TRIM & STABILITETS BOK

SJÖFARTSINSPEKTIONEN
GÖTEBORG
INK. 1991 -04- 17
Dnr 2102-913492

R/K GUSTAF DALÉN

SSRS

HEMMAHAMN: GÖTEBORG

GODKÄND
APPROVED
Under förutsättning att anmärkningar iakttages
Under condition that corrections are observed
Göteborgs sjöfartsinspektionsområde
Gothenburg region of the National Maritime Administration
Bilaga till skrivelse/Enclosure to letter 1991-05-14
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Dnr 2102-913492

IDENTITETSBETECKNINGAR:

Byggnadsår	1964
Nationell kod	SILH

HUVUDDIMENSIONER:

Längd över allt	18.50	m
Längd mellan perpendiklarna	15.74	m
Mallad bredd	5.75	m
Mallat djup	3.23	m
Djupgående till KVL	2.000	m

Arkivexemplar

FKAB
NAVAL ARCHITECTS – CONSULTANT ENGINEERS
Box 645
451 23 UDDEVALLA
Telefon 0522-981 00
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INNEHÅLL SIDA

BILAGOR: HYDROSTATISKA DATA
DYNAMISK STABILITET (MS DATA)
KRÄNGNINGSRAPPORT

Kommentar

I dynamiska stabiliteten är däckshuset ej medräknat.

KAPACITET OCH TYNGDPUNKTSKOORDINATER FÖR BRÄNNOLJE TANKAR

Tank	Spant	Volym Densitet=.85		Tyngdpunktsläge från L/2	Tyngdpunktsläge över BL	Yttrögh. moment
		m3	ton	m	m	m4
BRO SIDOTANK SB	29-20	5.60	4.76	-1.80	2.20	.22
BRO SIDOTANK BB	31-20	6.00	5.10	-2.20	2.20	.25
BRO BOTTENTANK	20-13	4.00	3.40	1.60	.70	.70
TOTALT		15.60	13.26	-1.08	1.82	1.17

KAPACITET OCH TYNGDPUNKTSKOORDINATER FÖR FÄRSKVATTEN TANKAR

Tank	Spant	Volym Densitet=1		Tyngdpunktsläge från L/2	Tyngdpunktsläge över BL	Yttrögh. moment
		m3	ton	m	m	m4
FW TANK FÖR	7-5	.60	.60	5.60	2.00	.05
FW TANK AKTER	37-31	1.40	1.40	-5.20	.80	1.30
TOTALT		2.00	2.00	-1.96	1.16	1.35

KONDITION Nr 1 :LÄTT FARTYG

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
DÖDVIKT	2.00	6.20	1.25	0.00
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	61.60	-.74	2.63	0.00

Djupgående vid L/2 över baslinjen d= 2.10 m
Djupgående för över baslinjen df= 1.89 m
Djupgående akter över baslinjen da= 2.32 m
Totalt trim t= .43 m

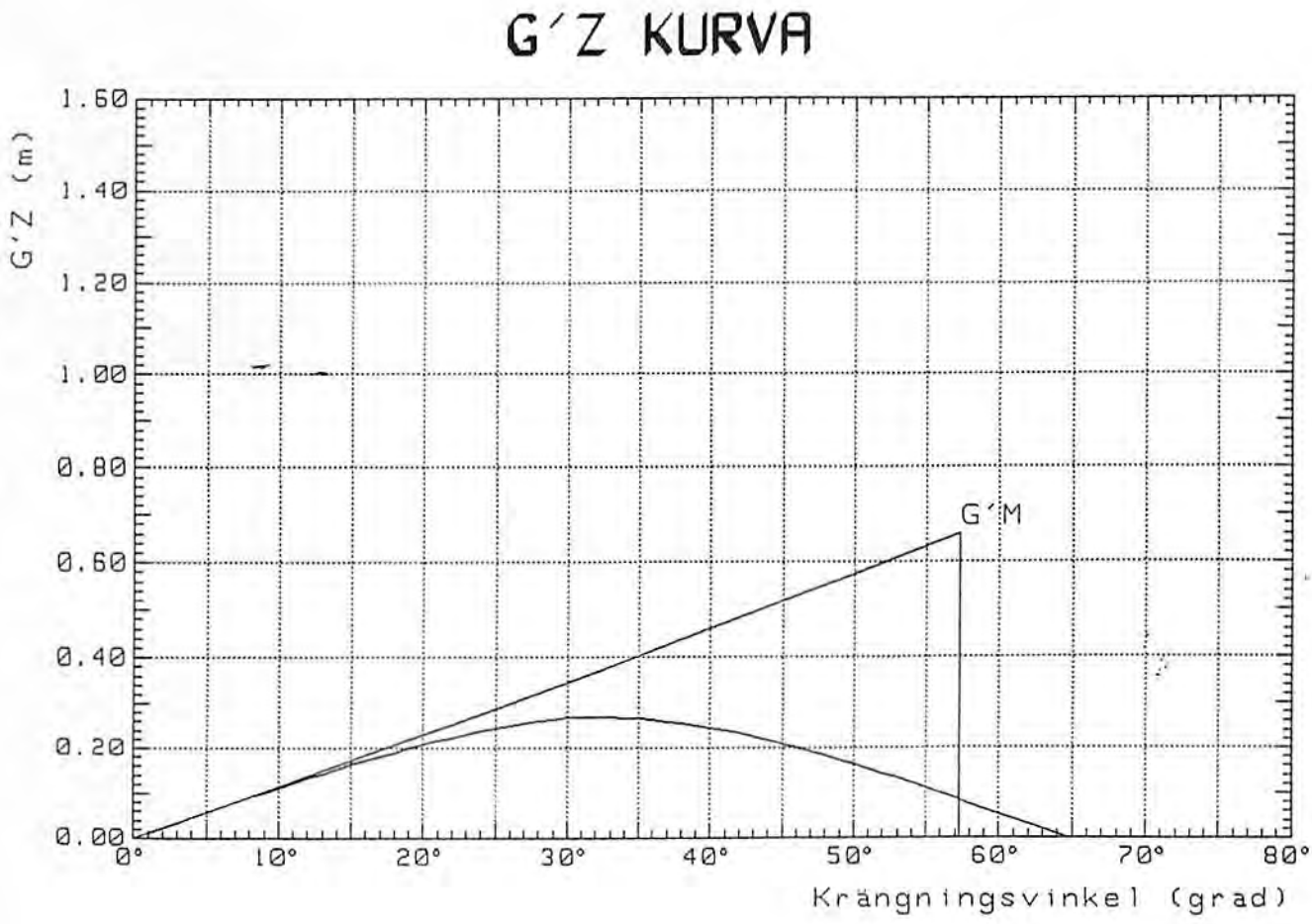
HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.39 m
Långskepps metacenter höjd KML= 15.15 m
Flytcentrum från L/2 LCF= -.46 m

KONDITION Nr 1 :LÄTT FARTYG

***** STABILITET *****

Tvärskepps metacentrum över baslinjen	KMT=	3.29 m
Viktstyngdpunkt över baslinjen	KG =	2.63 m
Tvärskepps metacenterhöjd	GM =	.66 m
Reduktion för fria vätskeytor	GG'=	0.00 m
Reducerad metacenterhöjd	G'M=	.66 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.003	.114	.112
20	-.018	.225	.207
30	-.061	.330	.269
45	-.256	.466	.210
60	-.518	.571	.053
75	-.744	.637	-.107

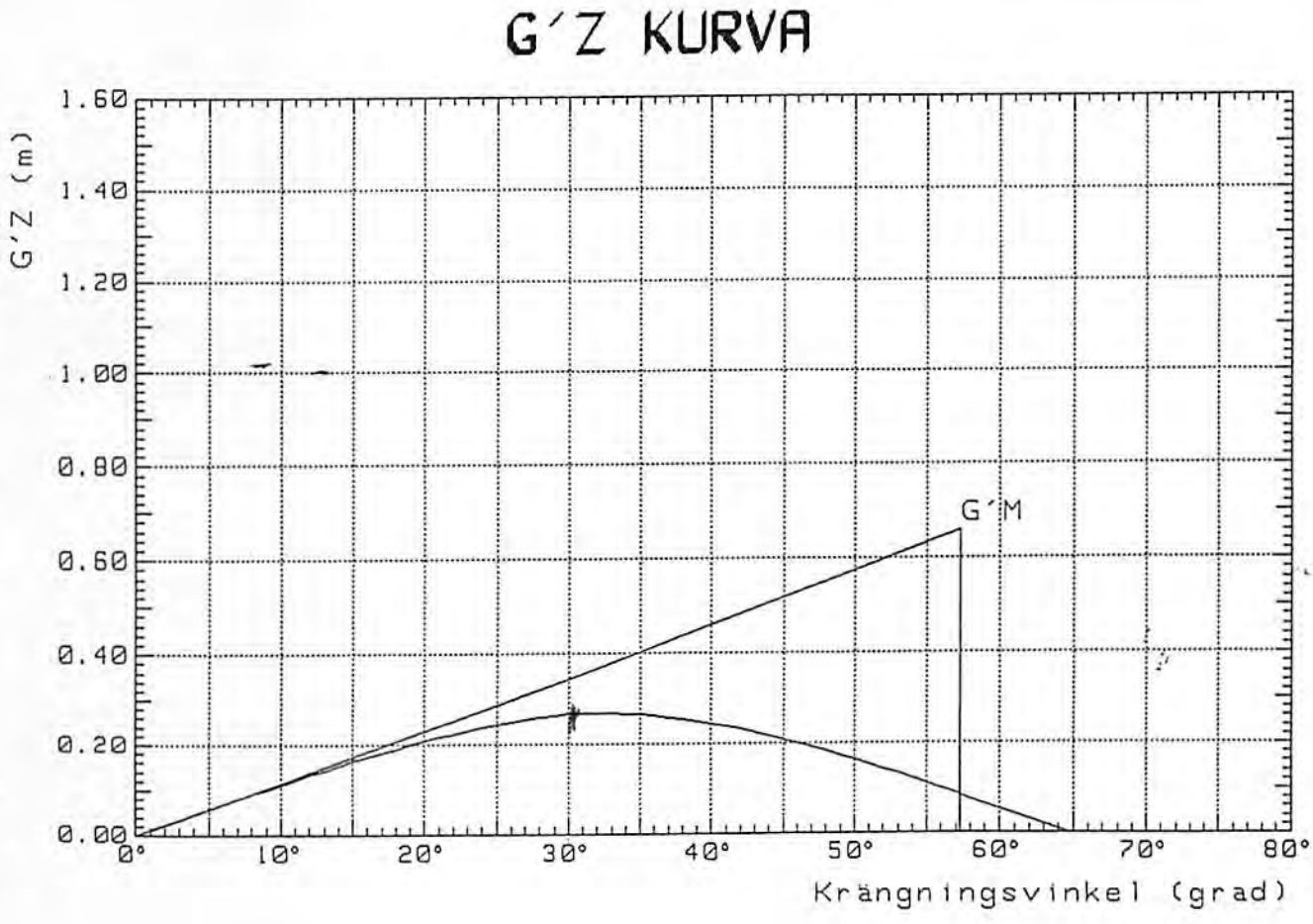


KONDITION Nr 1 :LÄTT FARTYG

***** STABILITET *****

Tvärskepps metacentrum över baslinjen	KMT= 3.29 m
Viktstyngdpunkt över baslinjen	KG = 2.63 m
Tvärskepps metacenterhöjd	GM = .66 m
Reduktion för fria vätskeytor	GG'= 0.00 m
Reducerad metacenterhöjd	G'M= .66 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.003	.114	.112
20	-.018	.225	.207
30	-.061	.330	.269
45	-.256	.466	.210
60	-.518	.571	.053
75	-.744	.637	-.107



KONDITION Nr 1 :LÄTT FARTYG

***** STABILITETS KRAV *****

	Verkligt	Krav	
Dynamisk hävarm 0-30°	.080	.055	
Dynamisk hävarm 0-40°	.126	.090	
Dynamisk hävarm 30-40°	.046	.030	
G'Z värde för Fi>=30°	.270	.200	
Vinkel för G'Z-max	31.7	30.0	
G'Z värde vid 60°	.053	.069	*
G'M-min	.659	.150	

(* = Kraven ej uppfyllda)

KONDITION Nr 2 :100 % BUNKER

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
BRO SIDOTANK SB	4.76	-1.80	2.20	.19
BRO SIDOTANK BB	5.10	-2.20	2.20	.21
BRO BOTTENTANK	3.40	1.60	.70	0.00
FV TANK FÖR	.60	5.60	2.00	.05
FV TANK AKTER (TRIMTANK)	1.40	-5.20	.80	0.00
BESÄTTNING 3 MAN	.24	0.00	4.50	0.00
DÖDVIKT	17.50	-.34	1.71	.45
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	77.10	-.83	2.46	.45

Djupgående vid L/2 över baslinjen d= 2.34 m
Djupgående för över baslinjen df= 2.07 m
Djupgående akter över baslinjen da= 2.60 m
Totalt trim t= .53 m

HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.41 m
Långskepps metacenter höjd KML= 14.62 m
Flytcentrum från L/2 LCF= -.53 m

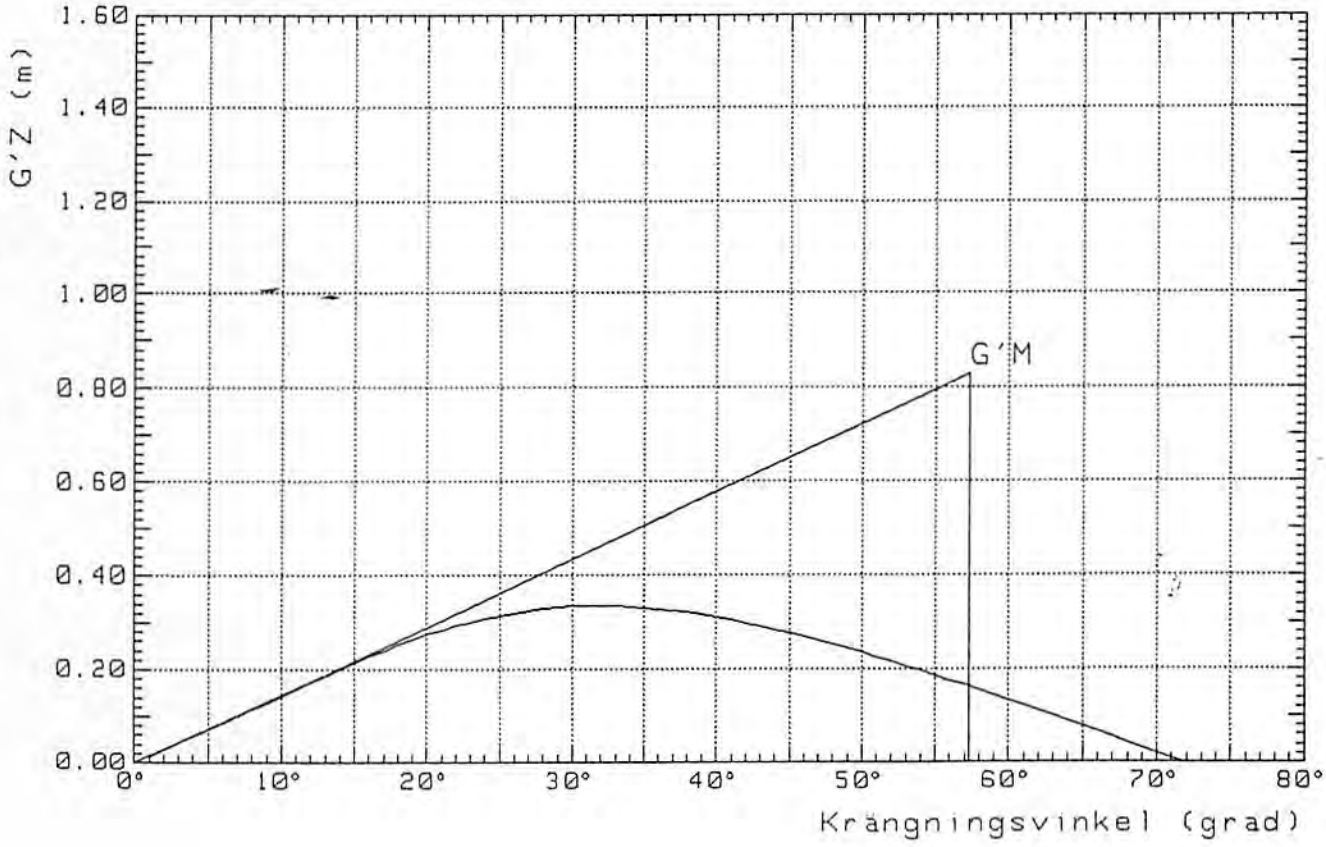
KONDITION Nr 2 :100 % BUNKER

***** STABILITET *****

Tvärskepps metacentrum över baslinjen	KMT=	3.30 m
Viktstyngdpunkt över baslinjen	KG =	2.46 m
Tvärskepps metacenterhöjd	GM =	.83 m
Reduktion för fria vätskeytor	GG'=	.01 m
Reducerad metacenterhöjd	G'M=	.83 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.001	.144	.143
20	-.008	.284	.275
30	-.079	.415	.336
45	-.309	.586	.277
60	-.585	.718	.133
75	-.836	.801	-.035

G´Z KURVA



KONDITION Nr 2 :100 % BUNKER

***** STABILITETS KRAV *****

	Verkligt	Krav
Dynamisk hävarm 0-30°	.104	.055
Dynamisk hävarm 0-40°	.162	.090
Dynamisk hävarm 30-40°	.057	.030
G'Z värde för Fi>=30°	.337	.200
Vinkel för G'Z-max	31.6	30.0
G'Z värde vid 60°	.133	.069
G'M-min	.829	.150

KONDITION Nr 3 :10 % BUNKER

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
BRO SIDOTANK SB 10%	.48	-1.80	1.40	.10
BRO SIDOTANK BB 10%	.51	-2.20	1.40	.10
BRO BOTTENTANK 10%	.34	1.60	.50	1.00
FV TANK FÖR	.06	5.60	2.00	.05
FV TANK AKTER (TRIMTANK)	1.40	-5.20	.80	0.00
BESÄTTNING 3 MAN	.24	0.00	4.50	0.00
DÖDVIKT	5.03	.80	1.27	1.25
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	64.63	-.83	2.57	1.25

Djupgående vid L/2 över baslinjen d= 2.15 m
Djupgående för över baslinjen df= 1.87 m
Djupgående akter över baslinjen da= 2.42 m
Totalt trim t= .55 m

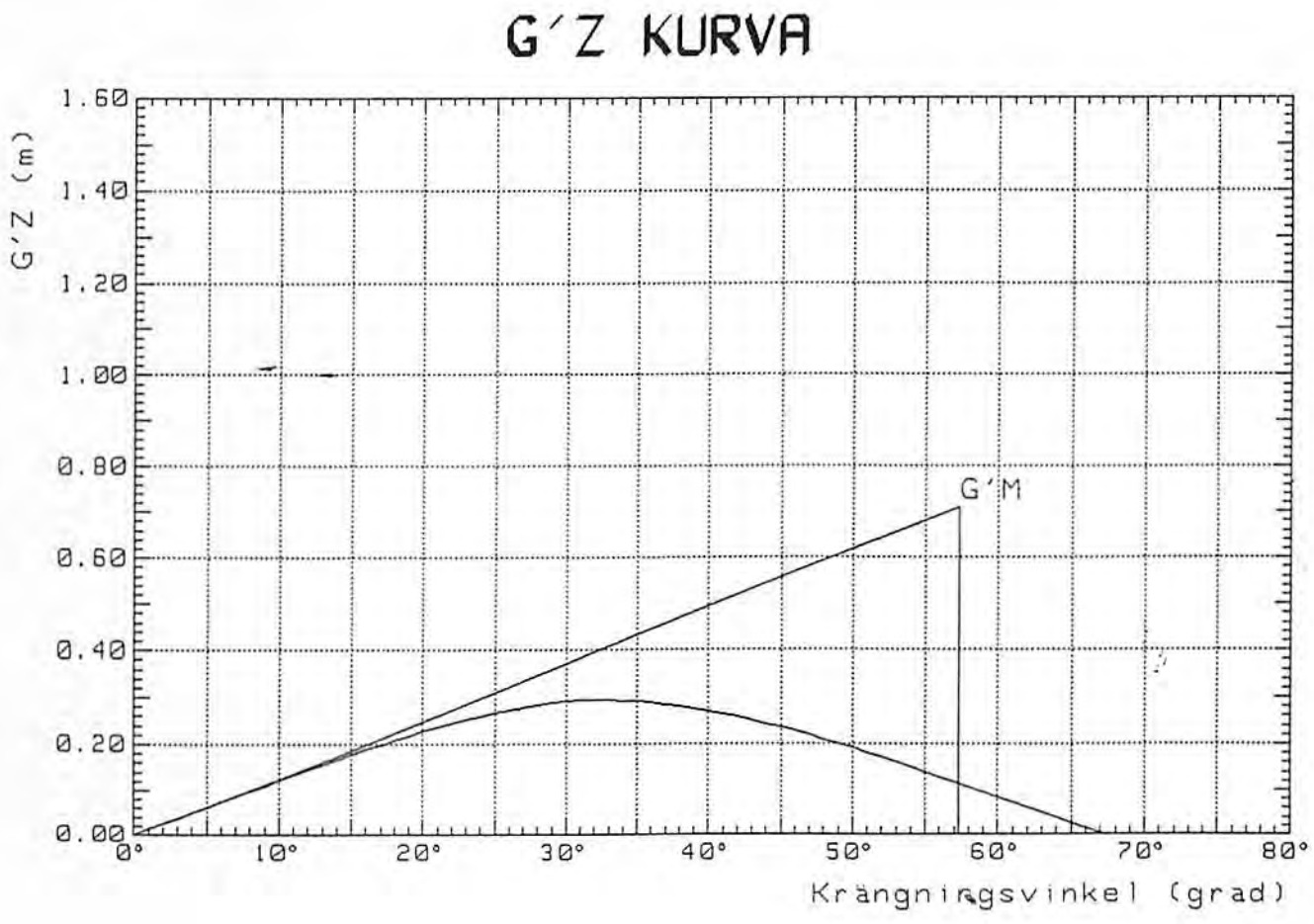
HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.40 m
Långskepps metacenter höjd KML= 15.06 m
Flytcentrum från L/2 LCF= -.48 m

KONDITION Nr 3 :10 % BUNKER

***** STABILITET *****

Tvärskepps metacentrum över baslinjen	KMT=	3.30 m
Viktstyngdpunkt över baslinjen	KG =	2.57 m
Tvärskepps metacenterhöjd	GM =	.73 m
Reduktion för fria vätskeytor	GG'=	.02 m
Reducerad metacenterhöjd	G'M=	.71 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.002	.123	.121
20	-.016	.243	.227
30	-.062	.355	.293
45	-.267	.502	.235
60	-.531	.615	.083
75	-.767	.686	-.081



KONDITION Nr 3 :10 % BUNKER

***** STABILITETS KRAV *****

	Verkligt	Krav
Dynamisk hävarm 0-30°	.088	.055
Dynamisk hävarm 0-40°	.138	.090
Dynamisk hävarm 30-40°	.050	.030
G'Z värde för Fi>=30°	.294	.200
Vinkel för G'Z-max	32.0	30.0
G'Z värde vid 60°	.083	.069
G'M-min	.710	.150

KONDITION Nr 4 :100 % BUNKER - TOM TRIMTANK

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
BRO SIDOTANK SB	4.76	-1.80	2.20	.19
BRO SIDOTANK BB	5.10	-2.20	2.20	.21
BRO BOTTENTANK	3.40	1.60	.70	0.00
FV TANK FÖR	.60	5.60	2.00	.05
FV TANK AKTER (TRIMTANK)	0.00	-5.20	.80	0.00
BESÄTTNING 3 MAN	.24	0.00	4.50	0.00
DÖDVIKT	16.10	.09	1.79	.45
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	75.70	-.75	2.49	.45

Djupgående vid L/2 över baslinjen d= 2.32 m
Djupgående för över baslinjen df= 2.10 m
Djupgående akter över baslinjen da= 2.53 m
Totalt trim t= .43 m

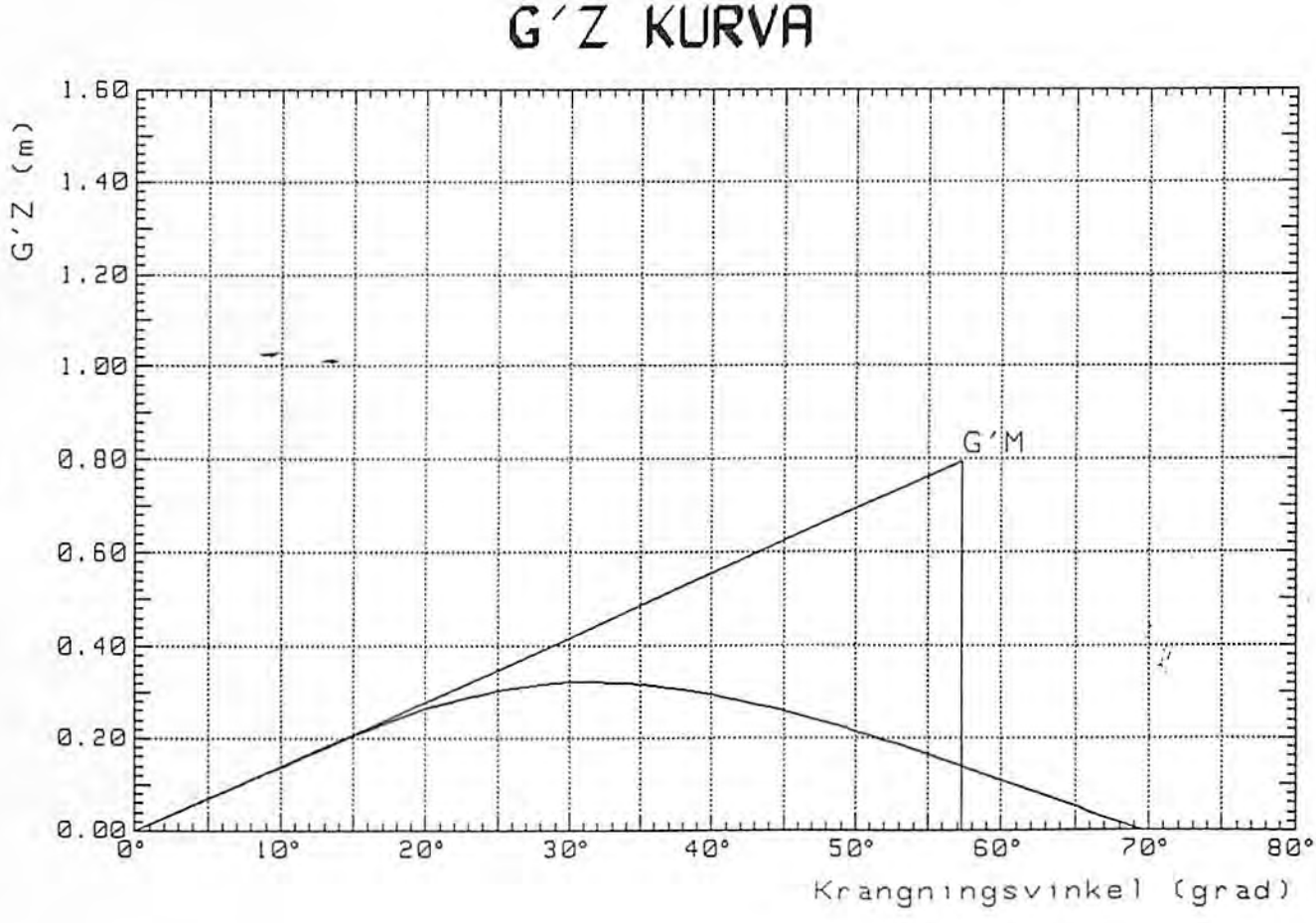
HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.41 m
Långskepps metacenter höjd KML= 14.67 m
Flytcentrum från L/2 LCF= -.53 m

KONDITION Nr 4 :100 % BUNKER - TOM TRIMTANK

***** STABILITET *****

Tvärskepps metacentrum över baslinjen	KMT=	3.29 m
Viktstyngdpunkt över baslinjen	KG =	2.49 m
Tvärskepps metacenterhöjd	GM =	.80 m
Reduktion för fria vätskeytor	GG'=	.01 m
Reducerad metacenterhöjd	G'M=	.80 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.001	.138	.137
20	-.009	.272	.264
30	-.076	.398	.322
45	-.305	.563	.258
60	-.580	.689	.109
75	-.831	.769	-.062



KONDITION Nr 4 :100 % BUNKER - TOM TRIMTANK

***** STABILITETS KRAV *****

	Verkligt	Krav
Dynamisk hävarm 0-30°	.100	.055
Dynamisk hävarm 0-40°	.154	.090
Dynamisk hävarm 30-40°	.055	.030
G'Z värde för Fi>=30°	.322	.200
Vinkel för G'Z-max	31.2	30.0
G'Z värde vid 60°	.109	.069
G'M-min	.796	.150

PILOT

Det norske Veritas program system for desktop computers

NV5001

HYDROSTATICS & INTACT STABILITY

PROGRAM VERSION : 08/87

CURRENT NV5000 MODEL NUMBER . . . . : 1
CURRENT NV5001 MODEL NUMBER . . . . : 1

I D E N T I F I C A T I O N

ID. : R/K GUSTAF DALÉN
DATE . . . . . : 900123
SIGNATURE . . . . . : FKABJJ

U N I T D E F I N I T I O N S

LENGTH UNIT	metres	[m]
LENGTH UNIT CONVERSION FACTOR	1.0000	[m/m]
WEIGHT UNIT	tonnes	[t]
WEIGHT UNIT CONVERSION FACTOR	1.0000	[t/t]

P R I N C I P A L D A T A

LENGTH BETWEEN PERPENDICULARS . . . . . :	15.740 m
BREADTH MOULDED . . . . . :	5.750 m
DEPTH MOULDED . . . . . :	3.230 m
DESIGN DRAUGHT . . . . . :	2.000 m
DIST. FROM ORIGIN TO AP . . . . . :	0.000 m

A X I S D E F I N I T I O N

POSITIVE DIRECTIONS ARE: X TO STARBOARD — POSITIVE TRIM BY THE STERN
Y FORWARD — POSITIVE HEEL TO STARBOARD
Z UPWARDS

REFERENCES

DEFINITION OF GLOBAL ORIGIN

TRANSVERSE....: CL
LONGITUDINAL..: AP (60 mm F.O. SPT #40)
VERTICAL.....: BL

OUTPUT REFERENCE POINT (RFP), DISTANCE FROM GLOBAL ORIGIN

TRANSVERSE....: 0.000 m : CL
LONGITUDINAL..: 7.870 m : AMIDSHIPS
VERTICAL.....: 0.000 m : BL

DRAUGHT EXTREME (above RFP):

VERTICAL.....: 0.000 m : BL

POSITION OF MAX. SECTION (fwd of RFP):

LONGITUDINAL..: -.330 m

ABBREVIATIONS

1 DRAUGHT EXTREME .: Extreme draught at RFP.
2 DRAUGHT RFP .....: Draught above RFP.
3 TRIM .....: Trim to stern in [m] .

4 DISPL TOTAL SW ..: Total displacement in seawater. (1.025 t/m3)
5 DISPL TOTAL FW ..: Total displacement in freshwater. (1 t/m3)
6 DISPL MLD .....: Moulded volume of displacement.

7 TCF SBD OF RFP ..: Transv. centre of flotation to starboard of RFP.
8 LCF FWD OF RFP ..: Long. centre of flotation forward of RFP.

9 TCB SBD OF RFP ..: Transv. centre of bouyancy to starboard of RFP.
10 LCB FWD OF RFP ..: Long. centre of bouyancy forward of RFP.
11 VCB ABOVE RFP ...: Vert. centre of bouyancy above RFP.

12 KMT .....: Position of transverse metacentre above RFP.
13 KML .....: Position of longitudinal metacentre above RFP.

14 IT .....: Transv. moment of inertia about neutral axis.
15 IL .....: Long. moment of inertia about neutral axis.

16 MCT SW .....: Moment to change trim one cm in seawater.
18 TPM SW .....: Force to change draught one cm in seawater.

23 WPA .....: Waterplane area.
24 WSA .....: Projected wetted surface area.

25 CB .....: Block coefficient = $\frac{\text{Displacement moulded}}{\text{Lbp*Draught(RFP)*Br.mld}}$
26 CM .....: Max section coefficient = $\frac{\text{Max sectional area}}{\text{Draught(RFP)*Br.mld}}$
27 CP .....: CB/CM
28 CW .....: Waterplane area coefficient = Waterplane area

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		TRIM : 0.000 [m]		
3 DRAUGHT RFP .....[m]:	1.600	1.650	1.700	1.750	1.800
4 DISP TOTAL SW .....[t]:	32.896	35.324	37.834	40.422	43.087
5 DISP TOTAL FW .....[t]:	32.093	34.463	36.911	39.436	42.037
6 DISP MLD .....[m3]:	31.568	33.920	36.351	38.859	41.442
8 LCF FWD OF RFP ....[m]:	-.278	-.290	-.302	-.314	-.325
10 LCB FWD OF RFP ....[m]:	-.422	-.412	-.404	-.398	-.393
11 VCB ABOVE RFP .....[m]:	1.115	1.150	1.185	1.220	1.255
12 KMT .....[m]:	3.114	3.145	3.172	3.195	3.213
13 KML .....[m]:	16.008	15.917	15.822	15.721	15.618
14 IT .....[m4]:	63.120	67.686	72.218	76.718	81.155
15 IL .....[m4]:	470.167	500.890	532.050	563.611	595.235
16 MCT SW .....[tm/cm]:	.306	.326	.346	.367	.388
18 TPM SW .....[t/cm]:	.474	.490	.506	.522	.536
23 WPA .....[m2]:	46.262	47.842	49.379	50.882	52.325
24 WSA .....[m2]:	71.577	73.849	76.094	78.317	80.493
25 CB .....:	.2180	.2271	.2363	.2453	.2544
26 CP .....:	.5196	.5250	.5306	.5362	.5418
27 CM .....:	.4196	.4326	.4453	.4576	.4695
28 CW .....:	.5112	.5286	.5456	.5622	.5781

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		TRIM : 0.000 [m]		
3 DRAUGHT RFP .....[m]:	1.850	1.900	1.950	2.000	2.050
4 DISP TOTAL SW .....[t]:	45.825	48.632	51.507	54.452	57.464
5 DISP TOTAL FW .....[t]:	44.707	47.446	50.251	53.124	56.062
6 DISP MLD .....[m3]:	44.096	46.817	49.605	52.461	55.383
8 LCF FWD OF RFP ....[m]:	-.343	-.365	-.387	-.409	-.431
10 LCB FWD OF RFP ....[m]:	-.389	-.386	-.386	-.387	-.389
11 VCB ABOVE RFP .....[m]:	1.289	1.323	1.357	1.391	1.424
12 KMT .....[m]:	3.228	3.241	3.255	3.265	3.269
13 KML .....[m]:	15.499	15.392	15.336	15.292	15.237
14 IT .....[m4]:	85.503	89.809	94.112	98.321	102.225
15 IL .....[m4]:	626.685	658.670	693.268	729.292	765.013
16 MCT SW .....[tm/cm]:	.408	.429	.451	.475	.498
18 TPM SW .....[t/cm]:	.551	.565	.579	.593	.606
23 WPA .....[m2]:	53.714	55.095	56.472	57.838	59.131
24 WSA .....[m2]:	82.619	84.741	86.883	89.022	91.133
25 CB .....:	.2634	.2723	.2811	.2898	.2985
26 CP .....:	.5475	.5531	.5587	.5643	.5699
27 CM .....:	.4810	.4922	.5031	.5136	.5237
28 CW .....:	.5935	.6087	.6240	.6391	.6533

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		TRIM : 0.000 [m]		
3 DRAUGHT RFP .....[m]:	2.100	2.150	2.200	2.250	2.300
4 DISP TOTAL SW .....[t]:	60.547	63.695	66.900	70.155	73.460
5 DISP TOTAL FW .....[t]:	59.070	62.141	65.268	68.444	71.668
6 DISP MLD .....[m3]:	58.374	61.428	64.539	67.699	70.906
8 LCF FWD OF RFP ....[m]:	-.453	-.472	-.487	-.502	-.516
10 LCB FWD OF RFP ....[m]:	-.392	-.397	-.402	-.406	-.410
11 VCB ABOVE RFP .....[m]:	1.457	1.491	1.524	1.556	1.589
12 KMT .....[m]:	3.272	3.275	3.277	3.278	3.279
13 KML .....[m]:	15.172	15.083	14.974	14.860	14.746
14 IT .....[m4]:	105.916	109.590	113.171	116.576	119.854
15 IL .....[m4]:	800.596	834.946	868.071	900.656	932.904
16 MCT SW .....[tm/cm]:	.521	.544	.565	.587	.608
18 TPM SW .....[t/cm]:	.619	.631	.642	.653	.663
23 WPA .....[m2]:	60.344	61.521	62.641	63.700	64.717
24 WSA .....[m2]:	93.221	95.297	97.347	99.367	101.373
25 CB .....:	.3071	.3157	.3241	.3324	.3406
26 CP .....:	.5756	.5813	.5870	.5925	.5980
27 CM .....:	.5336	.5430	.5522	.5611	.5696
28 CW .....:	.6668	.6798	.6921	.7038	.7151

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		TRIM : 0.000 [m]		
3 DRAUGHT RFP .....[m]:	2.350	2.400	2.450	2.500	2.550
4 DISP TOTAL SW .....[t]:	76.815	80.218	83.668	87.162	90.697
5 DISP TOTAL FW .....[t]:	74.941	78.262	81.627	85.036	88.485
6 DISP MLD .....[m3]:	74.164	77.468	80.818	84.211	87.645
8 LCF FWD OF RFP ....[m]:	-.530	-.543	-.553	-.559	-.565
10 LCB FWD OF RFP ....[m]:	-.415	-.420	-.425	-.430	-.435
11 VCB ABOVE RFP .....[m]:	1.621	1.653	1.685	1.717	1.749
12 KMT .....[m]:	3.280	3.281	3.280	3.278	3.278
13 KML .....[m]:	14.632	14.512	14.378	14.237	14.097
14 IT .....[m4]:	123.056	126.077	128.846	131.457	134.001
15 IL .....[m4]:	964.86	996.11	1025.86	1054.33	1082.28
16 MCT SW .....[tm/cm]:	.628	.649	.668	.687	.705
18 TPM SW .....[t/cm]:	.673	.683	.692	.700	.708
23 WPA .....[m2]:	65.704	66.637	67.497	68.307	69.089
24 WSA .....[m2]:	103.375	105.359	107.308	109.237	111.161
25 CB .....:	.3487	.3566	.3645	.3722	.3798
26 CP .....:	.6034	.6087	.6139	.6191	.6242
27 CM .....:	.5779	.5859	.5937	.6011	.6084
28 CW .....:	.7260	.7363	.7458	.7547	.7634

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		TRIM : 0.000 [m]		
3 DRAUGHT RFP .....[m]:	2.600	2.650	2.700	2.750	2.800
4 DISP TOTAL SW .....[t]:	94.272	97.885	101.535	105.221	108.939
5 DISP TOTAL FW .....[t]:	91.973	95.498	99.059	102.654	106.282
6 DISP MLD .....[m3]:	91.117	94.627	98.173	101.754	105.366
8 LCF FWD OF RFP ....[m]:	-.569	-.572	-.574	-.575	-.575
10 LCB FWD OF RFP ....[m]:	-.440	-.445	-.450	-.455	-.459
11 VCB ABOVE RFP .....[m]:	1.780	1.812	1.843	1.874	1.905
12 KMT .....[m]:	3.278	3.278	3.278	3.279	3.280
13 KML .....[m]:	13.957	13.817	13.676	13.540	13.405
14 IT .....[m4]:	136.447	138.750	140.917	142.976	144.947
15 IL .....[m4]:	1109.52	1135.88	1161.74	1187.12	1211.76
16 MCT SW .....[tm/cm]:	.723	.740	.757	.773	.789
18 TPM SW .....[t/cm]:	.716	.723	.730	.737	.743
23 WPA .....[m2]:	69.839	70.549	71.228	71.879	72.501
24 WSA .....[m2]:	113.076	114.981	116.880	118.776	120.666
25 CB .....:	.3872	.3945	.4018	.4088	.4158
26 CP .....:	.6292	.6342	.6390	.6437	.6484
27 CM .....:	.6154	.6222	.6287	.6351	.6413
28 CW .....:	.7717	.7795	.7870	.7942	.8011

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 1.600 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	32.743	32.896	33.269	34.292	36.158
5 DISP TOTAL FW .....[t]:	31.945	32.093	32.457	33.456	35.276
10 LCB FWD OF RFP ....[m]:	-.136	-.422	-.704	-1.125	-1.598
12 KMT .....[m]:	3.087	3.114	3.132	3.172	3.233

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 1.650 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	35.171	35.324	35.719	36.785	38.715
5 DISP TOTAL FW .....[t]:	34.313	34.463	34.848	35.888	37.771
10 LCB FWD OF RFP ....[m]:	-.130	-.412	-.693	-1.113	-1.585
12 KMT .....[m]:	3.125	3.145	3.165	3.203	3.260

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 1.700 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	37.668	37.834	38.248	39.368	41.356
5 DISP TOTAL FW .....[t]:	36.749	36.911	37.316	38.408	40.347
10 LCB FWD OF RFP ....[m]:	-.126	-.404	-.683	-1.103	-1.572
12 KMT .....[m]:	3.156	3.172	3.192	3.230	3.281

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 1.750 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	40.233	40.422	40.857	42.039	44.078
5 DISP TOTAL FW .....[t]:	39.251	39.436	39.861	41.014	43.003
10 LCB FWD OF RFP ....[m]:	-.123	-.398	-.675	-1.096	-1.560
12 KMT .....[m]:	3.179	3.195	3.214	3.252	3.298

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 1.800 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	42.869	43.087	43.546	44.789	46.875
5 DISP TOTAL FW .....[t]:	41.823	42.037	42.484	43.696	45.731
10 LCB FWD OF RFP ....[m]:	-.121	-.393	-.668	-1.089	-1.548
12 KMT .....[m]:	3.199	3.213	3.232	3.269	3.310

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 1.850 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	45.578	45.825	46.310	47.606	49.738
5 DISP TOTAL FW .....[t]:	44.466	44.707	45.180	46.445	48.525
10 LCB FWD OF RFP ....[m]:	-.121	-.389	-.662	-1.082	-1.538
12 KMT .....[m]:	3.215	3.228	3.248	3.282	3.319

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 1.900 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	48.358	48.632	49.156	50.491	52.667
5 DISP TOTAL FW .....[t]:	47.178	47.446	47.957	49.259	51.382
10 LCB FWD OF RFP ....[m]:	-.122	-.386	-.659	-1.075	-1.528
12 KMT .....[m]:	3.229	3.241	3.261	3.292	3.326

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 1.950 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	51.204	51.507	52.081	53.447	55.660
5 DISP TOTAL FW .....[t]:	49.955	50.251	50.811	52.143	54.303
10 LCB FWD OF RFP ....[m]:	-.123	-.386	-.657	-1.069	-1.518
12 KMT .....[m]:	3.240	3.255	3.271	3.299	3.329

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 2.000 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	54.117	54.452	55.075	56.470	58.715
5 DISP TOTAL FW .....[t]:	52.797	53.124	53.732	55.093	57.283
10 LCB FWD OF RFP ....[m]:	-.126	-.387	-.656	-1.064	-1.508
12 KMT .....[m]:	3.249	3.265	3.278	3.304	3.330

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.050 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	57.097	57.464	58.128	59.555	61.828
5 DISP TOTAL FW .....[t]:	55.705	56.062	56.710	58.103	60.320
10 LCB FWD OF RFP ....[m]:	-.129	-.389	-.656	-1.060	-1.498
12 KMT .....[m]:	3.256	3.269	3.283	3.307	3.330

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.100 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	60.141	60.547	61.235	62.705	64.996
5 DISP TOTAL FW .....[t]:	58.674	59.070	59.742	61.175	63.411
10 LCB FWD OF RFP ....[m]:	-.133	-.392	-.657	-1.055	-1.489
12 KMT .....[m]:	3.260	3.272	3.286	3.308	3.329

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.150 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	63.245	63.695	64.400	65.915	68.217
5 DISP TOTAL FW .....[t]:	61.703	62.141	62.830	64.308	66.553
10 LCB FWD OF RFP ....[m]:	-.138	-.397	-.658	-1.050	-1.479
12 KMT .....[m]:	3.264	3.275	3.288	3.308	3.327

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.200 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	66.411	66.900	67.621	69.178	71.489
5 DISP TOTAL FW .....[t]:	64.791	65.268	65.972	67.491	69.745
10 LCB FWD OF RFP ....[m]:	-.144	-.402	-.659	-1.046	-1.469
12 KMT .....[m]:	3.267	3.277	3.289	3.307	3.325

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.250 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	69.636	70.155	70.897	72.485	74.807
5 DISP TOTAL FW .....[t]:	67.937	68.444	69.167	70.717	72.982
10 LCB FWD OF RFP ....[m]:	-.152	-.406	-.661	-1.042	-1.459
12 KMT .....[m]:	3.269	3.278	3.290	3.305	3.322

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.300 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	72.919	73.460	74.227	75.837	78.173
5 DISP TOTAL FW .....[t]:	71.140	71.668	72.416	73.988	76.266
10 LCB FWD OF RFP ....[m]:	-.160	-.410	-.662	-1.039	-1.449
12 KMT .....[m]:	3.270	3.279	3.290	3.303	3.320

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 2.350 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	76.255	76.815	77.608	79.236	81.584
5 DISP TOTAL FW .....[t]:	74.395	74.941	75.716	77.303	79.594
10 LCB FWD OF RFP ....[m]:	-.168	-.415	-.664	-1.036	-1.439
12 KMT .....[m]:	3.271	3.280	3.288	3.301	3.317

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 2.400 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	79.637	80.218	81.037	82.679	85.032
5 DISP TOTAL FW .....[t]:	77.695	78.262	79.060	80.663	82.958
10 LCB FWD OF RFP ....[m]:	-.176	-.420	-.666	-1.033	-1.428
12 KMT .....[m]:	3.272	3.281	3.287	3.299	3.314

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 2.450 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	83.062	83.668	84.507	86.164	88.513
5 DISP TOTAL FW .....[t]:	81.037	81.627	82.446	84.062	86.355
10 LCB FWD OF RFP ....[m]:	-.184	-.425	-.668	-1.030	-1.417
12 KMT .....[m]:	3.273	3.280	3.285	3.297	3.312

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 2.500 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	86.530	87.162	88.017	89.688	92.024
5 DISP TOTAL FW .....[t]:	84.420	85.036	85.871	87.500	89.780
10 LCB FWD OF RFP ....[m]:	-.192	-.430	-.669	-1.026	-1.405
12 KMT .....[m]:	3.274	3.278	3.284	3.295	3.310

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 2.550 [m]			
2 TRIM ABOUT-STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	90.044	90.697	91.568	93.246	95.565
5 DISP TOTAL FW .....[t]:	87.847	88.485	89.335	90.972	93.235
10 LCB FWD OF RFP ....[m]:	-.200	-.435	-.671	-1.023	-1.394
12 KMT .....[m]:	3.274	3.278	3.283	3.293	3.308

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]	DRAFT RFP : 2.600 [m]			
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	93.601	94.272	95.157	96.846	99.137
5 DISP TOTAL FW .....[t]:	91.318	91.973	92.836	94.484	96.719
10 LCB FWD OF RFP ....[m]:	-.207	-.440	-.673	-1.019	-1.384
12 KMT .....[m]:	3.275	3.278	3.282	3.292	3.306

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.650 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	97.200	97.885	98.783	100.484	102.735
5 DISP TOTAL FW .....[t]:	94.829	95.498	96.374	98.034	100.229
10 LCB FWD OF RFP ....[m]:	-.215	-.445	-.675	-1.015	-1.373
12 KMT .....[m]:	3.276	3.278	3.282	3.290	3.304

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.700 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	100.835	101.535	102.443	104.148	106.373
5 DISP TOTAL FW .....[t]:	98.376	99.059	99.944	101.608	103.778
10 LCB FWD OF RFP ....[m]:	-.223	-.450	-.677	-1.011	-1.363
12 KMT .....[m]:	3.277	3.278	3.281	3.290	3.303

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.750 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	104.505	105.221	106.135	107.830	110.045
5 DISP TOTAL FW .....[t]:	101.957	102.654	103.546	105.200	107.361
10 LCB FWD OF RFP ....[m]:	-.230	-.455	-.678	-1.006	-1.352
12 KMT .....[m]:	3.279	3.279	3.282	3.289	3.302

HYDROSTATICS (SPLINE)	HEEL : 0.000 [Deg]		DRAFT RFP : 2.800 [m]		
2 TRIM ABOUT STERN ..[m]:	-.300	0.000	.300	.750	1.250
4 DISP TOTAL SW .....[t]:	108.209	108.939	109.860	111.533	113.720
5 DISP TOTAL FW .....[t]:	105.569	106.282	107.180	108.812	110.946
10 LCB FWD OF RFP ....[m]:	-.238	-.459	-.679	-1.001	-1.341
12 KMT .....[m]:	3.281	3.280	3.282	3.290	3.302

PILOT

Det norske Veritas program system for desktop computers

NV5001

HYDROSTATICS & INTACT STABILITY

PROGRAM VERSION : 08/87

CURRENT NV5000 MODEL NUMBER . . . . : 1
CURRENT NV5001 MODEL NUMBER . . . . : 1

I D E N T I F I C A T I O N

ID. : R/K GUSTAF DALÉN
DATE . . . . . : 900123
SIGNATURE . . . . . : FKABJJ

U N I T D E F I N I T I O N S

LENGTH UNIT	metres	[m]
LENGTH UNIT CONVERSION FACTOR	1.0000	[m/m]
WEIGHT UNIT	tonnes	[t]
WEIGHT UNIT CONVERSION FACTOR	1.0000	[t/t]

P R I N C I P A L D A T A

LENGTH BETWEEN PERPENDICULARS . . . . . :	15.740 m
BREADTH MOULDED . . . . . :	5.750 m
DEPTH MOULDED . . . . . :	3.230 m
DESIGN DRAUGHT . . . . . :	2.000 m
DIST. FROM ORIGIN TO AP . . . . . :	0.000 m

A X I S D E F I N I T I O N

POSITIVE DIRECTIONS ARE: X TO STARBOARD — POSITIVE TRIM BY THE STERN
Y FORWARD — POSITIVE HEEL TO STARBOARD
Z UPWARDS

R E F E R E N C E S

DEFINITION OF GLOBAL ORIGIN:

```
TRANSVERSE....: CL
LONGITUDINAL..: AP  ( 60 mm F.O. SPT #40 )
VERTICAL......: BL
```

OUTPUT REFERENCE POINT (RFP), DISTANCE FROM GLOBAL ORIGIN:

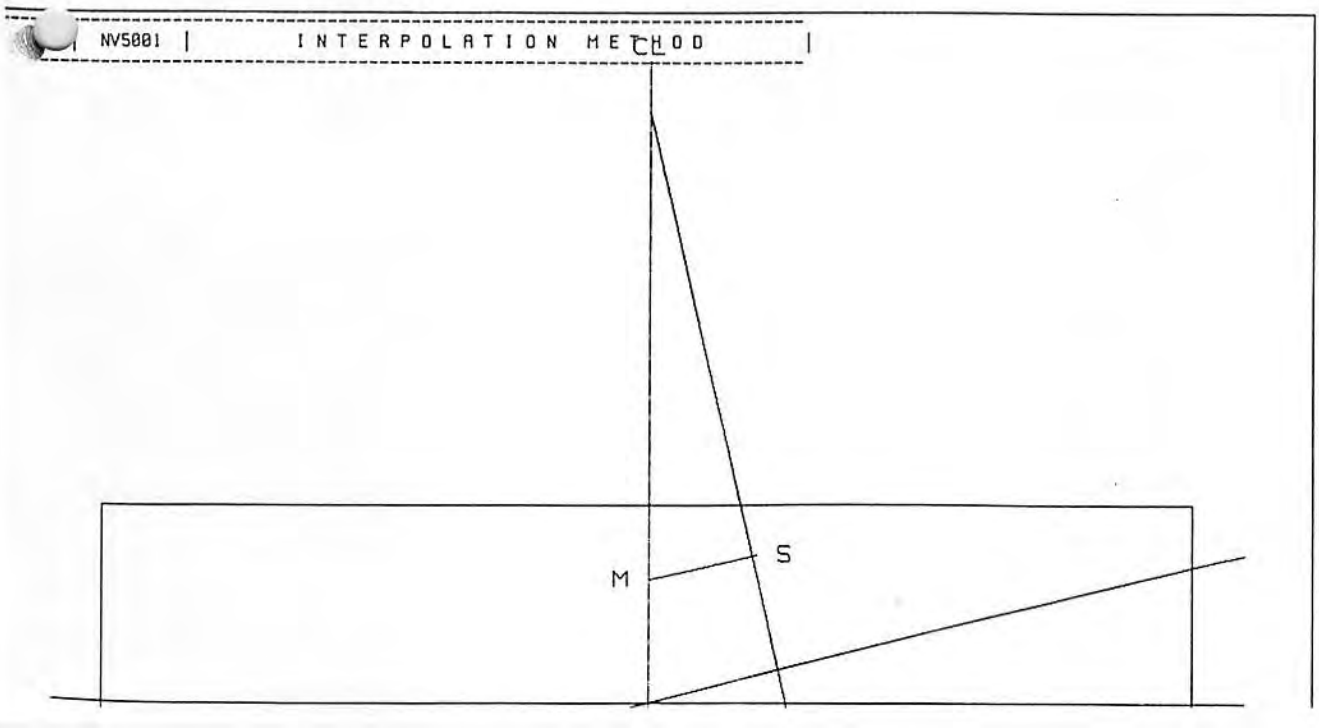
```
TRANSVERSE....:    0.000 m : CL
LONGITUDINAL..:    7.870 m : AMIDSHIPS
VERTICAL......:    0.000 m : BL
```

DRAUGHT EXTREME (above RFP):

```
VERTICAL......:    0.000 m : BL
```

A B B R E V I A T I O N S

```
 1 DRAUGHT EXTREME .:  Extreme draught at RFP.
 2 DRAUGHT RFP .....:  Draught above RFP.
 3 NORMAL DRAUGHT ..:  Draught measured normal to WP. at RFP.
 4 TRIM ............:  Trim to stern in m.

 5 DISPL TOTAL SW ..:  Total displacement in seawater.  (1.025 t/m3)
 6 DISPL TOTAL FW ..:  Total displacement in freshwater.  (1 t/m3)
 7 DISPL MLD .......:  Moulded volume of displacement.

 8 LCF FWD OF RFP ..:  Long. centre of flotation forward of RFP.

 9 TCB SBD OF RFP ..:  Transv. centre of bouyancy to starboard of RFP.
10 LCB FWD OF RFP ..:  Long. centre of bouyancy forward of RFP.
11 VCB ABOVE RFP ...:  Vert. centre of bouyancy above RFP.

12 KMT ............:  Position of transverse metacentre above RFP.

13 MS .............:  Stability lever about initial metacentre.
14 PN .............:  Stability lever about a given point P on
                      the vertical axis through the CB.

15 AREA : MS CURVE .:  The integral of MS curve from 0 to a given heel.
16 AREA : PN CURVE .:  The integral of PN curve from 0 to a given heel.

NOTE:  Calculation of stability levers are based on MOULDED lines.

FLOODING ANGLES ....:  '---' signifies below water at zero heel.
                       '+++' signifies above water at all angles of heel.
```


NV5001
INTERPOLATION METHOD
M
S

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.600 [m]

DRAFT EXTREME .....[m]:	1.600	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.422
DISP TOTAL SW .....[t]:	32.896	VCB ABOVE RFP .....[m]:	1.115
DISP TOTAL FW .....[t]:	32.093	WPA .....[m2]:	46.262
DISP MLD .....[m3]:	31.568	LCF FWD OF RFP .....[m]:	-.278
		KMT .....[m]:	3.114
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.114

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.538	1.553	.534	-.007	.0468	-.0005		
20.0	1.362	1.413	1.031	-.034	.1831	-.0047		
30.0	1.081	1.192	1.490	-.067	.4050	-.0122		
45.0	.555	.719	2.129	-.073	.8814	-.0307		
60.0	.032	.160	2.576	-.121	1.5017	-.0554		
75.0	-.510	-.472	2.683	-.325	2.2005	-.1077		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	34.8

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.650 [m]

DRAFT EXTREME .....[m]:	1.650	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.412
DISP TOTAL SW .....[t]:	35.324	VCB ABOVE RFP .....[m]:	1.150
DISP TOTAL FW .....[t]:	34.463	WPA .....[m2]:	47.842
DISP MLD .....[m3]:	33.920	LCF FWD OF RFP .....[m]:	-.290
		KMT .....[m]:	3.145
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.145

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.591	1.605	.540	-.006	.0460	-.0018		
20.0	1.415	1.466	1.042	-.033	.1841	-.0056		
30.0	1.133	1.244	1.504	-.069	.4080	-.0134		
45.0	.601	.773	2.123	-.101	.8872	-.0341		
60.0	.082	.216	2.538	-.186	1.5018	-.0709		
75.0	-.437	-.406	2.662	-.376	2.1924	-.1388		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	33.5

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.700 [m]

DRAFT EXTREME .....[m]:	1.700	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.404
DISP TOTAL SW .....[t]:	37.834	VCB ABOVE RFP .....[m]:	1.185
DISP TOTAL FW .....[t]:	36.911	WPA .....[m2]:	49.379
DISP MLD .....[m3]:	36.351	LCF FWD OF RFP .....[m]:	-.302
		KMT .....[m]:	3.172
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.172

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.643	1.658	.545	-.005	.0450	-.0032		
20.0	1.468	1.519	1.053	-.032	.1846	-.0067		
30.0	1.185	1.296	1.516	-.070	.4105	-.0144		
45.0	.652	.824	2.118	-.125	.8924	-.0367		
60.0	.133	.273	2.503	-.244	1.5016	-.0843		
75.0	-.364	-.341	2.639	-.425	2.1839	-.1670		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	32.3

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.750 [m]

DRAFT EXTREME .....[m]:	1.750	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.398
DISP TOTAL SW .....[t]:	40.422	VCB ABOVE RFP .....[m]:	1.220
DISP TOTAL FW .....[t]:	39.436	WPA .....[m2]:	50.882
DISP MLD .....[m3]:	38.859	LCF FWD OF RFP .....[m]:	-.314
		KMT .....[m]:	3.195
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.195

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.696	1.710	.550	-.005	.0439	-.0046		
20.0	1.521	1.572	1.061	-.031	.1847	-.0079		
30.0	1.238	1.349	1.528	-.070	.4127	-.0153		
45.0	.706	.874	2.111	-.148	.8970	-.0386		
60.0	.186	.332	2.471	-.296	1.5014	-.0959		
75.0	-.289	-.277	2.614	-.471	2.1749	-.1929		

FLOODING ANGLES [Deg]

DFP. NO.:	DECK
ANGLE :	31.0

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.800 [m]

DRAFT EXTREME .....[m]:	1.800	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.393
DISP TOTAL SW .....[t]:	43.087	VCB ABOVE RFP .....[m]:	1.255
DISP TOTAL FW .....[t]:	42.037	WPA .....[m2]:	52.325
DISP MLD .....[m3]:	41.442	LCF FWD OF RFP .....[m]:	-.325
		KMT .....[m]:	3.213
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.213

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.748	1.762	.554	-.004	.0432	-.0056		
20.0	1.574	1.625	1.069	-.029	.1852	-.0086		
30.0	1.291	1.402	1.538	-.068	.4145	-.0160		
45.0	.763	.924	2.105	-.167	.9011	-.0399		
60.0	.239	.392	2.442	-.340	1.5009	-.1056		
75.0	-.214	-.214	2.589	-.514	2.1657	-.2157		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	29.8

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.850 [m]

DRAFT EXTREME .....[m]:	1.850	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.389
DISP TOTAL SW .....[t]:	45.825	VCB ABOVE RFP .....[m]:	1.289
DISP TOTAL FW .....[t]:	44.707	WPA .....[m2]:	53.714
DISP MLD .....[m3]:	44.096	LCF FWD OF RFP .....[m]:	-.343
		KMT .....[m]:	3.228
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.228

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.795	1.808	.557	-.004	.0462	-.0029		
20.0	1.621	1.671	1.076	-.028	.1891	-.0056		
30.0	1.343	1.455	1.548	-.066	.4157	-.0167		
45.0	.822	.975	2.098	-.184	.9044	-.0410		
60.0	.297	.449	2.417	-.379	1.5000	-.1138		
75.0	-.159	-.140	2.565	-.553	2.1569	-.2354		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	28.6

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.900 [m]

DRAFT EXTREME .....[m]:	1.900	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.386
DISP TOTAL SW .....[t]:	48.632	VCB ABOVE RFP .....[m]:	1.323
DISP TOTAL FW .....[t]:	47.446	WPA .....[m2]:	55.095
DISP MLD .....[m3]:	46.817	LCF FWD OF RFP .....[m]:	-.365
		KMT .....[m]:	3.241
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.241

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.842	1.854	.559	-.004	.0491	-.0002		
20.0	1.668	1.718	1.081	-.027	.1929	-.0026		
30.0	1.395	1.506	1.557	-.063	.4177	-.0165		
45.0	.883	1.028	2.091	-.201	.9072	-.0422		
60.0	.363	.499	2.394	-.413	1.4989	-.1217		
75.0	-.107	-.070	2.538	-.593	2.1484	-.2540		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	27.5

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 1.950 [m]

DRAFT EXTREME .....[m]:	1.950	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.386
DISP TOTAL SW .....[t]:	51.507	VCB ABOVE RFP .....[m]:	1.357
DISP TOTAL FW .....[t]:	50.251	WPA .....[m2]:	56.472
DISP MLD .....[m3]:	49.605	LCF FWD OF RFP .....[m]:	-.387
		KMT .....[m]:	3.255
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.255

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.894	1.906	.561	-.004	.0483	-.0011		
20.0	1.721	1.770	1.087	-.026	.1929	-.0034		
30.0	1.446	1.549	1.564	-.064	.4226	-.0135		
45.0	.945	1.080	2.084	-.217	.9093	-.0440		
60.0	.434	.545	2.373	-.445	1.4974	-.1300		
75.0	-.040	-.020	2.508	-.636	2.1397	-.2727		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	26.5

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.000 [m]	
DRAFT EXTREME .....[m]:	2.000	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.387
DISP TOTAL SW .....[t]:	54.452	VCB ABOVE RFP .....[m]:	1.391
DISP TOTAL FW .....[t]:	53.124	WPA .....[m2]:	57.838
DISP MLD .....[m3]:	52.461	LCF FWD OF RFP .....[m]:	-.409
		KMT .....[m]:	3.265
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.265

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.946	1.958	.563	-.004	.0473	-.0023		
20.0	1.773	1.823	1.092	-.025	.1925	-.0044		
30.0	1.497	1.591	1.569	-.063	.4276	-.0098		
45.0	1.009	1.132	2.076	-.232	.9109	-.0453		
60.0	.508	.593	2.354	-.473	1.4954	-.1369		
75.0	.027	.031	2.478	-.676	2.1309	-.2888		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	25.5

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.050 [m]

DRAFT EXTREME .....[m]:	2.050	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.389
DISP TOTAL SW .....[t]:	57.464	VCB ABOVE RFP .....[m]:	1.424
DISP TOTAL FW .....[t]:	56.062	WPA .....[m2]:	59.131
DISP MLD .....[m3]:	55.383	LCF FWD OF RFP .....[m]:	-.431
		KMT .....[m]:	3.269
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.269

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	1.997	2.010	.564	-.003	.0466	-.0031		
20.0	1.825	1.876	1.096	-.022	.1920	-.0052		
30.0	1.552	1.640	1.573	-.061	.4297	-.0083		
45.0	1.077	1.183	2.068	-.244	.9119	-.0455		
60.0	.587	.644	2.334	-.497	1.4932	-.1413		
75.0	.093	.087	2.448	-.709	2.1222	-.3007		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	24.4

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.100 [m]	
DRAFT EXTREME .....[m]:	2.100	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.392
DISP TOTAL SW .....[t]:	60.547	VCB ABOVE RFP .....[m]:	1.457
DISP TOTAL FW .....[t]:	59.070	WPA .....[m2]:	60.344
DISP MLD .....[m3]:	58.374	LCF FWD OF RFP .....[m]:	-.453
		KMT .....[m]:	3.272
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.272

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.049	2.061	.565	-.003	.0457	-.0040		
20.0	1.878	1.928	1.101	-.019	.1918	-.0055		
30.0	1.609	1.690	1.575	-.061	.4306	-.0078		
45.0	1.148	1.235	2.058	-.255	.9122	-.0461		
60.0	.666	.695	2.317	-.516	1.4896	-.1463		
75.0	.160	.143	2.419	-.741	2.1139	-.3111		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	23.2

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.150 [m]

DRAFT EXTREME .....[m]:	2.150	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.397
DISP TOTAL SW .....[t]:	63.695	VCB ABOVE RFP .....[m]:	1.491
DISP TOTAL FW .....[t]:	62.141	WPA .....[m2]:	61.521
DISP MLD .....[m3]:	61.428	LCF FWD OF RFP .....[m]:	-.472
		KMT .....[m]:	3.275
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.275

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.101	2.113	.566	-.002	.0449	-.0048		
20.0	1.929	1.973	1.104	-.016	.1938	-.0037		
30.0	1.668	1.739	1.575	-.062	.4315	-.0072		
45.0	1.223	1.285	2.048	-.267	.9117	-.0475		
60.0	.734	.755	2.305	-.532	1.4862	-.1513		
75.0	.233	.196	2.395	-.769	2.1055	-.3217		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	22.1

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.200 [m]	
DRAFT EXTREME .....[m]:	2.200	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.402
DISP TOTAL SW .....[t]:	66.900	VCB ABOVE RFP .....[m]:	1.524
DISP TOTAL FW .....[t]:	65.268	WPA .....[m2]:	62.641
DISP MLD .....[m3]:	64.539	LCF FWD OF RFP .....[m]:	-.487
		KMT .....[m]:	3.277
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.277

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.152	2.164	.567	-.002	.0442	-.0056		
20.0	1.979	2.017	1.107	-.014	.1963	-.0013		
30.0	1.728	1.789	1.574	-.065	.4323	-.0067		
45.0	1.299	1.337	2.038	-.279	.9107	-.0491		
60.0	.802	.817	2.292	-.546	1.4827	-.1558		
75.0	.312	.250	2.375	-.791	2.0969	-.3320		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	21.1

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.250 [m]	
DRAFT EXTREME .....[m]:	2.250	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.406
DISP TOTAL SW .....[t]:	70.155	VCB ABOVE RFP .....[m]:	1.556
DISP TOTAL FW .....[t]:	68.444	WPA .....[m2]:	63.700
DISP MLD .....[m3]:	67.699	LCF FWD OF RFP .....[m]:	-.502
		KMT .....[m]:	3.278
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.278

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.203	2.216	.568	-.001	.0436	-.0062		
20.0	2.031	2.069	1.110	-.011	.1957	-.0020		
30.0	1.787	1.841	1.570	-.069	.4327	-.0065		
45.0	1.369	1.396	2.029	-.289	.9091	-.0510		
60.0	.883	.874	2.279	-.560	1.4778	-.1613		
75.0	.398	.303	2.356	-.810	2.0879	-.3419		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	20.0

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.300 [m]	
DRAFT EXTREME .....[m]:	2.300	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.410
DISP TOTAL SW .....[t]:	73.460	VCB ABOVE RFP .....[m]:	1.589
DISP TOTAL FW .....[t]:	71.668	WPA .....[m2]:	64.717
DISP MLD .....[m3]:	70.906	LCF FWD OF RFP .....[m]:	-.516
		KMT .....[m]:	3.279
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.279

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.254	2.267	.568	-.001	.0431	-.0067		
20.0	2.083	2.120	1.112	-.009	.1951	-.0026		
30.0	1.848	1.892	1.566	-.074	.4329	-.0064		
45.0	1.440	1.455	2.018	-.300	.9071	-.0534		
60.0	.970	.933	2.265	-.575	1.4726	-.1670		
75.0	.484	.357	2.341	-.826	2.0790	-.3514		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	18.9

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.350 [m]	
DRAFT EXTREME .....[m]:	2.350	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.415
DISP TOTAL SW .....[t]:	76.815	VCB ABOVE RFP .....[m]:	1.621
DISP TOTAL FW .....[t]:	74.941	WPA .....[m2]:	65.704
DISP MLD .....[m3]:	74.164	LCF FWD OF RFP .....[m]:	-.530
		KMT .....[m]:	3.280
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.280

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.305	2.318	.569	-.001	.0425	-.0074		
20.0	2.135	2.166	1.114	-.008	.1963	-.0015		
30.0	1.911	1.944	1.559	-.081	.4328	-.0066		
45.0	1.517	1.511	2.007	-.313	.9048	-.0559		
60.0	1.059	.990	2.252	-.588	1.4667	-.1733		
75.0	.565	.418	2.329	-.839	2.0704	-.3607		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	17.9

CROSS-CURVES (SPLINE) | FREE TO TRIM | SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION : | TRIM : 0.000 [m] | DRAFT RFP : 2.400 [m]

DRAFT EXTREME .....[m]:	2.400	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.420
DISP TOTAL SW .....[t]:	80.218	VCB ABOVE RFP .....[m]:	1.653
DISP TOTAL FW .....[t]:	78.262	WPA .....[m2]:	66.637
DISP MLD .....[m3]:	77.468	LCF FWD OF RFP .....[m]:	-.543
		KMT .....[m]:	3.281
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.281

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.356	2.369	.569	-.001	.0421	-.0077		
20.0	2.188	2.213	1.114	-.008	.1974	-.0004		
30.0	1.976	1.995	1.551	-.089	.4324	-.0072		
45.0	1.598	1.569	1.994	-.326	.9017	-.0592		
60.0	1.149	1.049	2.240	-.601	1.4600	-.1804		
75.0	.646	.481	2.320	-.849	2.0611	-.3706		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	16.9

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.450 [m]	
DRAFT EXTREME .....[m]:	2.450	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.425
DISP TOTAL SW .....[t]:	83.668	VCB ABOVE RFP .....[m]:	1.685
DISP TOTAL FW .....[t]:	81.627	WPA .....[m2]:	67.497
DISP MLD .....[m3]:	80.818	LCF FWD OF RFP .....[m]:	-.553
		KMT .....[m]:	3.280
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.280

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.402	2.411	.569	0.000	.0460	-.0039		
20.0	2.242	2.261	1.113	-.009	.1978	0.0000		
30.0	2.043	2.047	1.542	-.098	.4315	-.0079		
45.0	1.681	1.626	1.981	-.338	.8977	-.0629		
60.0	1.241	1.110	2.229	-.611	1.4526	-.1872		
75.0	.736	.540	2.311	-.857	2.0511	-.3797		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	15.9

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.500 [m]

DRAFT EXTREME .....[m]:	2.500	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.430
DISP TOTAL SW .....[t]:	87.162	VCB ABOVE RFP .....[m]:	1.717
DISP TOTAL FW .....[t]:	85.036	WPA .....[m2]:	68.307
DISP MLD .....[m3]:	84.211	LCF FWD OF RFP .....[m]:	-.559
		KMT .....[m]:	3.278
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.278

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.448	2.453	.569	0.000	.0498	0.0000		
20.0	2.298	2.311	1.110	-.012	.1976	-.0001		
30.0	2.111	2.100	1.531	-.108	.4303	-.0089		
45.0	1.766	1.685	1.968	-.350	.8930	-.0672		
60.0	1.335	1.172	2.218	-.621	1.4447	-.1944		
75.0	.834	.599	2.303	-.863	2.0408	-.3889		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	14.9

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.550 [m]

DRAFT EXTREME .....[m]:	2.550	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.435
DISP TOTAL SW .....[t]:	90.697	VCB ABOVE RFP .....[m]:	1.749
DISP TOTAL FW .....[t]:	88.485	WPA .....[m2]:	69.089
DISP MLD .....[m3]:	87.645	LCF FWD OF RFP .....[m]:	-.565
		KMT .....[m]:	3.278
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.278

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.499	2.503	.569	0.000	.0494	-.0004		
20.0	2.354	2.361	1.105	-.016	.1975	-.0002		
30.0	2.181	2.154	1.519	-.120	.4286	-.0105		
45.0	1.852	1.745	1.954	-.364	.8878	-.0723		
60.0	1.431	1.236	2.207	-.632	1.4365	-.2025		
75.0	.939	.658	2.296	-.871	2.0297	-.3998		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	13.8

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.600 [m]	
DRAFT EXTREME .....[m]:	2.600	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.440
DISP TOTAL SW .....[t]:	94.272	VCB ABOVE RFP .....[m]:	1.780
DISP TOTAL FW .....[t]:	91.973	WPA .....[m2]:	69.839
DISP MLD .....[m3]:	91.117	LCF FWD OF RFP .....[m]:	-.569
		KMT .....[m]:	3.278
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.278

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.549	2.554	.570	.001	.0488	-.0010		
20.0	2.412	2.411	1.098	-.023	.1974	-.0003		
30.0	2.252	2.209	1.506	-.133	.4266	-.0125		
45.0	1.940	1.807	1.940	-.378	.8820	-.0781		
60.0	1.532	1.299	2.196	-.643	1.4275	-.2113		
75.0	1.050	.717	2.288	-.878	2.0180	-.4115		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	12.8

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.650 [m]

DRAFT EXTREME .....[m]:	2.650	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.445
DISP TOTAL SW .....[t]:	97.885	VCB ABOVE RFP .....[m]:	1.812
DISP TOTAL FW .....[t]:	95.498	WPA .....[m2]:	70.549
DISP MLD .....[m3]:	94.627	LCF FWD OF RFP .....[m]:	-.572
		KMT .....[m]:	3.278
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.278

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.600	2.605	.570	.001	.0484	-.0014		
20.0	2.472	2.462	1.090	-.031	.1970	-.0007		
30.0	2.326	2.265	1.491	-.148	.4242	-.0149		
45.0	2.031	1.871	1.925	-.393	.8756	-.0845		
60.0	1.639	1.363	2.184	-.654	1.4176	-.2214		
75.0	1.168	.775	2.282	-.885	2.0057	-.4238		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	11.7

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.700 [m]	
DRAFT EXTREME .....[m]:	2.700	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.450
DISP TOTAL SW .....[t]:	101.535	VCB ABOVE RFP .....[m]:	1.843
DISP TOTAL FW .....[t]:	99.059	WPA .....[m2]:	71.228
DISP MLD .....[m3]:	98.173	LCF FWD OF RFP .....[m]:	-.574
		KMT .....[m]:	3.278
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.278

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.650	2.656	.570	.001	.0479	-.0019		
20.0	2.533	2.514	1.081	-.040	.1964	-.0013		
30.0	2.402	2.322	1.476	-.163	.4214	-.0178		
45.0	2.125	1.934	1.909	-.409	.8686	-.0916		
60.0	1.751	1.426	2.173	-.666	1.4068	-.2324		
75.0	1.292	.833	2.275	-.891	1.9929	-.4369		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	10.7

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]	
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.750 [m]	
DRAFT EXTREME .....[m]:	2.750	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.455
DISP TOTAL SW .....[t]:	105.221	VCB ABOVE RFP .....[m]:	1.874
DISP TOTAL FW .....[t]:	102.654	WPA .....[m2]:	71.879
DISP MLD .....[m3]:	101.754	LCF FWD OF RFP .....[m]:	-.575
		KMT .....[m]:	3.279
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.279

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.700	2.706	.570	.001	.0475	-.0023		
20.0	2.597	2.567	1.070	-.052	.1956	-.0021		
30.0	2.480	2.380	1.459	-.180	.4181	-.0212		
45.0	2.226	1.997	1.892	-.426	.8610	-.0994		
60.0	1.868	1.491	2.161	-.679	1.3952	-.2443		
75.0	1.424	.892	2.269	-.898	1.9789	-.4514		

FLOODING ANGLES [Deg]

DFP. NO.:	DECK
ANGLE :	9.6

CROSS-CURVES (SPLINE)	FREE TO TRIM	SPEC. GRAVITY : 1.025 [t/m3]
UPRIGHT CONDITION :	TRIM : 0.000 [m]	DRAFT RFP : 2.800 [m]

DRAFT EXTREME .....[m]:	2.800	TCB SBD OF RFP .....[m]:	0.000
		LCB FWD OF RFP .....[m]:	-.459
DISP TOTAL SW .....[t]:	108.939	VCB ABOVE RFP .....[m]:	1.905
DISP TOTAL FW .....[t]:	106.282	WPA .....[m2]:	72.501
DISP MLD .....[m3]:	105.366	LCF FWD OF RFP .....[m]:	-.575
		KMT .....[m]:	3.280
'PN' SBD OF RFP .....[m]:	0.000	'MS' SBD OF RFP .....[m]:	0.000
'PN' ABOVE RFP .....[m]:	0.000	'MS' ABOVE RFP .....[m]:	3.280

HEEL	NORM. DRAFT [m]		STAB. LEVER [m]		AREA [m*rad]		MIN. FREEB.	DFP.
[Deg]	AT AP	AT FP	PN	MS	PN	MS	[m]	NO.
10.0	2.751	2.756	.570	.001	.0473	-.0025		
20.0	2.663	2.620	1.057	-.065	.1946	-.0033		
30.0	2.561	2.439	1.442	-.198	.4143	-.0252		
45.0	2.331	2.060	1.875	-.445	.8526	-.1082		
60.0	1.992	1.557	2.149	-.692	1.3828	-.2575		
75.0	1.564	.951	2.263	-.905	1.9639	-.4675		

F L O O D I N G A N G L E S [Deg]

DFP. NO.:	DECK
ANGLE :	8.6

Krängningsrapport för livräddningskryssaren "M/S GUSTAF DALÉN"

Krängningsprovet utfördes 1990-12-04 vid Djupviks varv.

Fartyget låg fritt från kaj med slack i samtliga förtöjningsändar.

Det var helt vindstilla och inga vågor.

Följande personer var bl.a. närvarande:

Anders Wallgren	Sjöräddningssällskapet
Mats Berggren	Sjöfartsverket
Sven Forsén	Sjöfartsverket
Stefan Johnsson	Fartygskonstruktioner AB

Djupgåendeavläsningar samt beräkning av deplacement

Uppmätta fribord:

Akter	: 1.225 m
Midskepps spant 16 SB	: 1.060 m
Midskepps spant 16 BB	: 1.025 m
För	: 2.275 m

Dessa fribord motsvarar:

Medeldjupgående d_m = 2.30 m över baslinjen
Trim t = 0.68 m (akterligt)

Vattnets densitet uppmättes till 1.022 ton/m^3

Hydrostatiska data ger deplacement, långskeppstyngdpunkt och tvärskepps metacentrum:

Depl.= 73.71*1.022 = 75.33 ton
LCB = -0.981 m
KM_T = 3.301 m

Avgående vikter

Brännoljetankarna var fulla. Fw tank förut var full.

	Vikt ton	LCG m	VCG m	I ton*m
BRO sidotank SB	4.8	-1.80	2.20	-
BRO sidotank BB	5.1	-2.20	2.20	-
BRO bottentank	3.4	1.60	0.70	-
FW tank förut	0.6	5.60	2.00	-
FW tank akter	1.0	-5.20	0.80	1.3
Diverse i salong	0.05	-2.00	4.60	
Div. i nedre salong	0.13	1.40	1.40	
Div. i styrhytt	0.05	0.50	5.00	
Krängn.vikter	1.06	2.60	4.25	
2 man ombord	0.13	-4.00	1.60	
Totalt	16.32	-0.85	1.93	1.3

Korrektion för fria vätskeytor GG'= 1.3/75.33= 0.017 m

Tillkommande vikter

	Vikt ton	LCG m	VCG m
HIAB kran	0.47	3.00	5.00
Ankare	0.11	8.10	3.30
Totalt	0.58	3.97	4.68

Krängande moment, pendelutslag och metacenterhöjd

2 st krängningsvikter användes:

Vikt A : 500 kg placerad i utgångsläget på SB sida
Vikt B : 564 kg - " - - " - - " - BB sida

En pendel användes. Pendellängd = 2645 mm.

Metacenterhöjden beräknas enligt:

$$G'M = \frac{W * d * l}{D * a}$$

där W = Krängningsvikt i ton
d = Viktsförflyttning
l = Pendellängd = 2645 mm
D = Deplacement = 75.33 ton
a = Pendelutslag i millimeter

Förf. No.	VIKT	Flyttas	W ton	a mm	d m	G'M m	Fi (°)
1	A	SB-BB	0.500	92	4.18	0.798	1.99
2	A	BB-SB	0.500	92	4.18	0.798	1.99
3	B	BB-SB	0.564	105	4.17	0.786	2.27
4	A+B	SB-BB	1.064	199	4.17	0.783	4.30
5	B	BB-SB	0.564	103	4.10	0.788	2.23
6	A	BB-SB	0.500	95	4.23	0.782	2.06
7	A+B	SB-BB	1.064	198	4.14	0.781	4.28
8	A	BB-SB	0.500	96	4.18	0.764	2.08

Medelvärde G'M = 0.785 m

Beräkning av vertikala tyngdpunktscentrum

KM =	3.301 m	(sida 1)
G'M =	0.785 m	(sida 3)
KG' =	2.516 m	
GG' =	0.017 m	(sida 2)
KG =	2.499 m	

Beräkning av lätt fartyg

	Vikt ton	LCG m	KG m
Krängningskondition	75.33	-0.981	2.499
Tillkommande vikter (sida 3)	+ 0.58	3.97	4.68
Avgående vikter(sida 2)	-16.32	-0.85	1.93
Lätt Fartyg	59.6	-0.97	2.68

Summering:

Deplacement = 59.6 ton
Tyngdpunkt långskepps LCG = 0.97 m akter om L/2
Tyngdpunkt över baslinjen KG = 2.68 m

*) L/2 är placerad 7.87 m för om AP dvs 0.33 för om spant 21

FARTYGSKONSTRUKTIONER AB

Stefan Johnsson

Rederi: ISFJORD MARINE AB

KONDITION Nr 1 :LÄTT FARTYG

TRANSPORTSTYRELSEN
Göteborgs sjöfartsinspektionsområde
Ink. 2014 -01- 13
Dnr: TSS 2013-413

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
DÖDVIKT	2.00	6.20	1.25	0.00
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	61.60	-.74	2.63	0.00

Djupgående medel över baslinjen d= 2.10 m
Djupgående för över baslinjen df= 1.89 m
Djupgående akter över baslinjen da= 2.32 m
Totalt trim t= .43 m

HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.39 m
Långskepps metacenter höjd KML= 15.15 m
Flytcentrum från L/2 LCF= -.46 m

TRANSPORT STYRELSEN
Gothenburg Maritime Inspectorate Office
GODKÄND/APPROVED
Med avseende på/With respect to
Stabilitet
Under förutsättning att givna anmärkningar iakttages
Upon condition that the remarks made are observed
Name
Date 14/1-14 Dnr. TSS 2013-413

Skickat in 2 x ex.

Kompl. lastkonditioner för granskning.

Göteborg 16/1-14

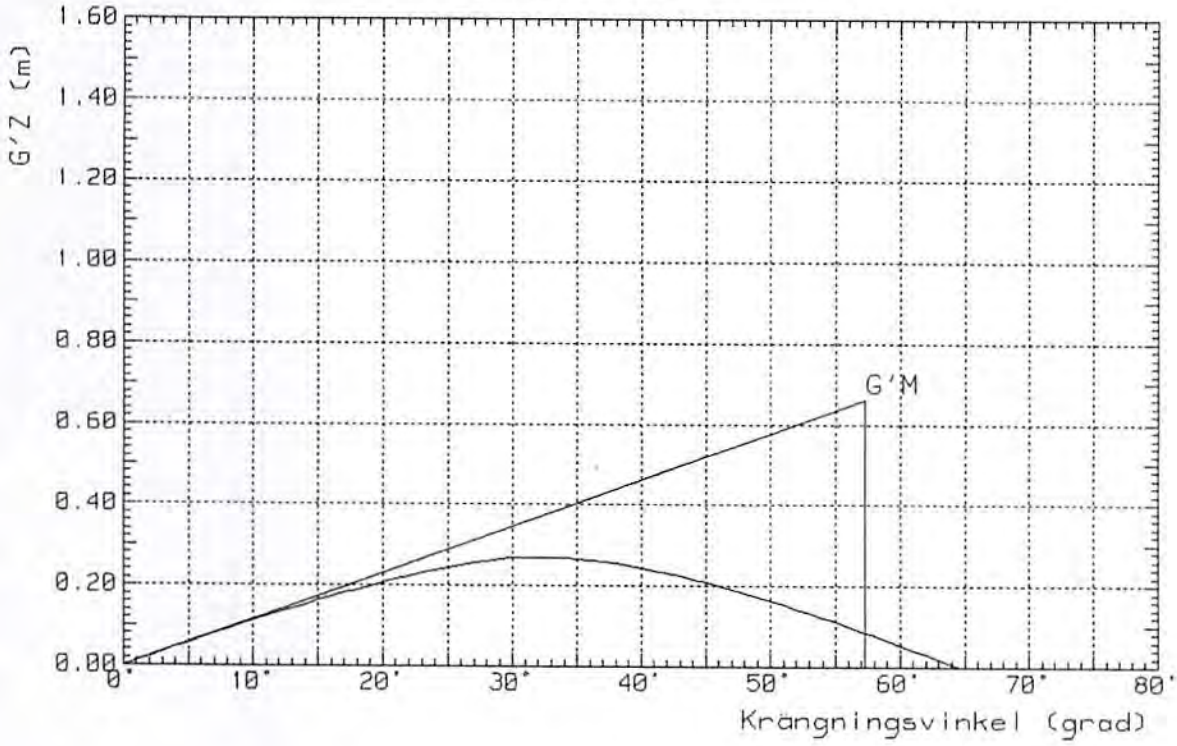
KONDITION Nr 1 :LÄTT FARTYG

*** STABILITET ***

Tvärskepps metacentrum över baslinjen	KMT= 3.29 m
Viktstyngdpunkt över baslinjen	KG = 2.63 m
Tvärskepps metacenterhöjd	GM = .66 m
Reduktion för fria vätskeytor	GG'= 0.00 m
Reducerad metacenterhöjd	G'M= .66 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.003	.114	.112
20	-.018	.225	.207
30	-.061	.330	.269
45	-.256	.466	.210
60	-.518	.571	.053
75	-.744	.637	-.107

G'Z KURVA

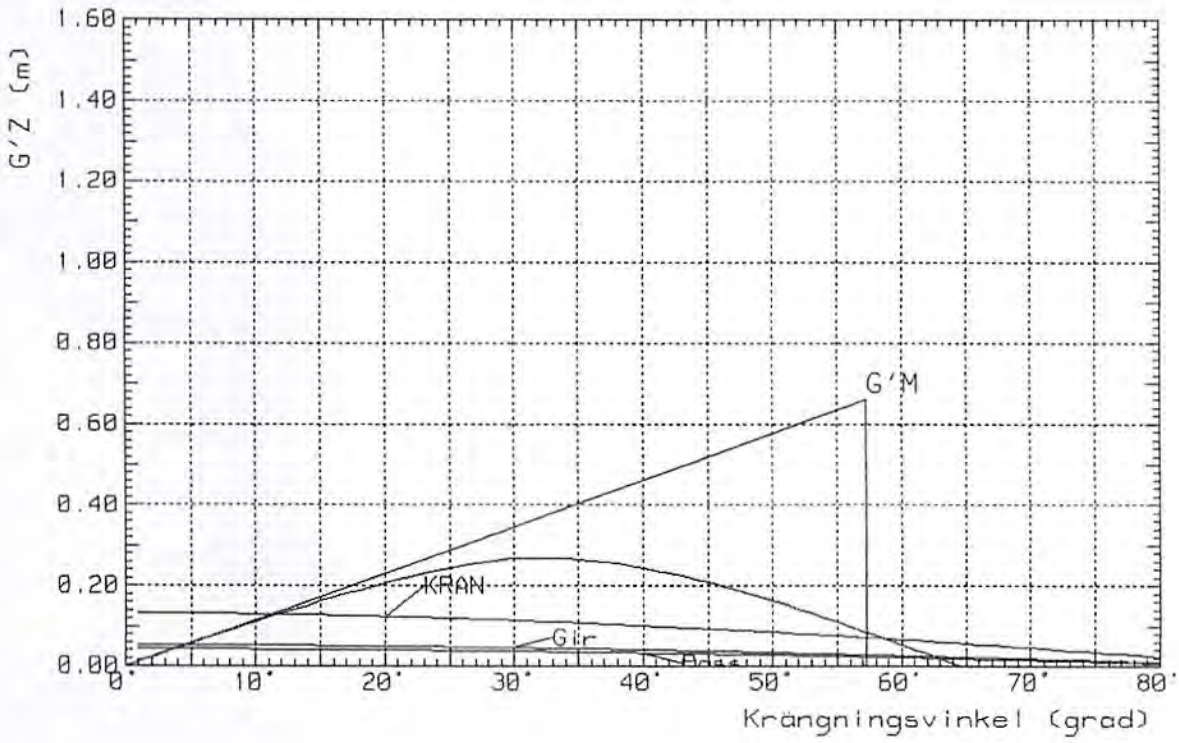


KONDITION Nr 1 :LÄTT FARTYG

*** STABILITETS KRAV ***

	Verkligt		Krav
Dynamisk hävarm 0-30°	.080		.055
Dynamisk hävarm 0-40°	.126		.090
Dynamisk hävarm 30-40°	.046		.030
G'Z värde för Fi>=30°	.270		.200
Vinkel för G'Z-max	31.7		25.0
G'M-min	.659		.150
Krängande moment: Passagerare	2.6	ton*m	
Krängningsvinkel:Passagerare	3.734		10.000
Krängande moment: Gir	3.3	ton*m	
Krängningsvinkel:Gir	4.634		10.000
Krängande moment: KRAN	8	ton*m	
Krängningsvinkel	12.0	grad	

G'Z KURVA



KONDITION Nr 2 :100 % BUNKER

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
BRO SIDOTANK SB	4.76	-1.80	2.20	.19
BRO SIDOTANK BB	5.10	-2.20	2.20	.21
BRO BOTTENTANK	3.40	1.60	.70	0.00
FV TANK FÖR	.60	5.60	2.00	.05
FV TANK AKTER (TRIMTANK)	1.40	-5.20	.80	0.00
BESÄTTNING 3 MAN	.24	0.00	4.50	0.00
PASSAGERARE 12 PERS	.96	0.00	4.50	0.00
DÖDVIKT	18.46	-.32	1.86	.45
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	78.06	-.82	2.49	.45

Djupgående medel över baslinjen d= 2.35 m
Djupgående för över baslinjen df= 2.09 m
Djupgående akter över baslinjen da= 2.61 m
Totalt trim t= .52 m

HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.42 m
Långskepps metacenter höjd KML= 14.58 m
Flytcentrum från L/2 LCF= -.54 m

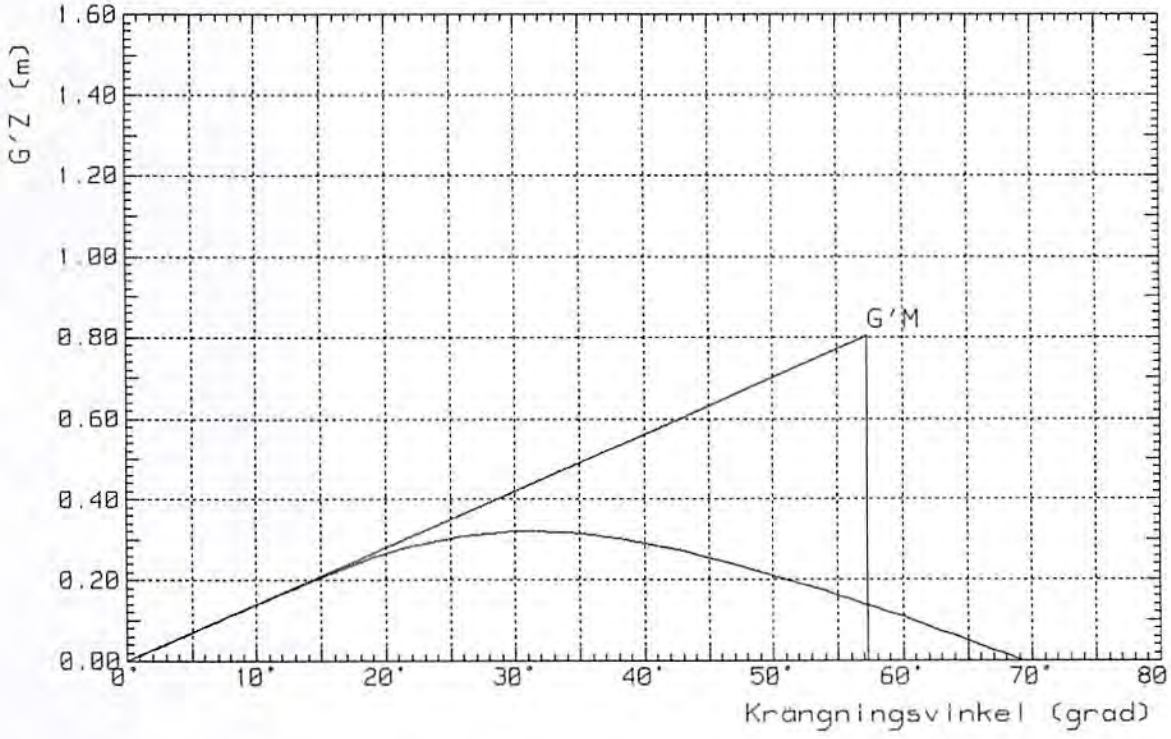
KONDITION Nr 2 :100 % BUNKER

*** STABILITET ***

Tvärskepps metacentrum över baslinjen	KMT=	3.29 m
Viktstyngdpunkt över baslinjen	KG =	2.49 m
Tvärskepps metacenterhöjd	GM =	.81 m
Reduktion för fria vätskeytor	GG'=	.01 m
Reducerad metacenterhöjd	G'M=	.80 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.001	.139	.138
20	-.008	.275	.267
30	-.081	.402	.320
45	-.313	.568	.255
60	-.588	.695	.107
75	-.839	.776	-.064

G'Z KURVA

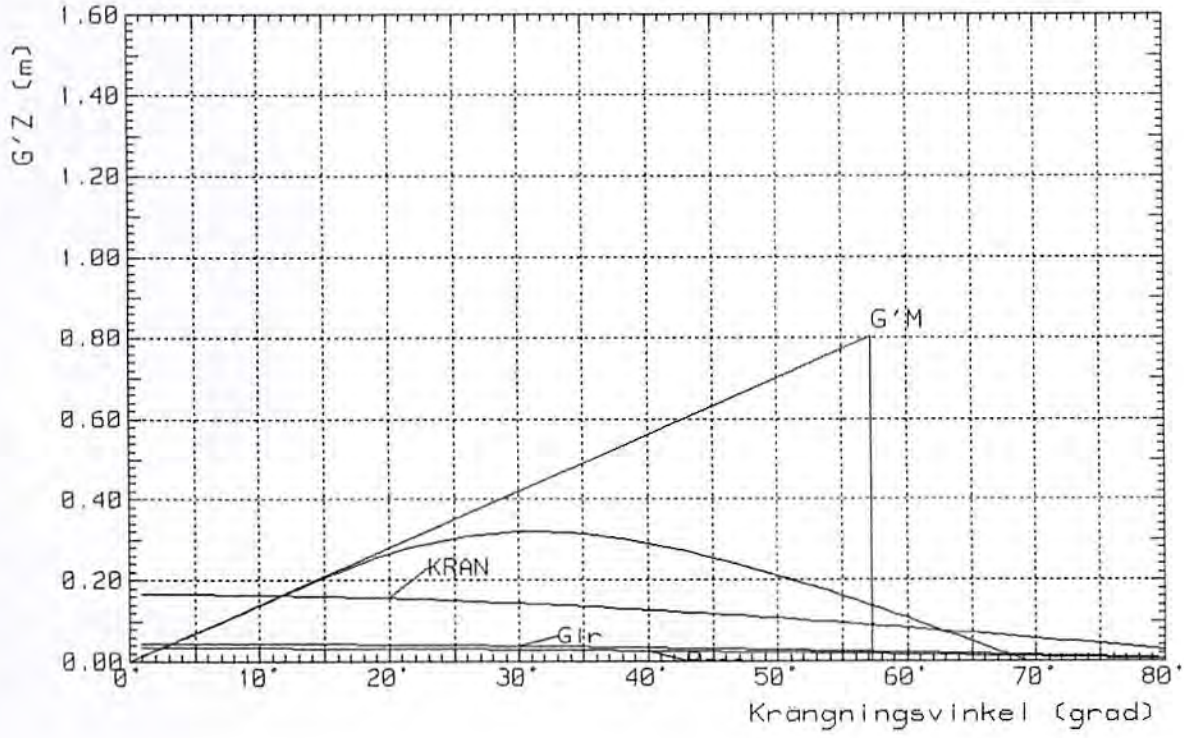


KONDITION Nr 2 :100 % BUNKER

*** STABILITETS KRAV ***

	Verkligt		Krav
Dynamisk hävarm 0-30°	.100		.055
Dynamisk hävarm 0-40°	.155		.090
Dynamisk hävarm 30-40°	.054		.030
G'Z värde för Fi>=30°	.321		.200
Vinkel för G'Z-max	30.8		25.0
G'M-min	.803		.150
Krängande moment: Passagerare	2.6	ton*m	
Krängningsvinkel:Passagerare	2.411		10.000
Krängande moment: Gir	3.5	ton*m	
Krängningsvinkel:Gir	3.151		10.000
Krängande moment: KRAN	13	ton*m	
Krängningsvinkel	12.0	grad	

G'Z KURVA



KONDITION Nr 3 :10 % BUNKER

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
BRO SIDOTANK SB 10%	.48	-1.80	1.40	.10
BRO SIDOTANK BB 10%	.51	-2.20	1.40	.10
BRO BOTTENTANK 10%	.34	1.60	.50	1.00
FV TANK FÖR	.06	5.60	2.00	.05
FV TANK AKTER (TRIMTANK)	1.40	-5.20	.80	0.00
BESÄTTNING 3 MAN	.24	0.00	4.50	0.00
PASSAGERARE 12 PERS	.96	0.00	4.50	0.00
DÖDVIKT	5.99	.67	1.79	1.25
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	65.59	-.82	2.60	1.25

Djupgående medel över baslinjen d= 2.16 m
Djupgående för över baslinjen df= 1.90 m
Djupgående akter över baslinjen da= 2.43 m
Totalt trim t= .53 m

HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.40 m
Långskepps metacenter höjd KML= 15.02 m
Flytcentrum från L/2 LCF= -.48 m

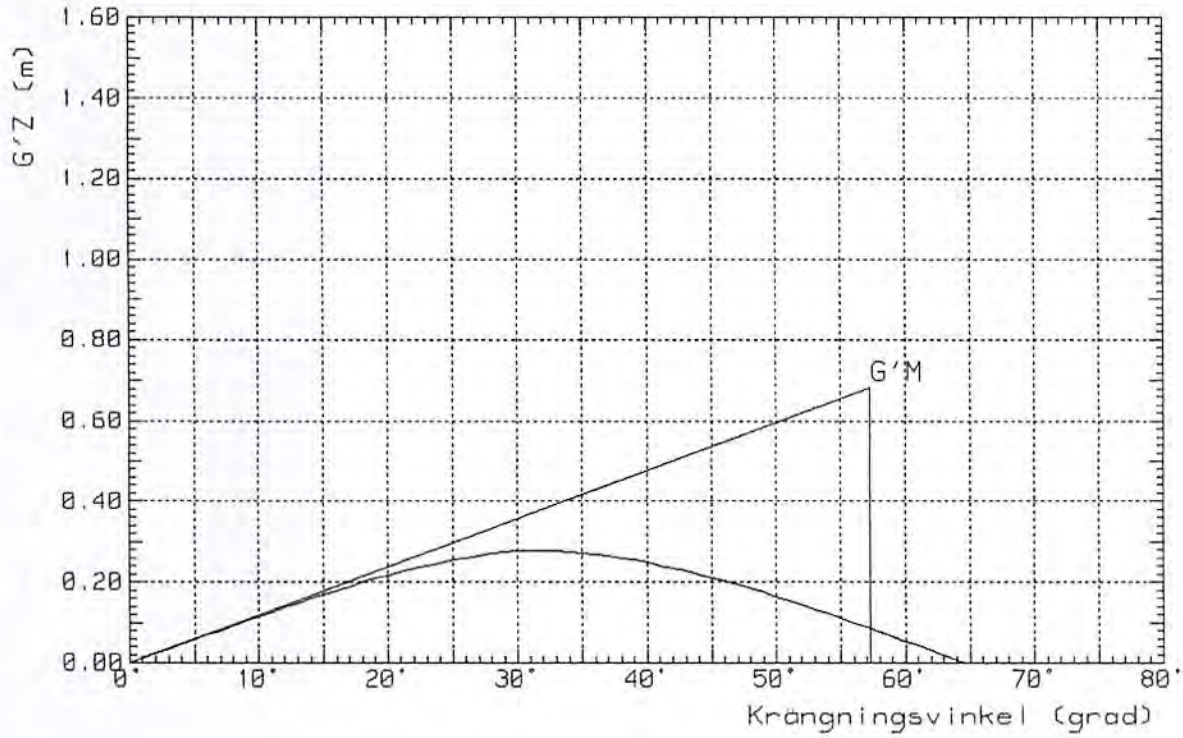
KONDITION Nr 3 :10 % BUNKER

*** STABILITET ***

Tvärskepps metacentrum över baslinjen	KMT=	3.30 m
Viktstyngdpunkt över baslinjen	KG =	2.60 m
Tvärskepps metacenterhöjd	GM =	.70 m
Reduktion för fria vätskeytor	GG'=	.02 m
Reducerad metacenterhöjd	G'M=	.68 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.002	.118	.116
20	-.016	.233	.218
30	-.063	.341	.278
45	-.270	.482	.211
60	-.536	.590	.054
75	-.774	.658	-.116

G'Z KURVA

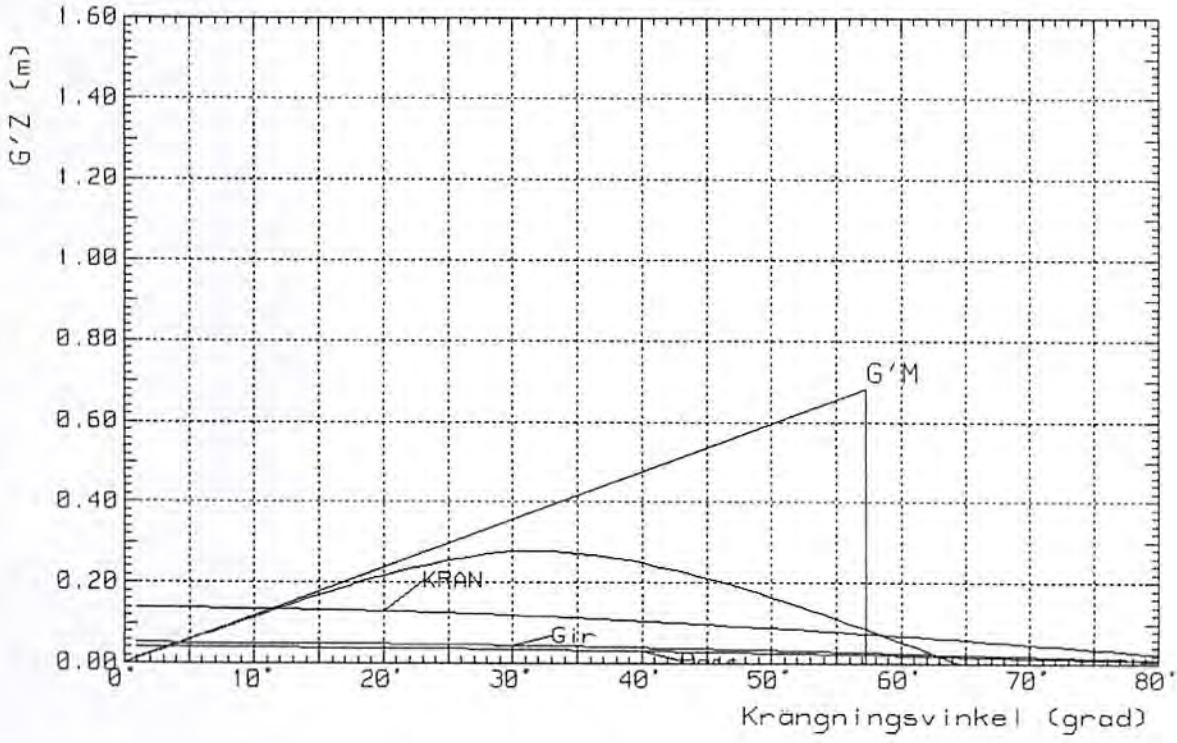


KONDITION Nr 3 :10 % BUNKER

*** STABILITETS KRAV ***

	Verkligt		Krav
Dynamisk hävarm 0-30°	.084		.055
Dynamisk hävarm 0-40°	.131		.090
Dynamisk hävarm 30-40°	.047		.030
G'Z värde för Fi>=30°	.279		.200
Vinkel för G'Z-max	31.2		25.0
G'M-min	.681		.150
Krängande moment: Passagerare	2.6	ton*m	
Krängningsvinkel:Passagerare	3.388		10.000
Krängande moment: Gir	3.4	ton*m	
Krängningsvinkel:Gir	4.345		10.000
Krängande moment: KRAN	9	ton*m	
Krängningsvinkel	12.0	grad	

G'Z KURVA



KONDITION Nr 4 :100 % BUNKER - TOM TRIMTANK

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
BRO SIDOTANK SB	4.76	-1.80	2.20	.19
BRO SIDOTANK BB	5.10	-2.20	2.20	.21
BRO BOTTENTANK	3.40	1.60	.70	0.00
FV TANK FÖR	.60	5.60	2.00	.05
FV TANK AKTER (TRIMTANK)	0.00	-5.20	.80	0.00
BESÄTTNING 3 MAN	.24	0.00	4.50	0.00
PASSAGERARE 12 PERS	.96	0.00	4.50	0.00
DÖDVIKT	17.06	.08	1.94	.45
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	76.66	-.74	2.52	.45

Djupgående medel över baslinjen d= 2.33 m
Djupgående för över baslinjen df= 2.12 m
Djupgående akter över baslinjen da= 2.54 m
Totalt trim t= .42 m

HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.41 m
Långskepps metacenter höjd KML= 14.63 m
Flytcentrum från L/2 LCF= -.53 m

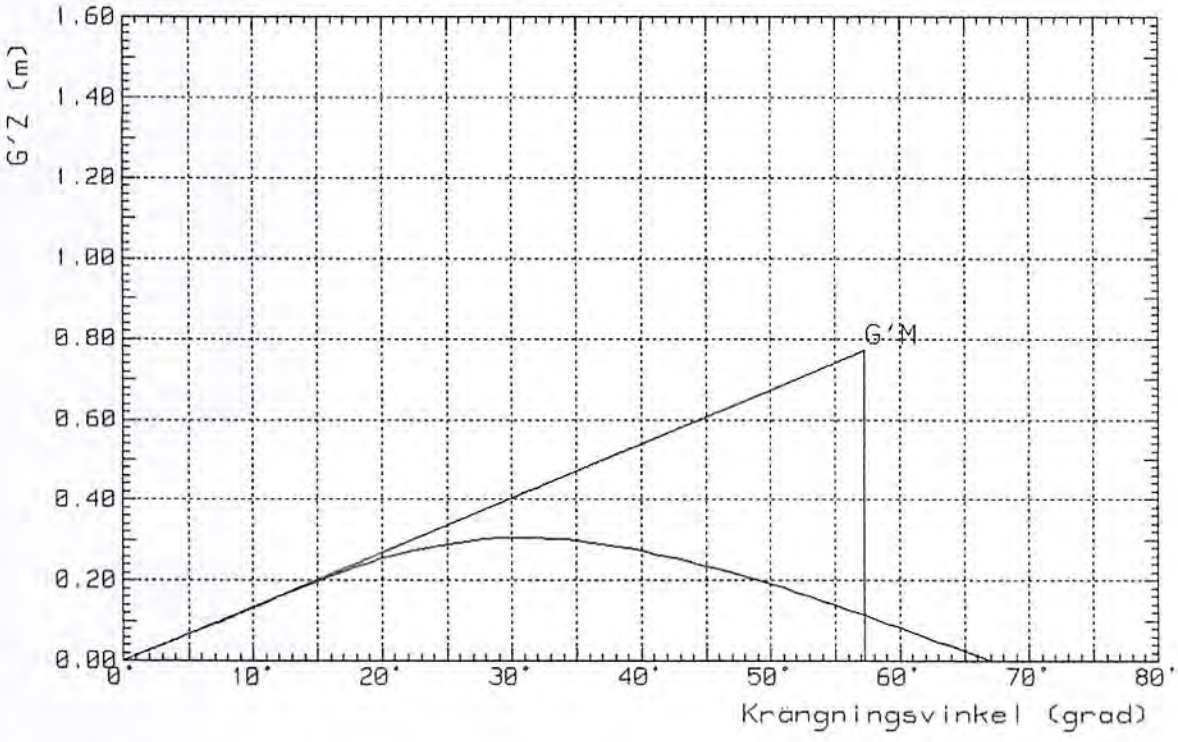
KONDITION Nr 4 :100 % BUNKER - TOM TRIMTANK

*** STABILITET ***

Tvärskepps metacentrum över baslinjen	KMT=	3.29 m
Viktstyngdpunkt över baslinjen	KG =	2.52 m
Tvärskepps metacenterhöjd	GM =	.78 m
Reduktion för fria vätskeytor	GG'=	.01 m
Reducerad metacenterhöjd	G'M=	.77 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.001	.134	.133
20	-.008	.263	.255
30	-.079	.385	.307
45	-.309	.545	.236
60	-.584	.667	.083
75	-.835	.744	-.091

G'Z KURVA

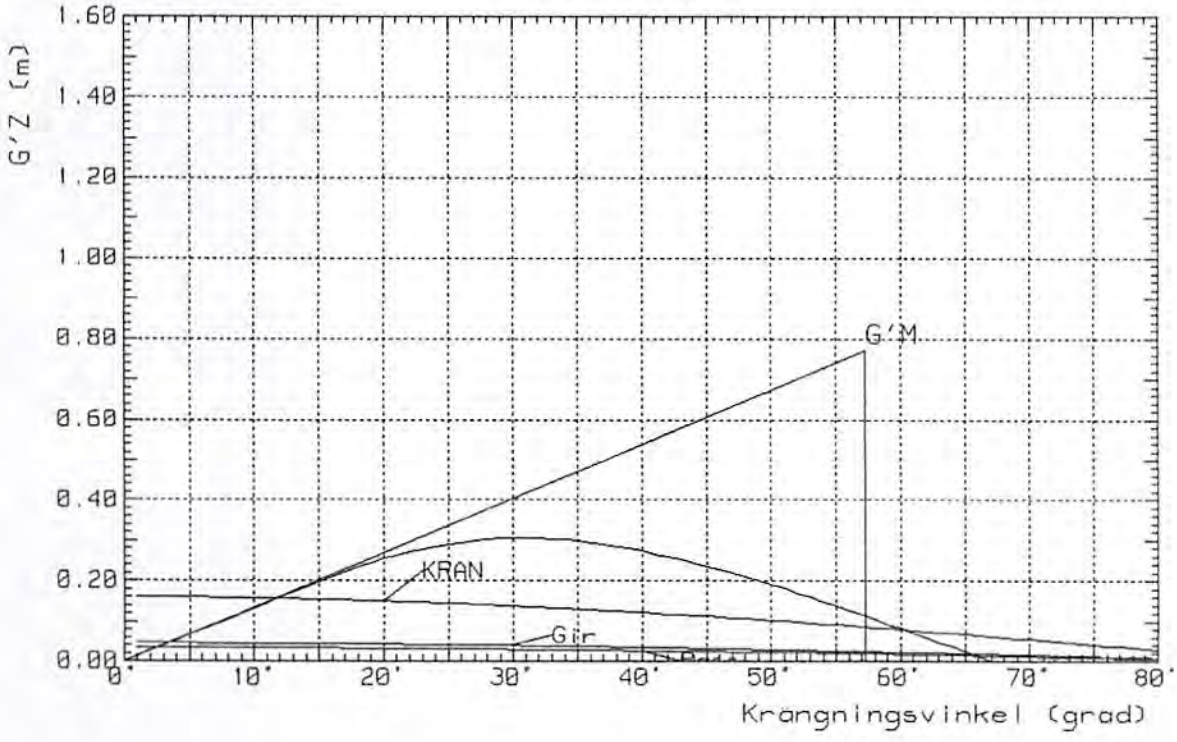


KONDITION Nr 4 :100 % BUNKER - TOM TRIMTANK

*** STABILITETS KRAV ***

	Verkligt		Krav
Dynamisk hävarm 0-30°	.096		.055
Dynamisk hävarm 0-40°	.148		.090
Dynamisk hävarm 30-40°	.052		.030
G'Z värde för Fi>=30°	.307		.200
Vinkel för G'Z-max	30.5		25.0
G'M-min	.770		.150
Krängande moment: Passagerare	2.6	ton*m	
Krängningsvinkel:Passagerare	2.560		10.000
Krängande moment: Gir	3.5	ton*m	
Krängningsvinkel:Gir	3.384		10.000
Krängande moment: KRAN	12	ton*m	
Krängningsvinkel	12.0	grad	

G'Z KURVA



KONDITION Nr 6 :10% BUNKER - TOM TRIMTANK + NEDISNING

TRANSPORTSTYRELSEN
Göteborgs sjöfartsinspektionsområde
Ink. 2014 -01- 23
Dnr:

Arkivexemplar

SILH

Benämning	Vikt	Lcg från L/2	Vcg över BL	Yt-Moment
	Ton	m	m	Ton x m
FAST BALLAST FÖRUT	2.00	6.20	1.25	0.00
BRO SIDOTANK SB 10%	.48	-1.80	1.40	.10
BRO SIDOTANK BB 10%	.51	-2.20	1.40	.10
BRO BOTTENTANK 10%	.34	1.60	.50	1.00
FV TANK FÖR	.06	5.60	2.00	.05
FV TANK AKTER (TRIMTANK)	0.00	-5.20	.80	0.00
BESÄTTNING 3 MAN	.24	0.00	4.50	0.00
PASSAGERARE 12 PERS	.96	0.00	4.50	0.00
NEDISNING HOR.YTOR	2.10	0.00	5.00	0.00
NEDISNING VERT.YTOR	.73	0.00	5.50	0.00
DÖDVIKT	7.42	1.52	3.25	1.25
EGENVIKT	59.60	-.97	2.68	0.00
TOTAL VIKT	67.02	-.69	2.74	1.25

Djupgående medel över baslinjen d= 2.19 m
Djupgående för över baslinjen df= 2.00 m
Djupgående akter över baslinjen da= 2.38 m
Totalt trim t= .38 m

HYDROSTATER VID 0-TRIM
Deplacementstyngdpunkt från L/2 LCB= -.40 m
Långskepps metacenter höjd KML= 14.97 m
Flytcentrum från L/2 LCF= -.49 m

3/8

TRANSPORT STYRELSEN
Gothenburg Maritime Inspectorate Office
GODKÄND/APPROVED
Med avseende på/With respect to
Stabilitet
Under förutsättning att givna anmärkningar iakttages
Upon condition that the remarks made are observed
Name
Date 29/1-14 Dnr. TSS 2013-413

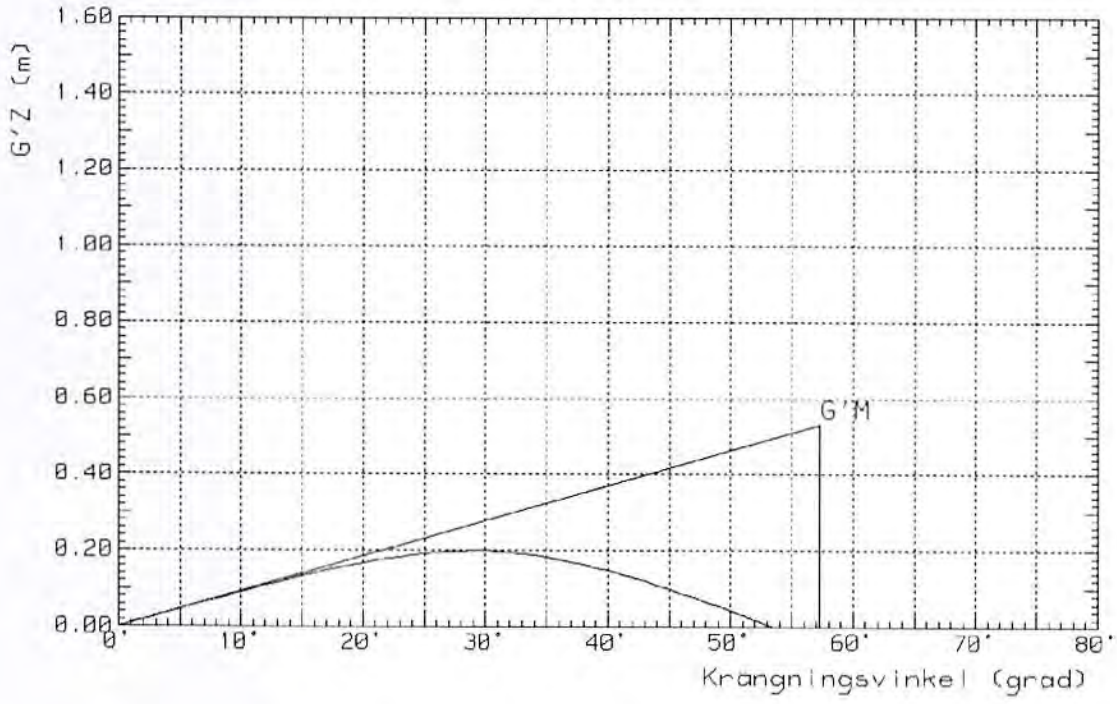
KONDITION Nr 6 :10% BUNKER - TOM TRIMTANK + NEDISNING

*** STABILITET ***

Tvärskepps metacentrum över baslinjen	KMT= 3.29 m
Viktstyngdpunkt över baslinjen	KG = 2.74 m
Tvärskepps metacenterhöjd	GM = .55 m
Reduktion för fria vätskeytor	GG'= .02 m
Reducerad metacenterhöjd	G'M= .53 m

Fi (grad)	MS (m)	G'M*sin(Fi)	G'Z (m)
10	-.002	.092	.090
20	-.014	.182	.167
30	-.064	.265	.201
45	-.277	.375	.099
60	-.543	.460	-.083
75	-.787	.513	-.274

G'Z KURVA

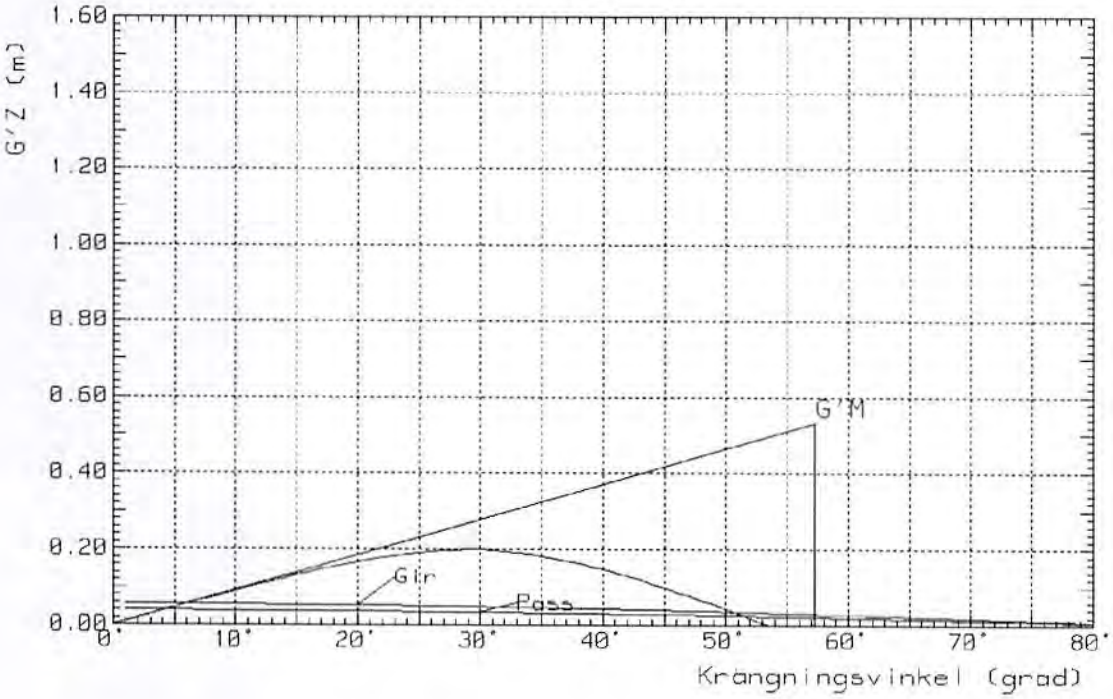


KONDITION Nr 6 :10% BUNKER - TOM TRIMTANK + NEDISNING

*** STABILITETS KRAV ***

	Verkligt		Krav
Dynamisk hävarm 0-30°	.064		.055
Dynamisk hävarm 0-40°	.095		.090
Dynamisk hävarm 30-40°	.031		.030
G'Z värde för Fi>=30°	.201		.200
Vinkel för G'Z-max	30.0		25.0
G'M-min	.531		.150
Krängande moment: Passagerare	2.6	ton*m	
Krängningsvinkel:Passagerare	4.261		10.000
Krängande moment: Gir	3.8	ton*m	
Krängningsvinkel:Gir	6.067		10.000

G'Z KURVA



Gällande fartyg:

Göteborg den 9 januari 2014

Gustaf Dalen, Callsign: SILH

Nedisning, påbyggnad

Horisontella ytor, is/m2:	30kg/m2
Vertikala ytor, is/m2	7kg/m2
Horisontella ytor totalt =	70m2
Vertikala ytor totalt =	103,65m2
70 x 30 =	2100kg
103,65 =	725,55kg
Totalvikt =	**2826kg**

Där horisontella:

Övre däck:	25,4m2
Akterdäck:	10m2
Sidor däck:	14m2
Fördäck:	20,6m2
Totalt:	**70m2**

Där vertikala:

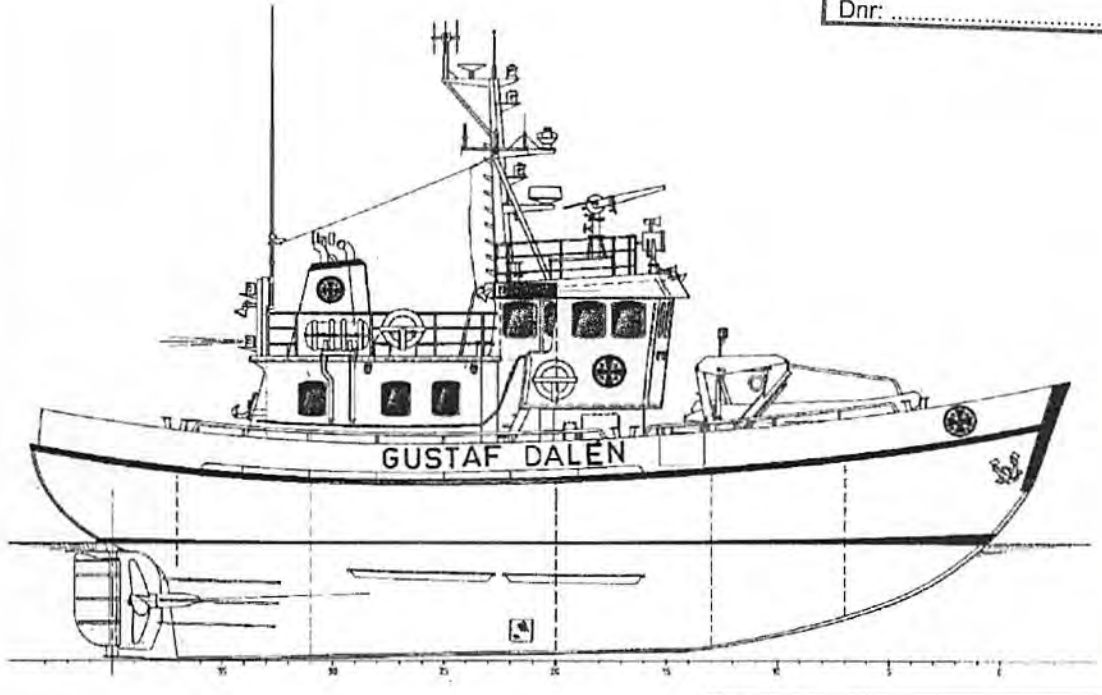
Förkant bygge:	11,37m2
Akterkant bygge:	6m2
Sidor (skrov+däckshus):	43,14m2 x 2
Totalt:	**103,65m2**

Mot bakgrund av tidigare genomförda beräkningar står det utan allt rimligt tvivel att fartyget klarar denna vikt samt därtill även klarar GM 0,15 även om en yterliggare vikt av 960 kg för 12 st. passagerare skulle adderas. Den totala vikten skulle då avrundat uppåt bli närmare 4 ton.

RS Gustaf Dalén

Unlimited sea area calculations

TRANSPORTSTYRELSEN
Göteborgs sjöfartsinspektionsområde
Ink. 2013 -02- 14
Dnr: .....



TRANSPORT STYRELSEN
Gothenburg Maritime Inspectorate Office

GODKÄND/APPROVED

Med avseende på/With respect to
Skrovstyrka
Under förutsättning att givna anmärkningar iakttages
Upon condition that the remarks made are observed
Name .....
Date 29/1-14 Dnr TSS 2013-413

REV:	DATE:	SIGN:	DESCRIPTION:
A	2013-01-10	UO	For approval

FKAB MARINE DESIGN

Fartygskonstruktioner AB
Uddevalla
PHONE: +46-(0)522-981 00
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PHONE: +46-(0)31-744 56 50

E-mail: info@fkab.se
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SIGN:	DATE:	CHECKED:	DATE:	DOCUMENT NO:	REV:
UO	2013-01-10	SJ	2013-01-11	**13230-2-202-01**	**A**

TABLE OF CONTENTS: Page:

1. INTRODUCTION:

R/K Gustaf Dalén is in this report investigated for an unlimited sea area.

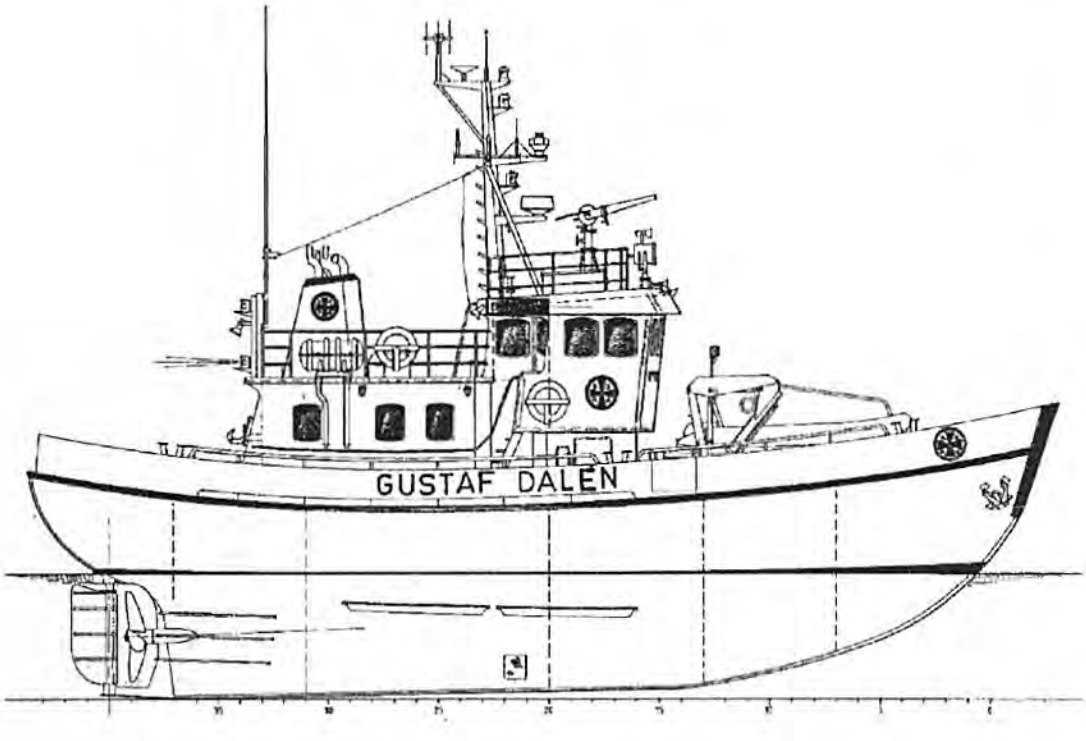
The report includes scantling calculation of:

- bottom and bilge plating
- deck plating.
- Stiffeners

All calculations shows that R/K Gustaf Dalén fulfils the DnV requirement for an unlimited sea area

General arrangement according to: Djupviks varv AB Drawing 22746

DNV Rules for classification is used as reference



MAIN DIMENSION:
- LENGHT OVER ALL: 18,5 M
- LPP: 15,74 M
- EXTERNAL BREADTH: 5,75
- MOLDED DEPHT: 3,23 M

2. Structure calculations

2.1 Bottom and bilge plating – C200:

DnV Rules for ships Pt3. Ch 2. Sec 5 gives:

$t = ((15,8 \times k_a \times s \times \sqrt{p})/\sqrt{\sigma}) + tk$

k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the baseline to the load point, maximum T (m)
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and f (f = D-T ==> 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\ (y/(B+75))-1,2\ (T-z)$
p	28,470		$p = 10 \times T + p_{dp}$
t	**3,08**		**$t = ((15,8 \times k_a \times s \times \sqrt{p})/\sqrt{\sigma}) + tk$**

C202 The thickness is not to be less than:

$t = 5.0 + 0,04L + t_k$
$t = 5.0 + 0,04 \times 15,74 + 0 \rightarrow 5,63$

I.e. a bottom and bilge thickness of 9.0-12 mm is OK.

2.2 : Strenght deck plating – C102

DnV Rules for ships Pt3. Ch 2. Sec 7 gives:

$t = ((15,8 \times k_a \times s \times \sqrt{p})/\sqrt{\sigma}) + tk$

k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	1,30	m	Vertical distance in m from the waterline at draught T to deck
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\ (y/(B+75))-1,2\ (T-z)$
p	-0,250		$p = a(p_{dp}-(4+0,2k_s)h_o)$ = minimum 5.0
t	**1,29**		**$t = ((15,8 \times k_a \times s \times \sqrt{p})/\sqrt{\sigma}) + tk$**

C103 The thickness is not to be less than:

$t = t_0 + k \times L + t_k$

t_o	5,5		
k	0,02		
L	15,74		
t_k	0,0		According to Pt.3 Ch.2 Sec 2 D200
t	**5,8**		**$t= t_0 + k \times L + t_k$**

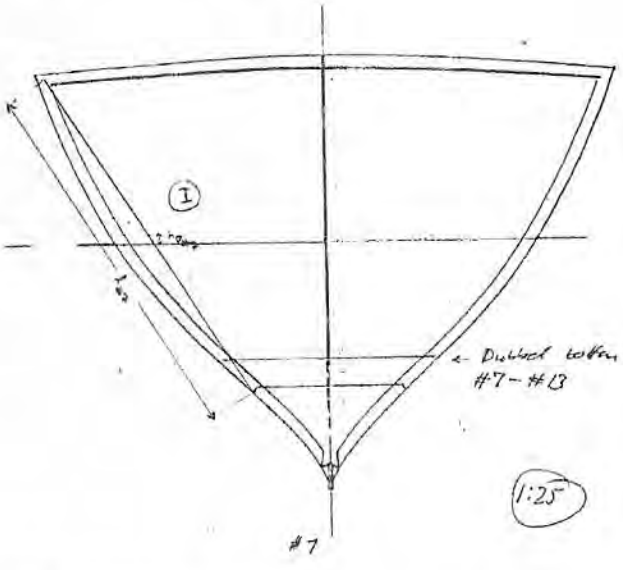
I.e. a deck plating thickness of 6 mm is OK.

2.3 : Strenght main frame – C400

DnV Rules for ships Pt3. Ch 2. Sec 6 gives:
Section modulus requirement is given by the greater of:

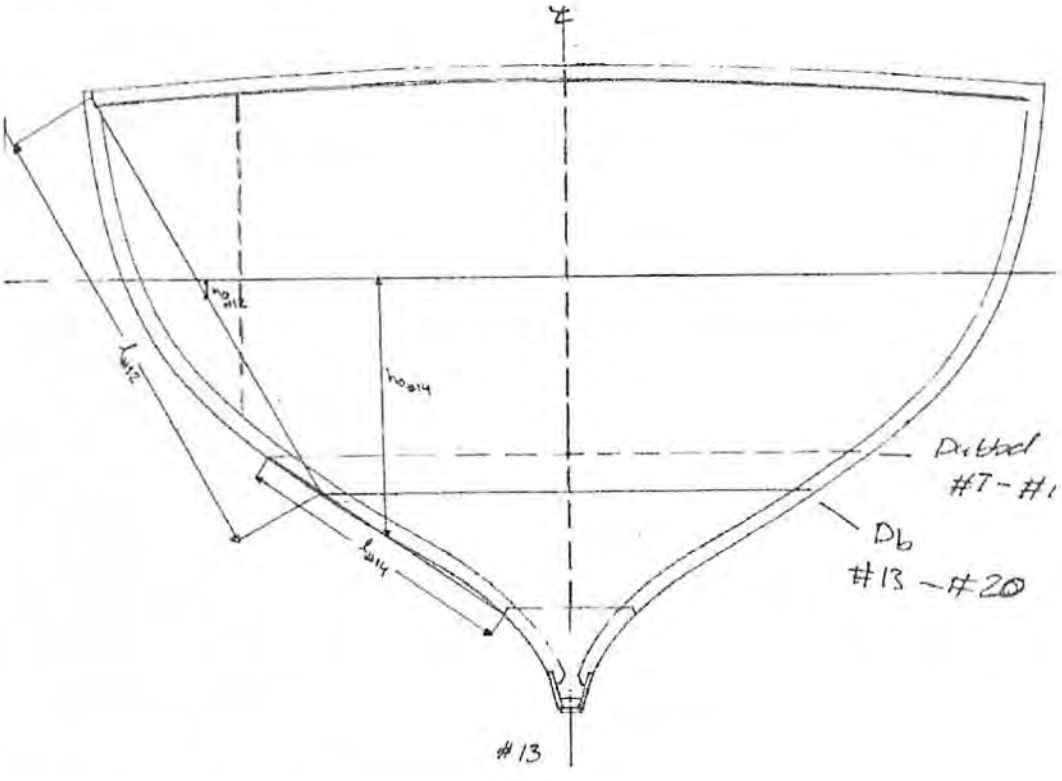
$Z = 0.5 \times l_{max}^2 \times s \times p \times w_k$ and $Z = 6.5\sqrt{L} = 6,5\sqrt{15,74} = 25,8$

2.3.1 : Main frame #7



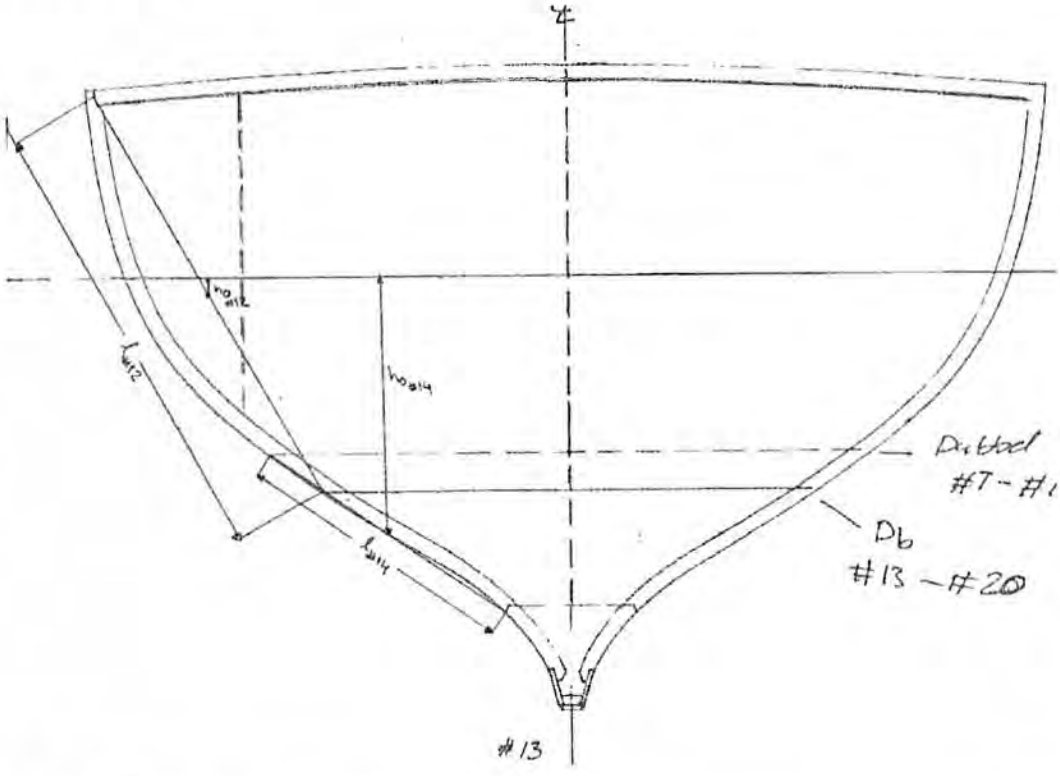
k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	0,06	m	Vertical distance in m from the waterline at draught T to the load point
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\,(y/(B+75))-1,2\,(T-z)$
p_1	N/A		Sea pressure below summer load waterline $p_1 = 10 \times h_0 + p_{dp}$
p_2	5,206		Sea pressure above summer load waterline $p_2 = p_{dp}-(4+0,2k_s)h_o)$ = minimum 6,25 +0,025L = 6,64
l	2,7		Stiffener span
w_k	1,0		Corrosion factor
Z	**9,68**		**$Z = 0.5 \times l^2 \times s \times p_2 \times w_k$**

2.3.2 : Main frame #12



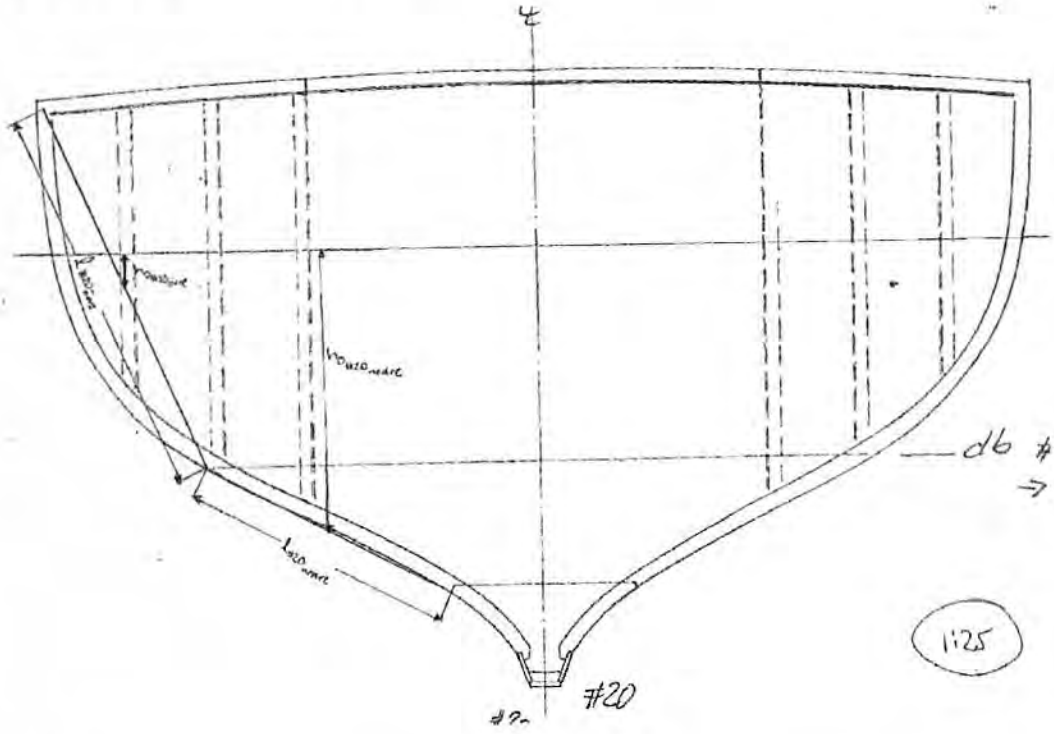
k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	0,09	m	Vertical distance in m from the waterline at draught T to the load point
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\ (y/(B+75))-1,2\ (T-z)$
p_1	6,370		Sea pressure below summer load waterline $p_1 = 10 \times h_0 + p_{dp}$
p_2	N/A		Sea pressure above summer load waterline $p_2 = p_{dp}-(4+0,2k_s)h_o)$ = minimum 6,25 +0,025L = 6,64
l	2,4		Stiffener span
w_k	1,0		Corrosion factor
Z	**7,34**		**$Z = 0.5 \times l^2 \times s \times p_1 \times w_k$**

2.3.3 : Main frame #14



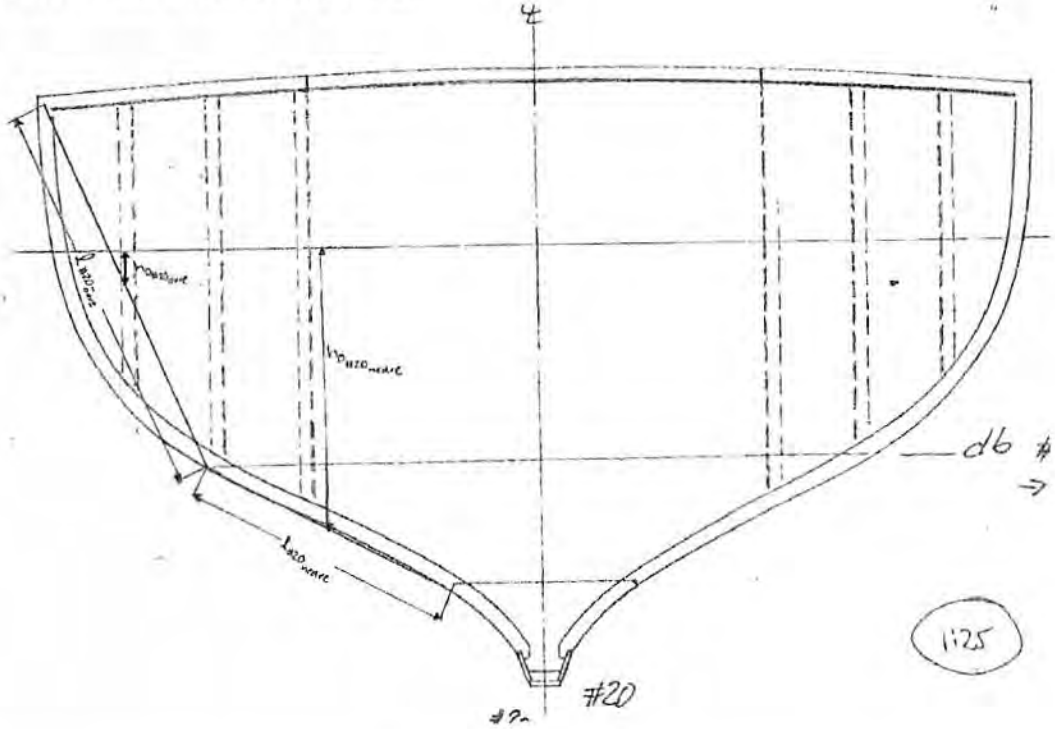
k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	1,34	m	Vertical distance in m from the waterline at draught T to the load point
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\,(y/(B+75))-1,2\,(T-z)$
p_1	18,870		Sea pressure below summer load waterline $p_1 = 10 \times h_0 + p_{dp}$
p_2	N/A		Sea pressure above summer load waterline $p_2 = p_{dp}-(4+0,2k_s)h_o)$ = minimum 6,25 +0,025L = 6,64
l	1,5		Stiffener span
w_k	1,0		Corrosion factor
Z	**8,49**		**$Z = 0.5 \times l^2 \times s \times p_1 \times w_k$**

2.3.4 : Main frame #20 upper



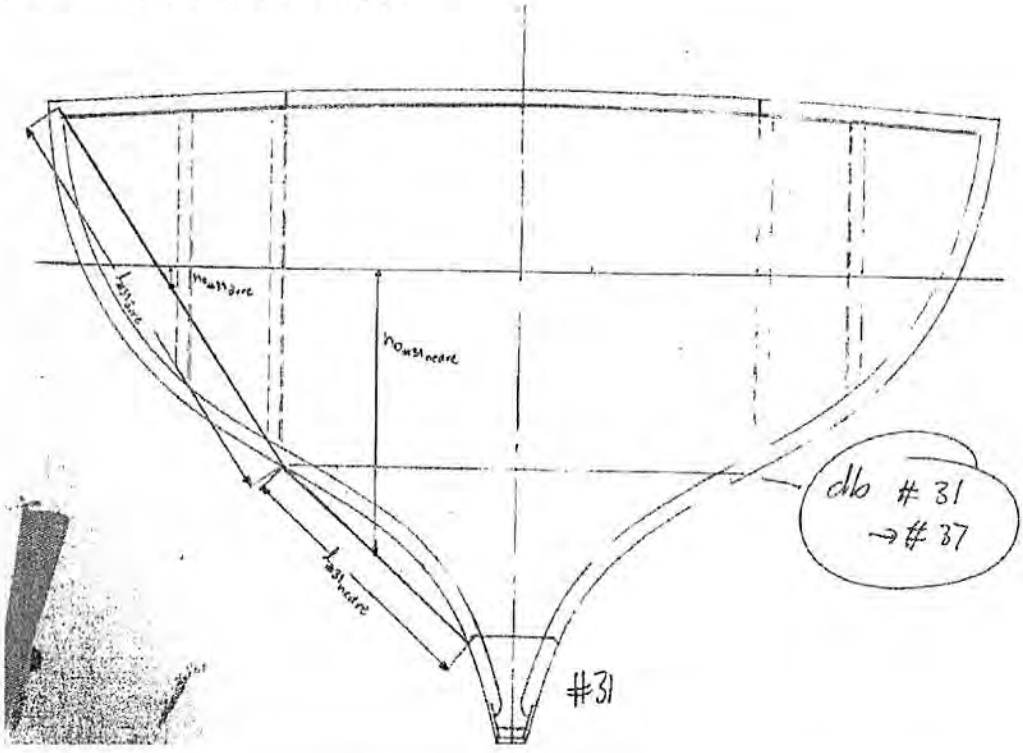
k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	0,18	m	Vertical distance in m from the waterline at draught T to the load point
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\,(y/(B+75))-1,2\,(T-z)$
p_1	7,270		Sea pressure below summer load waterline $p_1 = 10 \times h_0 + p_{dp}$
p_2	N/A		Sea pressure above summer load waterline $p_2 = p_{dp}-(4+0,2k_s)h_o)$ = minimum 6,25 +0,025L = 6,64
l	2,14		Stiffener span
w_k	1,0		Corrosion factor
Z	**6,66**		**$Z = 0.5 \times l^2 \times s \times p_1 \times w_k$**

2.3.5 : Main frame #20 lower



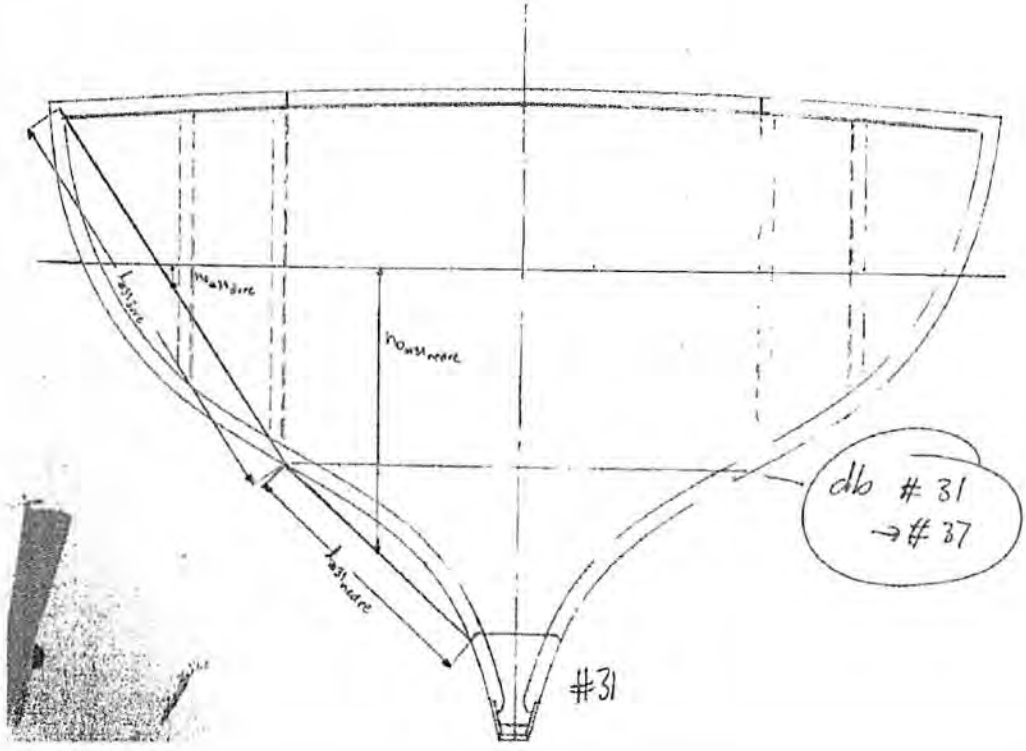
k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	1,50	m	Vertical distance in m from the waterline at draught T to the load point
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\ (y/(B+75))-1,2\ (T-z)$
p_1	20,470		Sea pressure below summer load waterline $p_1 = 10 \times h_0 + p_{dp}$
p_2	N/A		Sea pressure above summer load waterline $p_2 = p_{dp}-(4+0,2k_s)h_o)$ = minimum 6,25 +0,025L = 6,64
l	1,48		Stiffener span
w_k	1,0		Corrosion factor
Z	**8,97**		**$Z = 0.5 \times l^2 \times s \times p_1 \times w_k$**

2.3.6 : Main frame #31 upper



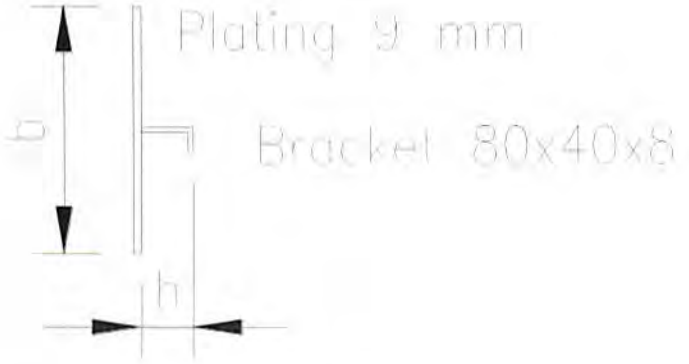
k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	0,10	m	Vertical distance in m from the waterline at draught T to the load point
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\ (y/(B+75))-1,2\ (T-z)$
p_1	6,470		Sea pressure below summer load waterline $p_1 = 10 \times h_0 + p_{dp}$
p_2	N/A		Sea pressure above summer load waterline $p_2 = p_{dp}-(4+0,2k_s)h_o)$ = minimum 6,25 +0,025L = 6,64
l	2,2		Stiffener span
w_k	1,0		Corrosion factor
Z	**6,26**		**$Z = 0.5 \times l^2 \times s \times p_1 \times w_k$**

2.3.7 : Main frame #31 lower



k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	1,48	m	Vertical distance in m from the waterline at draught T to the load point
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
□			
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\,(y/(B+75))-1,2\,(T-z)$
p_1	20,270		Sea pressure below summer load waterline $p_1 = 10 \times h_0 + p_{dp}$
p_2	N/A		Sea pressure above summer load waterline $p_2 = p_{dp}-(4+0,2k_s)h_o)$ = minimum 6,25 +0,025L = 6,64
l	1,3		Stiffener span
w_k	1,0		Corrosion factor
Z	**7,28**		**$Z = 0.5 \times l^2 \times s \times p_1 \times w_k$**

2.3.8 : Existing section modulus:



Calculation Z (section modulus mm^3)

	b	h	Distance to CG	Area	S (A*CG)	I (A*CG^2)	I0= b*h^3/12
1	40	8	85	320	27200	2312000	1706,66667
2	8	72	45	576	25920	1166400	248832
3	400	9	4,5	3600	16200	72900	24300
Σ		89		4496	69320	3551300	274838,667

CG	15,42
h_Σ-CG	73,58
I	2757353
Z	37473

$I + I_0 - A*S^2$

I/biggest distance to Tp

NAUTICUS Hull

PROFILES

Vers. 14.0, Nauticus Hull, Jan. 2011

Ship Id:

Sign:
Time: 14:13
Date: 13.01.07

INPUT

Section dimensions:

		Save to stack		Save to stack		Save to stack	
Location, Id text							
Effective plate width	s =	400 mm	s =	mm	Outer diam.	mm	
Plate thickness	t =	9.0 mm	t =	mm	Thickness	mm	
Web height (excl flanges)	hw =	72 mm	hw =	mm			
Web thickness	tw =	8.0 mm	tw =	mm			
Flange width	bf =	40 mm					
Flange thickness	tf =	8.0 mm					
Added Area	Aadd =	mm²	Aadd =	mm²			
Y-distance	Y =	mm	Y =	mm			

Help | Print | Show stack >> | Show Eff. Flange >>

RESULTS

		I - beam:		HP - profile:		Circular profile:	
Neutral axis, from bottom	Na =	1.5 cm	Na =	0.0 cm			
Moment of inertia	Iz =	276 cm4	Iz =	0 cm4	Iz =	0 cm4	
Section modulus, plate	Z plt =	**179** cm3	Z plt =	**0** cm3	Zt = Zb =	**0.0** cm3	
Section modulus, flange	Z flg =	**37** cm3	Z flg =	**0.0** cm3	Atot =	0.0 cm2	
Web area	Aw =	5.8 cm2	Aw =	0.0 cm2	Ip =	0 cm4	
Total profile area	Atot =	45 cm2	Atot =	0.0 cm2			

2.3.9 : Summary - section modulus:

Reguired section modulus according to calculation is 2.3.1-2.3.7

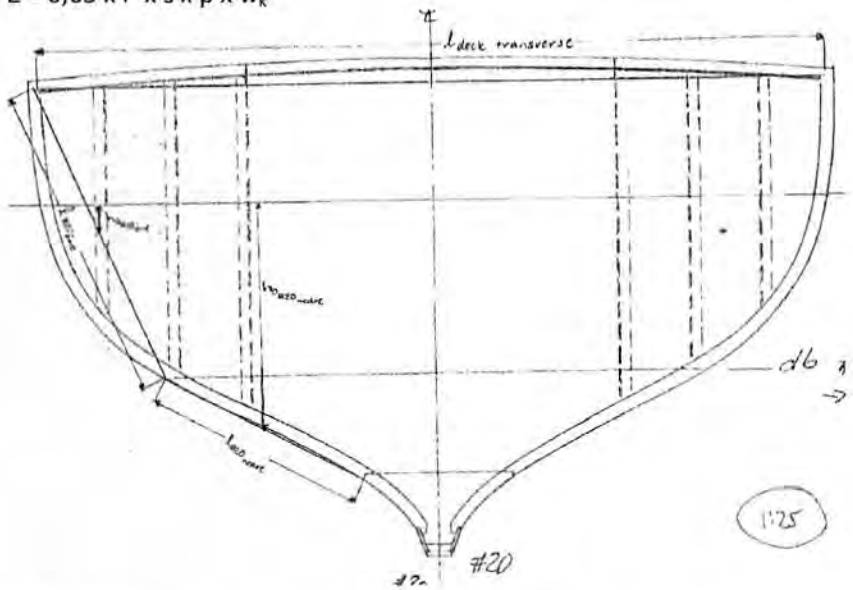
$Z = 6.5 \sqrt{L} = 6,5 \sqrt{15,74} = 25,8$
$Z_{\#7} = 9,68$
$Z_{\#12} = 7,34$
$Z_{\#14} = 8,49$ **HIGHEST VALUE = 25,8**
$Z_{\#20\ upper} = 6,66$
$Z_{\#20}$ lower = 8,97
$Z_{\#31\ upper} = 6,26$
$Z_{\#31\ lower} = 7,28$

Existing section modulus is 37 cm^3 (according to calculation shown in 2.3.8) ➔ OK

2.4 : Strenght deck transverse – C400

DnV Rules for ships Pt3. Ch 2. Sec 7 gives:

$Z = 0{,}63 \times l^2 \times s \times p \times w_k$

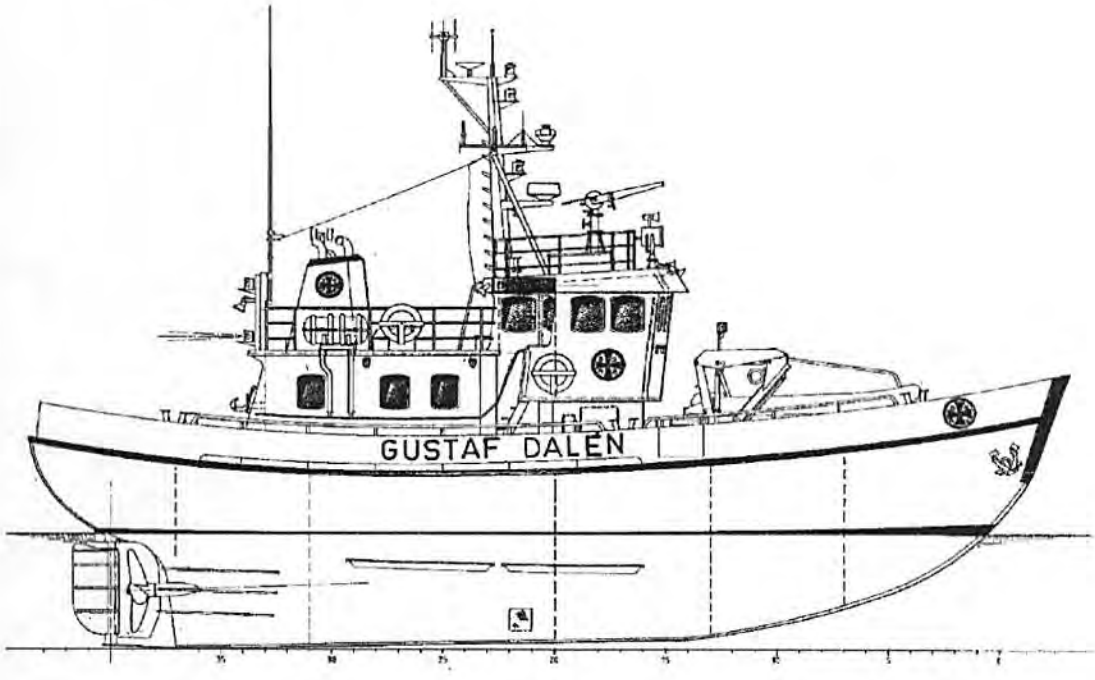


k_a	1,0		Correction factor
s	0,4	m	Stiffener spacing
T	2,3	m	Rule draught
y	2,875	m	Horizontal distance from the centre line to the load point
z	0,0	m	Vertical distance from the centre line to the load line
L	15,74	m	Length
C_W	1,247		0,0792 x L
k_f	0,93	m	Smallest of T and F ==> f = D-T = 3,23-2,3 =0,93
B	5,75	m	Breadth
σ	120		Allowable stress
k_s	2		
h_o	1,30	m	Vertical distance in m from the waterline at draught T to deck
t_k	0		According to Pt.3 Ch.2 Sec 2 D200
a	1,0		
□			
p_l	3,423		$p_l = k_s \times C_W + k_f$
p_{dp}	5,470		$p_{dp} = p_l + 135\,(y/(B+75))-1{,}2\,(T-z)$
p	-0,250		$p = a(p_{dp}-(4+0{,}2k_s)h_o)$ = minimum 5.0
l	5,3		stiffener span i m ($l_{deck\ transverse}$ in above picture)
w_k	1,0		Section modulus corrosion factor in tanks
Z	**35,4**		**Section modulus (cm^3) $Z = 0{,}63 \times l^2 \times s \times p \times w_k$**

Existing section modulus is 37 cm^3 (according to calculation shown in 2.3.8) ➔ OK

RS Gustaf Dalén

Ice class calculation: ICE-C / ICE-1C



REV:	DATE:	SIGN:	DESCRIPTION:
A	2013-01-29	UO	For approval

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UO	2013-01-29	SJ	2013-01-30	**13230-2-100-01**	**A**

TABLE OF CONTENTS: Page:

1. INTRODUCTION:

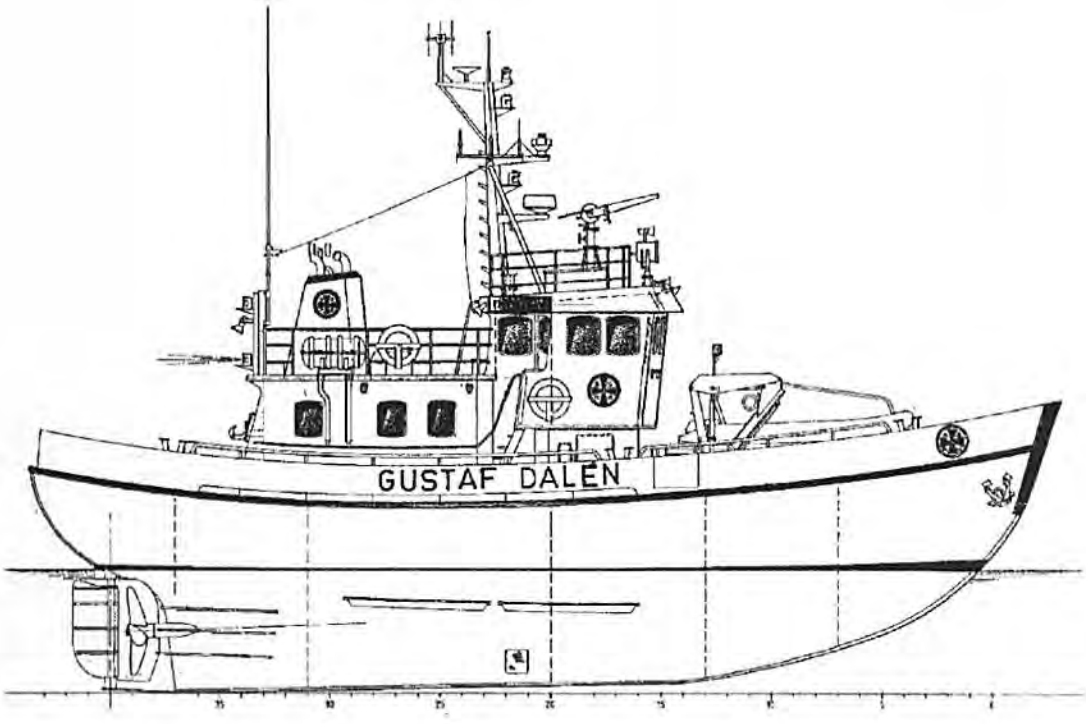
Ice class calculations for R/K Gustaf Dalén

The report includes calculations for
- Basic ice strengthening: ICE-C
- Ice strengthening for the Northern Baltic: ICE-1C

The calculations shows that R/K Gustaf Dalén fulfils the DnV requirement for a basic ice strengthening ICE-C (January 1990) but does not fulfil the requirements for ICE-1C

General arrangement according to: Djupviks varv AB Drawing 22746

DNV Rules for classification January 1990 is used as reference



MAIN DIMENSION:
- LENGHT OVER ALL: 18.5 M
- LPP: 15.74 M
- EXTERNAL BREADTH: 5.45
- MOLDED DEPHT: 3.25 M

2. Basic ICE Strengthening ICE-C

2.1 Shell plating – B100:

DnV Rules for ships Pt5. Ch 1. Sec 2 – January 1990 gives:

From stem to a distance B abaft F.P and within a belt extending vertically from 0,5 m above LWL to 0,5 m below BWL, the shell plating thickness is not to be less than:

$t = 6 + 0{,}11 * L + \Delta t$ (mm)

Term	Value	Definition
L	18,5	Rule lenght
Δt	-2,3	$\Delta t = 20 * (s_0 - s_s)$
Δt	0,0	Minimum
s_0	0,4	Spacing in m of ordinary main frames
s_s	0,5	0,48 + 0,002 * L
t	8,0	$t=6 + 0{,}11 * L + \Delta t$

Required minimum thickness for the shell plating is according to above 8,0 mm.
Existing thickness is 9-12 mm ➔ OK

2.2 Ordinary frames – B200:

DnV Rules for ships Pt5. Ch 1. Sec 2 – January 1990 gives:

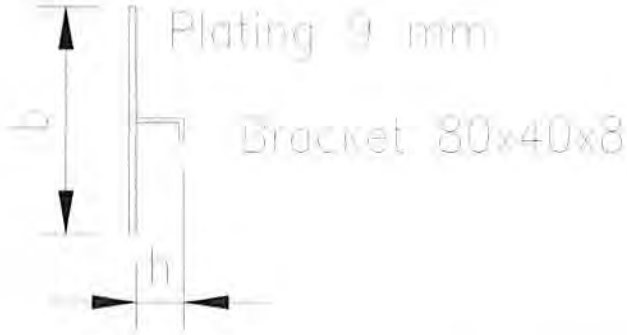
Ordinary frames in fore peak are to have a section modulus not less than:

$Z = 0,25 * L * T (cm^3)$

Term	Value	Definition
L	18,5	Rule lenght (m)
T	2,0	Rule draught (m)
Z	9,3	Z = 0,25 * L * T (cm3) - Section modulus

The distance between ordinary frames in fore peak is not to exceed 0,61 m (see s_0 in previous chapter =) ➔ OK

Existing section modulus



Calculation Z (section modulus mm3)

	b	h	Distance to CG	Area	S (A*CG)	I (A*CG²)	I0= b*h³/12
1	40	8	85	320	27200	2312000	1706,66667
2	8	72	45	576	25920	1166400	248832
3	400	9	4,5	3600	16200	72900	24300
Σ		89		4496	69320	3551300	274838,667

CG	15,42	
h_Σ-CG	73,58	
I	2757353	$I + I_0 - A*S^2$
Z	37473	I/biggest distance to Tp

Where plating is 12 mm, the section modulus is 39,3 cm3

Required section modulus is according to above 9,3 cm³.
Existing section modulus is: 37,5 cm³ ➔ OK

2.3 Ordinary frames- B202

DnV Rules for ships Pt5. Ch 1. Sec 2 – January 1990 gives:

From collision bulkhead to 1,5 B abaft F.P, the section modulus of ordinary main frames is not to be less than:

$Z = 0,4 * L * s0 * T$ (cm3)

Term	Value	Definition
L	18,5	Rule lenght (m)
T	2,0	Rule draught (m)
S_0	0,4	Spacing in m of ordinary main frames
Z	5,9	$Z = 0,4 * L * s0 * T$ (cm^3) - Section modulus

Required section modulus is according to above 5,9 cm^3.
Existing section modulus is: 37,5 cm^3 → OK

2.4 Intermediate ice frames – B300

DnV Rules for ships Pt5. Ch 1. Sec 2 – January 1990 gives:

The intermediate ice frames are to have a section modulus not less than:

— forward of collision bulkhead

$Z = (L^2/160 + 10) * s_0/s_s$ (cm3)

Term	Value	Definition
L	18,5	Rule lenght (m)
T	2,0	Rule draught (m)
S_0	0,4	Spacing in m of ordinary main frames
S_s	0,5	$s_s = 0,48 + 0,002 * L$
	1,3	Proportion konstant (frame span 2,6 m instead of 2,0 m)
Z	12,2	$Z = (L^2/160+10) * s_0/s_s$ * prop.constant (cm^3) - Section modulus

Required section modulus is according to above 12,2 cm^3, but need in no case have a section modulus large that 75% of the ordinary frames:
0,75 * 9,3 = 7,0 cm^3

Existing section modulus is: 37,5 cm^3 → OK

— abaft collision bulkhead

$Z = (L^2/100 + 20) * s_0/s_s$ (cm3)

Term	Value	Definition
L	18,5	Rule lenght (m)
T	2,0	Rule draught (m)
S_0	0,4	Spacing in m of ordinary main frames
S_s	0,5	$s_s = 0,48 + 0,002 * L$
	1,3	Proportion konstant (frame span 2,6 m instead of 2,0 m)
Z	23,6	$Z = (L^2/100+20) * s_0/s_s$ *prop.constant (cm^3) - Section modulus

Required section modulus is according to above 23,6 cm^3, but need in no case have a section modulus large that 75% of the ordinary frames:
0,75 * 9,3 = 7,0 cm^3

Existing section modulus is: 37,5 cm^3 → OK

2.5 Output of propulsion machinery – C101

DnV Rules for ships Pt5. Ch 1. Sec 2 – January 1990 gives:

The maximum continous output is generally not to be less than:

$Ps = 0,73 * L * B$ (kW)

Term	Value	Definition
L	18,5	Rule lenght (m)
B	5,8	Rule breadth (m)
P_s	77,7	Ps = 0,73 * L * B (kW) - output of propulsion machinery

Required continous output of propulsion machinery according to above 78 kW.
Existing output of propulsion machinery is 471 kW ➔ OK

3. ICE Strengthening for the northern Baltic ICE-1C

3.1 Design Loads – B100

DnV Rules for ships Pt5. Ch 1. Sec 3 – January 1990 gives:

An ice strengthened ship is assumed to operate in open sea conditions corresponding to a level ice thickness not exceeding h_0. The design height (h) of the area actually under ice pressure at any particular point of time is, however, assumed to be only a fraction of the ice thickness. The values for ho and h for ICE-1C is (according to DnV table B1):
$h_0 = 0,4$ m h = 0,22 (m)

3.2 Ice pressure ICE-1C – B200

DnV Rules for ships Pt5. Ch 1. Sec 3 – January 1990 gives:

The design ice pressure (based on a nominal ice pressure of 5600 kN/m2) is determined by the formula:

$p = 5600 * c_d * c_1 * c_a$ (kN/m2)

Term	Value	Definition
k	0,18	$\sqrt{(\Delta f * Ps)/1000}$
Δf	70,0	Displacement (t)
P_s	471,0	Machinery output (kW)
a	30,0	
b	230,0	
c_d	0,24	Probability factor (size and engine output) $c_d = (a*k + b)/1000$
c_1	1,0	Probability factor (ice pressure versus region of the hull)
c_a	1,0	Probability factor (fulllenght of area under pressure at the same time)
p	1318,5	Ice pressure: $p = 5600 * c_d * c_1 * c_a$ (kN/m^2)

3.3 Shell plating – Plate thickness in the ice belt - C200

DnV Rules for ships Pt5. Ch 1. Sec 3 – January 1990 gives:

$t = 21,1 * s * \sqrt{(x_1 * p_{PL}/\sigma_F)} + t_c$

Term	Value	Definition
x_1	0,80	$x_1 = 1,3 - 4,2/((h/s)+1,8)^2$, maximum 1,0
p_{PL}	988,9	$p_{PL} = 0,75 * p$
t_c	2,0	Increment for abrasion and corrosion
h	0,22	Design height of the area actually under ice pressure (m)
s	0,2	Stiffener spacing (m)
σ_F	235	Yield stress of the material
t	9,75	$t=21,1 * s * \sqrt{(x_1 * p_{PL}/\sigma_F)} + t_c$

Required shell plating according to above 9,75 mm.
Existing shell plating is 12 mm ➔ OK

3.4 Transverse frames - D200

DnV Rules for ships Pt5. Ch 1. Sec 3 – January 1990 gives:

$Z = p * s * h * l /(m_t * / \sigma_F) * 10^3$ (cm^3)

Term	Value	Definition
p	1318,5	Ice pressure as calculated in 3.2
s	0,2	Stiffener spacing (m)
h	0,2	Design height of the area actually under ice pressure (m)
l	2,6	Stiffener span (m)
m_0	6,0	Constant - boundary condition
m_t	6,4	$m_t = 7 * m_0 / (7 - 5 * h/l)$
σ_F	235	Yield stress of the material
Z	100,5	$Z = p * s * h * l /(m_t * \sigma_F) * 10^3$, section modulus ($cm^3$)

Required section modulus according to above is 100,5 cm^3.
Existing section modulus is 37 cm^3 (9 mm plate) and 39 cm^3 (12 mm plate)➔ NOK

3.5 Machinery – Engine output J102

DnV Rules for ships Pt5. Ch 1. Sec 3 – January 1990 gives:

The engine output is not to be, in any case, less than 740 kW for ice class ICE-1C. Existing engine output is 471 kW ➔ NOK

(According to DnV Januari 2012 the engine output for ICE-1C needs to be at least 1000kW)

Gällande fartyg:

Göteborg den 9 december 2013

Gustaf Dalen, Callsign: SILH

Ankrings och förtöjningsarrangemang

Befintlig utrustningskontroll mot erkänd organisations regler med hänsyn tagen till "service restriction" eller liknande motsvarande fartområde A.

Följande dokumentation och regelverk har använts:

- TSFS 2009:114 bilaga 3 regel 5-8
- Tabellbilaga: Fart i område A (Nr 10/1946).
- DNV gällande EN

Formel för beräkning av utrustningsnummer:

$$EN = (0{,}5\ LBD)2/3 + 2hB + 0{,}1A$$

Där:

- EN = utrustningsnummer
- L = Vattenlinjens längd vid största djupgående
- B = Största bredd
- D = Sidohöjd midskepps
- h = Höjden midskepps från vattenlinjen till översta däck ökat med höjden av de däcksbyggnader som har en bredd av minst 0,25 x bredden.
- A = Fartygets sidoprofil ovan vattenlinjen (+h)

  (h exkluderas då enbart skorsten (<25% av bredden) är borträknad i totala sidoprofil, h =D i beräkning)

TRANSPORT STYRELSEN
Gothenburg Maritime Inspectorate Office
GODKÄND/APPROVED
Med avseende på/With respect to
Ankringsutrustning
Under förutsättning att givna anmärkningar iakttages
Upon condition that the remarks mentioned are observed
Namn
Date 29/1-14 Dnr. TSS 2013-413

Värden för uträkning:

L = 15,74 meter

B = 5,75

D = 4,8

A = 43,14m2 (där 29,13 m2 är skrov samt brädgång + 14m2 är däckshus)

(0,5LDB)2/3	(0,5 x 15,74 x 5,75 x 4,8) 2/3	= 36,13
2hB	2 x 4,8 x 5,75	= 55,2
0,1A	0,1 x 43,14	= 95,644
EN =	avrundat uppåt	**96**

Förutsättningar fartyg:

Ankare 1: HHP vikt 113 kgs

Ankare 2: stockankare vikt 80 kgs

Totalvikt: 193kgs

Kätting: 120 meter i en länk utan schacklar (riggat på ankare 1)

Länkdiameter 14mm

Till ankare 2 finns bogserända à100 meter vb.

Bevis: enl. tabellbilaga XXI TSFS 2009:114 bilaga 3 regel 5-8. Fartområde A

Krävs för utrustningsnummer 75-100

- 2 ankare med en sammantagen totalvikt på 125 kgs (193 kgs)
- Länkdiameter om 12mm (14mm)
- Kättinglängd sammanlagd 110 meter (120+100)

Fartyget är således gällande ankringsarrangemang väl utrustat.

Därtill enl. TSFS 2009:114 bilaga 3 regel 5-8

- *Befintlig utrustning som är inskriven i TB på existerande fartyg accepteras*
- *Om HHP ankare på ett konventionellt fartyg kan ankarvikten reduceras med 25%*
- *För fartyg med längd < 50 meter kan alternativa arrangemang accepteras under förutsättning att arrangemang och funktion är tillfredställande*

Tabellbilaga XXI.

Ankare, kätting och tross.

Östersjö- eller vidsträcktare fart.

Utrustningsnummer (se 156 §)			Bogankare [1]		Ankarkätting [2]		
			Antal	Sammanlagd totalvikt i kg. [3]	Strömankarets totalvikt i kg. [3]	Länkjärns diameter i mm	Sammanlagd längd i meter
50	intill	75	1	75	25	11	90
75	»	100	2	125	25	12	110
100	»	125	2	175	25	13	110
125	»	150	2	200	25	13	125
150	»	200	2	250	50	14	150
200	»	250	2	300	50	15	175
250	»	300	2	350	75	17	175
300	»	350	2	400	75	18	175
350	»	425	2	425	75	18	175
425	»	525	2	500	75	19	200
525	»	625	2	575	100	21	200
625	»	725	2	650	125	22	225
725	»	850	2	725	125	23	225
850	»	1 025	2	850	150	24	250
1 025	»	1 275	2	1 000	175	25	250
1 275	»	1 500	2	1 250	225	27	275
1 500	»	1 700	3	2 000	250	30	300
1 700	»	1 900	3	2 300	275	31	325
1 900	»	2 100	3	2 550	300	31	325
2 100	»	2 300	3	2 750	300	33	350
2 300	»	2 500	3	2 950	330	33	350
2 500	»	2 700	3	3 150	330	35	375
2 700	»	2 900	3	3 350	365	35	375
2 900	»	3 100	3	3 525	365	37	375
3 100	»	3 300	3	3 675	400	37	375

[1] Prämfartyg må, där enligt tabellen tre bogankare fordras, undvara det tredje bogankaret och må därvid den sammanlagda totalvikten av båda bogankarna vara två tredjedelar av tabellens sammanlagda totalvikt, minskad på sätt i anm. [2] sägs.

[2] För prämfartyg må i tabellen angiven ankarvikt minskas med 10 procent.

[3] Ankarkätting, vars länkjärnsdiameter uppgår till 22 mm eller mera, skall vara stolpkättingar.

Kom. kall. beslut d. 19 nov. 1946 (Nr 10/1946).

IN CATTRS L DO

KOPIA

DET NORSKE VERITAS

Form No. 7

Certificate N
CDF 9029

CERTIFICATE FOR PROPELLER

Ship MANUFACTURER:
TEIGNBRIDGE PROPELLERS LTD, FORDE ROAD, NEWTON ABBOT, DEVON

Signal letters
WORKS REF 98017

Shipyard CUSTOMER:
LEEMHUIS MARINKONSULT AB RALLSTAVAGEN 30, S-73400 HALLSTAHAMMAR, SWEDEN

Yard No.
ORDER NO 4723

Owners INTENDED FOR:
M/S "GUSTAF DAHLEN"

Port of Registry

Class

PROPELLER [X] RIGHT HAND — **BLADES** [ ]

Manufacturer			Place		Year
TEIGNBRIDGE PROPELLERS			FORDE ROAD, NEWTON ABBOT, DEVON		1990
Diameter in mm	Number of blades	Weight in kg	The propeller is		The blades are
1600	4	320	[X] new	[ ] used	[ ] new [ ] used

Survey and Measurement in mm

BOSS			SHAFT HOLE DIAMETER		BLADE THICKNESS AT		
Outs. dia. fwd.	Outs. dia. aft	Length	Forward	Aft	0,2 R	0.25 R	0,6 R
290	265	285	129.5	101.25	-	49	25

BLADE WIDTH AT *)			FACE PITCH AT			RAKE IN DEGREES
0,2 R	0.25 R	0,6 R	0,2 R	0,35 R	0,6 R	
-	351	546	-	1361	1357	11.9°

Controllable-pitch Propeller

BLADE THICKNESS AT		BLADE WIDTH AT *)		EXAMINATION CONDITION
0,35 R	0,6 R	0,35 R	0,6 R	
-	-	-	-	

THE PROPELLER WAS: [ ] Painted [X] Not painted [X] Found in order

*) The blade width measured in the expanded cylindrical section

FOR TEST OF MATERIALS, SEE THE REVERSE SIDE

If the material should afterwards prove to be defective, it may in conformity with the Rules be rejected notwithstanding its previous acceptance

[X] The propeller was
[ ] The blades were

finally marked:

N.V.
CDF 9029
10.9.90
WGT 320 KGS
DIA 1600 MM
BLADE AREA 0.725M²
PITCH 0.6 R 1357

BALANCING		VALUES ACCORDING TO	
[X] statically	[ ] dynamically	[ ] maker's information	[X] appr. drawing
Flywheel effect WD^2		Expanded blade area ratio	Thrust
46.06 KG.M² kgm^2		0.6 R	51.152 KN

DESIGNED ATTACHMENT TO PROPELLER SHAFT: [X] key [ ] keyless [ ] flange [ ]

MIN KEY RADIUS 1.6 MM

REMARKS in case of [ ] propeller [ ] blades previously [ ] used: [ ] reconditioned:

[X] The propeller is [ ] The blades are
in accordance with drawing No.
AQUASTAR 4 DRG NO PP2924
approval date
5 SEPTEMBER 1990

Place NEWTON ABBOT
Date 10 SEPTEMBER 1990

DET NORSKE VERITAS CARDIFF

D. Jamieson
D JAMIESON Surveyor

NV 5000 5.73

Det norske Veritas has no liability for loss or damage caused by its organs, officers, employees or others who act under assignment from the Institution, regardless of whether such person has acted intentionally or negligently and irrespective of whether the loss or damage has affected a shipowning company, a shipyard or others who have requested the Institution's assistance or any third party who without having any contractual relations with the Institution, has acted or made arrangements in reliance on decisions made or information given by or on behalf of the Institution. ... in the preceding paragraph, can the individual or individuals who have personally caused the loss or damage be held ...

TEST OF MATERIALS

MATERIAL SPECIFICATIONS

MATERIAL		POSSIBLE TRADE NAME
	Mn-Al-bronze	
X	Ni-Al-bronze	'CU3'
	Mn-Bronze	
	Stainless steel	
	Cast steel	
	Cast iron	

MECHANICAL PROPERTIES

0.2% PROOF Yield point N kp/mm²	Elongation % min.	Gauge length mm	Tensile strength N kp/mm²	NON-DESTRUCTIVE TESTING
245	15		590	Ultrasonic
Impact test, KCU energy kpm/cm², min.		Contraction % min.		Magnetic particle
Heat treatment		Other requirements		Dye penetrant

TEST RESULTS

Cast No.	Test No.	0.2% PROOF Yield point N kp/mm²	Tensile strength N kp/mm²	Elongation %	Contraction %	Impact tests KCU-energy kpm/cm² at °C
H8686		267	643	17		

REMARKS. Non-destructive testing

rocess

Heat treatment

CHEMICAL COMPOSITION %

Cast No.	Cu	Sn	Pb	Zn	Fe	Ni	Al	Si	Mn	Mg	REMARKS
H8686	BAL	0.01	<0.01	0.06	4.33	4.89	9.58	0.04	1.28	<0.05	

Stamping:

N.V.

CDF.9029

stamping is placed

ON BOSS

The material is tested and surveyed in CAST condition, and is in accordance with the above requirements.

DET NORSKE VERITAS CARDIFF

Place NEWTON ABBOT

Date 10 SEPTEMBER 1990

D. JAMIESON Surveyor.