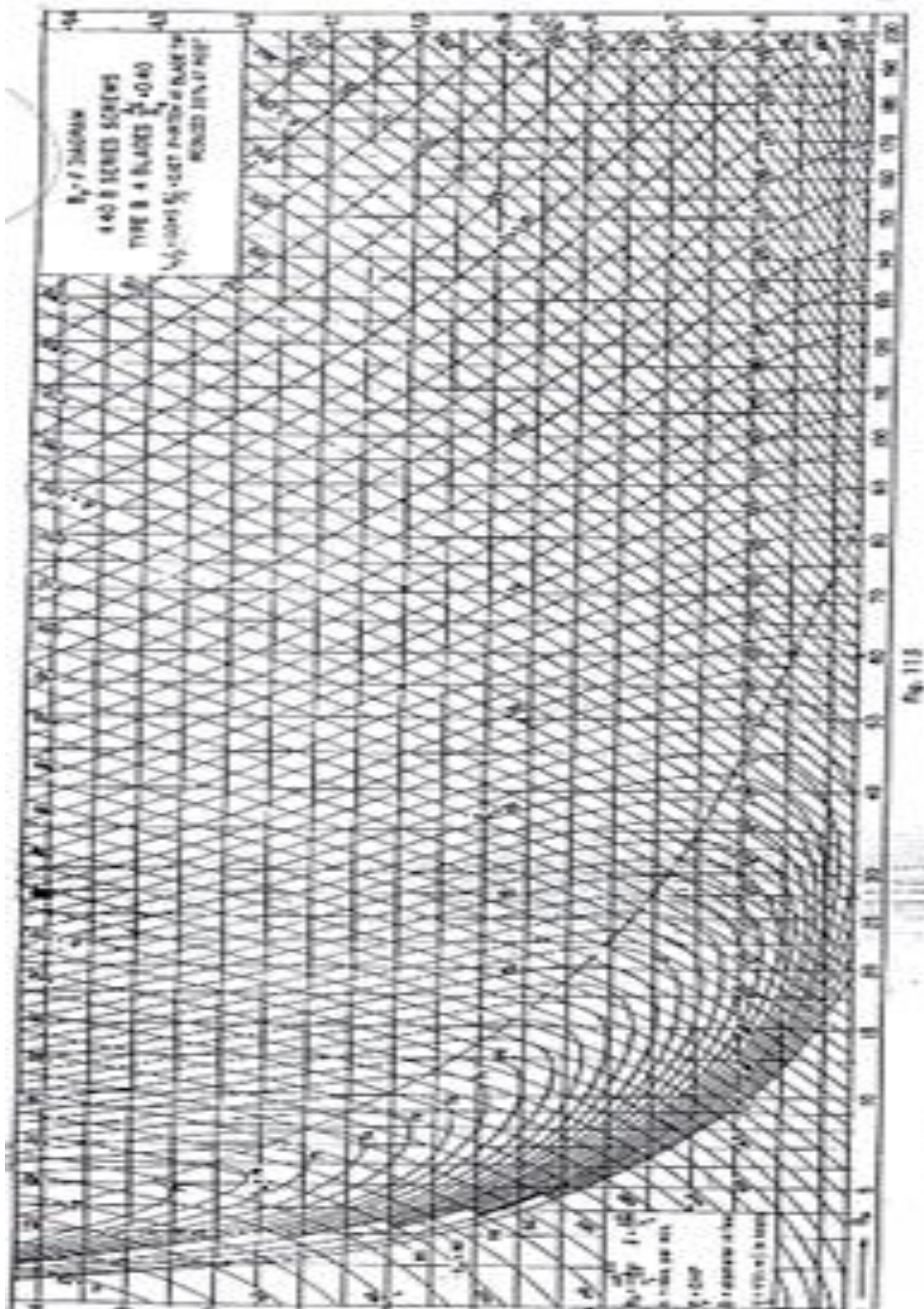
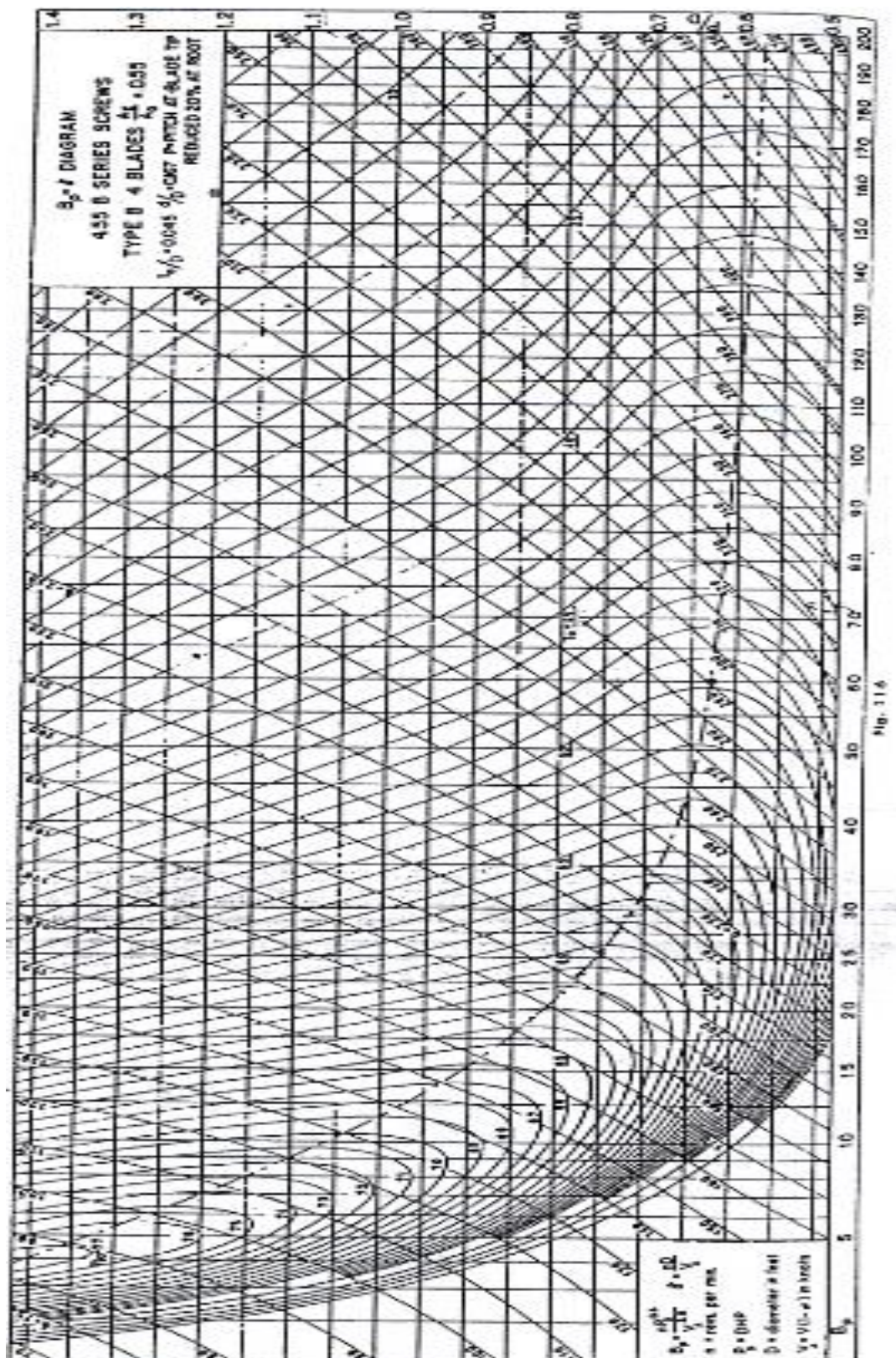


LAMPIRAN

Lampiran 1. Diagram B4- 40



Lampiran 2. Diagram B4- 55



Lampiran 3. Diagram B4 -70

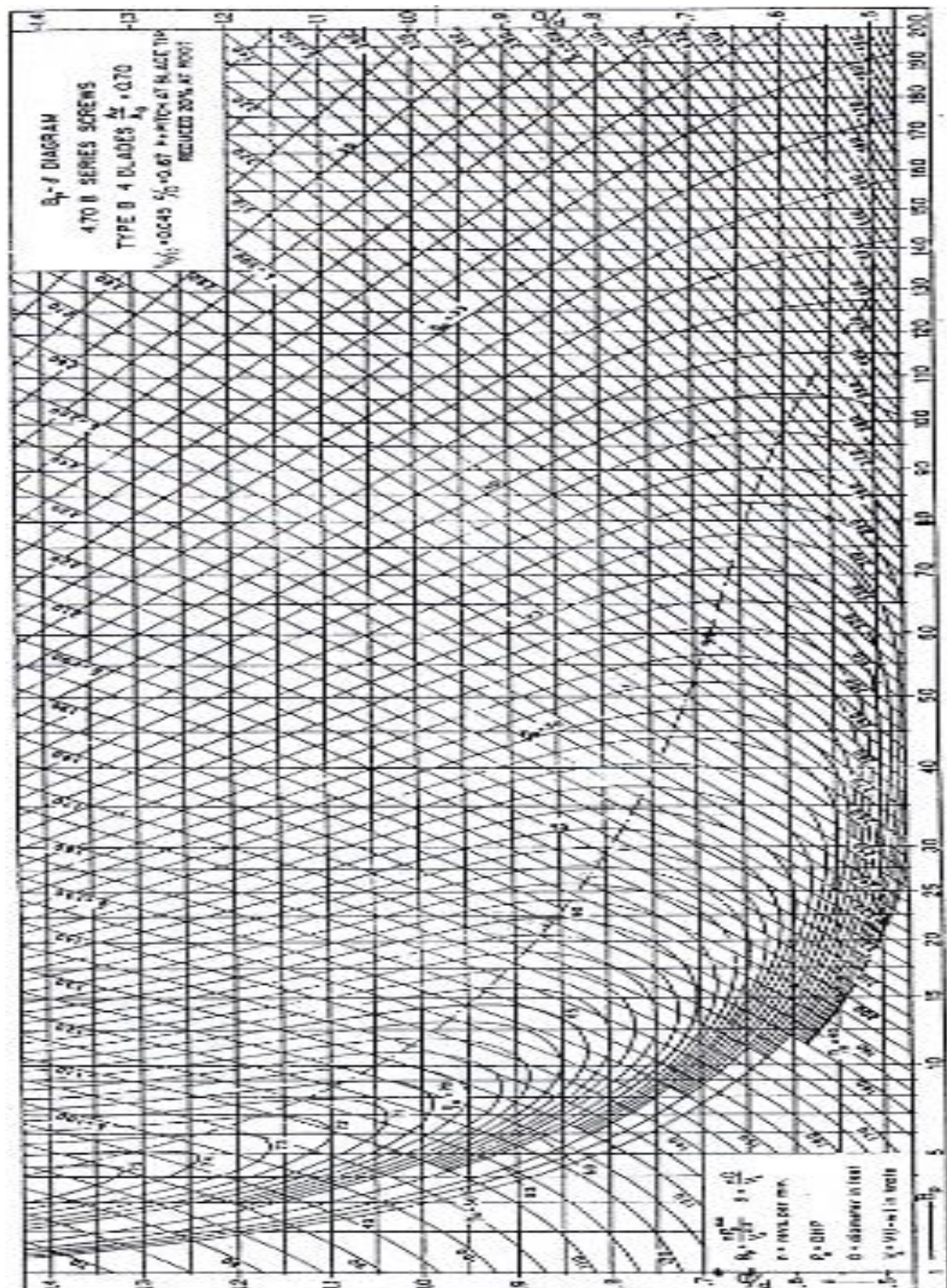
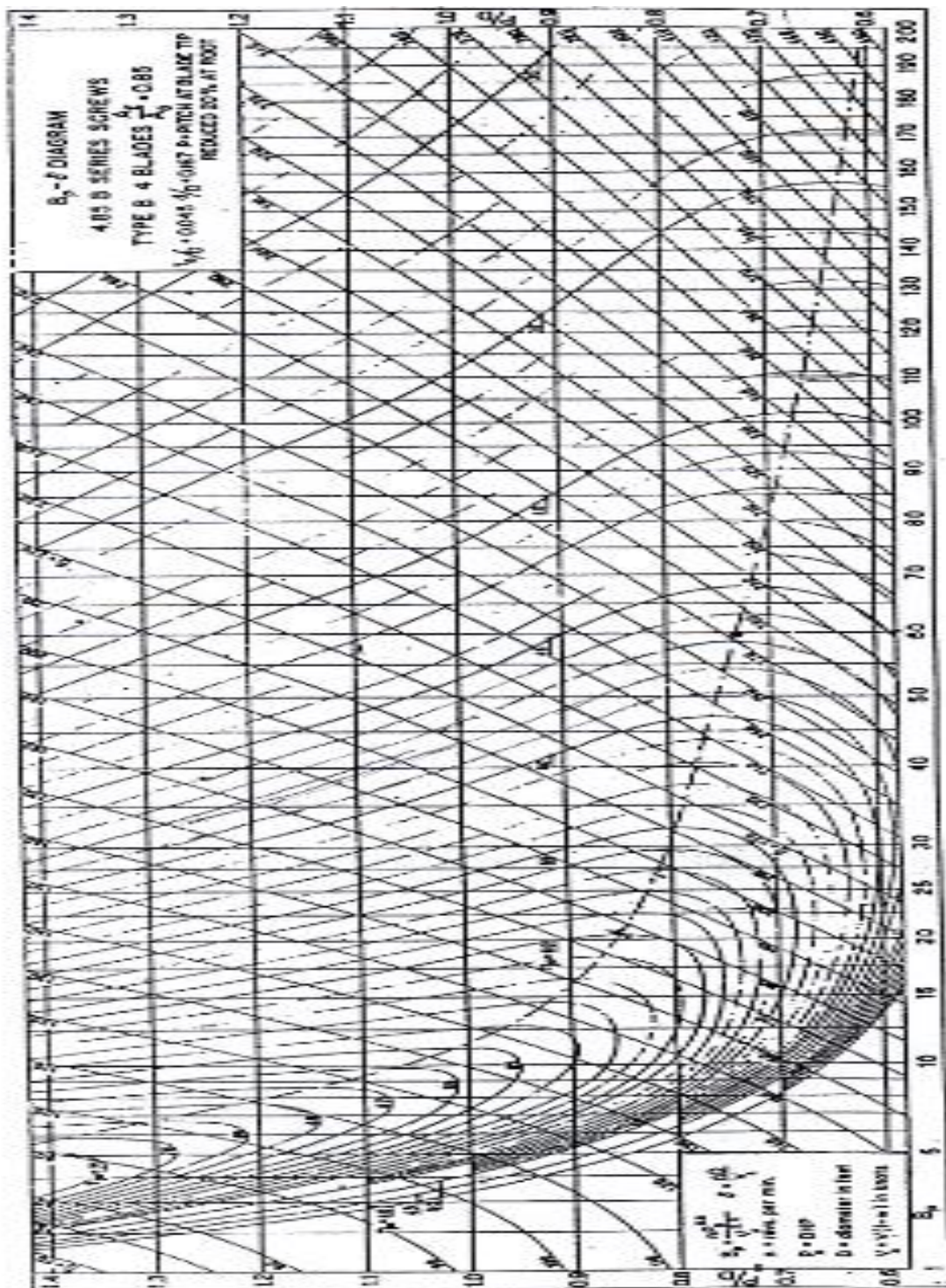
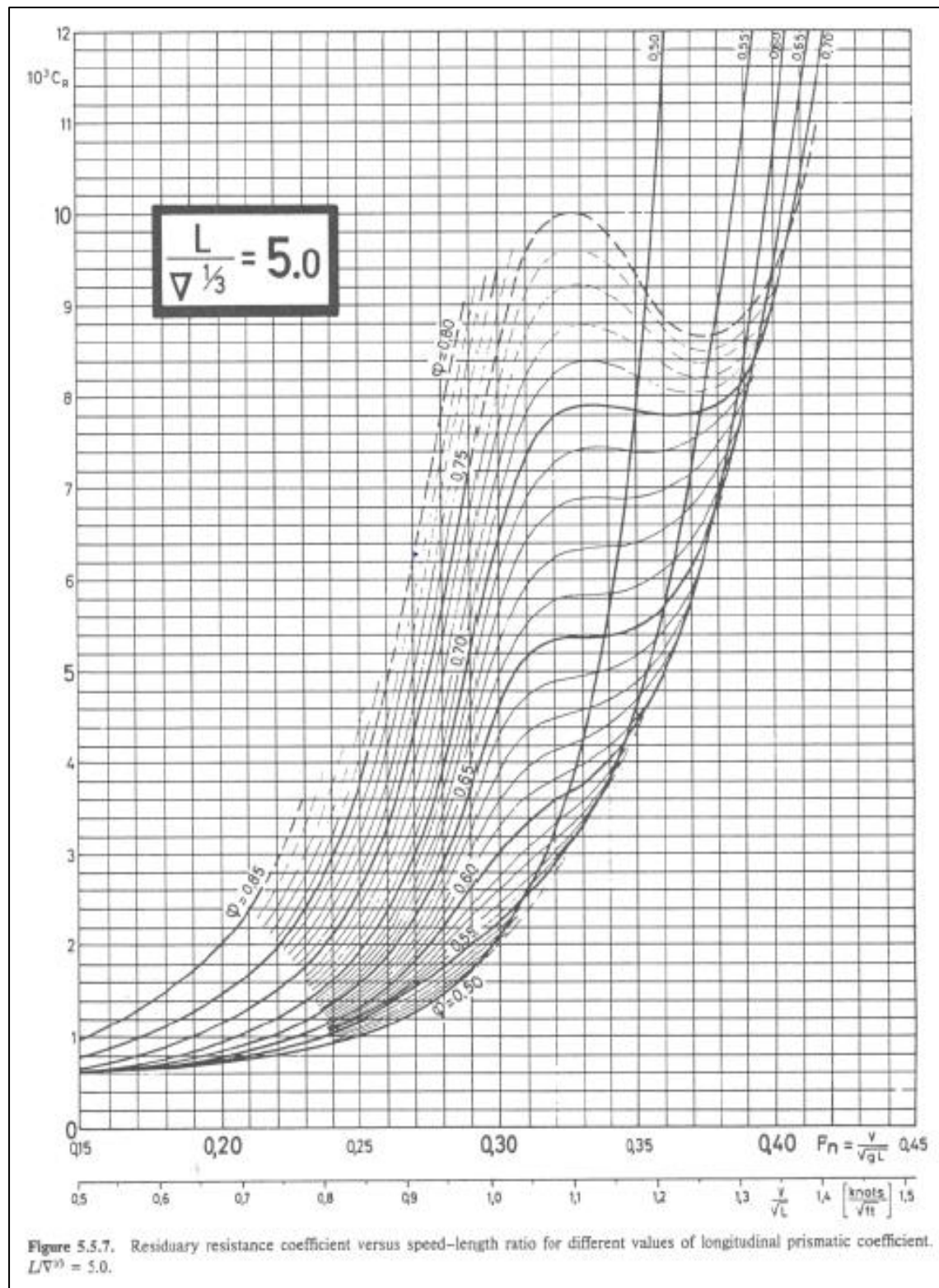


Fig. 117

Lampiran 4. Diagram B4 -85



Lampiran 5. Diagram Kurva Residual *Resistance Coefficient* 5.0



Lampiran 6. Diagram Kurva Residual *Resistance Coefficient* 5.5

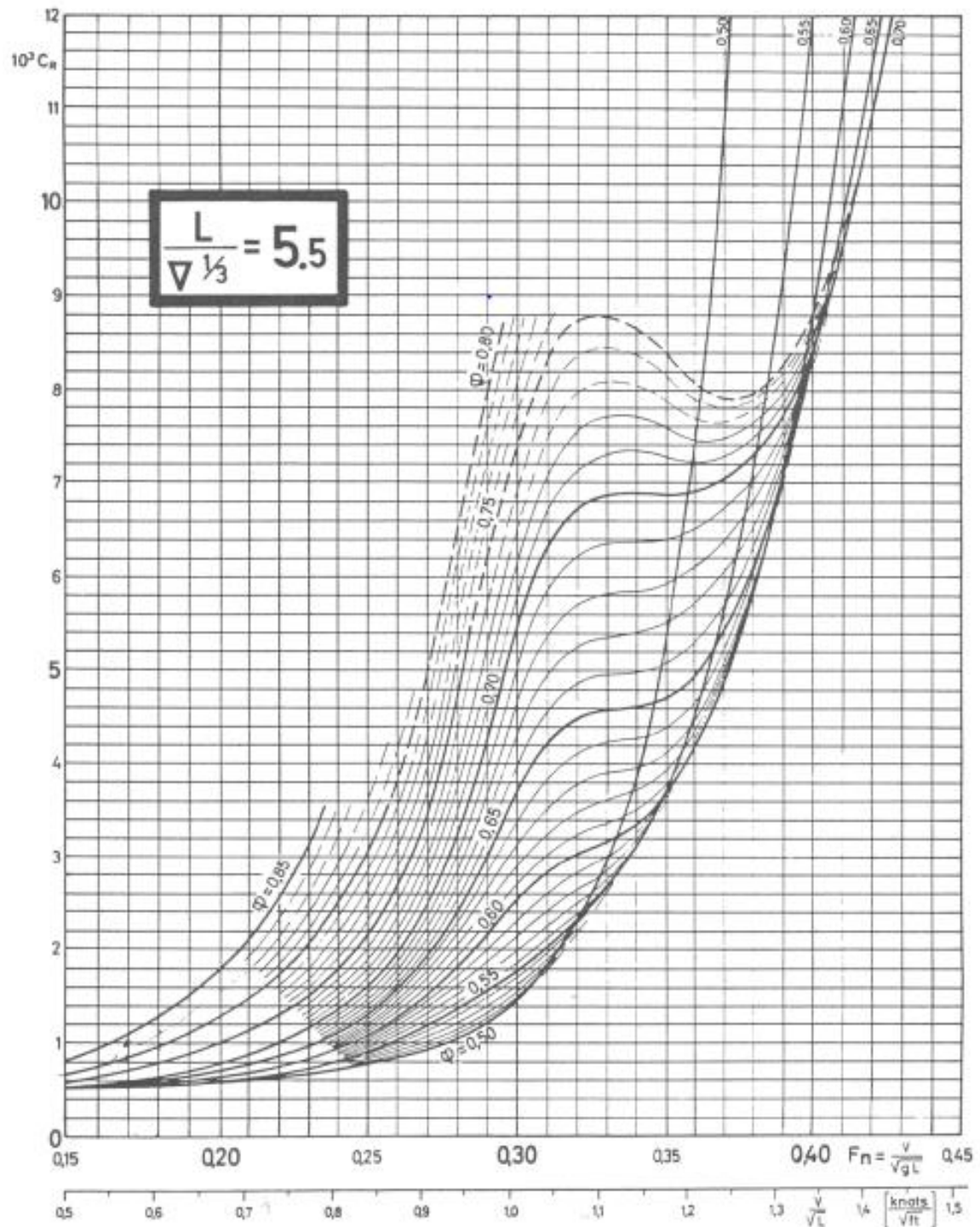
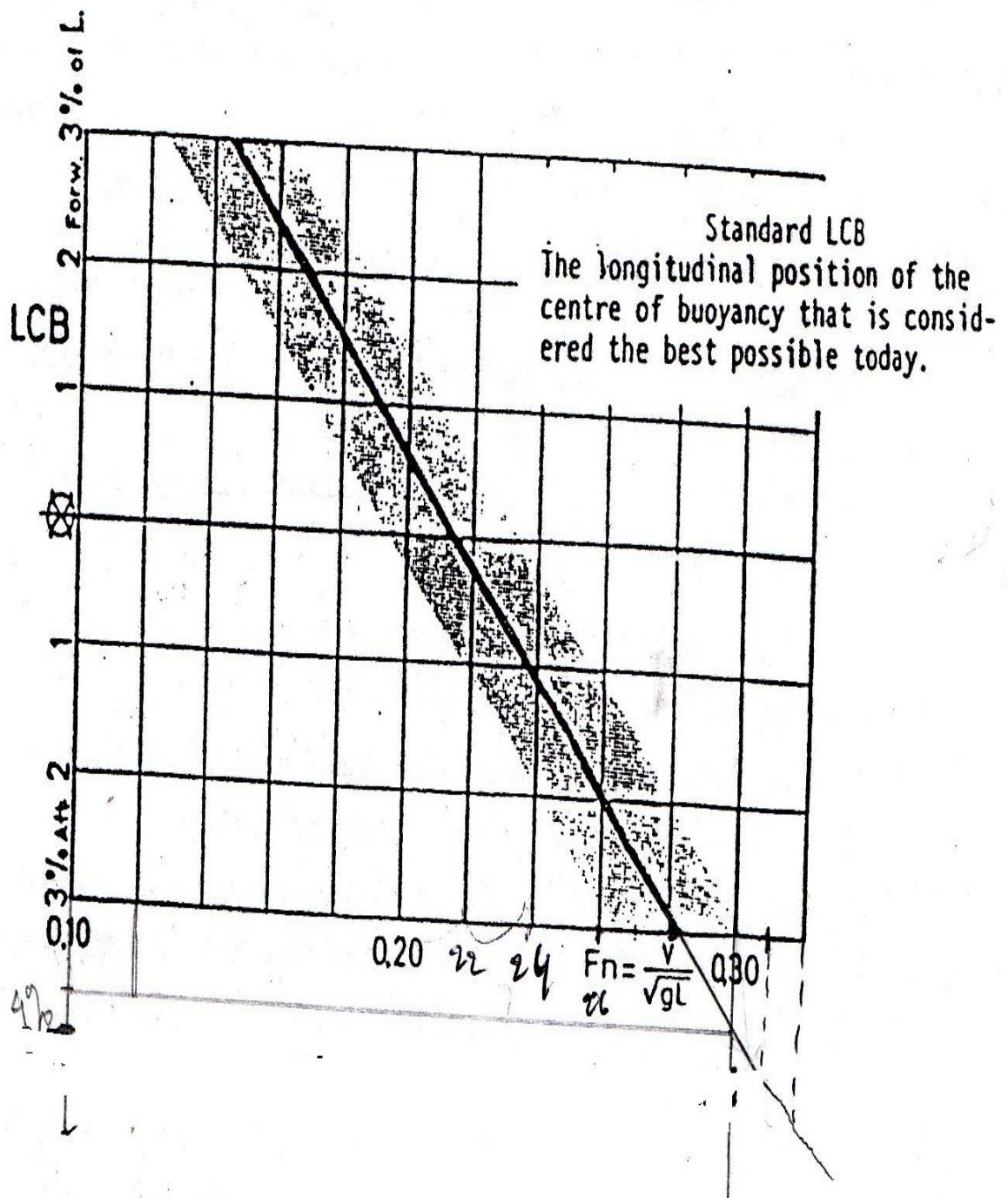
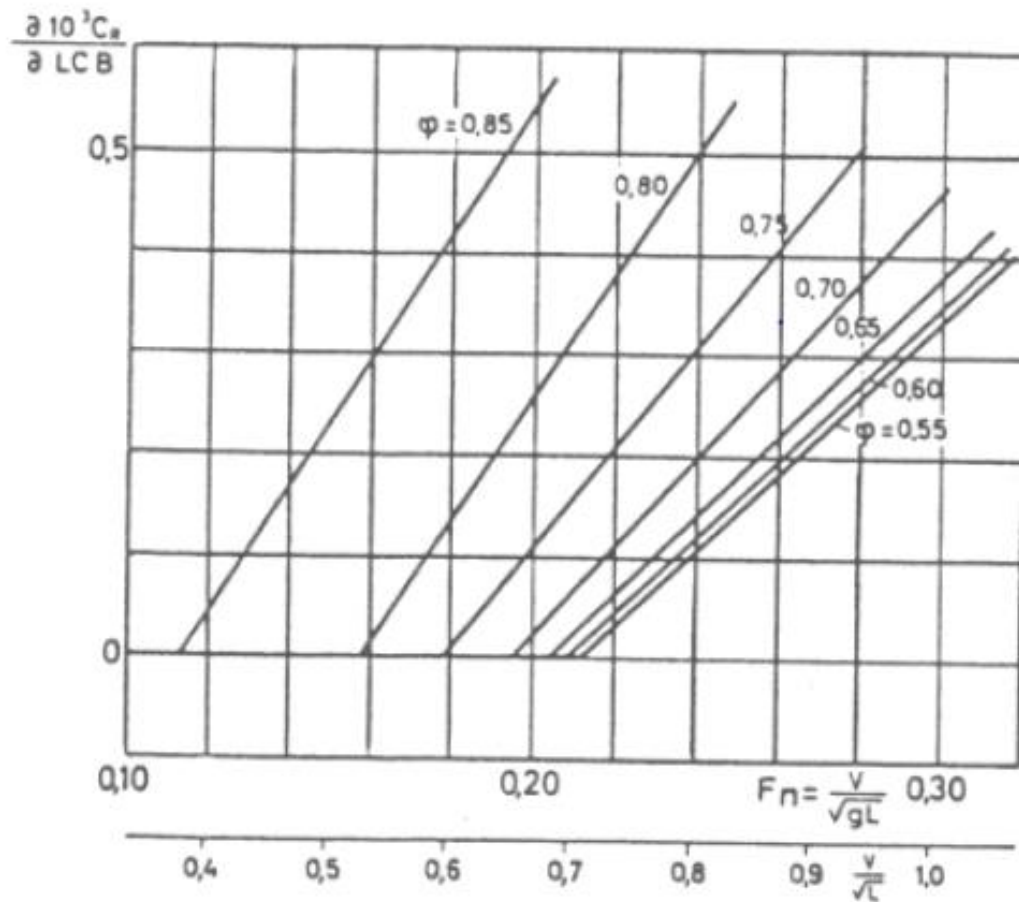


Figure 5.5.8. Residuary resistance coefficient versus speed-length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 5.5$.

Lampiran 7. Standar LCB Kapal *Standard Guldhammer dan Harvald*



Lampiran 8. Koreksi C_R LCB Kapal *Standard Guldhammer dan Harvald*



Lampiran 9. Katalog Mesin Utama

MAN Diesel & Turbo

MAN V28/33D STC

Tier II Tier III EPA Tier 2

Tier III with SCR

Bore: 280 mm, Stroke: 330 mm

			Load profile 'Navy'	
Speed	r/min	1000	1032	
map	bar	26.9	28.6	
Rated power output	- ICFN	kW	- ICFN	kW
12V28/33D STC		5,460		6,000
16V28/33D STC		7,280		8,000
20V28/33D STC		9,100		10,000

Specific Fuel Oil Consumption (SFOC) to ISO conditions

ICFN fuel stop power	-	192.5 g/kWh
MCR 100%	190 g/kWh (194 g/kWh ¹⁾)	189.0 g/kWh
MCR 85%	188 g/kWh (188 g/kWh ¹⁾)	194.5 g/kWh

Specific lube oil consumption 0.4 g/kWh

Engine type specific reference charge air temperature before cylinder 40 °C

Figures on theoretical propeller curve for distillates according to ISO 8217 DMA

Dimensions

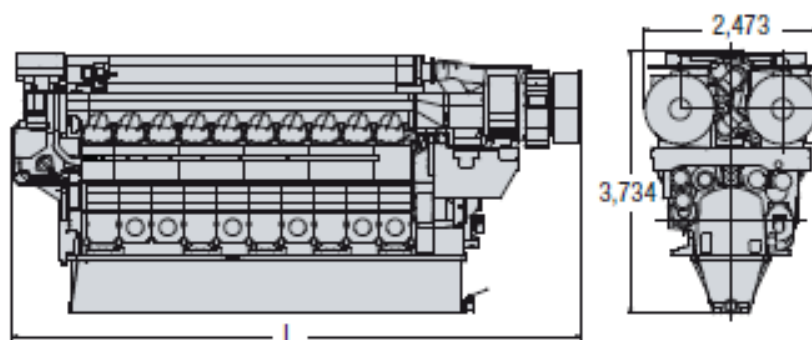
Cyl. No.		12	16	20
L	mm	6,207	7,127	8,047
Dry mass *	t	37.8	45.8	52.9

For multi-engine arrangement only

¹⁾ Engine is EPA Tier 2 compliant

Weight and performance parameters refer to engine with flywheel, TC silencer, attached pumps, oil filters and lube oil cooler

* Tolerance: 5%



Lampiran 10. Katalog Mesin Bantu

C32

GENERATOR SET ENGINE/AUXILIARY

Electronic Control System

RATINGS AND FUEL CONSUMPTION

IMO Tier II/IMO Tier III

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
791	590	1500	37.9	203.8	NC	II	IW
923	688	1500	44.0	203.0	NC	II	IW
1172	874	1500	57.0	207.0	NC	II	IW
1172	874	1500	57.9	210.3	NC	I/I/III	NC
916	683	1800	45.3	210.8	NC	II	IW
1047	781	1800	51.8	210.4	NC	II	IW
1047	781	1800	TBD	TBD	NC	I/I/III	NC
1333	994	1800	64.9	207.2	NC	II	IW
1333	994	1800	65.1	207.9	NC	I/I/III	NC

U.S. EPA Tier 4 & IMO Tier III

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
1172	874	1500	55.6	202.1	NC	III	IW
1332	994	1800	64.0	204.4	T4C	III	IW

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	5.7 x 6.4 in	145 x 162 mm
Displacement	1959 cu in	32.1 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	6950 - 7160 lb	3152 - 3248 kg

DIMENSIONS

	LE	H	WE
min.	83.5 in/2121 mm	60.9 in/1547 mm	60.2 in/1528 mm
max.	89.9 in/2284 mm	62.5 in/1587 mm	60.2 in/1528 mm

Lampiran 11. *Free Fall Life Boat*

Marine used 6.5m / 7.5m 20 / 25 persons totally enclosed fiber lifeboat and rescue boat

Product Description

Overview of SOLAS Totally Enclosed Lifeboat :

1. Comply with the requirements and rules of SOLAS and amendment 1996, LSA Code, MSC.218(82),MSC.272(85),MSC.320(89)&MSC.81(70),MSC.81(70),MSC.226(82),MSC.274(85),MSC.321(89).
2. Boat body material: fire-pretended type FRP.
3. Fitted with stainless release mechanism and launched or recovered by falls.
4. It can self-rafting by itself when capitalized.
5. Equipment is equipped according to SOLAS requirement.
6. The surface for walking is antiskid.
7. Equip a manual pump remove the ponding in the boat.
8. Rubber fender is fitted around the boat.

Type	Dimension	Persons	Hook Distance	Depth	Craft weight	Full load	Speed	Engine
GRB50C/F	5*2.3*2.84m	25	4.5m	1.0m	2115/2457kg	4260/4602kg	≥8	380J-3/YANMAR3JH25
GRB57C/F	5.8*2.32*3.1m	33	5.3m	1.15m	2284/2262kg	5008/5344kg	≥8	380J-3/YANMAR3JH25
GRB65C/F	6.6*2.32*3.1m	40	6.1m	1.15m	2284/2262kg	6161/6436kg	≥8	380J-3/YANMAR3JH25
GRB75C/F	7.6*2.78*3.1m	55	7.1m	1.2m	3125/3500kg	7537/7857kg	≥8	380J-3/YANMAR3JH30
GRB80C/F	8.0*2.98*3.1m	65	7.6m	1.2m	3000/3300kg	7537/7857kg	≥8	380J-3/YANMAR3JH30
GRB85C/F	8.5*3.3*3.3m	90	8.1m	1.25m	4361/4691kg	11786/12116kg	≥8	380J-3/YANMAR3JH30
GR93C/F	9.3*3.45*3.35m	106	8.9m	1.3m	5160/5461kg	13810/14220kg	≥8	380J-3
GRB99C/F	10.05*3.8*3.45m	120	9.4m	1.25m	6050/6500kg	15950/16400kg	≥8	N485J-3/BUKH DV48RME
GR102C/F	10.28*3.5*3.35m	130	8.95m	1.3m	5658/5960kg	15375/15775kg	≥8	380J-3
GR117C/F	11.7*3.55*3.4m	150	11.3m	1.3m	5317/5617kg	18190/18600kg	≥8	380J-3

Lampiran 12. Inflatable Liferaft

RAFT	
Solas Approved throw overboard types of life rafts with 15 person	
Model No.	ATOE - 15
Shape	Regular octagon
Capacity	15
Material	Neoprene coated fabric (buoyancy tube), water-proof cloth (canopy)
Cylinder	ØL x 1
Gas composition	CO2 and N2
Lighting system	1 interior lighting lamp, 1 exterior indication lamp
Battery life	≥12hrs
Ballast system	4 x 60.5L water pockets for better stability
Temperature inflating range	-30 — +65°C
Max stowage height	18 - 50M from water surface
Use	Suitable for offshore cruising or open sea longer voyages
Standard	It meets the China MSA- "Regulations for the Statutory Surveys of Ships and offshore Installations---Technical Regulations for the Statutory Surveys of Sea-going Ships Engaged in Domestic Voyages"2004, and its 2008 Amendments, Part4, Ch.3 and SOLAS(74/96) LSA, MSC.81(70), MSC.226(82), MSC.218(82), MSC.293(87), ISO15738(2002)
Equipment outfit	Solas A/ B pack
Life raft dimension (mm)	3238X3238X1000
Canister dimension (mm)	1285xØ70xØ70 (Solas A Pack)
	1230xØ45x550 (Solas B Pack)
Outer package dimension (mm)	1320x720xØ60 (Solas A Pack)
	1280xØ60xØ70 (Solas B Pack)
Weight (kg)	≤130
Conveyance:	
Solas A Pack	Solas B pack
Qty/ 20'FCL: 40units	Qty/ 20'FCL: 45units
Qty/ 40'FCL: 83units	Qty/ 40'FCL: 93units
Qty/ 20'HQ: 104units	Qty/ 20'HQ: 117units



Lampiran 13. *Rescue Boat*

Quick Details

Place of Origin:	Jiangsu, China, Jiangsu, China (Mainland)	Brand Name:	HYPRO, HYPRO
Model Number:	GRP	Part:	Used Rescue Boat For Sale
Type:	Marine Used Rescue Boat For Sale	Kind:	Rescue Boat
Properties:	Used Rescue Boat For Sale		

Product Description

Model	Dimension	Engine	Speed	Capacity	Unloaded	Full loaded
NM43R	4.30*1.86*0.78m	MERCURY 25HP	≥6knots	6P	605kg	1100kg
NM45R (Single Hook)	4.50*1.86*0.78m	MERCURY 25HP	≥6knots	6P	700kg	1195kg
NM45R (Double Hook)	4.50*1.86*0.78m	MERCURY 25HP	≥6knots	6P	700kg	1195kg

Picture Introduce



Lampiran 14. *Crane*

MORDEC™ DECK MACHINERY
Marine Deck Crane

- Types: Provision Crane / Flow Boom Crane / Knuckle Boom Crane / Telescopic Crane
- Capacity: Up to 50ton
- Large range of working radius
- Drive: Electrical / Electro-Hydraulic / Diesel-Hydraulic



Specifications subject to change without notice. This edition supersedes all previous issues.

Lampiran 15. Katalog Plat

CALCULATED PLATE WEIGHT (FROM THICKNESS & SIZE)

Width x Length (in mm)	1219 x 2438	1524 x 3048	1524 x 6096	1524 x 9144	1524 x 12192	1829 x 6096	1829 x 12192	1829 x 18292	2133 x 6096	2133 x 12192	2438 x 6096	2438 x 12192	2438 x 18292	2743 x 6096	2743 x 12192	3048 x 6096	3048 x 12192	3353 x 6096	3353 x 12192
Width x Length (in ft)	4' x 8'	5' x 10'	5' x 20'	5' x 30'	5' x 40'	6' x 20'	6' x 40'	7' x 20'	7' x 40'	8' x 20'	8' x 40'	8' x 20'	8' x 40'	9' x 20'	9' x 40'	10' x 20'	10' x 40'	11' x 20'	11' x 40'
Width x Length (in inch)	48 x 96	60 x 120	60 x 240	60 x 360	60 x 480	72 x 240	72 x 480	84 x 240	84 x 480	96 x 240	96 x 480	108 x 240	108 x 480	120 x 240	120 x 480	132 x 240	132 x 480	144 x 240	144 x 480
Thickness (mm)	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
8	187	292	467	583	729	875	1021	1167	1313	1459	1605	1751	1897	2043	2189	2335	2481	2627	2773
10	233	365	583	729	875	1021	1167	1313	1459	1605	1751	1897	2043	2189	2335	2481	2627	2773	2919
12	280	438	688	875	1021	1167	1313	1459	1605	1751	1897	2043	2189	2335	2481	2627	2773	2919	3065
14	327	511	792	989	1186	1383	1580	1777	1974	2171	2368	2565	2762	2959	3156	3353	3550	3747	3944
16	373	583	894	1104	1313	1522	1731	1940	2149	2358	2567	2776	2985	3194	3403	3612	3821	4030	4239
18	420	656	1008	1239	1470	1701	1932	2163	2394	2625	2856	3087	3318	3549	3780	4011	4242	4473	4704
20	467	729	1114	1365	1616	1867	2118	2369	2620	2871	3122	3373	3624	3875	4126	4377	4628	4879	5130
22	513	802	1229	1500	1771	2042	2313	2584	2855	3126	3397	3668	3939	4210	4481	4752	5023	5294	5565
24	560	875	1334	1625	1916	2207	2498	2789	3080	3371	3662	3953	4244	4535	4826	5117	5408	5699	5990
26	607	932	1439	1750	2061	2372	2683	2994	3305	3616	3927	4238	4549	4860	5171	5482	5793	6104	6415
28	653	1021	1544	1875	2206	2537	2868	3199	3530	3861	4192	4523	4854	5185	5516	5847	6178	6509	6840
30	700	1094	1659	2000	2341	2682	3023	3364	3705	4046	4387	4728	5069	5410	5751	6092	6433	6774	7115
32	747	1167	1774	2125	2466	2807	3148	3489	3830	4171	4512	4853	5194	5535	5876	6217	6558	6899	7240
34	793	1239	1879	2240	2581	2922	3263	3604	3945	4286	4627	4968	5309	5650	5991	6332	6673	7014	7355
36	840	1313	1984	2345	2686	3027	3368	3709	4050	4391	4732	5073	5414	5755	6096	6437	6778	7119	7460
38	887	1386	2089	2450	2791	3132	3473	3814	4155	4496	4837	5178	5519	5860	6201	6542	6883	7224	7565
40	933	1459	2194	2555	2896	3237	3578	3919	4260	4601	4942	5283	5624	5965	6306	6647	6988	7329	7670
42	980	1532	2299	2660	3001	3342	3683	4024	4365	4706	5047	5388	5729	6070	6411	6752	7093	7434	7775
44	1027	1605	2404	2765	3106	3447	3788	4129	4470	4811	5152	5493	5834	6175	6516	6857	7198	7539	7880
46	1073	1678	2509	2870	3211	3552	3893	4234	4575	4916	5257	5598	5939	6280	6621	6962	7303	7644	7985
48	1120	1751	2614	2975	3316	3657	3998	4339	4680	5021	5362	5703	6044	6385	6726	7067	7408	7749	8090
50	1166	1823	2719	3080	3421	3762	4103	4444	4785	5126	5467	5808	6149	6490	6831	7172	7513	7854	8195
52	1213	1896	2824	3185	3526	3867	4208	4549	4890	5231	5572	5913	6254	6595	6936	7277	7618	7959	8300
54	1260	1969	2929	3290	3631	3972	4313	4654	4995	5336	5677	6018	6359	6700	7041	7382	7723	8064	8405
56	1306	2042	3034	3395	3736	4077	4418	4759	5100	5441	5782	6123	6464	6805	7146	7487	7828	8169	8510
58	1353	2115	3139	3500	3841	4182	4523	4864	5205	5546	5887	6228	6569	6910	7251	7592	7933	8274	8615
60	1400	2188	3244	3605	3946	4287	4628	4969	5310	5651	5992	6333	6674	7015	7356	7697	8038	8379	8720
62	1446	2261	3349	3710	4051	4392	4733	5074	5415	5756	6097	6438	6779	7120	7461	7802	8143	8484	8825
64	1493	2334	3454	3815	4156	4497	4838	5179	5520	5861	6202	6543	6884	7225	7566	7907	8248	8589	8930
66	1540	2407	3559	3920	4261	4602	4943	5284	5625	5966	6307	6648	6989	7330	7671	8012	8353	8694	9035
68	1586	2480	3664	4025	4366	4707	5048	5389	5730	6071	6412	6753	7094	7435	7776	8117	8458	8799	9140
70	1633	2553	3769	4130	4471	4812	5153	5494	5835	6176	6517	6858	7199	7540	7881	8222	8563	8904	9245
72	1680	2626	3874	4235	4576	4917	5258	5599	5940	6281	6622	6963	7304	7645	7986	8327	8668	9009	9350
74	1726	2699	3979	4340	4681	5022	5363	5704	6045	6386	6727	7068	7409	7750	8091	8432	8773	9114	9455
76	1773	2772	4084	4445	4786	5127	5468	5809	6150	6491	6832	7173	7514	7855	8196	8537	8878	9219	9560
78	1820	2845	4189	4550	4891	5232	5573	5914	6255	6596	6937	7278	7619	7960	8301	8642	8983	9324	9665
80	1866	2918	4294	4655	4996	5337	5678	6019	6360	6701	7042	7383	7724	8065	8406	8747	9088	9429	9770
82	1913	2991	4399	4760	5101	5442	5783	6124	6465	6806	7147	7488	7829	8170	8511	8852	9193	9534	9875
84	1960	3064	4504	4865	5206	5547	5888	6229	6570	6911	7252	7593	7934	8275	8616	8957	9298	9639	9980
86	2006	3137	4609	4970	5311	5652	5993	6334	6675	7016	7357	7698	8039	8380	8721	9062	9403	9744	10085
88	2053	3210	4714	5075	5416	5757	6098	6439	6780	7121	7462	7803	8144	8485	8826	9167	9508	9849	10190
90	2100	3283	4819	5180	5521	5862	6203	6544	6885	7226	7567	7908	8249	8590	8931	9272	9613	9954	10295
92	2146	3356	4924	5285	5626	5967	6308	6649	6990	7331	7672	8013	8354	8695	9036	9377	9718	10059	10400
94	2193	3429	5029	5390	5731	6072	6413	6754	7095	7436	7777	8118	8459	8800	9141	9482	9823	10164	10505
96	2240	3502	5134	5495	5836	6177	6518	6859	7200	7541	7882	8223	8564	8905	9246	9587	9928	10269	10610
98	2286	3575	5239	5600	5941	6282	6623	6964	7305	7646	7987	8328	8669	9010	9351	9692	10033	10374	10715
100	2333	3648	5344	5705	6046	6387	6728	7069	7410	7751	8092	8433	8774	9115	9456	9797	10138	10479	10820

Calculated considering specific gravity of steel as 7.85 Kg/mm², and dimension in mm.

Not Available Sizes

Active
Go to S

07

Flat Products | Steel Plate

Lampiran 16. Perhitungan Tebal Pelat

NO	URAIAN	RULES LLOYD'S REGISTER 2017	RUMUS	HASIL (mm)	GAMBAR
1	Lebar Pelat Lunas / Keel Plate	Part 4 Chapter 1 Section 5	$b = 70B \text{ (mm)}$	1800	
2	Tebal Pelat Lunas / Keel Plate		$t = \text{Tebal Pelat Alas} + 2 \text{ (mm)}$	24	
3	Pelat Alas / Bottom Plate				
	Dibagian belakang	Part 3 Chapter 6 Section 3			
	0,075L dari AP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
	diantara 0,075L dan 0,15L dari AP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
	didepan 0,15L dari AP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
	Dibagian tengah (ruang munt)	Part 4 Chapter 1 Section 5	$t = 0,001s_1f_1(0,056L + 16,7) \sqrt{\frac{p}{s_2}}$	22	
	Dibagian depan	Part 3 Chapter 5 Section 3			
	0,075L dari FP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
	diantara 0,075L dan 0,25L dari FP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
	didepan 0,25L dari FP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
4	Pelat Inner Bottom	Part 4 Chapter 7 Section 8	$t = 0,00136(s + 660) \sqrt{k \cdot L \cdot T + 5}$	19	
5	Pelat Bilga / Bilge Plate	Part 3 Chapter 6 Section 3			
	Dibagian belakang				
	0,075L dari AP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
	diantara 0,075L dan 0,15L dari AP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
	didepan 0,15L dari AP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	

	Dibagian tengah (ruang muat)	<i>Part 4 Chapter 1 Section 5</i>	$t = 0,001s_1f_1(0,056L + 16,7)\sqrt{\frac{P_L}{s_2}}$	22	
	Dibagian depan				
	0,075L dari FP		$t = (6,5 + 0,033L)\sqrt{\frac{ks_1}{s_b}}$	12,7	
	diantara 0,075L dan 0,25L dari FP	<i>Part 3 Chapter 5 Section 3</i>	$t = (6,5 + 0,033L)\sqrt{\frac{ks_1}{s_b}}$	12,7	
	didepan 0,25L dari FP		$t = (6,5 + 0,033L)\sqrt{\frac{ks_1}{s_b}}$	12,7	
6	<i>Solid Floor</i>	<i>Part 4 Chapter 1 Section 8</i>	$t = (0,008d_{op} + 1)\sqrt{k} \text{ mm}$	12,7	
7	<i>Center Girder</i>	<i>Part 4 Chapter 1 Section 8</i>	$t = (0,008d_{op} + 4)\sqrt{k} \text{ mm}$	16	
8	<i>Side Girder</i>		$t = (0,0075d_{op} + 1)\sqrt{k} \text{ mm}$	12	
9	<i>Engine Settings</i>				
	<i>Top Plate</i>	<i>Part 3 Chapter 7 Section 6</i>	$t = 19 + 3,4f$	24	
	<i>Girders</i>		$t_1 = 28 + 4,08f$	36	
	<i>Floor Plate</i>		$t_2 = 10 + 1,3f$	12	
10	<i>Pelat Sisi / Side Shell</i>				
	Dibagian belakang				
	0,075L dari AP		$t = (6,5 + 0,033L)\sqrt{\frac{ks_1}{s_b}}$	12,7	
	diantara 0,075L dan 0,15L dari AP	<i>Part 3 Chapter 6 Section 3</i>	$t = (6,5 + 0,033L)\sqrt{\frac{ks_1}{s_b}}$	12,7	
	didepan 0,15L dari AP		$t = (6,5 + 0,033L)\sqrt{\frac{ks_1}{s_b}}$	12,7	
	Dibagian tengah				
	dari D/4 dari gunwale		$t = 0,00085s_1f_1(0,083L + 10)\sqrt{\frac{P_L}{s_2}} \text{ (mm)}$	18	
	dari D/4 dari mid-depth	<i>Part 4 Chapter 1 Section 5</i>	$t = 0,00085s_1f_1(0,083L + 10)\sqrt{\frac{P_L}{s_2}} \text{ (mm)}$	18	
	dari D/4 dari base		$t = 0,00085s_1f_1(0,083L + 10)\sqrt{\frac{P_L}{s_2}} \text{ (mm)}$	18	
	Dibagian depan				
	0,075L dari FP	<i>Part 3 Chapter 5 Section 3</i>	$t = (6,5 + 0,033L)\sqrt{\frac{ks_1}{s_b}}$	12,7	

Approved by

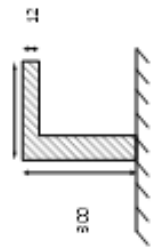
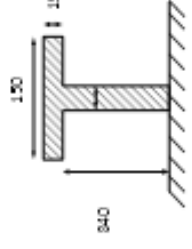
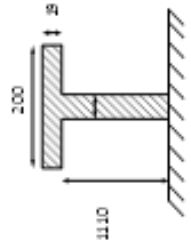
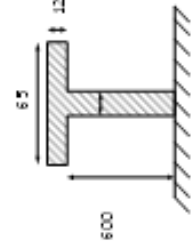
diantara 0,075L dan 0,2L dari FP	Part 3 Chapter 5 Section 3	$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
didepan 0,2L dari FP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
Diantara hopper tank dan topside tank	Part 4 Chapter 7 Section 6	$t = \sqrt{L}$ mm	15	
Sisi pada Poop deck	Part 3 Chapter 6 Section 3	$t = (6,5 + 0,017L) \sqrt{\frac{ks_1}{s_b}}$	9	
Sisi pada Forecastle	Part 3 Chapter 5 Section 3	$t = (7 + 0,02L) \sqrt{\frac{ks_1}{s_b}}$	10	
11 Pelat Sheer Strake Dibagian belakang 0,075L dari AP	Part 3 Chapter 6 Section 3			
diantara 0,075L dan 0,15L dari AP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
didepan 0,15L dari AP		$t = (5,5 + 0,02L) \sqrt{\frac{ks_1}{s_b}}$	9	
Dibagian tengah (ruang muat)	Part 4 Chapter 1 Section 5	$t = 0,00085s_1 f_1 (0,083L + 10) \sqrt{\frac{f_2}{s_1}}$	18	
Dibagian depan 0,075L dari FP	Part 3 Chapter 5 Section 3	$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
diantara 0,075L dan 0,2L dari FP		$t = (6,5 + 0,033L) \sqrt{\frac{ks_1}{s_b}}$	12,7	
didepan 0,2L dari FP		$t = (5,5 + 0,02L) \sqrt{\frac{ks_1}{s_b}}$	9	
12 Pelat Deck (weather deck) Dibagian belakang 0,075L dari AP	Part 3 Chapter 6 Section 2	$t = (5,5 + 0,02L) \sqrt{\frac{ks_1}{s_b}}$	9	

Activate Windows

di antara 0,075L dan 0,15L dari AP	Part 3 Chapter 6 Section 2	$t = (5,5 + 0,02L) \sqrt{\frac{k_{s1}}{s_b}}$	9	
		$t = (5,5 + 0,02L) \sqrt{\frac{k_{s1}}{s_b}}$	9	
		$t = 0,001s_1 \sqrt{LE} + 2,5$	14	
Dibatas tepi Diluar garis pembukuan Dibatas tepi 0,075L dari FP di antara 0,075L dan 0,2L dari FP di depan 0,2L dari FP	Part 4 Chapter 1 Section 4	$t = (6,5 + 0,02L)C \sqrt{\frac{k_{r1}}{s_b}}$	10	
		$t = (5,5 + 0,02L)C \sqrt{\frac{k_{r1}}{s_b}}$	9	
		$t = (5,5 + 0,02L)C \sqrt{\frac{k_{r1}}{s_b}}$	9	
13 Pelat Deck (Lower deck Plating) Diluar garis pembukuan Second deck Third deck or platform Didalam garis pembukuan	Part 4 Chapter 1 Section 4	$t = 0,012s_1 \sqrt{k}$	8	
		$t = 0,01s_1 \sqrt{k}$	8	
		$t = 0,01s_1 \sqrt{k}$	8	
14 Forecastle	Part 3 Chapter 8 Section 4	$t = (6 + 0,017L) \sqrt{\frac{k_2}{s_b}}$	12	
15 Hatch Coaming	Part 4 Chapter 7 Section 13	$t = 14,9s \sqrt{\frac{p_{coam}}{\sigma_{allow}}} S_{coam}$	12	
16 Hatch Cover	Part 4 Chapter 7 Section 12	$t = F_p 15,8s \sqrt{\frac{p}{0,95\sigma_f}}$	8	
17 Stiffeners	Part 4 Chapter 7 Section 6	$t = 7 + 0,03L$	14	
15 Manhole	Part 3 Chapter 10 Section 5	tidak boleh kurang dari 600 mm x 600 mm.	600 x 800 mm	
16 Lightening Hole			Diameter 450 mm	
17 Brackets Lower brackets Upper brackets	Part 4 Chapter 7 Section 6	$t = t_{min} + 0,5$ $t = t_{min}$	10	
18 Watertight bulkhead	Part 4 Chapter 1 Section 9	$t = 0,004sf \sqrt{kh_4}$	10	
			8	

19	Filler	Part 4 Chapter 1 Section 4	$\frac{d_p}{t} = 40$	8.8 Diameter 35.5 mm	
Sumber: Perhitungan Pribadi					

Lampiran 17. Perhitungan Modulus

NO	URAIAN	RULES LLOYD'S REGISTER 2017	RUMUS	HASIL (cm ³)	GAMBAR (mm)
1	Modulus Bottom Longitudinal	Part 4 Chapter 1 Section 6	$Z = yskh_2l_e^2 F_1 F_2$	880,97	
2	Modulus Hopper side tank structure	Part 4 Chapter 7 Section 3			
	Bottom and side shell transverse		$Z = 11,71 \rho k S h_1 l_e^2$	5799,2	
	Sloped buthead transverse		$Z = 11,71 \rho k S h_1 l_e^2$	9784,96	
3	Modulus Topside Tank Structure	Part 4 Chapter 7 Section 7			
	Shell and buthead transverse		$Z = 7,54 k S h_1 l_e^2$	1730,5	

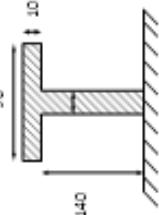
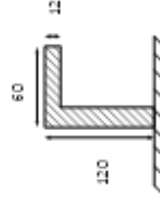
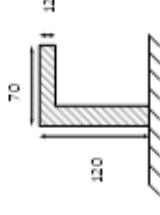
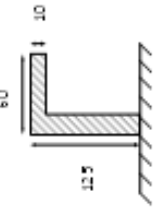
	Sloped bulk head transverse			$Z = 0,01skh_d^2$	$5240,24$	
4	Modulus Inner bottom longitudinal	Part 4 Chapter 7 Section 8		$Z = \frac{0,0085k_d^2 M C_b}{(1 - 0,235 \frac{D}{D_s})^2} \times 1,00$	$1988,62$	
5	Modulus shell framing (transverse)					
	main flanges pada targo			$Z = 3,50skh_T H^2 \times 10^{-3}$	$57,5$	
	main flanges pada targo untuk ballast	Part 4 Chapter 7 Section 6		$Z = 1,15 \times Z$	$22,87$	
	Pada outside wing anak			$Z = 1,15 \times (9,1skD_s \times 10^{-3})$	$155,42$	

	Wedge	Part 4 Chapter 1 Section 6	$Z = 11.7pkSh_e l_e^2$	1503.7	
	Deck transverse	Part 4 Chapter 1 Section 6	$Z = 2.5 (0.2 l_s^2 + H_1^{-2}) K_1 S_1 H_1 g$		
6	Modulus shell framing (longitudinal) Dibagi bagian belokan	Part 3 Chapter 6 Section 4			
	Side longitudinal in poop		$Z = 0.0065sk l_e^2 (0.6 + 0.167 D_2)$	217.09	
	Side longitudinal in way of deck spaces Belokan dari after peak bulkhead				
	Above the waterline		$Z = 0.0085sk h_{T1} l_e^2 F_p$	25.98	

	<i>Below the waterline</i>		$Z = 0,0085skh_{T1}l_e^2F_R$		$213,88$	
	<i>disasters after peak bulbhead dan 0,2L dari AP</i>					
	<i>Above the waterline</i>		$Z = 0,007skh_{T1}l_e^2F_R$		$21,4$	
	<i>Below the waterline</i>		$Z = 0,007skh_{T1}l_e^2F_R$		$184,37$	
	<i>dibagi atas gab (ruang mast)</i>	<i>Part 4 Chapter 7 Section 6</i>				
	<i>main frame pada kargo</i>		$Z = 3,50skh_{T1}H^2 \times 10^{-3}$		$57,5$	
	<i>main frame pada kargo untuk ballast</i>	<i>Part 3 Chapter 5 Section 4</i>	$Z = 1,15 \times Z$		$22,87$	
	<i>dibagian depan</i>					

565

7	Modulus Stiffener	Part 4 Chapter 9 Section 7			
	Horizontal			$Z = 0,006715 S12b2$	340,62
	Vertical				
8	Modulus Weather, cargo, dan accommodation deck beams	Part 4 Chapter 1 Section 4			
	Strong weather deck			$Z = (K_1 K_2 T D + K_3 B_1 s h_1 l_e^2) k \times 10^{-4}$	69,33
	Cargo deck			$Z = (400 K_1 T D + 30,8 s h_1 l_e^2) k \times 10^{-4}$	210,58
	Accommodation deck			$Z = (530 K_1 T D + 30,8 s h_1 l_e^2) k \times 10^{-4}$	119,68
9	Modulus Deck girders, transverses and beams	Part 4 Chapter 1 Section 4			

	Girders dan transverses		$Z = 4,75 kSH_y I_y^2$	190,38	
10	Bulkhead transverses or stringers	Part 4 Chapter 7 Section 8	$Z = 7,5 kSH_y I_y^2$	138,68	
11	Bulwark	Part 3 Chapter 8 Section 5	$Z = (33 + 0,44L)h^2 s$	154	
12	Modulus Cargo dan accommodation deck longitudinal	Part 4 Chapter 1 Section 4			
	Cargo deck		$Z = sk(5,9L_1 + 25h_1 I_y^2) \times 10^{-4}$	159,49	
	Accommodation deck		$Z = sk(5,1L_1 + 25h_1 I_y^2) \times 10^{-4}$	113,05	

Sumber: Perhitungan Pribadi

Lampiran 18. Katalog *Windlass & mooring winch*

Main Technical Specification

Chain Dia. (mm)	Working Load(kN)	Working Speed(m/min)	Mooring Pull(kN)	Mooring Speed(m/min)	Drum Capacity(m)	Motor Power(kw)
14/16/17.5	8.3/10.9/13.0	≥9	8	≥12	Φ11x100	5.5
19/20.5/22	15.3/17.9/20.6	≥9	15	≥12	Φ13x120	7.5
24/26	24.5/28.7	≥9	20	≥12	Φ15x120	11
28/30	33.3/38.3	≥9	30	≥12	Φ18x150	15
32/34/36	43.5/49.1/55.1	≥9	40	≥12	Φ20.5x150	22
38/40/42	61.4/68.0/75.0	≥9	50	≥12	Φ20.5x150	30
44/46/48	82.3/89.9/97.9	≥9	60	≥12	Φ26x200	37
50/52/54	106.3/114.9/123.9	≥9	60	≥15	Φ26x200	45
56/58/60	133.3/143.0/153.0	≥9	80	≥15	Φ26x200	55
62/64	163.4/174.1	≥9	80	≥15	Φ30x200	55
66/68	185.1/196.5	≥9	100	≥15	Φ30x200	75
70/73	208.3/226.5	≥9	120	≥15	Φ32.5x200	75
76/78	245.5/258.6	≥9	125	≥15	Φ32.5x200	90
81/84	311.7/335.2	≥9	140	≥15	Φ36x200	110
78/90	359.5/384.8	≥9	150	≥15	Φ38x200	120
92/95	402.0/428.7	≥9	200	≥15	Φ40x200	130
97/100	446.9/475.0	≥9	250	≥15	Φ42x200	150
105/107	523.7/543.8	≥9	300	≥15	Φ44x200	180
112/114	595.8/617.3	≥9	350	≥15	Φ48x200	200

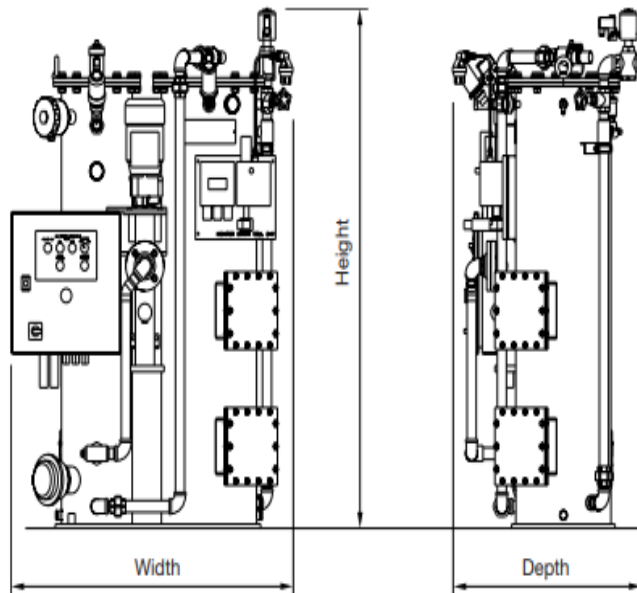
Activat
Go to Se

Lampiran 19. Katalog *Pillar*

NB. INCH	O.D	5S	5	10S	10	20	30	STD4 0S	40	60	XS/ 80S	80	100	120	140	160	XXS
1/8	10.27		0.09	1.24	1.24			1.73			2.41						
1/4	13.72		1.24	1.65	1.65			2.23			3.02						
3/8	17.15		1.24	1.65	1.65			2.31			3.20						
1/2	21.34	1.65	1.65	2.11	2.11			2.77			3.73					4.75	7.47
3/4	26.67	1.65	1.65	2.11	2.11			2.87			3.91					5.54	7.82
1	33.40	1.65	1.65	2.77	2.77			3.38			4.55					6.35	9.09
1-1/4	42.16	1.65	1.65	2.77	2.77			3.56			4.85					6.35	9.70
1-1/2	48.26	1.65	1.65	2.77	2.77			3.68			5.08					7.14	10.16
2	60.33	1.65	2.7	2.77	2.77			3.91			5.54					8.71	11.07
2-1/2	73.03	2.11	2.11	3.05	3.05			5.16			7.01					9.53	14.02
3	88.90	2.11	2.11	3.05	3.05			5.49			7.62					11.13	15.24
3-1/2	101.60	2.11	2.11	3.05	3.05			5.74			8.08						16.15
4	114.30	2.11		3.05	3.05			6.02			8.56			11.13		13.49	17.12
5	141.30	2.77	2.77	3.40	3.40			6.55			9.53			12.70		15.88	19.05
6	168.30	2.77	2.77	3.40	3.40			7.11			10.91			14.27		18.24	21.95
8	219.10	2.77		3.76	3.76	6.35	7.04	8.18		10.31	12.70		15.06	18.24	20.62	23.01	22.23
10	273.05	3.40	2.77	4.19	4.19	6.35	7.80	9.27		12.70	12.70	15.06	18.24	21.41	5.40	28.58	25.40
12	323.90	3.96	3.40	4.57	4.57	6.35	8.38	9.53	10.31	14.27	12.70	17.54	21.41	25.40	28.58	33.32	25.40
14	355.60	3.96		4.78	6.35	7.92	9.53	9.53	11.13	15.06	12.70	19.05	23.80	27.76	31.75	35.71	
16	406.40	4.19	3.95	4.78	6.35	7.92	9.53	9.53	12.70	16.66	12.70	21.41	26.19	30.94	36.53	40.46	
18	457.20	4.19		4.78	6.35	7.92	11.13	9.53	14.27	19.05	12.70	23.80	29.36	34.93	39.67	45.24	
20	508.00	4.78		5.54	6.35	9.53	12.70	9.53	15.06	20.26	12.70	26.19	32.54	38.10	44.45	49.93	
22	558.80	4.78		5.54	6.35	9.53	14.27	9.53	15.90	22.22	12.70	28.60	34.90	41.30	47.60	54.00	
24	609.60	5.54		6.35	6.35	12.70		9.53	17.45	24.59	12.70	30.94	38.89	46.02	52.37	59.51	
26	650.40				7.92	12.70	15.88	9.53			12.70						
28	711.20				7.92	12.70	15.88	9.53			12.70						
30	762.00	6.35		7.92	7.92	12.70	15.88	9.53			12.70						
32	812.80				7.92	12.70	15.88	9.53	17.48		12.70						
34	863.60				7.92	12.70	15.88	9.53	17.48		12.70						
36	914.40				7.92	12.70	15.88	9.53	19.05		12.70						
42	1066.8	0.35			7.95			9.53			2.70						

Lampiran 20. Katalog Wartsila OWS series 15

Fig.1 Detailed elevation drawings



TECHNICAL SPECIFICATION

- Operating temperature
 - Minimum: 10°C
 - Maximum: 55°C
- Operating pressure
 - Normal: 1.38 bar
 - Maximum: 3.45 bar
- Air supply
 - Required pressure: 5-7 bar
- Pump performance
 - Maximum suction: 6 meters
 - Maximum discharge: 30 meters
- IMO tested parameters
 - Maximum oil flow: 100%
 - Maximum oil density: 0.989 s.g. @ 15°C
 - Maximum oil viscosity: RMG 35
 - Maximum emulsions: 3000 ppm

WEIGHTS & DIMENSIONS

Model No.	Capacity (m ³ /hr)	Dimensions (mm)			Weight (kg)	
		Width (inc. maint)	Depth (inc. maint)	Height (inc. maint)	Dry	Wet
OWS-05-15-LITE	0.5	1031 (1655)	672 (1080)	1474 (1700)	170	270
OWS-05-15	0.5	1031 (1655)	672 (1080)	1474 (1700)	250	350
OWS-10-15	1	1370 (2075)	861 (1300)	1474 (1750)	540	990
OWS-20-15	2	1370 (2075)	861 (1300)	1474 (1750)	540	990
OWS-30-15	3	1519 (2300)	985 (1560)	1547 (1750)	700	1430
OWS-50-15	5	1675 (2452)	1060 (1715)	1547 (2000)	800	1680

Lampiran 21. Ship Unloader



Model	Max. Ship size	Capacity tph*	Commodities**	Road/port/mobile	On rails	On rubber tyres	Fixed	Off shore	Over beam	Operator's Cabin	Wire luffing	Hydraulic luffing	Clean-Up Unit
5 000 S	5,000 dwt	100 - 300	free flowing	x	x	x	x			x			
10 000 S trailer based	10,000 dwt	100 - 300	free flowing	x	x	x	x			x			
10 000 S gantry based	15,000 dwt	100 - 300	free flowing		x	x	x			x			
15 000 S trailer based	15,000 dwt	200 - 550	free flowing	x		x	x			x			
15 000 S gantry based	25,000 dwt	200 - 500	free flowing		x	x	x			x			
F type	Panamax	200 - 800	various		x	x	x	x	x	x	x	x	x
G type	Panamax	200 - 800	various		x	x	x	x	x	x	x	x	x
C type	180,000 dwt	500 - 2500	various		x	x	x	x	x	x	x	x	x
M type	Cape Size	600 - 1600	various		x	x		x	x	x	x	x	x
D type	200,000 dwt	500 - 2500	various		x	x		x	x	x	x	x	x
PortMaster	120,000 dwt	200 - 550	grain/agribulk		x	x	x			x	x	x	

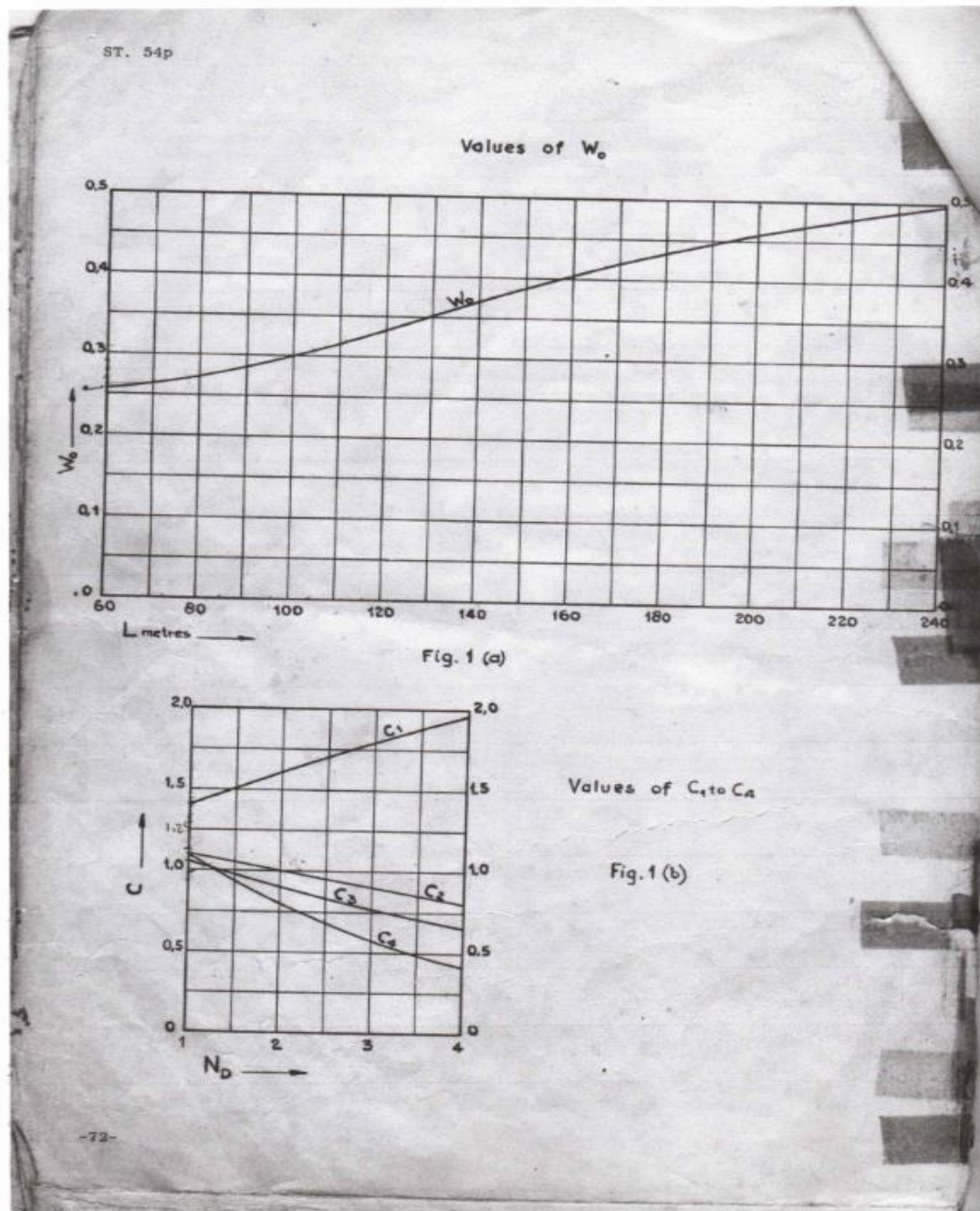
* The capacity depends on material, ship size and several other factors. The range indicated may vary.

** Free flowing: Cement, alumina, ground slag, dry flyash, grain, animal feed stuff and more

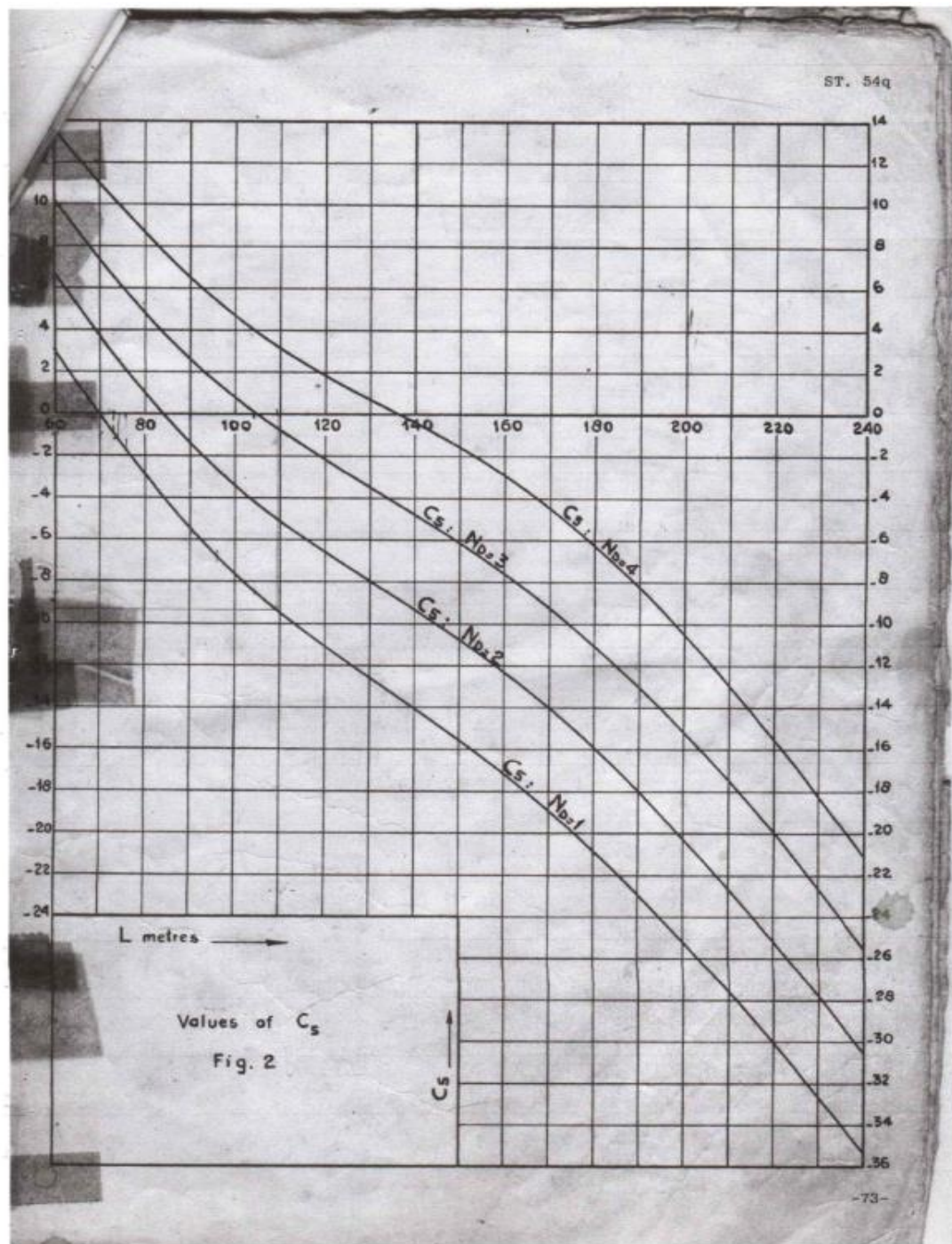
Various: Free flowing, coal, fertilizers, various minerals and chemicals and more

*** Other tailor-made versions may be available

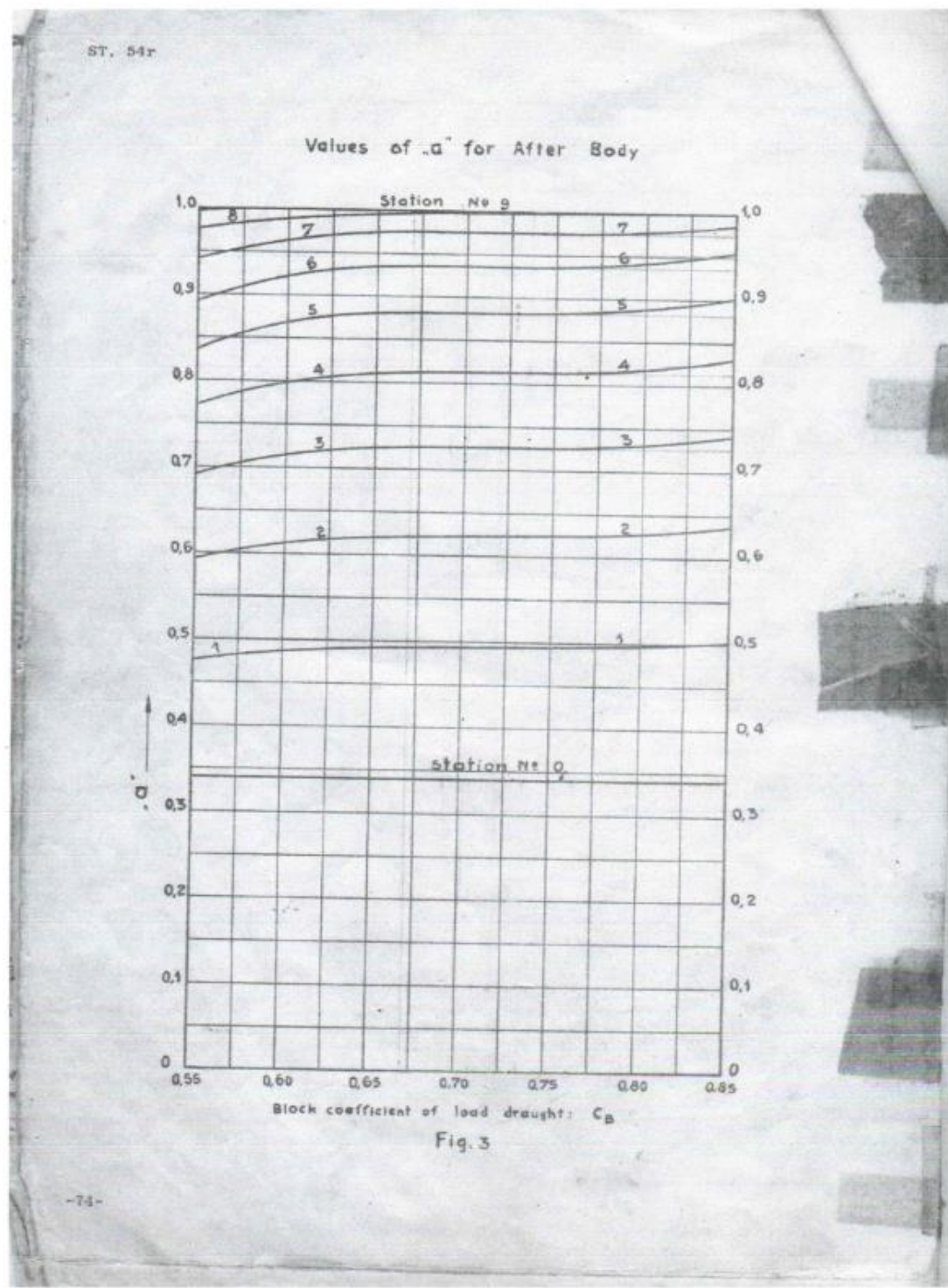
Lampiran 22. Grafik W_0 , C_1 , C_2 , C_3 Dan C_4



Lampiran 23. Grafik C5



Lampiran 24. Grafik α For After Body



Lampiran 25. Grafik a For Fore Body

