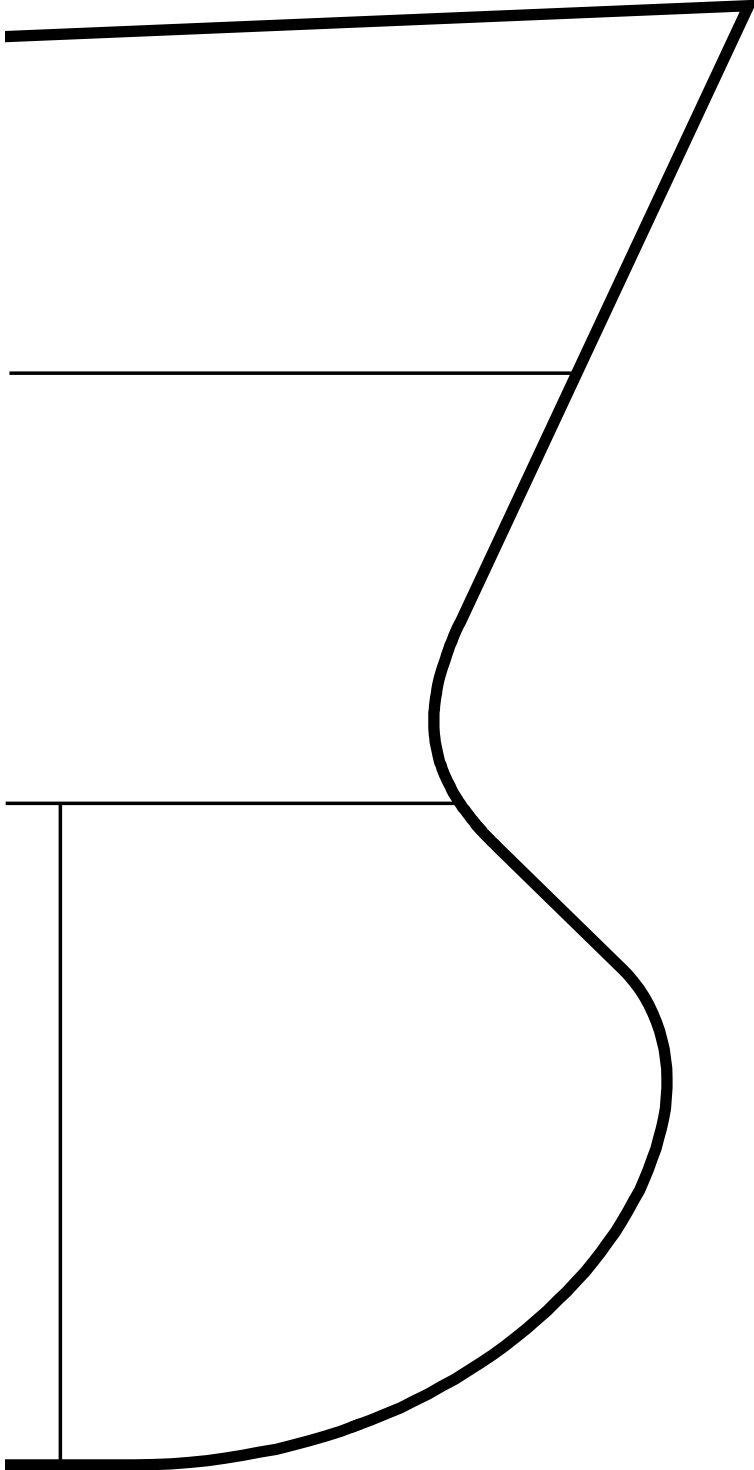
Special Service Craft

Version: 2012.0.0.1

Groene Kotter

Yard: VCU

Yard Number: XX



**Lloyd's
Register**

1 Details

1.1 Basic_Data

Property	Units	Entered
Length Overall	m	20.00
Length Perpendiculars	m	19.15
Summer Waterline Length	m	19.85
Rule Length	m	19.15
Depth	m	2.35
Breadth	m	5.40
Summer Draught	m	1.60
Maximum Speed	knots	11.00
Moulded Displacement Mass	tonnes	75.00
Water Density	kg/m3	1025.00
Moulded Displacement Volume	m3	73.17
Block Coefficient		0.44
Taylor quotient		2.47
Number of Hulls		1
Load Line Length	m	19.85
Global Assessment		Yes
Sailing Yacht		No

1.2 Additional_Data

Property	Units	Entered
Craft has Chines		Yes
Breadth between Chines	m	5.00
Deadrise Angle	deg	3.00
Support Girth	m	3.00
Side shell deadrise angle at 0.75Lwl	deg	15.00
Bottom deadrise angle at 0.75Lwl	deg	19.00

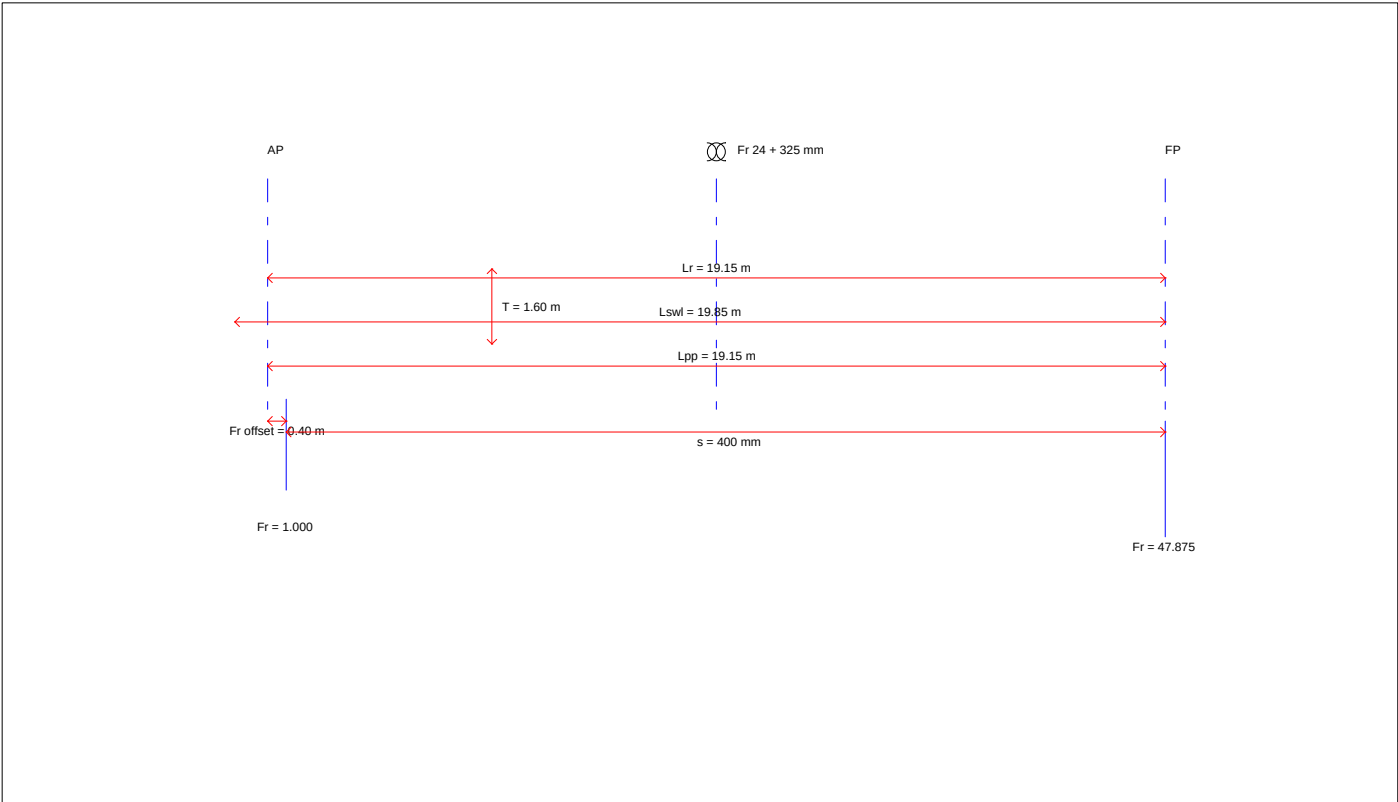
1.3 Classification

Property	Entered
Craft Type	Mono
Service Area	G4
Service Type	Workboat
HSC Compliant	No
LDC Compliant	No
Planing	No

1.4 Craft

Property	Entered
LR Number	nn
Project Title	Groene Kotter
Builder	VCU
Yard Number	XX
Hull Material	Steel
Superstructure Material	Steel

1.5 Transverse Framing Regions



Property	Units	Entered
Reverse framing?		0
Location of first frame from AP (Lpp) (aft AP -ve)	m	0.40
First frame number		1.00

Framing System

Frame spacing (mm)	Number of frame spacings between floors	Start frame #	End frame #	End Frame Forward of AP (m)	End frame (x/LRule)
400.00	1.00	1.00	47.88	19.15	1.00

2 Loadings

Distance fwd AP (m)	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55
Loading_Conditions	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09

Distance fwd AP (m)	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
Loading_Conditions	56.09	56.09	56.09	56.09	56.09	56.09	62.09	68.52	74.95

2.1 Loading Conditions

Property	Units	Entered
Basic Data		
Waterline Length	m	19.85
Draught	m	1.60
Displacement Mass	tonnes	75.00
Water Density	kg/m3	1025.00
Displacement Volume	m3	73.17
LCG from AP	m	8.25
Max Breadth of Hull at LCG	m	5.40
Vertical Acceleration at LCG	g	2.21
Relative Vertical Speed	knots	9.18
Hull Type		Partially Submerged
In Contact with Water		Yes
Waterline Offset from AP	m	1.60
Block Coefficient, Cb		0.44
Operational Parameters		
Allowable Speed	knots	11.00
Operating Mode		Displacement
Froude Number		0.41
Taylor Quotient		2.47
Volumetric Speed Number		14.70
Wave Height		
Significant	m	4.00
Maximum	m	6.67
Surviving	m	5.16
Additional Data		
Operational Height	m	2.60
Air Gap	m	0.00
Girth Distance	m	4.00

Distance fwd AP (m)	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50
Hydrodynamic Wave Pressure	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73
Pitching Pressure	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73	26.73
Bottom Impact Pressure	16.10	14.91	13.89	13.05	12.38	11.88	11.56	11.41	11.43	11.63	12.00
Forebody Impact Pressure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Design Pressure	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09	56.09

Distance fwd AP (m)	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
Hydrodynamic Wave Pressure	26.73	26.73	26.73	26.73	26.73	26.73	26.73	31.31	36.21	41.11
Pitching Pressure	26.73	26.73	26.73	26.73	26.73	26.73	26.73	31.31	36.21	41.11
Bottom Impact Pressure	12.54	13.26	14.14	15.20	16.44	17.85	19.43	21.18	23.11	25.21
Forebody Impact Pressure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.69	17.71	17.73
Design Pressure	56.09	56.09	56.09	56.09	56.09	56.09	56.09	62.09	68.52	74.95

4 Materials

4.1 Steel

Property	Units	Entered
High tensile steel factor, ks	///	1.00
Modulus of Elasticity	N/mm2	200000.00
Yield Stress	N/mm2	235.00
Structure efficiency factor	///	1.00
Ultimate Tensile Strength	N/mm2	400.00
Steel Type	///	Mild
Poisson's ratio	///	0.30
Density	kg/m3	7850.00
Display colour	///	255

4.2 Steel #1

Property	Units	Entered
High tensile steel factor, ks	///	1.00
Modulus of Elasticity	N/mm2	200000.00
Yield Stress	N/mm2	235.00
Structure efficiency factor	///	1.00
Ultimate Tensile Strength	N/mm2	400.00
Steel Type	///	Mild
Poisson's ratio	///	0.30
Density	kg/m3	7850.00
Display colour	///	255

6 Structure

6.1 huid

6.1.1 Huid voor fr 36

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	200.00		
Panel Breadth	mm	400.00		
Panel Length	mm	1750.00		
Panel Aspect Ratio		4.38		
Stiffener Spacing	mm	400.00		
Thickness	mm	6.00		3.60
Height of weather deck	m	3.18		
Height of Chine	m	1.11		
Height above Base	m	1.80		
Distance FWD of AP	m	14.40		
Design Pressure	kN/m2	33.62	33.62	
Vertical distance of underside of keel above baseline, zk	m	0.00		
Mean deadrise angle of bottom plating at location	deg	20.00		
Mean deadrise angle of side plating at local section	deg	15.00		
Slamming Zone		Yes		

6.1.2 Huid mid fr 22

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	0.00		
Panel Breadth	mm	400.00		
Panel Length	mm	1.85		
Panel Aspect Ratio		216.22		
Stiffener Spacing	mm	400.00		
Thickness	mm	6.00		4.65
Height of weather deck	m	2.35		
Height of Chine	m	0.62		
Height above Base	m	0.65		
Distance FWD of AP	m	8.80		
Design Pressure	kN/m2	47.55	47.55	
Vertical distance of underside of keel above baseline, zk	m	0.00		
Slamming Zone		No		

6.1.3 Spant voor fr 36

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	2.70		
Stiffener Spacing	mm	400.00		
Thickness of Attached Plate	mm	6.00		
Width of Attached Plate	mm	400.00		
Profile		HP 120 x6		
Section Modulus	cm3	54.90		32.08
Inertia	cm4	546.79		206.75
Web Area	cm2	7.20		1.23
Angle of Web to Plate	deg	80.00		
Height of weather deck	m	2.85		
Height of Chine	m	1.10		
Height above Base	m	1.20		
Distance FWD of AP	m	14.80		
Design Pressure	kN/m2	20.17	20.17	
Vertical distance of underside of keel above baseline, zk	m	0.15		

6.1.4 Spant mid fr 22

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	1.30		
Stiffener Spacing	mm	400.00		
Thickness of Attached Plate	mm	6.00		

Property	Units	Entered	Derived	Required
Width of Attached Plate	mm	263.29		
Profile		75x8		Pass
Section Modulus	cm ³	14.95		7.92
Inertia	cm ⁴	99.92		24.58
Web Area	cm ²	6.00		0.63
Angle of Web to Plate	deg	90.00		
Height of weather deck	m	2.35		
Height of Chine	m	0.62		
Height above Base	m	1.00		
Distance FWD of AP	m	8.80		
Design Pressure	kN/m ²	21.48	21.48	
Vertical distance of underside of keel above baseline, zk	m	0.00		

6.2 Vlak

6.2.1 Vlak voor fr 36

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	100.00		
Panel Breadth	mm	400.00		
Panel Length	mm	1600.00		
Panel Aspect Ratio		4.00		
Stiffener Spacing	mm	400.00		
Thickness	mm	6.00		4.50
Slamming Zone		Yes		
Below Tangential Point		Yes		
Height of Chine	m	0.62		
Height above Base	m	0.00		
Distance FWD of AP	m	14.40		
Design Pressure	kN/m ²	56.09	56.09	
Vertical distance of underside of keel above baseline, zk	m	0.00		

6.2.2 Vlak mid fr 22

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	0.00		
Panel Breadth	mm	400.00		
Panel Length	mm	2.30		
Panel Aspect Ratio		173.91		
Stiffener Spacing	mm	0.40		
Thickness	mm	6.00		4.50
Slamming Zone		No		
Below Tangential Point		Yes		
Height of Chine	m	0.50		
Height above Base	m	0.00		
Distance FWD of AP	m	8.80		
Design Pressure	kN/m ²	56.09	56.09	
Vertical distance of underside of keel above baseline, zk	m	0.00		

6.2.3 Vrang mid fr 22

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	1.85		
Stiffener Spacing	mm	800.00		
Thickness of Attached Plate	mm	6.00		
Width of Attached Plate	mm	419.69		
Profile		T200x6+80x8		Pass
Section Modulus	cm ³	180.14		41.89
Inertia	cm ⁴	2825.08		184.96
Web Area	cm ²	12.00		2.35
Angle of Web to Plate	deg	80.00		
Below Tangential Point		Yes		
Height of Chine	m	0.50		
Height above Base	m	0.00		

Property	Units	Entered	Derived	Required
Distance FWD of AP	m	8.80		
Design Pressure	kN/m2	28.04	28.04	
Vertical distance of underside of keel above baseline, zk	m	0.00		

6.2.4 Vrang voor fr 36

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	1.00		
Stiffener Spacing	mm	400.00		
Thickness of Attached Plate	mm	6.00		
Width of Attached Plate	mm	221.04		
Profile		T200x6+80x8		Pass
Section Modulus	cm3	180.22		4.97
Inertia	cm4	2345.03		11.87
Web Area	cm2	12.00		0.52
Angle of Web to Plate	deg	90.00		
Below Tangential Point		Yes		
Height of Chine	m	0.60		
Height above Base	m	0.80		
Distance FWD of AP	m	14.40		
Design Pressure	kN/m2	22.79	22.79	
Vertical distance of underside of keel above baseline, zk	m	0.00		

6.3 *Bulkheads

6.3.1 *Watertight Bulkhead Fr 44

Property	Units	Entered
Height of Bhd. Deck	m	2.40

6.3.1.1 *Watertight Bhd. Plate Fr 44

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	0.00		
Panel Breadth	mm	400.00		
Panel Length	mm	3200.00		
Panel Aspect Ratio		8.00		
Stiffener Spacing	mm	400.00		
Thickness	mm	5.00		3.00
Load Head	m	1.40		
Height above Base	m	1.00		
Design Pressure	kN/m2	10.08	10.08	

6.3.1.2 *Watertight Bhd. Pri.Stf. Fr 44

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	3.20		
Stiffener Spacing	mm	400.00		
Thickness of Attached Plate	mm	4.00		
Width of Attached Plate	mm	400.00		
Profile		HP 80 x5		
Section Modulus	cm3	21.21		13.94
Inertia	cm4	145.49		110.59
Web Area	cm2	4.00		0.45
Angle of Web to Plate	deg	90.00		
Load Head	m	1.20		
Height above Base	m	1.20		
Design Pressure	kN/m2	8.64	8.64	
Load Model		A		

6.3.2 *Watertight Bulkhead Fr 25

Property	Units	Entered
Height of Bhd. Deck	m	3.20

6.3.2.1 *Watertight Bhd. Plate (Fe)

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	0.00		
Panel Breadth	mm	400.00		
Panel Length	mm	2000.00		
Panel Aspect Ratio		5.00		
Stiffener Spacing	mm	400.00		
Thickness	mm	5.00		3.00
Load Head	m	2.20		
Height above Base	m	1.00		
Design Pressure	kN/m2	15.84	15.84	

6.3.2.2 *Watertight Bhd. Pri.Stf. (Fe)

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	2.00		
Stiffener Spacing	mm	400.00		
Thickness of Attached Plate	mm	5.00		
Width of Attached Plate	mm	350.88		
Profile		HP 80 x5		
Section Modulus	cm3	21.54		9.99
Inertia	cm4	150.45		49.50
Web Area	cm2	4.00		0.52
Angle of Web to Plate	deg	90.00		
Load Head	m	2.20		
Height above Base	m	1.00		
Design Pressure	kN/m2	15.84	15.84	
Load Model		A		

6.4 Deck Structure**6.4.1 Voordek-plaat fr 36**

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	120.00		
Panel Breadth	mm	400.00		
Panel Length	mm	4.60		
Panel Aspect Ratio		86.96		
Stiffener Spacing	mm	400.00		
Thickness	mm	5.00		3.60
Vertical Acceleration	g	3.17		
Distance FWD of AP	m	14.40		
Pressure exerted by the cargo, WCDP	kN/m2	1.00		
Design Pressure	kN/m2	13.08	13.08	

6.4.2 Hoofddek-plaat fr 22

Property	Units	Entered	Derived	Required
Steel		Steel		
Curvature	mm	100.00		
Panel Breadth	mm	0.40		
Panel Length	mm	5.40		
Panel Aspect Ratio		13.50		
Stiffener Spacing	mm	0.40		
Thickness	mm	6.00		3.60
Vertical Acceleration	g	2.26		
Distance FWD of AP	m	8.80		
Pressure exerted by the cargo, WCDP	kN/m2	1.00		
Design Pressure	kN/m2	13.08	13.08	

6.4.3 Voordek-spanten fr 36

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	1.80		
Stiffener Spacing	mm	400.00		

Property	Units	Entered	Derived	Required
Thickness of Attached Plate	mm	5.00		
Width of Attached Plate	mm	327.08		
Profile		HP 120 x6		
Section Modulus	cm3	54.17		4.95
Inertia	cm4	505.49		26.58
Web Area	cm2	7.20		0.29
Angle of Web to Plate	deg	90.00		
Vertical Acceleration	g	3.26		
Distance FWD of AP	m	14.80		
Pressure exerted by the cargo, WCDP	kN/m2	1.00		
Design Pressure	kN/m2	7.00	7.00	

6.4.4 Hoofdek spanten fr 22

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	1.80		
Stiffener Spacing	mm	400.00		
Thickness of Attached Plate	mm	6.00		
Width of Attached Plate	mm	327.08		
Profile		HP 80 x5		
Section Modulus	cm3	21.88		4.95
Inertia	cm4	156.01		26.58
Web Area	cm2	4.00		0.29
Angle of Web to Plate	deg	90.00		
Vertical Acceleration	g	2.26		
Distance FWD of AP	m	8.80		
Pressure exerted by the cargo, WCDP	kN/m2	1.00		
Design Pressure	kN/m2	7.00	7.00	

6.4.5 Langsdrager

Property	Units	Entered	Derived	Required
Steel		Steel		
Effective Span	m	3.40		
Stiffener Spacing	mm	1800.00		
Thickness of Attached Plate	mm	6.00		
Width of Attached Plate	mm	825.15		
Profile		HP 140 x7		
Section Modulus	cm3	84.81		79.46
Inertia	cm4	1056.32		806.04
Web Area	cm2	9.80		2.43
Angle of Web to Plate	deg	90.00		
Vertical Acceleration	g	2.26		
Distance FWD of AP	m	8.80		
Pressure exerted by the cargo, WCDP	kN/m2	1.00		
Design Pressure	kN/m2	7.00	7.00	

6.5 Single_Bottom

6.5.1 Bar_Keel_(Fe)

Property	Units	Entered	Required
Steel		Steel	
Area	cm2	25.00	20.15
Thickness	mm	20.00	15.57

6.5.2 Bar_Stem_(Fe)

Property	Units	Entered	Required
Area	cm2	16.00	15.32
Steel		Steel	

6.6 *Superstructure

6.6.1 *Superstructure_Plate_dak stuurhut

Property	Units	Entered	Derived	Required
Distance FWD of AP	m	12.80		
Location		House Top		
Design Pressure	kN/m2	6.54	6.54	
Steel		Steel		
Curvature	mm	50.00		
Panel Breadth	mm	400.00		
Panel Length	mm	1200.00		
Panel Aspect Ratio		3.00		
Stiffener Spacing	mm	400.00		
Thickness	mm	4.00		2.40

6.6.2 *Superstructure_Plate_front stuurhut

Property	Units	Entered	Derived	Required
Distance FWD of AP	m	15.20		
Location		Front 1st Tier		
Design Pressure	kN/m2	16.35	16.35	
Steel		Steel		
Curvature	mm	0.00		
Panel Breadth	mm	850.00		
Panel Length	mm	1.20		
Panel Aspect Ratio		708.33		
Stiffener Spacing	mm	850.00		
Thickness	mm	7.00		6.23

6.6.3 *Superstructure_Pri.Stf dak stuurhut

Property	Units	Entered	Derived	Required
Distance FWD of AP	m	12.80		
Location		Coachroof		
Design Pressure	kN/m2	7.00	7.00	
Steel		Steel		
Effective Span	m	1.80		
Stiffener Spacing	mm	400.00		
Thickness of Attached Plate	mm	4.00		
Width of Attached Plate	mm	327.08		
Profile		50x6		Pass
Section Modulus	cm3	5.16		4.95
Inertia	cm4	24.22		21.26
Web Area	cm2	3.00		0.29
Angle of Web to Plate	deg	90.00		

6.6.4 *Superstructure_Pri.Stf front stuurhut

Property	Units	Entered	Derived	Required
Distance FWD of AP	m	5.00		
Location		Front 1st Tier		
Design Pressure	kN/m2	7.52	7.52	
Steel		Steel		
Effective Span	m	1.10		
Stiffener Spacing	mm	1200.00		
Thickness of Attached Plate	mm	6.00		
Width of Attached Plate	mm	339.71		
Profile		HP 80 x5		
Section Modulus	cm3	21.92		6.45
Inertia	cm4	157.04		11.73
Web Area	cm2	4.00		0.61
Angle of Web to Plate	deg	90.00		

8 Transverse Sections

8.1 Midship_Section

Property	Units	Entered
Only include effective longitudinal material?	///	Yes
Frame Number	///	23
Frame Offset	mm	375.00
Distance forward of AP	m	9.57
Fraction of rule length (x/LRule)	///	0.50
Section modulus at deck	m ³	0.00
Section modulus at keel	m ³	0.00
Shear area	m ²	0.00
Inertia YY	m ⁴	0.00
Inertia ZZ	m ⁴	0.00
Total area	m ²	0.00
Total effective area	m ²	0.00
Inertia YZ	m ⁴	0.00
Centroid Y	m	0.00
Centroid Z	m	0.14
Inertia YY'	m ⁴	0.00
Inertia ZZ'	m ⁴	0.00
Principal Axis Angle	deg	0.00
Weight/Unit length	kg/m	14.44

Legend

8.1.1 Global_Stiffener

Property	Units	Entered
Y	m	0.00
Z	m	0.00
Angle from vertical	deg	0.00
Flipped?	///	0
Stiffener Profile	///	T200x6+80x8
Material	///	Steel
Is stiffener longitudinally effective?	///	Yes
Inertia YY	m ⁴	0.00
Inertia ZZ	m ⁴	0.00
Total area	m ²	0.00
Total effective area	m ²	0.00
Inertia YZ	m ⁴	0.00
Centroid Y	m	0.00
Centroid Z	m	0.14
Inertia YY'	m ⁴	0.00
Inertia ZZ'	m ⁴	0.00
Principal Axis Angle	deg	0.00
Height above Base	m	0.00
Weight/Unit length	kg/m	14.44

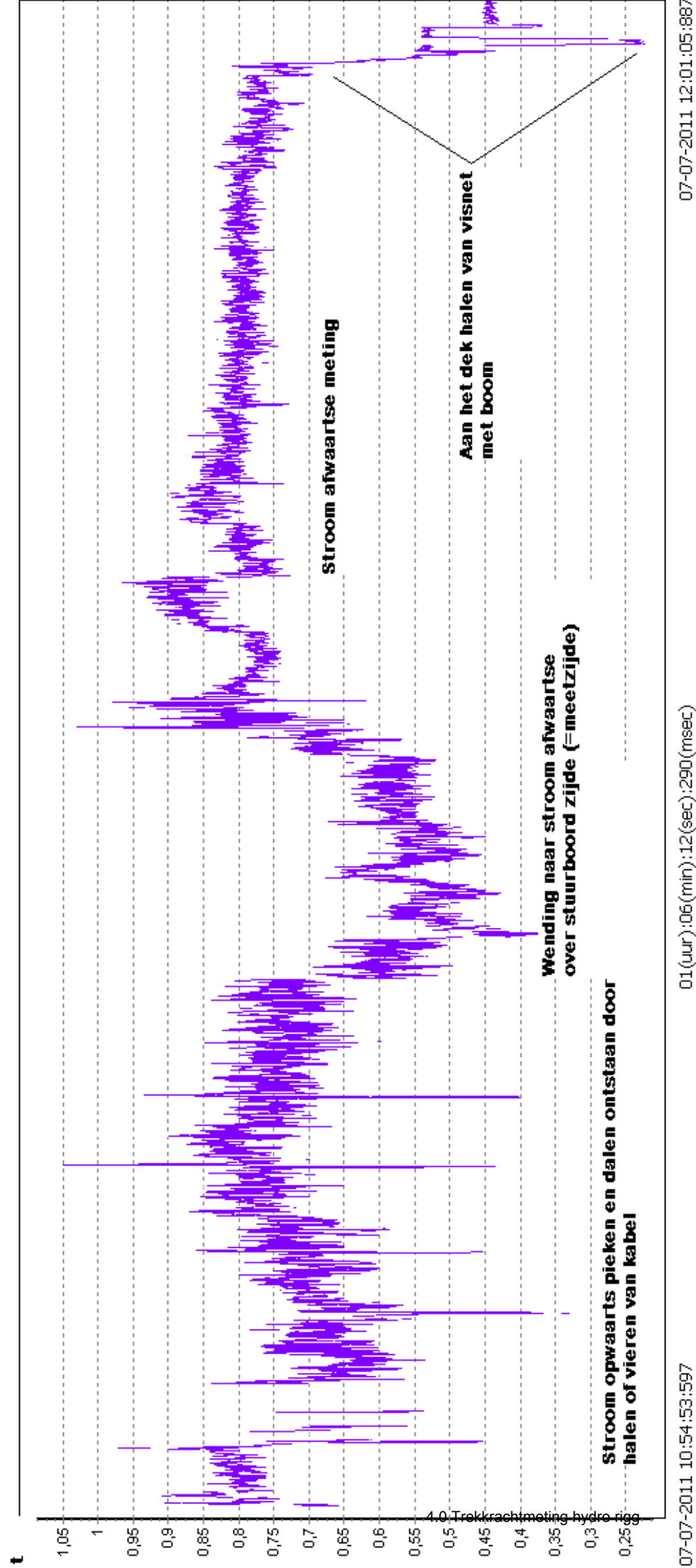
8.1.2 Construction_Lines

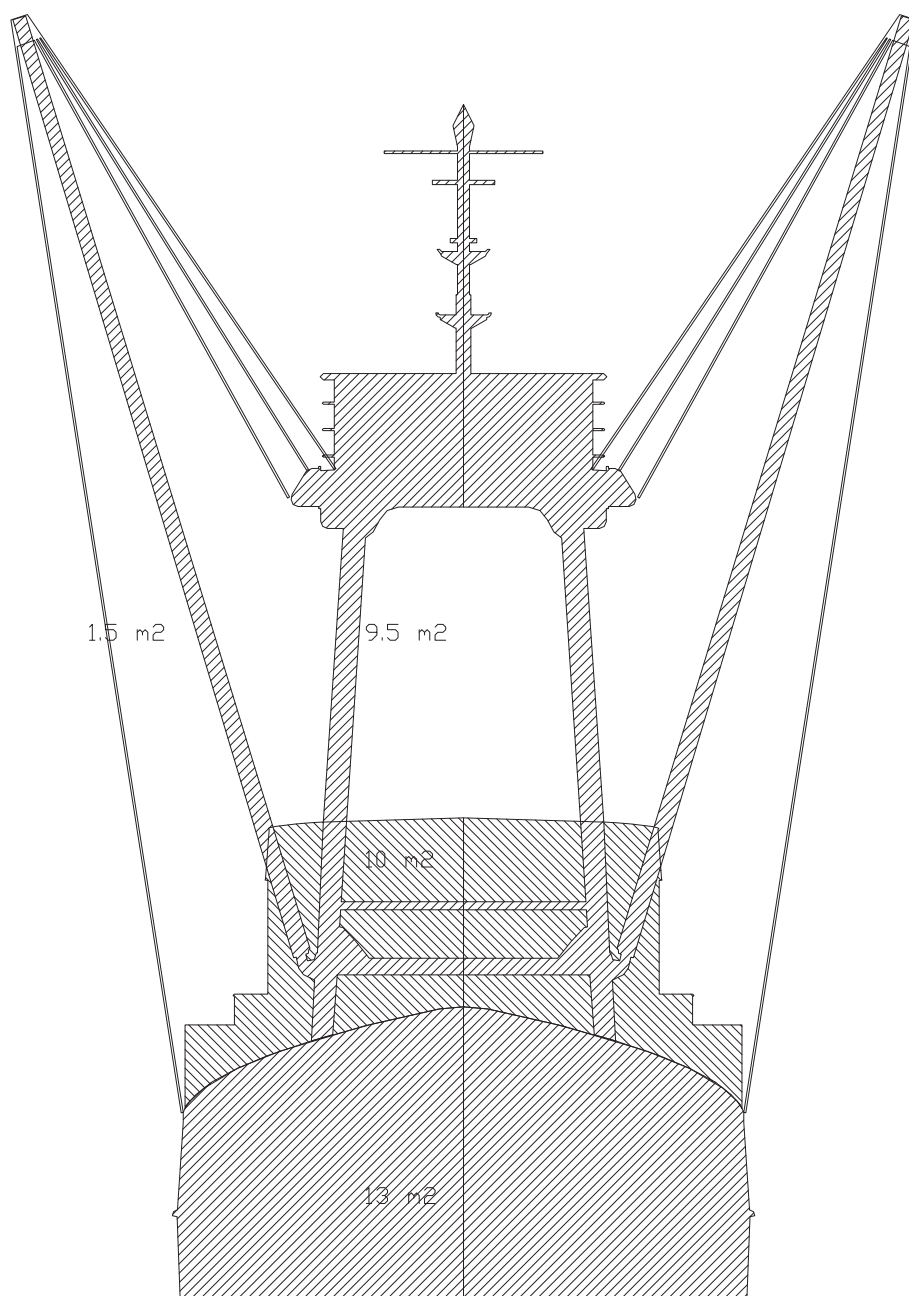
8.1.2.1 Construction_Line

Property	Units	Entered
Line type	///	Flat
Y (Start)	mm	0.00
Z (Start)	mm	0.00
Y (End)	mm	2243.00
Z (End)	mm	118.00

8.1.2.2 Construction_Line #1

Property	Units	Entered
Line type	///	Flat
Y (Start)	mm	2243.00
Z (Start)	mm	118.00
Y (End)	mm	2609.00
Z (End)	mm	547.00





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Project: Groene Kotter			Projectnr.: 1124		
Omschrijving: Frontaal wind opp			Tekeningnr.		
Opdrachtgever: VCU		Getekend	HD	Datum	22.9.2011
		Schaal	nvt	Klasse	
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Referentie kottter weerstand inclusief wind en zeegang

MARIN report 25081 Referentie kottter			
Speed knots	Resistance kN	PE kW	
1	0,126	0,06	
2	0,456	0,47	
3	0,980	1,51	
4	1,692	3,48	
5	2,629	6,76	
6	4,137	12,77	
7	7,212	25,97	
8	14,000	57,62	
9	22,100	102,32	
10	28,800	148,16	
11	36,600	207,12	

5 Bft(m/s)		
Vaw	Windage	
m/s	kN	
9,51	1,24	
10,03	1,38	
10,54	1,52	
11,06	1,67	
11,57	1,83	
12,09	2,00	
12,60	2,17	
13,12	2,35	
13,63	2,54	
14,14	2,74	
14,66	2,94	

8 Bft(m/s)		
Vaw	Windage	
m/s	kN	
19,51	5,21	
20,03	5,49	
20,54	5,77	
21,06	6,06	
21,57	6,36	
22,09	6,67	
22,60	6,98	
23,12	7,31	
23,63	7,64	
24,14	7,97	
24,66	8,31	

Tgv Zeegang	
Raw	
15%	
kW	
0,019	
0,068	
0,147	
0,254	
0,394	
0,621	
1,082	
2,100	
3,315	
4,320	
5,490	

Totalen		incl Raw		Vrijvarend	
Vrijvarend		5 Bft(m/s)		8 Bft(m/s)	
kW		kW		kN	KW
1,383		0,711		5,352	2,753
1,900		1,955		6,010	6,183
2,647		4,085		6,898	10,646
3,618		7,445		8,009	16,481
4,855		12,487		9,387	24,145
6,755		20,851		11,428	35,274
10,465		37,686		15,279	55,020
18,452		75,941		23,406	96,330
27,955		129,433		33,050	153,023
35,856		184,458		41,091	211,392
45,028		254,810		50,405	285,234

Wind weerstand				
Airdrag	Area sqm	Cd	0,5*ρ*Cd*A	ρ l(kg/m3)
Hull	13	0,5	4,1925	1,290
Superstructure	9	0,5	2,9025	
Mast	9	1	5,805	
Rigging	1	1,2	0,774	
		Total	13,674	

Referentie kotter benodigd vermogen & verbruik

Benodigd vermogen (Ps)		Benodigde trekkracht(kN)		Benodigd vermogen (Ps)		Verbruik		
vrij varend		vissend 5 Bft		vissend 5 Bft		5 Bft(m/s)		vissend
Speed	8 Bft(m/s)	1200 kg/zijde	8 Bft(m/s)	1200 kg/zijde	8 Bft(m/s)	5 Bft(m/s)	8 Bft(m/s)	5 Bft(m/s)
knots	5 Bft(m/s)	8 Bft(m/s)	1200 kg/zijde	8 Bft(m/s)	1200 kg/zijde	5 Bft(m/s)	8 Bft(m/s)	5 Bft(m/s)
	kW	kW	kN	kW	kN	lt/h	lt/h	lt/h
1	1,221	4,725	24,903	120,66	24,903	0,3	1,2	30,2
2	3,377	10,271	25,420	129,86	25,420	0,8	2,6	32,5
3	7,093	17,772	26,167	141,63	26,167	1,8	4,5	35,5
4	12,969	27,607	27,138	157,25	27,138	3,2	6,9	39,4
5	21,789	40,511	28,375	176,50	28,375	5,5	10,2	44,2
6	36,445	59,285				9,1	14,9	
7	66,429	93,254				16,6	23,4	
8	137,593	167,823				34,5	42,1	
9	240,376	273,255				60,2	68,5	
10	345,650	380,886				86,6	95,4	
11	480,948	517,666				120,5	129,7	

specifiek brandstofverbruik
213 gr/kW

Groene kotter weerstand inclusief wind en zeegang

Marin rapport Groene Kotter				5 Bft(m/s) 9		8 Bft(m/s) 19		Tgv Zeegang Raw		Totalen Vrijvarend			
Speed knots	Resistance kN	PE kW		Vaw m/s	Windage kN	Vaw m/s	Windage kN	15% kN		kN	incl Raw kW	kN	Vrijvarend 8 Bft(m/s) kW
1	0,104	0,05		9,51	1,19	19,51	5,02	0,016		1,314	0,676	5,143	2,646
2	0,382	0,39		10,03	1,33	20,03	5,29	0,057		1,766	1,817	5,731	5,896
3	0,814	1,26		10,54	1,47	20,54	5,57	0,122		2,402	3,708	6,503	10,036
4	1,397	2,87		11,06	1,61	21,06	5,85	0,210		3,219	6,625	7,456	15,342
5	2,139	5,50		11,57	1,77	21,57	6,14	0,321		4,226	10,871	8,598	22,116
6	3,093	9,55		12,09	1,93	22,09	6,43	0,464		5,484	16,927	9,991	30,840
7	4,552	16,39		12,60	2,09	22,60	6,74	0,683		7,329	26,393	11,973	43,114
8	6,648	27,36		13,12	2,27	23,12	7,05	0,997		9,914	40,802	14,693	60,470
9	9,957	46,10		13,63	2,45	23,63	7,37	1,494		13,901	64,362	18,816	87,117
10	15,787	81,22		14,14	2,64	24,14	7,69	2,368		20,794	106,973	25,844	132,955
11	26,200	148,26		14,66	2,83	24,66	8,02	3,930		32,964	186,542	38,150	215,889

Wind weerstand				
Air drag	Area sqm	Cd	0,5*p*Cd*A	p l(kg/m3)
Hull	15,2	0,5	4,902	1,290
Superstructure	4,9	0,5	1,58025	
Mast	3,8	1	2,451	
Rigging	5,5	1,2	4,257	
Total			13,19025	

Groene kottter benodigd vermogen& verbruik

Benodigd vermogen (Ps) vrij varend in golven			Benodigde trekkracht(kN) vissend 5 Bft	Benodigd vermogen (Ps) vissend 5 Bft	Verbruik l/hr		
Speed	5 Bft(m/s)	8 Bft(m/s)			5 Bft(m/s)	8 Bft(m/s)	vissend
knots	kW	kW		kW	lt/h	lt/h	lt/h
1	1,146	4,485	24,834	93,22	0,3	1,1	23,4
2	3,121	9,837	25,286	99,95	0,8	2,5	25,0
3	6,422	16,882	25,922	109,27	1,6	4,2	27,4
4	11,532	25,937	26,739	121,44	2,9	6,5	30,4
5	19,019	37,579	27,746	137,96	4,8	9,4	34,6
6	29,615	52,402			7,4		
7	45,793	72,648			11,5		
8	70,091	100,884			17,6		
9	109,478	143,913			27,4		
10	181,367	218,921			45,4		

specifiek brandstofverbruik
213 gr/kW

Viscycclus Garnalenkotter Lauwersoog										
Schip: Referentie kotter			Trekkracht tuig			850 kg/zijde				
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal	
		h	kn		hr	kW	lt/hr	kW	lt	
Naar de visgronden(5 Bft) Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting		4,0	8,5	1	4,0	189,20	47,4	757	190	6,6%
		2,0	4,0	36	72,0	114,86	28,8	8270	2072	72,1%
		0,5	3,0	36	18,0	7,10	1,8	128	32	1,1%
		4,0	8,5	1	4,0	189,20	47,4	757	190	6,6%
		1,5		2	3,0	50,00	10,9	150	33	1,1%
		0,5		36	18,0	10,00	2,2	180	39	1,4%
		101,0		1	101,0	6,00	1,3	606	132	4,6%
		101,0		1	101,0	5,00	1,1	505	110	3,8%
		101,0		1	101,0	3,00	0,7	303	66	2,3%
		101,00		1	101,0	0,50	0,1	50,50	11	0,4%
								11706	2874	

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Totalen		lt
Verbruik per reis		2874
waarvan:	vissen	2072
	stomen	411
	overig	391

Viscycclus Garnalenkotter Lauwersoog				Trekkracht tuig				1200 kg/zijde			
Schip: Groene kotter- schroef 1150 mm											
Omschrijving	uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal			
	h	kn		hr	kW	lt/hr	kW	lt			
Naar de visgronden Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting	4,0	8,5	1	4,0	88,16	22,1	353	88	3,1%		
	2,0	4,0	36	72,0	127,21	31,9	9159	2295	79,4%		
	0,5	3,0	36	18,0	6,44	1,6	116	29	1,0%		
	4,0	8,5	1	4,0	88,16	22,1	353	88	3,1%		
	1,5		2	3,0	50,00	10,9	150	33	1,1%		
	0,5		36	18,0	10,00	2,2	180	39	1,4%		
	101,0		1	101,0	6,00	1,3	606	132	4,6%		
	101,0		1	101,0	5,00	1,1	505	110	3,8%		
	101,0		1	101,0	3,00	0,7	303	66	2,3%		
101,00		1	101,0	0,50	0,1	50,50	11	0,4%			
							11775	2892			

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Totalen		It
Verbruik per reis		2892
waarvan:	vissen	2295
	stomen	206
	overig	391
		14%

Viscycclus Garnalenkotter Lauwersoog									
Schip: Referentie kotter				Trekkracht tuig			1200 kg/zijde		
Omschrijving	uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal	
	h	kn		hr	kW	lt/hr	kW	lt	
Naar de visgronden Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting	4,0	8,5	1	4,0	189,2	47,4	757	190	5,2%
	2,0	4,0	36	72,0	157,3	39,4	11322	2837	78,0%
	0,5	3,0	36	18,0	7,1	1,8	128	32	0,9%
	4,0	8,5	1	4,0	189,2	47,4	757	190	5,2%
	1,5		2	3,0	50,0	10,9	150	33	0,9%
	0,5		36	18,0	10,0	2,2	180	39	1,1%
	101,0		1	101,0	6,0	1,3	606	132	3,6%
	101,0		1	101,0	5,0	1,1	505	110	3,0%
	101,0		1	101,0	3,0	0,7	303	66	1,8%
	101,00		1	101,0	0,50	0,1	50,50	11	0,3%
							14758	3639	

Totalen		lt
Verbruik per reis		3639
waarvan:	vissen	2837
	stomen	411
	overig	391

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Viscycclus Garnalenkotter XXXX											
Schip: Referentie kotter				Trekkracht tuig				1200 kg/zijde			
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal		
		h	kn		hr	kW	lt/hr	kW	lt		
Naar de visgronden Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting		10,0	8,5	1	10,0	189,2	47,4	1892	474	12,5%	
		2,0	4,0	31	62,0	157,3	39,4	9750	2443	64,3%	
		0,5	3,0	31	15,5	7,1	1,8	110	28	0,7%	
		10,0	8,5	1	10,0	189,2	47,4	1892	474	12,5%	
		1,5		2	3,0	50,0	10,9	150	33	0,9%	
		0,5		31	15,5	10,0	2,2	155	34	0,9%	
		100,5		1	100,5	6,0	1,3	603	131	3,5%	
		100,5		1	100,5	5,0	1,1	503	109	2,9%	
		100,5		1	100,5	3,0	0,7	302	66	1,7%	
		100,50		1	100,5	0,50	0,1	50,25	11	0,3%	
										15406	3802

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Totalen		lt
Verbruik per reis		3802
waarvan:	vissen	2443
	stomen	976
	overig	384

Viscycclus Garnalenkotter Lauwersoog										Trekkracht tuig				650 kg/zijde			
Schip: Groene kotter																	
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal								
		h	kn		hr	kW	lt/hr	kW	lt								
Naar de visgronden		4,0	8,5	1	4,0	89,78	22,5	359	90			5,1%					
Vissen		2,0	4,0	36	72,0	63,87	16,0	4599	1152			65,8%					
Stomend verwerken		0,5	3,0	36	18,0	6,44	1,6	116	29			1,7%					
Naar de haven		4,0	8,5	1	4,0	89,78	22,5	359	90			5,1%					
Laden, lossen bedrijfsklaar maken		1,5		2	3,0	50,00	10,9	150	33			1,9%					
Verwerkings apparatuur		0,5		36	18,0	10,00	2,2	180	39			2,2%					
Koeling		101,0		1	101,0	6,00	1,3	606	132			7,5%					
Stationair verbruik generator(40 kW)		101,0		1	101,0	5,00	1,1	505	110			6,3%					
Verwarming accommodatie		101,0		1	101,0	3,00	0,7	303	66			3,8%					
Navigatie app + verlichting		101,00		1	101,0	0,50	0,1	50,50	11			0,6%					
												7227		1752			

Totalen		lt
Verbruik per reis		1752
waarvan:	vissen	1152
	stomen	209
	overig	391

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Viscycclus Garnalenkotter Lauwersoog										Trekkracht tuig				750 kg/zijde			
Schip:		Groene kotter															
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal								
		h	kn		hr	kW	lt/hr	kW	lt								
Naar de visgronden Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting		4,0	8,5	1	4,0	89,78	22,5	359	90			4,6%					
		2,0	4,0	36	72,0	74,33	18,6	5352	1341			69,1%					
		0,5	3,0	36	18,0	6,44	1,6	116	29			1,5%					
		4,0	8,5	1	4,0	89,78	22,5	359	90			4,6%					
		1,5		2	3,0	50,00	10,9	150	33			1,7%					
		0,5		36	18,0	10,00	2,2	180	39			2,0%					
		101,0		1	101,0	6,00	1,3	606	132			6,8%					
		101,0		1	101,0	5,00	1,1	505	110			5,7%					
		101,0		1	101,0	3,00	0,7	303	66			3,4%					
		101,00		1	101,0	0,50	0,1	50,50	11			0,6%					
									7980	1941							

Totalen		lt	
Verbruik per reis		1941	100%
waarvan:	vissen	1341	69%
	stomen	209	11%
	overig	391	20%

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Viscycclus Garnalenkotter Lauwersoog										Trekkracht tuig				850 kg/zijde			
Schip:		Groene kotter															
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal								
		h	kn		hr	kW	lt/hr	kW	lt								
Naar de visgronden Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting		4,0	8,5	1	4,0	89,78	22,5	359	90			4,2%					
		2,0	4,0	36	72,0	84,80	21,2	6106	1530			71,8%					
		0,5	3,0	36	18,0	6,44	1,6	116	29			1,4%					
		4,0	8,5	1	4,0	89,78	22,5	359	90			4,2%					
		1,5		2	3,0	50,00	10,9	150	33			1,5%					
		0,5		36	18,0	10,00	2,2	180	39			1,8%					
		101,0		1	101,0	6,00	1,3	606	132			6,2%					
		101,0		1	101,0	5,00	1,1	505	110			5,2%					
		101,0		1	101,0	3,00	0,7	303	66			3,1%					
		101,00		1	101,0	0,50	0,1	50,50	11			0,5%					
							8734			2130							

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Totalen		It
Verbruik per reis	2130	100%
waarvan: vissen	1530	72%
stomen	209	10%
overig	391	18%

Totalen		uren
Duur reis	101	100%
waarvan: vissen	72	71%
stomen	26	26%
overig	3	3%

Viscycclus Garnalenkotter Lauwersoog										Trekkracht tuig				950 kg/zijde			
Schip:		Groene kotter															
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal								
		h	kn		hr	kW	lt/hr	kW	lt								
Naar de visgronden Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting		4,0	8,5	1	4,0	89,78	22,5	359	90			3,9%					
		2,0	4,0	36	72,0	95,27	23,9	6859	1719			74,1%					
		0,5	3,0	36	18,0	6,44	1,6	116	29			1,3%					
		4,0	8,5	1	4,0	89,78	22,5	359	90			3,9%					
		1,5		2	3,0	50,00	10,9	150	33			1,4%					
		0,5		36	18,0	10,00	2,2	180	39			1,7%					
		101,0		1	101,0	6,00	1,3	606	132			5,7%					
		101,0		1	101,0	5,00	1,1	505	110			4,7%					
		101,0		1	101,0	3,00	0,7	303	66			2,8%					
		101,00		1	101,0	0,50	0,1	50,50	11			0,5%					
										9488		2318					

Totalen		lt
Verbruik per reis		2318
waarvan:	vissen	1719
	stomen	209
	overig	391

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Viscycclus Garnalenkotter Lauwersoog										Trekkracht tuig				1200 kg/zijde					
Schip: Groene kotter																			
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal										
		h	kn		hr	kW	lt/hr	kW	lt										
Naar de visgronden		4,0	8,5	1	4,0	89,80	22,5	359	90			3,2%							
Vissen		2,0	4,0	36	72,0	121,44	30,4	8744	2191			78,5%							
Stomend verwerken		0,5	3,0	36	18,0	6,44	1,6	116	29			1,0%							
Naar de haven		4,0	8,5	1	4,0	89,80	22,5	359	90			3,2%							
Laden, lossen bedrijfsklaar maken		1,5		2	3,0	50,00	10,9	150	33			1,2%							
Verwerkings apparatuur		0,5		36	18,0	10,00	2,2	180	39			1,4%							
Koeling		101,0		1	101,0	6,00	1,3	606	132			4,7%							
Stationair verbruik generator(40 kW)		101,0		1	101,0	5,00	1,1	505	110			3,9%							
Verwarming accommodatie		101,0		1	101,0	3,00	0,7	303	66			2,4%							
Navigatie app + verlichting		101,00		1	101,0	0,50	0,1	50,50	11			0,4%							
										11373		2791							

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Totalen		lt
Verbruik per reis		2791
waarvan:	vissen	2191
	stomen	209
	overig	391
		14%

Viscycclus Garnalenkotter XXXX									
Schip: Groene kotter				Trekkracht tuig		1200 kg/zijde			
Omschrijving		uren	snelheid	aantal	totaal tijd	Vermogen	verbruik	totaal	totaal
		h	kn		hr	kW	lt/hr	kW	lt
Naar de visgronden Vissen Stomend verwerken Naar de haven Laden, lossen bedrijfsklaar maken Verwerkings apparatuur Koeling Stationair verbruik generator(40 kW) Verwarming accommodatie Navigatie app + verlichting		10,0	8,5	1	10,0	89,80	22,5	898	225
		2,0	4,0	31	62,0	121,44	30,4	7529	1887
		0,5	3,0	31	15,5	6,44	1,6	100	25
		10,0	8,5	1	10,0	89,80	22,5	898	225
		1,5		2	3,0	50,00	10,9	150	33
		0,5		31	15,5	10,00	2,2	155	34
		100,5		1	100,5	6,00	1,3	603	131
		100,5		1	100,5	5,00	1,1	503	109
		100,5		1	100,5	3,00	0,7	302	66
		100,50		1	100,5	0,50	0,1	50,25	11
								11187	2745

specifiek brandstofverbruik hoofdmotor
213 gr/kW

specifiek brandstofverbruik generator
185 gr/kW

Totalen		It
Verbruik per reis		2745
waarvan:	vissen	1887
	stomen	475
	overig	384

Samenvatting

Vaar profiel:

Lauwersoog

Schip:	ben. trek kg/zijde	Totaal per reis l.	Vissen	Stomen	Overig
Ref.kotter+ trad.tuig	1200	3.639	2.837	411	391
Groene Kotter + trad.tuig	1200	2.791	2.191	209	391
Groene Kotter + hydr. Wing	850	2.130	1.530	209	391
Groene Kotter + hydr. Wing	650	1.752	1.152	209	391

Vaar profiel:

XXX

Schip:	ben. trek kg/zijde	Totaal per reis l.	Vissen	Stomen	Overig
Ref.kotter+ trad.tuig	1200	3.499	2.443	691	365
Groene Kotter + trad.tuig	1200	2.745	1.887	475	391

Schroef diameter

Lauwersoog

Groene Kotter + trad.tuig	ben. trek kg/zijde	per reis	Totaal
Schroef 1150	1200	2982 l.	100%
Schroef 1350	1200	2791 l.	94%

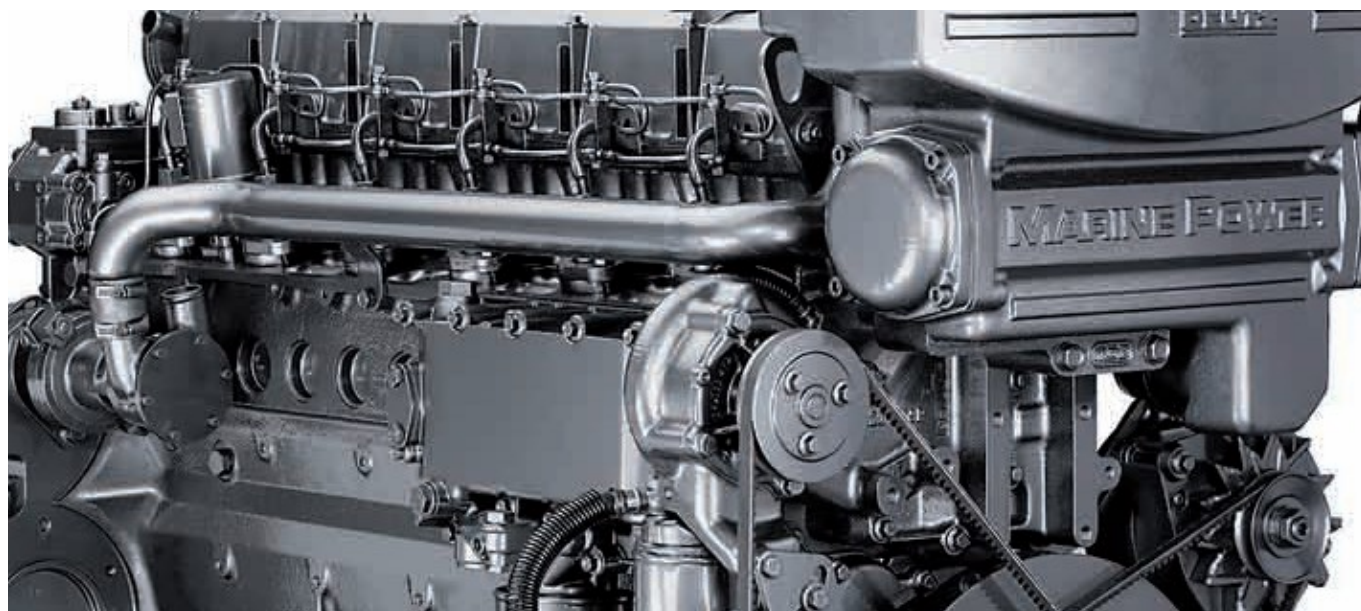
Lauwersoog

Schip:	Vaarprofiel	Verbruik per reis l.	Totaal
Ref.kotter+ trad.tuig	L 'oog	3.639	100%
Groene Kotter + trad.tuig	L 'oog	2.791	77%
Ref.kotter+ trad.tuig	XXX	3.499	100%
Groene Kotter + trad.tuig	XXX	2.745	78%

Vistuigen

Lauwersoog

Schip:	ben. trek kg/zijde	Totaal per reis l.	Totaal
Groene Kotter + trad.tuig	1200	2.791	100%
Groene Kotter + hydr. Wing	850	2.130	76%
Groene Kotter + hydr. Wing	650	1.752	63%



1013M

72–195 kW (96–261 bhp) at 1500–2300 rpm

The engine company.



Technical data

Engine type		BF4M1013M	BF4M1013MC	BF6M1013M	BF6M1013MC	BF6M1013MCP
Number of cylinders		4	4	6	6	6
Bore/stroke	mm in	108/130 4.25/5.12	108/130 4.25/5.12	108/130 4.25/5.12	108/130 4.25/5.12	108/130 4.25/5.12
Capacity	l cuin	4.76 290	4.76 290	7.15 436	7.15 436	7.15 436
Compression ratio		17.5	17.5	17.5	17.5	17.5

Powers for ship engines		BF4M1013M	BF4M1013MC	BF6M1013M	BF6M1013MC	BF6M1013MCP
acc. to power group A						
at 1800 rpm	kW bhp	—	—	—	—	141 189
at 1900 rpm	kW bhp	72 96	89 119	108 145	130 174	145 194
at 2300 rpm	kW bhp	81 109	102 137	123 165	148 198	166 222
acc. to power group B*						
at 1900 rpm	kW bhp	83 111	103 138	126 169	153 205	169 226
at 2100 rpm	kW bhp	—	—	—	—	182 243
at 2300 rpm	kW bhp	95 127	118 158	130 174	174 233	195 261

Powers for on-board units		BF4M1013M	BF4M1013MC	BF6M1013M	BF6M1013MC	BF6M1013MCP
at 1500 rpm – “G” (“N”)*	kW bhp	77 (81) 103 (109)	92 (97) 123 (130)	116 (122) 155 (163)	139 (146) 186 (196)	NA
at 1800 rpm – “G” (“N”)*	kW bhp	81 (85) 109 (114)	100 (105) 134 (141)	122 (128) 163 (172)	148 (155) 198 (208)	NA

* “B” and “N” powers are not classifiable

Power group A: Blocked useful power for unlimited continuous operation, SCFN (ICFN**) or MCFN according to ISO 3046-1. Utilisation > 70 %, operating time > 3,000 hours.

Power group B: Blocked useful power for unlimited continuous operation, SCFN (ICFN**) according to ISO 3046-1. Utilisation < 70 %, operating time < 3,000 hours.

Powers for on-board units: “G” continuous power, SCXN (ICXN**) or MCXN according to ISO 3046-1. Overloadable by 10 % for 1 hr. within 12 hour operation.

“N” continuous power, SCXN (ICXN**) according to ISO 3046-1. Overloadable by 5 % for 1 hr. within 12 hr. operation. Perm. av. utilisation ≤ 80 %.

** valid for engines without charge air cooler (standard reference conditions)

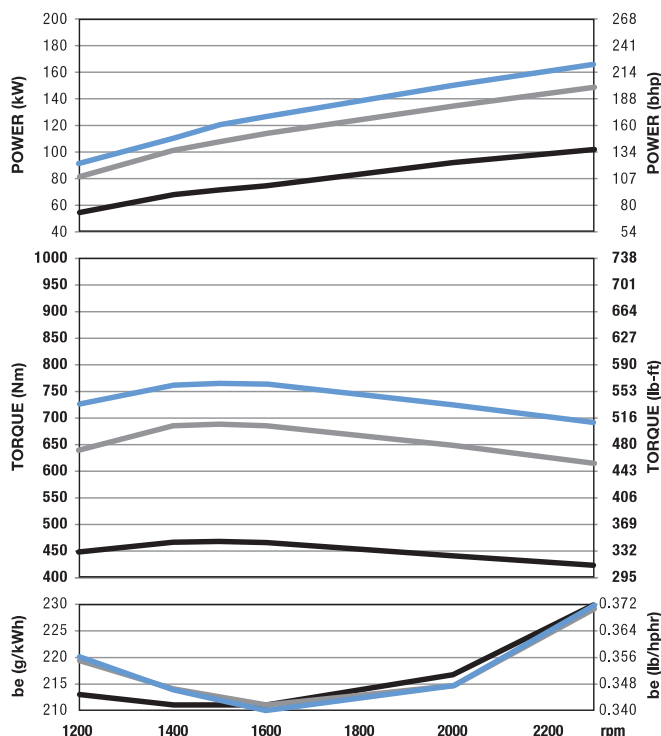
The data on this data sheet are for information purposes only and are not binding values. The data in the offer is decisive.

Standard torque curves

Power group A

BF4M1013MC | BF6M1013MC | BF6M1013MCP

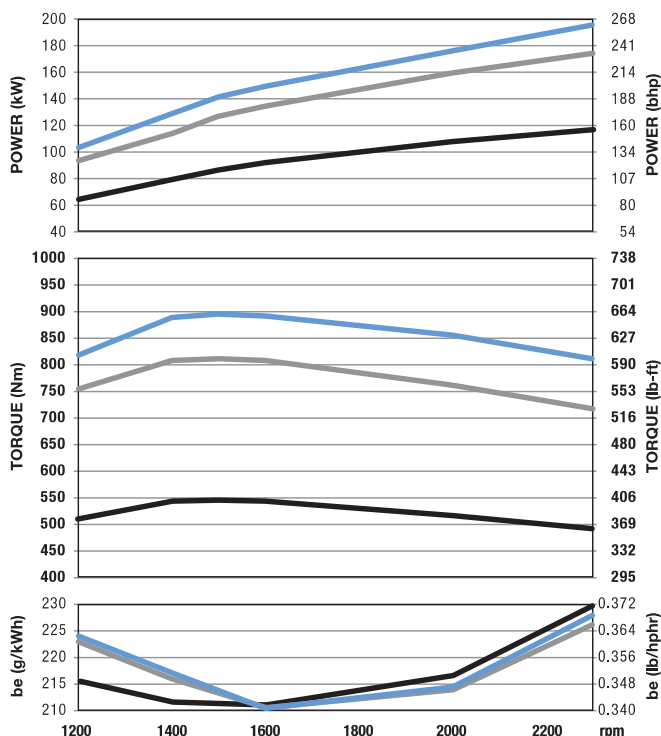
2300 rpm



Power group B

BF4M1013MC | BF6M1013MC | BF6M1013MCP

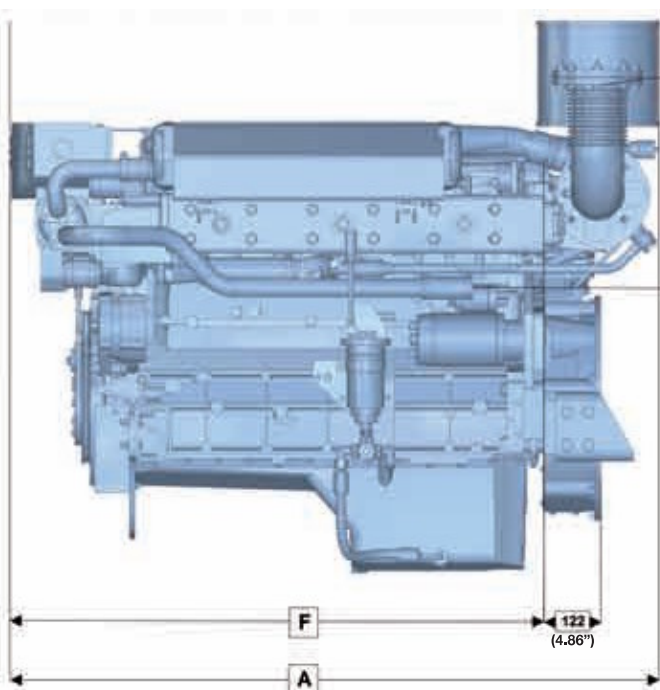
2300 rpm



Raw water cooling

Dimensions		BF4M1013M	BF4M1013MC	BF6M1013M	BF6M1013MC	BF6M1013MCP
A	mm in	1125 44.29	1125 44.29	1408 55.43	1408 55.43	1408 55.43
B	mm in	666 26.22	666 26.22	850 33.46	850 33.46	850 33.46
C	mm in	1185 46.65	1185 46.65	1197 47.13	1197 47.13	1197 47.13
D	mm in	346 13.62	346 13.62	360 14.17	360 14.17	360 14.17
E	mm in	839 33.03	839 33.03	837 32.95	837 32.95	837 32.95
F	mm in	894 35.20	894 35.20	1158 45.59	1158 45.59	1158 45.59

Weight		BF4M1013M	BF4M1013MC	BF6M1013M	BF6M1013MC	BF6M1013MCP
Weight dry						
incl. heat exchanger	kg lbs	560 1235	580 1280	730 1610	760 1675	760 1675



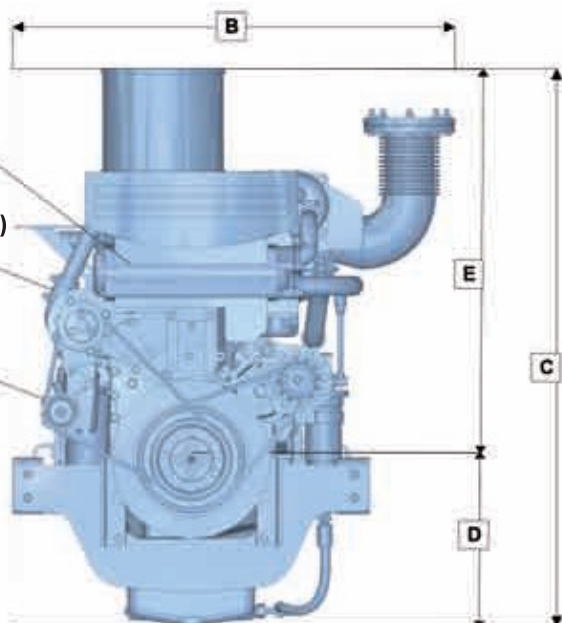
Exhaust flange diam.		4-cyl.	6-cyl.
inside	mm in	77 3.03	115 4.52
outside	mm in	138 5.43	196 7.72
bolt holes	mm in	4x Ø 14 0.55	8x Ø 14 0.55

Raw water outlet
Ø 42 (appr. 1.65")

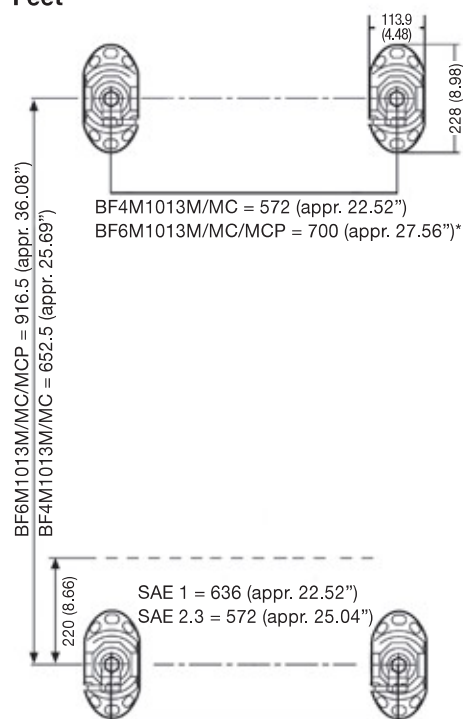
Fuel return
M18 x Ø 1,5

Raw water inlet
Ø 38 (appr. 1.50")

Fuel inlet
M16 x Ø 1,5



Feet

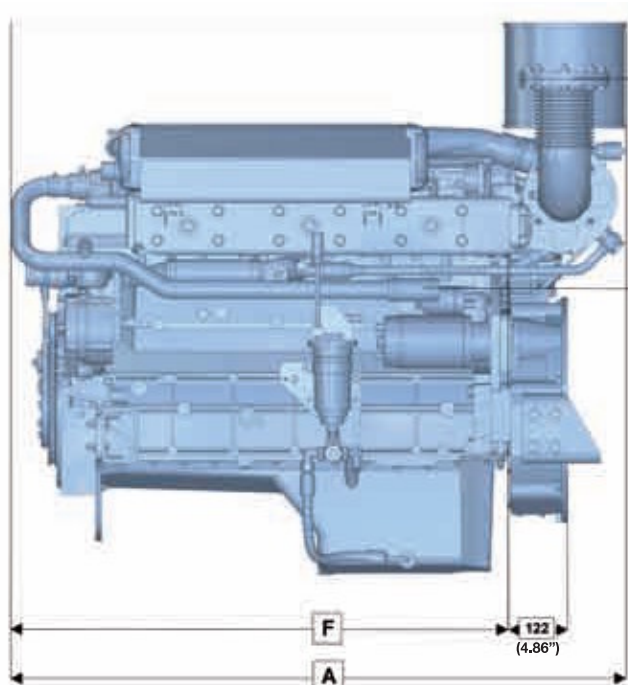


*6 cyl. Gen engine = 572 (appr. 22.52")

Keel cooling

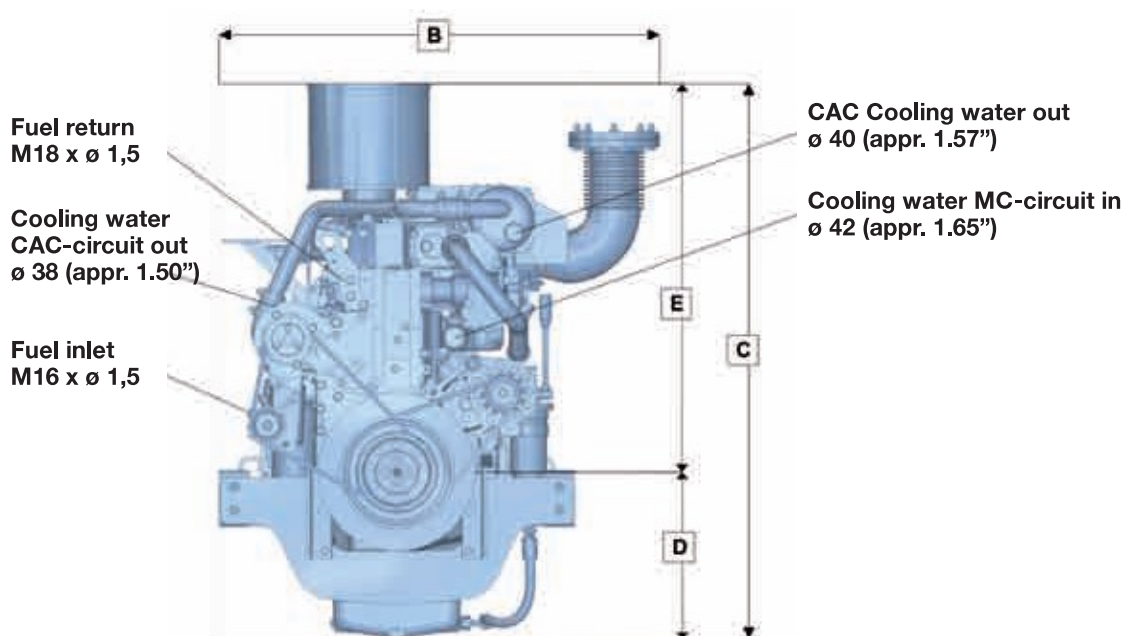
Dimensions		BF4M1013M	BF4M1013MC	BF6M1013M	BF6M1013MC	BF6M1013MCP
A	mm in	1050 41.34	1050 41.34	1334 52.52	1334 52.52	1334 52.52
B	mm in	666 26.22	666 26.22	850 33.46	850 33.46	850 33.46
C	mm in	1185 46.65	1185 46.65	1197 47.13	1197 47.13	1197 47.13
D	mm in	346 13.62	346 13.62	360 14.17	360 14.17	360 14.17
E	mm in	839 33.03	839 33.03	837 32.95	837 32.95	837 32.95
F	mm in	820 32.28	820 32.28	1084 42.68	1084 42.68	1084 42.68

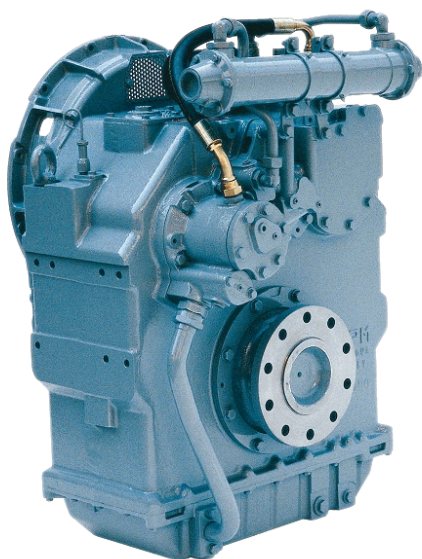
Weight		BF4M1013M	BF4M1013MC	BF6M1013M	BF6M1013MC	BF6M1013MCP
Weight incl. keel cooling	kg lbs	540 1190	560 1235	710 1565	740 1632	740 1632



Exhaust flange diam.		4-cyl.	6-cyl.
inside	mm in	77 3.03	115 4.52
outside	mm in	138 5.43	196 7.72
bolt holes	mm in	4x Ø 14 0.55	8x Ø 14 0.55

Cooling water MC-circuit out
Ø 42 (appr. 1.65")





ZF W350-1

Vertical offset, direct mount marine transmission.

Maximum Input**

Duty	kW	hp	RPM
Medium	570	765	2400
Continuous	497	666	2400

** Must not be exceeded

Description

- Robust design also withstands continuous duty in workboat applications .
- Fully works tested, reliable and simple to install .
- Design, manufacture and quality control standards comply with ISO 9001 .
- Reverse reduction marine transmission with hydraulically actuated multi-disc clutches .
- Compatible with all types of engines and propulsion systems .

Features

- Case hardened and precisely ground gear teeth for long life and smooth running .
- Output shaft thrust bearing designed to take maximum propeller thrust astern and ahead .
- Smooth and reliable hydraulic shifting with control lever for attachment of push-pull cable .
- Suitable for twin engine installations (same ratio and torque capacity in ahead or astern mode) .
- Emergency "get home" capability .
- Replaceable oil filter cartridge .
- Compact, space saving design; Integral SAE 1 bell housing; SAE 0 adapter.
- Durable cast iron construction .

Options

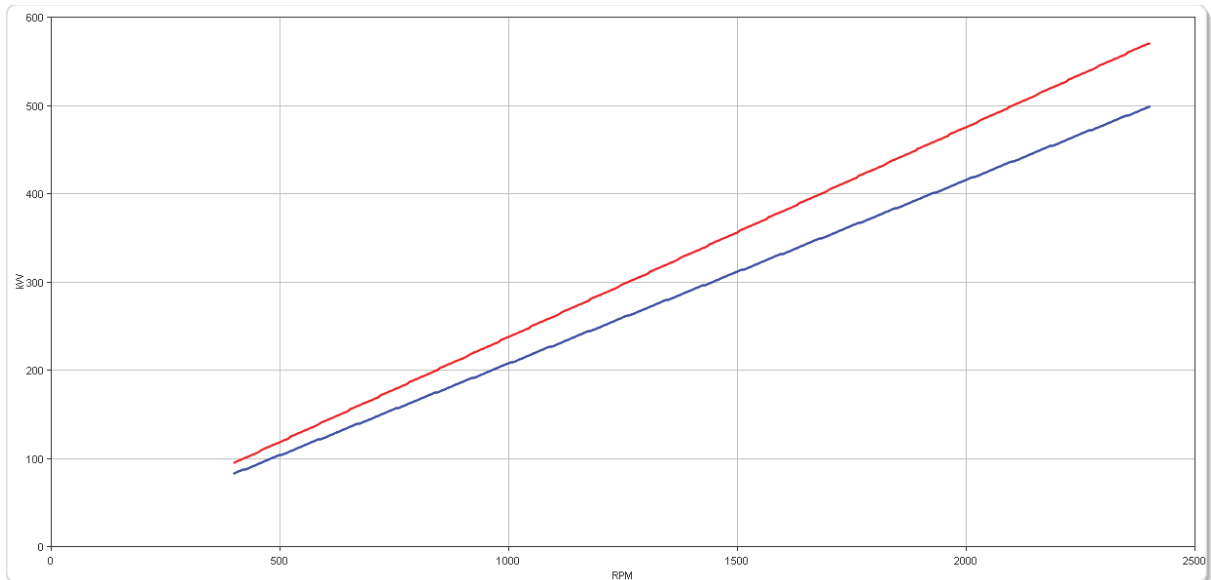
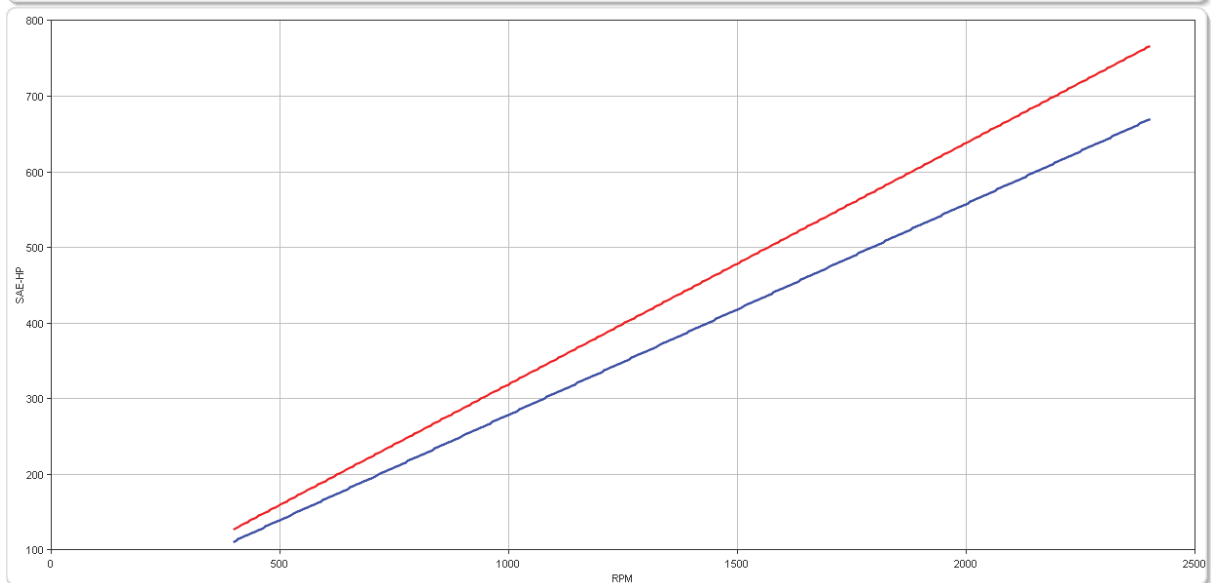
- Engine-matched torsional coupling .
- Propeller shaft flange and coupling bolt sets .
- Classification by all major Classification Societies on request .
- Oil cooler complete with fittings and flexible oil hoses .
- Monitoring kit .
- Trolling valve for slow-speed drive .
- PTO's (live or clutchable - retrofittable) .
- Mounting brackets for rigid connection to foundation .

ZF W350-1

Ratings

Medium Duty

RATIOS	MAX. TORQUE		POWER/RPM		MAXIMUM RATED POWER						MAX. RPM
	Nm	ftlb	kW	hp	kW	hp	kW	hp	kW	hp	
							1800 rpm	2100 rpm	2300 rpm		
3.026*, 3.500, 3.968, 4.536, 4.962, 5.458*, 5.955	2272	1676	0.2379	0.3190	428	574	500	670	547	734	2400
6.409*	1985	1464	0.2079	0.2787	374	502	436	585	478	641	2400

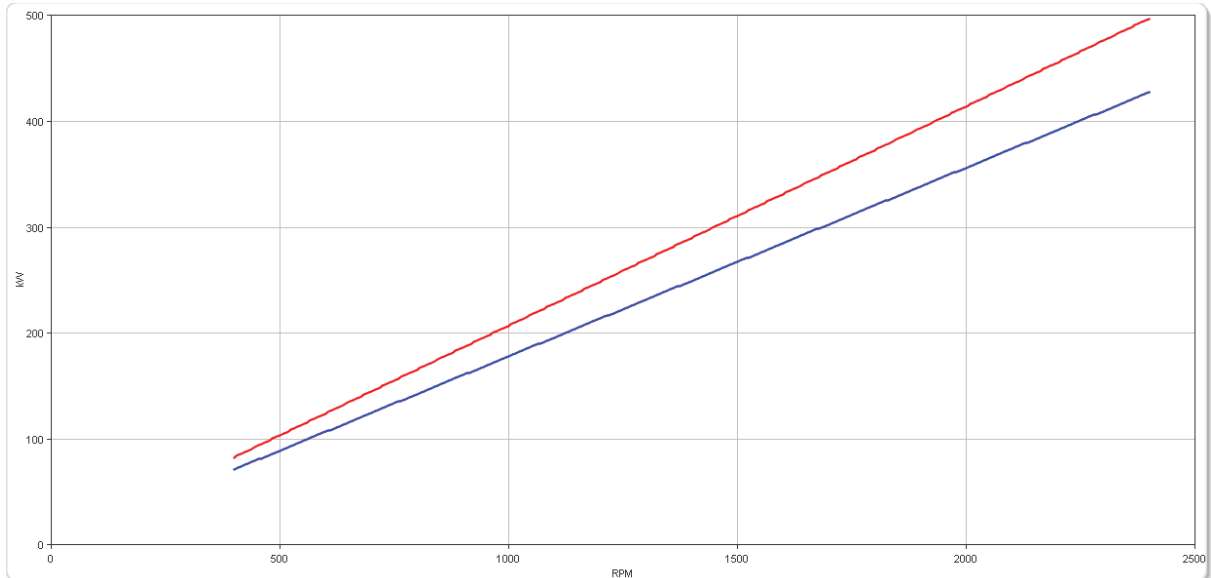
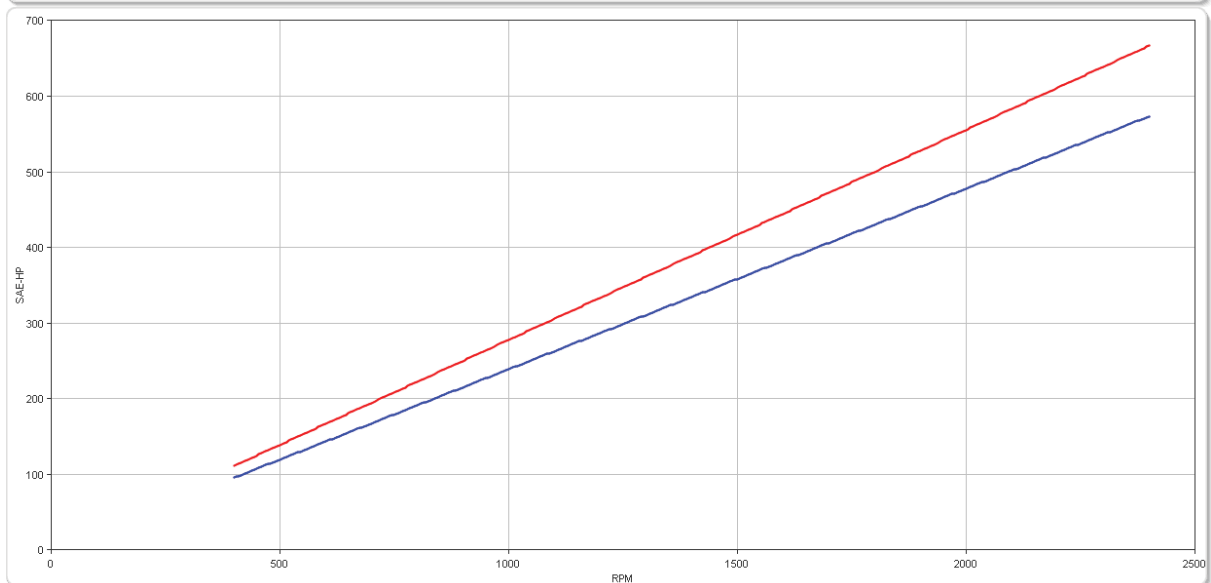


ZF W350-1

Ratings

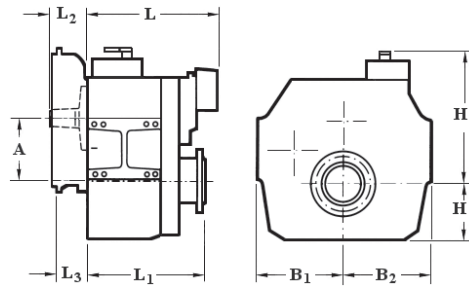
Continuous Duty

RATIOS	MAX. TORQUE		POWER/RPM		MAXIMUM RATED POWER						MAX. RPM
	Nm	ftlb	kW	hp	kW	hp	kW	hp	kW	hp	
							1200 rpm	1600 rpm	1800 rpm		
3.026*, 3.500, 3.968, 4.536, 4.962, 5.458*, 5.955	1978	1459	0.2071	0.2778	249	333	331	444	373	500	2400
6.409*	1701	1255	0.1781	0.2389	214	287	285	382	321	430	2400



ZF W350-1

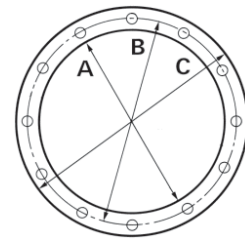
Dimensions



mm (inches)									
A	B ₁	B ₂	H ₁	H ₂	L	L ₁	L ₂	L ₃	Bell Hsg.
335 (13.2)	335 (13.2)	335 (13.2)	315 (12.4)	585 (23.0)	636 (25.0)	500 (19.7)	92.0 (3.62)	-	
Weight kg (lb)					Oil Capacity Litre (US qt)				
500 (1101)					23.0 (24.4)				

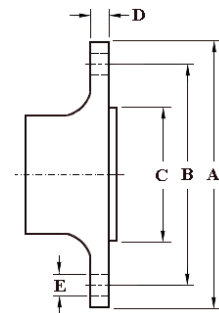
SAE Bell Housing Dimensions

SAE No.	A		B		C		Bolt Holes		
							No.	Diameter	
	mm	in	mm	in	mm	in		mm	in
0	647.7	25.5	679.45	26.75	711.2	28.0	16	13.49	17/32
1	511.18	20.125	530.23	20.875	552.45	21.75	12	11.91	15/32



Output Coupling Dimensions

A		B		C		D		Bolt Holes		
								No.	Diameter (E)	
mm	in	mm	in	mm	in	mm	in		mm	in
260	10.2	218	8.58	140	5.51	20.0	0.79	10	20.3	0.80



Project

Datum

Groene.kotter**3-9-2012****Opmerkingen en conclusies**

Betreft 40 reizen van 101 uur per jaar. Levensduur:

20 jr

(op basis van vaarprofiel L'oog)

Bouw**Materialen**

Deel	Materiaal		hoeveelheid	indicator	resultaat
Romp	Platen	Staal (onlegegeerd)	20708 kg	165	3417
	Profielen	Staal (onlegegeerd)	9098 kg	165	1501
Opbouw	Platen	Staal (onlegegeerd)	2808 kg	165	463
	Profielen	Staal (onlegegeerd)	842 kg	165	139

Bewerkings proces

Deel	Materiaal	Proces	hoeveelheid	indicator	resultaat
Romp	Staal (onlegegeerd)	Warm walsen	29806 kg	27	805
Opbouw	Staal (onlegegeerd)	Warm walsen	2808 kg	27	76

totaal 6401**Gebruik** exl verbranding van brandstof

	L per reis	totaal (levensduur)	Indicator	Resultaat
Productie brandstof	2791	2232800	174	326346

Sloop**Recyclen**

	Materiaal	%	Hoeveelheid	Indicator	
	Staal (onlegegeerd)	80%	18812,8	-155	-2915,984

Totaal geschatte LCA**totaal** 329831**Ref.kotter****4-9-2012****Opmerkingen en conclusies**

Betreft 40 reizen van 101 uur per jaar. Levensduur:

20 jr

(op basis van vaarprofiel l'oog)

Bouw**Materialen**

Deel	Materiaal		hoeveelheid	indicator	resultaat
Romp	Platen	Staal (onlegegeerd)	28467 kg	165	4697
	Profielen	Staal (onlegegeerd)	9116,3 kg	165	1504
Opbouw	Platen	Aluminium	1797,8 kg	1045	1879
	Profielen	Aluminium	305,28 kg	1045	319

Bewerkings proces

Deel	Materiaal	Proces	hoeveelheid	indicator	resultaat
Romp	Staal (onlegegeerd)	Warm walsen	37583,3 kg	27	1015
Opbouw	Aluminium	(Alu.) Walsen	1797,8 kg	53	95

totaal 9509**Gebruik** exl verbranding van brandstof

	L per reis	totaal (levensduur)	Indicator	Resultaat
Productie brandstof	3639	2911200	174	425501

Sloop**Recyclen**

	Materiaal	%	Hoeveelheid	Indicator	
	Staal (onlegegeerd)	80%	37583,3	-155	-5825,4115
	Aluminium	80%	1797,8	-915	-1644,987

totaal -7470**Totaal geschatte LCA****totaal** 427540

Uitgangspunten stabiliteit berekeningen

Naam schip	: "Groene kotter"
Scheepstype	: Viskotter
Visserij type	: Boomkorvisserij (garnalen)
Lengte o.a.	: 19.95 m
Lengte loodlijnen (sarc berek.)	: 19.15 m
Breedte o.a.	: 5.85 m
Breedte (huid)	: 5.40 m
Holte	: 2.35 m
Vermogen	: 145 kW

2.2 Scheepsgegevens

Spantenraam:	Lijnenplan dd 12/6/12
Tankgegevens:	Algemeen plan dd 30/8/12
Windcontour:	Algemeen plan dd 30/8/12

2.3 Het leeg scheepsgewicht

Het leeg scheepsgewicht conform bijgevoegde berekeningen:

	Gewicht	VCG	LCG	TCG
Schip	67.500 ton	2.35 m.	9.04 m.	0.00 m.

2.4 Stabiliteit eisen

Stabiliteit criteria : Uitgangspunt zijn de Nederlandse stabiliteit eisen voor boomkorvisserij. Om het schip ook onder Duitse en Belgische te kunnen later varen zijn de extra eisen van die landen (België: minimum vrijboord, Duitsland GZ omvang > 60 grd) ook meegenomen

1 Minimum metacentrum hoogte G'M	0.50 meter
2 Maximum GZ bij 30 graden of meer	0.240 meter
3 Top van de GZ curve bij minstens	25.000 graden
4 Oppervlak onder GZ curve tot 30 graden	0.066 mrad
5 Oppervlak onder GZ curve tot 40 graden	0.108 mrad
6 Oppervlak onder GZ curve tussen 30 graden en 40 graden	0.036 mrad
7 Maximum hellinghoek volgens IMO's A.562 windcriterium	50.000 graden
8 Maximum statische hellinghoek t.g.v. de wind	16.000 graden
9 Omvang GZ kromme > 60 grd. (Duitsland)	0.001 meter
9 Restvrijboord tot dek 0.1xB , min.0.60 (België)	0.600 meter

Algemene opmerkingen.

- 1- Deze berekening is gebaseerd op bijgevoegde gewicht berekening. Het aanpassen van de diverse gewicht posten, kan grote invloed op resultaat hebben.
- 2- Op basis van deze gewicht berekening zal er nog enige trimballast geplaatst moeten worden, afhankelijk van de definitieve uitvoering.

SAMENVATTING STABILITEITSBEREKENINGEN Groene Kotter

Beladingstoestand Vertrek haven voorraden 100%, tanks 98%

<u>Hydrostatica</u>		<u>Eis</u>	<u>Waarde</u>
Diepgang		1.500	1.373 m
T achtermerk (usk)	1.576 m		
T voormerk (usk)	1.505 m		
Trim	0.095 m		
Statische hellingshoek	0.00 graden SB		
Hoek schip vervuld	60.00 graden		
<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>		<u>Eis</u>	<u>Waarde</u>
Minimum metacentrumhoogte G'M		0.500	0.797 meter
Maximum GZ bij 30 graden of meer		0.240	0.334 meter
Top van de GZ kromme bij minstens		25.000	33.132 graden
Oppervlak onder de GZ kromme tot 30 graden		0.066	0.097 mrad
Oppervlak onder de GZ kromme tot 40 graden		0.108	0.155 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden		0.036	0.057 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562		50.000	38.251 graden
Maximum statische hellingshoek t.g.v. wind		16.000	8.105 graden
Omvang GZ kromme > 60 grd (Duitse eis)		0.001	0.074 meter
Vrijboord (eis België)		0.600	0.992 meter
<u>KG¹</u>			
Actueel	2.114 m		
Maximum toelaatbare	2.188 m		

Beladingstoestand Aankomst visgronden , tanks 50%

<u>Hydrostatica</u>		<u>Eis</u>	<u>Waarde</u>
Diepgang		1.500	1.318 m
T achtermerk (usk)	1.563 m		
T voormerk (usk)	1.421 m		
Trim	0.010 m		
Statische hellingshoek	0.00 graden SB		
Hoek schip vervuld	60.00 graden		
<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>		<u>Eis</u>	<u>Waarde</u>
Minimum metacentrumhoogte G'M		0.500	0.805 meter
Maximum GZ bij 30 graden of meer		0.240	0.322 meter
Top van de GZ kromme bij minstens		25.000	32.150 graden
Oppervlak onder de GZ kromme tot 30 graden		0.066	0.097 mrad
Oppervlak onder de GZ kromme tot 40 graden		0.108	0.151 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden		0.036	0.055 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562		50.000	45.220 graden
Maximum statische hellingshoek t.g.v. wind		16.000	8.697 graden
Omvang GZ kromme > 60 grd (Duitse eis)		0.001	0.045 meter
Vrijboord (eis België)		0.600	1.029 meter
<u>KG¹</u>			
Actueel	2.163 m		
Maximum toelaatbare	2.175 m		

Beladingstoestand Vertrek visgronden, tanks 50%, vangst 8 ton

<u>Hydrostatica</u>		<u>Eis</u>	<u>Waarde</u>
Diepgang		1.500	1.387 m
T achtermerk (usk)	1.759 m		
T voormerk (usk)	1.405 m		
Trim	-0.244 m		
Statische hellingshoek	0.00 graden SB		
Hoek schip vervuld	60.00 graden		
<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>		<u>Eis</u>	<u>Waarde</u>
Minimum metacentrumhoogte G'M		0.500	0.815 meter
Maximum GZ bij 30 graden of meer		0.240	0.351 meter
Top van de GZ kromme bij minstens		25.000	32.561 graden
Oppervlak onder de GZ kromme tot 30 graden		0.066	0.103 mrad
Oppervlak onder de GZ kromme tot 40 graden		0.108	0.163 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden		0.036	0.060 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562		50.000	36.323 graden
Maximum statische hellingshoek t.g.v. wind		16.000	7.642 graden
Omvang GZ kromme > 60 grd (Duitse eis)		0.001	0.068 meter
Vrijboord (eis België)		0.600	0.889 meter
<u>KG¹</u>			
Actueel	2.099 m		
Maximum toelaatbare	2.176 m		

Beladingstoestand Vertrek visgronden, tanks 50%, vangst 4 ton (=50%)

<u>Hydrostatica</u>		<u>Eis</u>	<u>Waarde</u>
Diepgang		1.500	1.352 m
T achtermerk (usk)	1.663 m		
T voormerk (usk)	1.412 m		
Trim	-0.120 m		
Statische hellingshoek	0.00 graden SB		
Hoek schip vervuld	60.00 graden		
<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>		<u>Eis</u>	<u>Waarde</u>

Minimum metacentrumhoogte G'M	0.500	0.840 meter
Maximum GZ bij 30 graden of meer	0.240	0.348 meter
Top van de GZ kromme bij minstens	25.000	32.582 graden
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.103 mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.162 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.059 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	38.292 graden
Maximum statische hellingshoek t.g.v. wind	16.000	7.900 graden
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.069 meter
Vrijboord (eis België)	0.600	0.961 meter
<u>KG'</u>		
Actueel	2.117 m	
Maximum toelaatbare	2.191 m	

Beladingstoestand Vertrek visgronden, tanks 50%, vangst 1.6 ton

<u>Hydrostatica</u>		<u>Eis</u>	<u>Waarde</u>
Diepgang		1.500	1.332 m
T achtermerk (usk)	1.604 m		
T voormerk (usk)	1.417 m		
Trim	-0.044 m		
Statische hellingshoek	0.00 graden SB		
Hoek schip vervuld	60.00 graden		
<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>			
Minimum metacentrumhoogte G'M	0.500	0.839 meter	
Maximum GZ bij 30 graden of meer	0.240	0.337 meter	
Top van de GZ kromme bij minstens	25.000	32.429 graden	
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.100 mrad	
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.158 mrad	
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.058 mrad	
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	40.735 graden	
Maximum statische hellingshoek t.g.v. wind	16.000	8.242 graden	
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.062 meter	
Vrijboord (eis België)	0.600	1.002 meter	
<u>KG'</u>			
Actueel	2.137 m		
Maximum toelaatbare	2.182 m		

Beladingstoestand Aankomst haven, tanks 10%, vangst 8 ton (=100%)

<u>Hydrostatica</u>		<u>Eis</u>	<u>Waarde</u>
Diepgang		1.500	1.344 m
T achtermerk (usk)	1.749 m		
T voormerk (usk)	1.340 m		
Trim	-0.311 m		
Statische hellingshoek	0.00 graden SB		
Hoek schip vervuld	60.00 graden		
<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>			
Minimum metacentrumhoogte G'M	0.500	0.817 meter	
Maximum GZ bij 30 graden of meer	0.240	0.341 meter	
Top van de GZ kromme bij minstens	25.000	31.838 graden	
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.102 mrad	
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.159 mrad	
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.058 mrad	
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	40.090 graden	
Maximum statische hellingshoek t.g.v. wind	16.000	8.135 graden	
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.036 meter	
Vrijboord (eis België)	0.600	0.908 meter	
<u>KG'</u>			
Actueel	2.148 m		
Maximum toelaatbare	2.187 m		

Beladingstoestand Aankomst haven, tanks 10%, vangst 4 ton (=50%)

<u>Hydrostatica</u>		<u>Eis</u>	<u>Waarde</u>
Diepgang		1.500	1.310 m
T achtermerk (usk)	1.653 m		
T voormerk (usk)	1.347 m		
Trim	-0.187 m		
Statische hellingshoek	0.00 graden SB		
Hoek schip vervuld	60.00 graden		
<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>			
Minimum metacentrumhoogte G'M	0.500	0.840 meter	
Maximum GZ bij 30 graden of meer	0.240	0.333 meter	
Top van de GZ kromme bij minstens	25.000	31.714 graden	
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.101 mrad	
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.157 mrad	
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.056 mrad	
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	44.729 graden	
Maximum statische hellingshoek t.g.v. wind	16.000	8.442 graden	
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.035 meter	
Vrijboord (eis België)	0.600	0.984 meter	

<u>KG'</u>	
Actueel	2.169 m
Maximum toelaatbare	2.181 m

Beladingstoestand Aankomst haven, tanks 10%, vangst 1.6 ton(=20%)

<u>Hydrostatica</u>	<u>Eis</u>	<u>Waarde</u>
Diepgang	1.500	1.239 m
T achtermerk (usk)		1.636 m
T voormerk (usk)		1.241 m
Trim		-0.293 m
Statische hellingshoek		0.00 graden SB
Hoek schip vervuld		60.00 graden

<u>Boomkorkotter (IL&T + Duitse en Belgische eis)</u>	<u>Eis</u>	<u>Waarde</u>
Minimum metacentrumhoogte G'M	0.500	0.992 meter
Maximum GZ bij 30 graden of meer	0.240	0.380 meter
Top van de GZ kromme bij minstens	25.000	31.941 graden
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.116 mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.181 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.065 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	42.424 graden
Maximum statische hellingshoek t.g.v. wind	16.000	7.940 graden
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.097 meter
Vrijboord (eis België)	0.600	1.019 meter
<u>KG'</u>		
Actueel		2.120 m
Maximum toelaatbare		2.160 m

Het schip voldoet aan de eisen

TRIM-EN STABILITEITSBEREKENING

Groene Kotter

19 sep 2012 11:55:19

Conditie : Vertrek haven voorraden 100%, tanks 98%

Omschrijving	Vulling %	S.G. ton/m ³	Gewicht ton	Zhoogte m	Zlengte m	Zbreedte m	VrVlstof tonm
Leeg schip 120917	-	-	67.500	2.350	9.040	0.000	0.000
Bemanning	-	-	0.225	3.350	8.800	0.000	0.000
Voorraden 100%	-	-	1.000	2.000	12.000	0.000	0.000
Bomen getopt	-	-	-0.800	8.500	6.500	0.000	0.000
Bomen afgetopt	-	-	0.800	5.000	6.500	0.000	0.000
Ballast	-	-	2.200	0.250	11.000	0.000	0.000
	-	-	0.000	0.000	0.000	0.000	0.000
Brandstof SB	98.0	0.850	2.263	0.879	8.159	2.297	0.073
Brandstof BB	98.0	0.850	2.263	0.879	8.159	-2.297	0.073
Hydrauliek olie	98.0	0.850	0.539	0.924	10.560	2.227	0.013
Smeerolie	98.0	0.850	0.539	0.924	10.560	-2.227	0.013
Drinkwater	98.0	1.000	1.441	0.745	14.200	0.000	0.551
Vuile olie tank	98.0	0.850	0.265	0.249	10.600	0.000	0.014
TOTAAL	-	-	78.235	2.112	9.203	0.000	0.737

Carenewaarden

Volume	75.652 m ³
WL zwaartepunt	7.896 m
ETM	1.017 tonm/cm
Ton/cm inzinking	0.854 ton/cm
Soortelijk gewicht	1.025 ton/m ³

Trimligging en diepgangen

Diepgangen boven basis :	
Diepgang gem. (Lpp/2)	1.369 m
Diepg. achter (App)	1.326 m
Diepg. voor (Fpp)	1.412 m
Trim	0.086 m

Dwarsstabiliteit

KM dwars	2.916 m
KG	2.112 m
GM vast	0.804 m
GG' correctie	0.009 m
G'M gecorrigeerd	0.795 m

Diepgangen op de merken :

T Achtermerk	1.576 m
T Voormerk	1.498 m
KG'	2.122 m

De stabiliteitswaarden gelden voor de opgegeven trimligging.

Statische arm en dynamische weg, berekend met vrije vertrimming :

Hoek(SB) graden	Diepgang m	Trim m	KNsin• m	KG'sin• m	GBcos• m	G'Nsin• m	Dyn.weg mrad
0.00	1.369	0.086	0.000	0.000	0.000	-0.000	0.000
5.00	1.367	0.102	0.253	0.185	0.000	0.068	0.003
10.00	1.360	0.142	0.501	0.368	0.000	0.132	0.012
20.00	1.327	0.293	0.976	0.726	0.000	0.251	0.046
30.00	1.251	0.541	1.387	1.061	0.000	0.326	0.097
40.00	1.120	0.818	1.671	1.364	0.000	0.307	0.154
50.00	0.933	1.106	1.832	1.625	0.000	0.207	0.199
60.00	0.645	1.422	1.906	1.837	0.000	0.069	0.224

Statische hellingshoek is 0.000 graden naar stuurboord

Contour : Zijaanzicht

SamenvattingHydrostatica

Diepgang	
T achtermerk (usk)	1.576 m
T voormerk (usk)	1.498 m
Trim	0.086 m
Statische hellingshoek	0.00 graden SB
Hoek schip vervuld	60.00 graden

Eis	Waarde
1.500	1.369 m

Boomkorkotter (IL&T + Duitse en Belgische eis)

Minimum metacentrumhoogte G'M

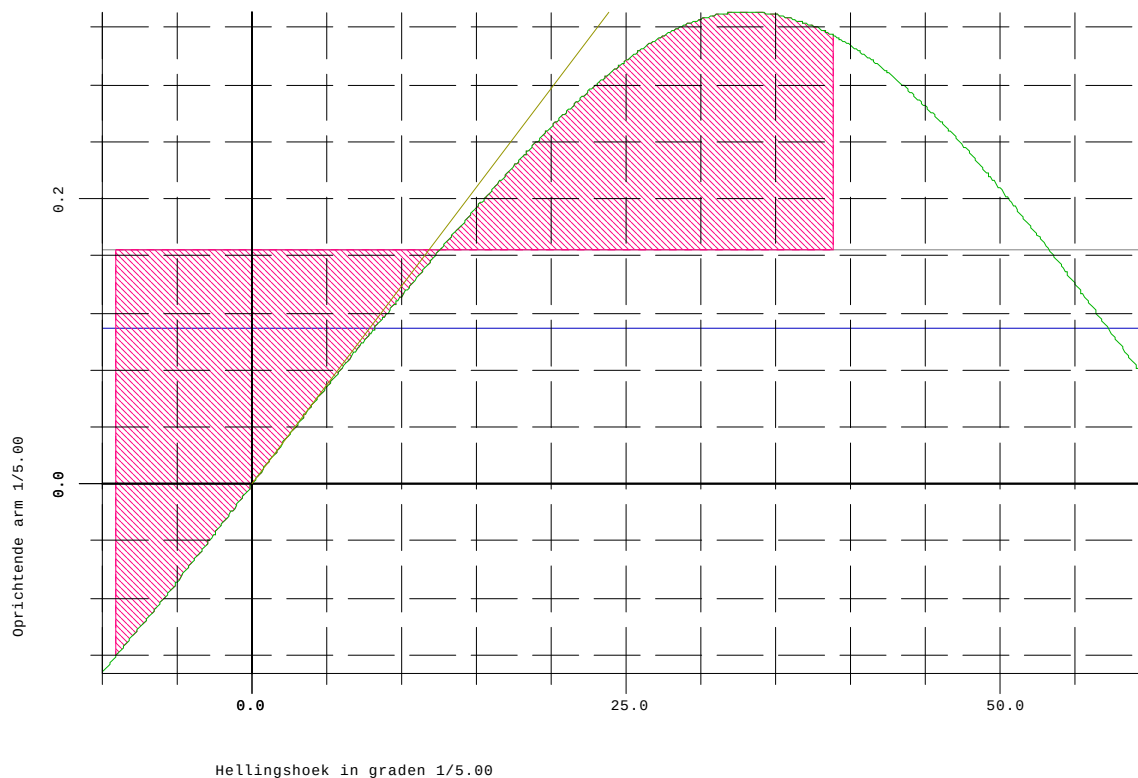
Eis	Waarde
0.500	0.795 meter

Maximum GZ bij 30 graden of meer	0.240	0.331 meter
Top van de GZ kromme bij minstens	25.000	33.009 graden
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.097 mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.154 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.057 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	38.822 graden
Maximum statische hellingshoek t.g.v. wind	16.000	8.188 graden
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.069 meter
Vrijboord (eis België)	0.600	0.995 meter

KG'

Actueel 2.122 m
Maximum toelaatbare 2.187 m

Deze beladingstoestand voldoet aan bovengenoemde eisen.



TRIM-EN STABILITEITSBEREKENING
Groene Kotter

19 sep 2012 11:55:20

Conditie : Vertrek visgronden, tanks 50%, vangst 8 ton (=100%)

Omschrijving	Vulling %	S.G. ton/m ³	Gewicht ton	Zhoogte m	Zlengte m	Zbreedte m	VrVlstof tonm
Leeg schip 120917	-	-	67.500	2.350	9.040	0.000	0.000
Bemanning	-	-	0.225	3.350	8.800	0.000	0.000
Vorraden 50%	-	-	0.500	2.000	12.000	0.000	0.000
Bomen getopt	-	-	-0.800	8.500	6.500	0.000	0.000
Bomen afgetopt	-	-	0.800	5.000	6.500	0.000	0.000
Visvangst 100%	-	-	8.000	1.500	4.400	0.000	0.000
Ballast	-	-	2.200	0.250	11.000	0.000	0.000
	-	-	0.000	0.000	0.000	0.000	0.000
Brandstof SB	50.0	0.850	1.155	0.577	8.172	2.270	0.065
Brandstof BB	50.0	0.850	1.155	0.577	8.172	-2.270	0.065
Hydrauliek olie	50.0	0.850	0.275	0.638	10.547	2.200	0.010
Smeerolie	50.0	0.850	0.275	0.638	10.547	-2.200	0.010
Drinkwater	50.0	1.000	0.735	0.625	14.200	0.000	0.551
Vuile olie tank	50.0	0.850	0.135	0.131	10.599	0.000	0.014
TOTAAL	-	-	82.155	2.097	8.692	-0.000	0.714

Carenewaarden

Volume	79.440 m ³
WL zwaartepunt	7.712 m
ETM	1.080 tonm/cm
Ton/cm inzinking	0.868 ton/cm
Soortelijk gewicht	1.025 ton/m ³

Trimligging en diepgangen

Diepgangen boven basis :	
Diepgang gem. (Lpp/2)	1.382 m
Diepg. achter (App)	1.509 m
Diepg. voor (Fpp)	1.256 m
Trim	-0.253 m

Dwarsstabiliteit

KM dwars	2.919 m
KG	2.097 m
GM vast	0.822 m
GG' correctie	0.009 m
G'M gecorrigeerd	0.813 m

Diepgangen op de merken :

T Achtermerk	1.759 m
T Voormerk	1.398 m
KG'	2.106 m

De stabiliteitswaarden gelden voor de opgegeven trimligging.

Statische arm en dynamische weg, berekend met vrije vertrimming :

Hoek(SB) graden	Diepgang m	Trim m	KNsin● m	KG'sin● m	GBcos● m	G'Nsin● m	Dyn.weg mrad
0.00	1.382	-0.253	0.000	0.000	-0.000	0.000	0.000
5.00	1.381	-0.251	0.254	0.184	-0.000	0.070	0.003
10.00	1.376	-0.235	0.504	0.366	-0.000	0.139	0.012
20.00	1.351	-0.148	0.988	0.720	-0.000	0.268	0.048
30.00	1.293	0.010	1.398	1.053	-0.000	0.345	0.103
40.00	1.192	0.147	1.672	1.354	-0.000	0.319	0.162
50.00	1.052	0.198	1.818	1.613	-0.000	0.205	0.209
60.00	0.820	0.198	1.886	1.824	-0.000	0.063	0.232

Statische hellingshoek is 0.000 graden naar stuurboord

Contour : Zijaanzicht

Samenvatting

Hydrostatica

Diepgang	
T achtermerk (usk)	1.759 m
T voormerk (usk)	1.398 m
Trim	-0.253 m
Statische hellingshoek	0.00 graden SB
Hoek schip vervuld	60.00 graden

Eis	Waarde
1.500	1.382 m

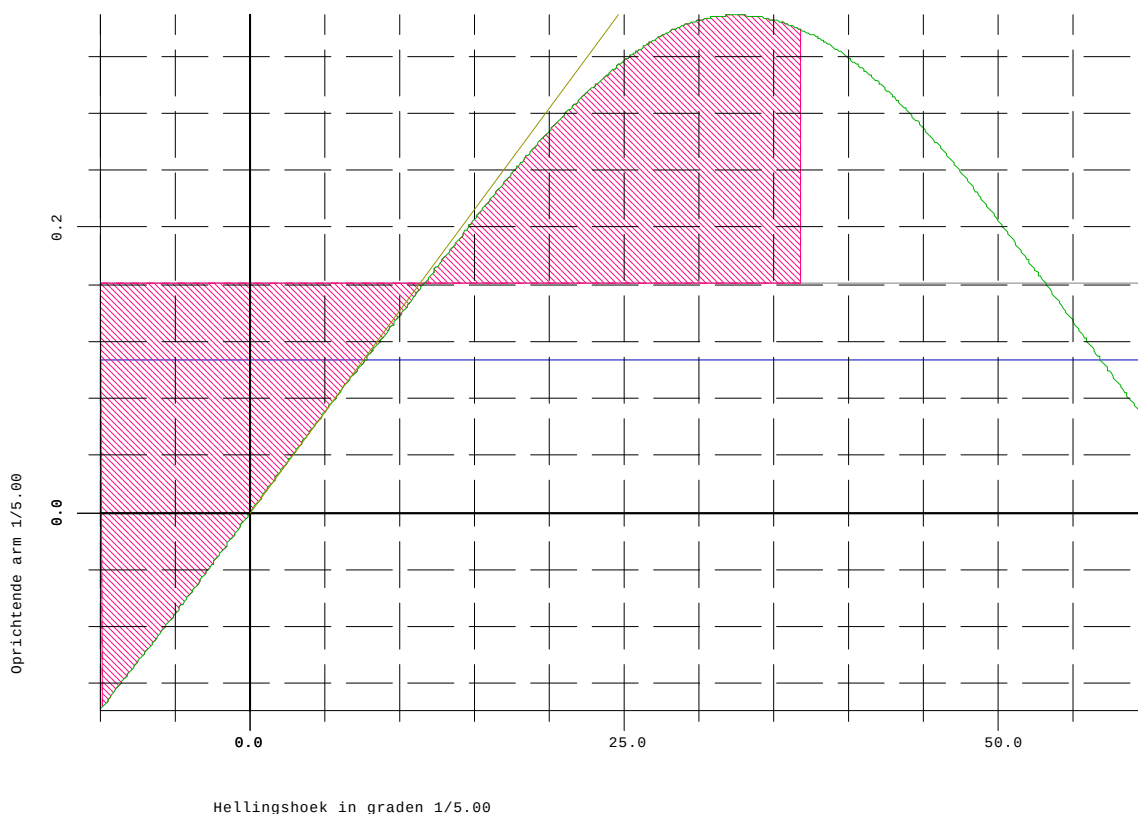
Boomkorkotter (IL&T + Duitse en Belgische eis)

	Eis	Waarde
Minimum metacentrumhoogte G'M	0.500	0.813 meter
Maximum GZ bij 30 graden of meer	0.240	0.349 meter
Top van de GZ kromme bij minstens	25.000	32.464 graden
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.103 mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.162 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.060 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	36.730 graden
Maximum statische hellingshoek t.g.v. wind	16.000	7.714 graden
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.063 meter
Vrijboord (eis België)	0.600	0.890 meter

KG'

Actueel	2.106 m
Maximum toelaatbare	2.177 m

Deze beladingstoestand voldoet aan bovengenoemde eisen.



TRIM-EN STABILITEITSBEREKENING
Groene Kotter

19 sep 2012 11:55:24

Conditie : Aankomst haven, tanks 10%, vangst 1.6 ton(=20%)

Omschrijving	Vulling %	S.G. ton/m ³	Gewicht ton	Zhoogte m	Zlengte m	Zbreedte m	VrVlstof tonm
Leegscheeps	-	-	64.764	2.280	8.800	0.000	0.000
Bemanning	-	-	0.225	3.350	8.800	0.000	0.000
Vorraden 10%	-	-	0.100	2.000	12.000	0.000	0.000
Bomen getopt	-	-	-0.800	8.500	6.500	0.000	0.000
Bomen afgetopt	-	-	0.800	5.000	6.500	0.000	0.000
Visvangst 20%	-	-	1.600	0.900	4.400	0.000	0.000
Ballast	-	-	2.200	0.250	11.000	0.000	0.000
	-	-	0.000	0.000	0.000	0.000	0.000
Brandstof SB	10.0	0.850	0.231	0.269	8.262	2.172	0.021
Brandstof BB	10.0	0.850	0.231	0.269	8.262	-2.172	0.021
Hydrauliek olie	10.0	0.850	0.055	0.330	10.497	2.118	0.003
Smeerolie	10.0	0.850	0.055	0.330	10.497	-2.118	0.003
Drinkwater	10.0	1.000	0.147	0.525	14.200	0.000	0.551
Vuile olie tank	98.0	0.850	0.265	0.249	10.600	0.000	0.014
TOTAAL	-	-	69.873	2.120	8.790	-0.000	0.612

Carenewaarden

Volume	67.574 m ³
WL zwaartepunt	7.697 m
ETM	1.037 tonm/cm
Ton/cm inzinking	0.855 ton/cm
Soortelijk gewicht	1.025 ton/m ³

Trimligging en diepgangen

Diepgangen boven basis :
Diepgang gem. (Lpp/2) 1.235 m
Diepg. achter (App) 1.386 m
Diepg. voor (Fpp) 1.084 m
Trim -0.303 m

Dwarsstabiliteit

KM dwars	3.119 m
KG	2.120 m
GM vast	0.999 m
GG' correctie	0.009 m
G'M gecorrigeerd	0.991 m

Diepgangen op de merken :

T Achtermerk	1.636 m
T Voormerk	1.233 m
KG'	2.128 m

De stabiliteitswaarden gelden voor de opgegeven trimligging.

Statische arm en dynamische weg, berekend met vrije vertrimming :

Hoek(SB) graden	Diepgang m	Trim m	KNsin• m	KG'sin• m	GBcos• m	G'Nsin• m	Dyn.weg mrad
0.00	1.235	-0.303	0.000	0.000	-0.000	0.000	0.000
5.00	1.233	-0.293	0.270	0.186	-0.000	0.084	0.004
10.00	1.227	-0.262	0.533	0.370	-0.000	0.163	0.015
20.00	1.193	-0.121	1.027	0.728	-0.000	0.299	0.055
30.00	1.105	0.121	1.439	1.064	-0.000	0.375	0.116
40.00	0.949	0.384	1.712	1.368	-0.000	0.344	0.180
50.00	0.717	0.625	1.873	1.630	-0.000	0.243	0.232
60.00	0.368	0.853	1.934	1.843	-0.000	0.091	0.261

Statische hellingshoek is 0.000 graden naar stuurboord

Contour : Zij aanzicht

Samenvatting

Hydrostatica

Diepgang	
T achtermerk (usk)	1.636 m
T voormerk (usk)	1.233 m
Trim	-0.303 m
Statische hellingshoek	0.00 graden SB
Hoek schip vervuld	60.00 graden

<u>Eis</u>	<u>Waarde</u>
1.500	1.235 m

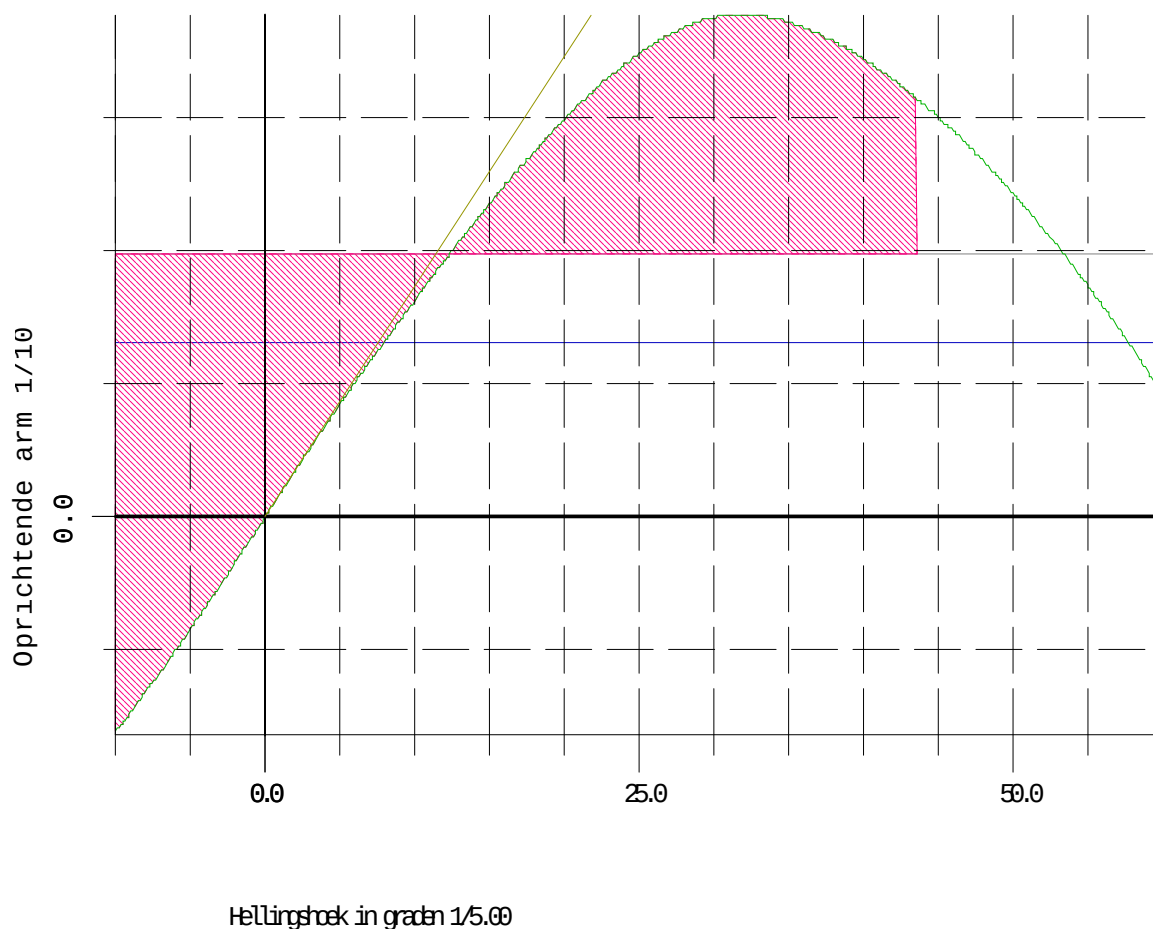
Boomkorkotter (IL&T + Duitse en Belgische eis)

	Eis	Waarde
Minimum metacentrumhoogte G'M	0.500	0.991 meter
Maximum GZ bij 30 graden of meer	0.240	0.377 meter
Top van de GZ kromme bij minstens	25.000	31.817 graden
Oppervlak onder de GZ kromme tot 30 graden	0.066	0.116 mrad
Oppervlak onder de GZ kromme tot 40 graden	0.108	0.180 mrad
Oppervlak onder de GZ kromme tussen 30 en 40 graden	0.036	0.064 mrad
Maximum hellingshoek volgens het windcriterium van IMO A.562	50.000	43.488 graden
Maximum statische hellingshoek t.g.v. wind	16.000	8.011 graden
Omvang GZ kromme > 60 grd (Duitse eis)	0.001	0.091 meter
Vrijboord (eis België)	0.600	1.020 meter

KG'

Actueel	2.128 m
Maximum toelaatbare	2.158 m

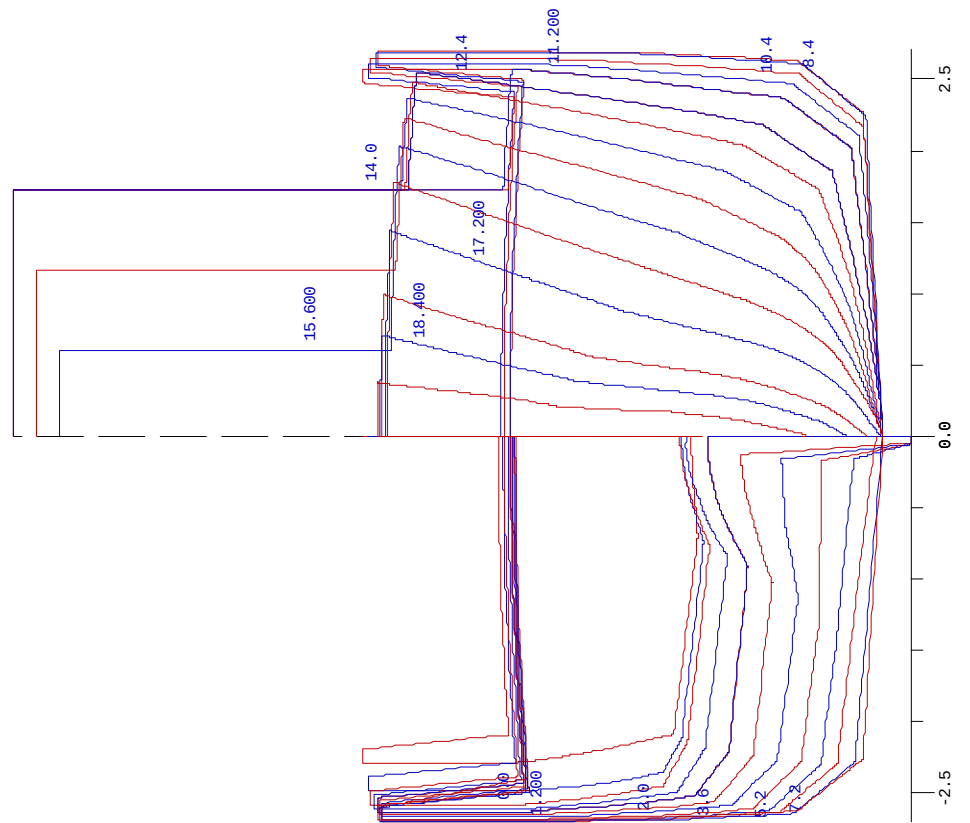
Deze beladingstoestand voldoet aan bovengenoemde eisen.



Groene Kotter

Schetsmatig lijnenplan

19-9-2012
11:29:30



SAMENVATTING VAN MAXIMUM TANKINHOUDEN

Groene Kotter

19 sep 2012 16:53:51

Compartiment	Volume	Gewicht	Zhoogte	Zlengte	Zbreedte	Idwars	S.G.
Brandstof SB	2.717	2.309	0.891	8.159	2.297	0.087	0.850
Brandstof BB	2.717	2.309	0.891	8.159	-2.297	0.087	0.850
Subtotaal	5.433	4.618	0.891	8.159	0.000		

Compartiment	Volume	Gewicht	Zhoogte	Zlengte	Zbreedte	Idwars	S.G.
Drinkwater	1.470	1.470	0.750	14.200	0.000	0.551	1.000
Subtotaal	1.470	1.470	0.750	14.200	0.000		

Compartiment	Volume	Gewicht	Zhoogte	Zlengte	Zbreedte	Idwars	S.G.
Hydrauliek olie	0.648	0.550	0.935	10.561	2.227	0.015	0.850
Smeerolie	0.648	0.550	0.935	10.561	-2.227	0.015	0.850
Vuile olie tank	0.318	0.270	0.254	10.600	0.000	0.016	0.850
Subtotaal	1.613	1.371	0.801	10.568	0.000		
Totaal	8.517	7.460	0.850	9.658	0.000		

CARENE TABELLEN

Groene Kotter

Trim = 0.000 m

19 sep 2012 16:56:11

Diepgang uit basis	1.200	1.225	1.250	1.275	1.300
Waterlijnoppeervlak	76.05	77.09	78.37	79.79	81.06
Zwaartepunt	8.380	8.295	8.186	8.065	7.965
I langs	1507	1561	1625	1706	1791
I dwars	147	149	151	153	156
Ton/cm inzinking	0.79	0.80	0.81	0.83	0.84
Volume	62.80	64.71	66.65	68.62	70.62
Volume & aanhangsels	63.37	65.29	67.25	69.23	71.26
Displacement	64.95	66.93	68.93	70.97	73.04
B hoogte	0.711	0.726	0.741	0.756	0.771
B lengte	9.294	9.267	9.237	9.206	9.173
B breedte	0.000	0.000	0.000	0.000	0.000
KM dwars	3.048	3.023	3.004	2.990	2.981
KM langs	24.708	24.843	25.126	25.612	26.125
Eenheid trimmoment	0.81	0.84	0.87	0.91	0.96
Blok coëfficiënt	0.5061	0.5108	0.5156	0.5204	0.5253

Diepgang uit basis	1.325	1.350	1.375	1.400	1.425
Waterlijnoppeervlak	82.22	83.17	83.51	83.71	84.03
Zwaartepunt	7.877	7.808	7.796	7.792	7.783
I langs	1866	1922	1970	1986	2002
I dwars	158	161	162	163	165
Ton/cm inzinking	0.85	0.86	0.86	0.87	0.87
Volume	72.66	74.72	76.80	78.89	80.99
Volume & aanhangsels	73.31	75.39	77.49	79.60	81.72
Displacement	75.14	77.28	79.43	81.59	83.76
B hoogte	0.786	0.801	0.816	0.831	0.847
B lengte	9.138	9.103	9.068	9.034	9.002
B breedte	0.000	0.000	0.000	0.000	0.000
KM dwars	2.967	2.952	2.931	2.902	2.880
KM langs	26.467	26.526	26.472	26.010	25.560
Eenheid trimmoment	1.00	1.03	1.05	1.06	1.07
Blok coëfficiënt	0.5303	0.5352	0.5402	0.5449	0.5496

Diepgang uit basis	1.450	1.475	1.500
Waterlijnoppeervlak	84.31	84.55	84.71
Zwaartepunt	7.775	7.772	7.775
I langs	2017	2032	2043
I dwars	166	167	168
Ton/cm inzinking	0.87	0.87	0.88
Volume	83.09	85.20	87.32
Volume & aanhangsels	83.84	85.97	88.10
Displacement	85.93	88.12	90.30
B hoogte	0.862	0.876	0.891
B lengte	8.971	8.941	8.913
B breedte	0.000	0.000	0.000
KM dwars	2.858	2.835	2.810
KM langs	25.139	24.724	24.289
Eenheid trimmoment	1.08	1.09	1.09
Blok coëfficiënt	0.5541	0.5586	0.5629