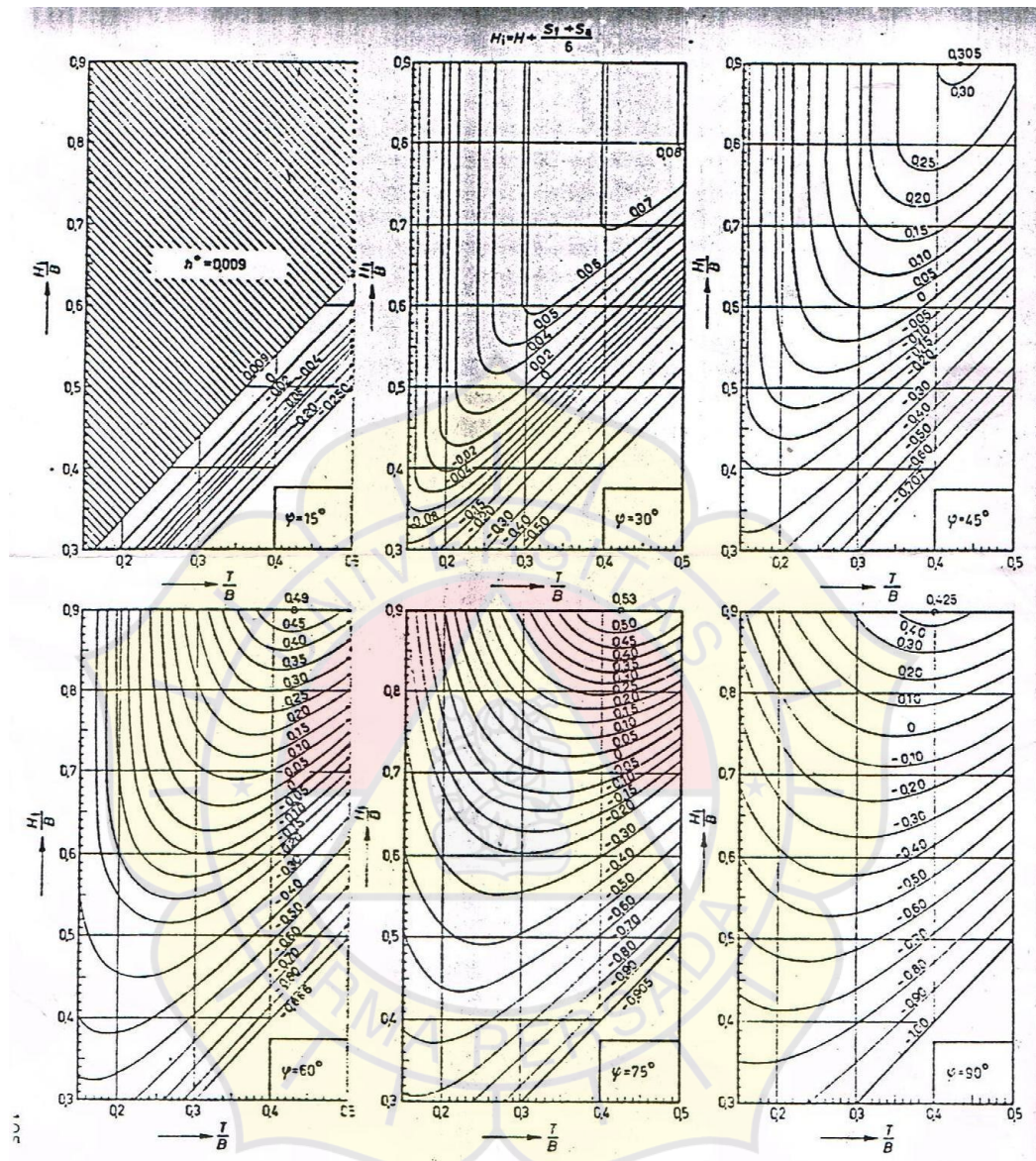
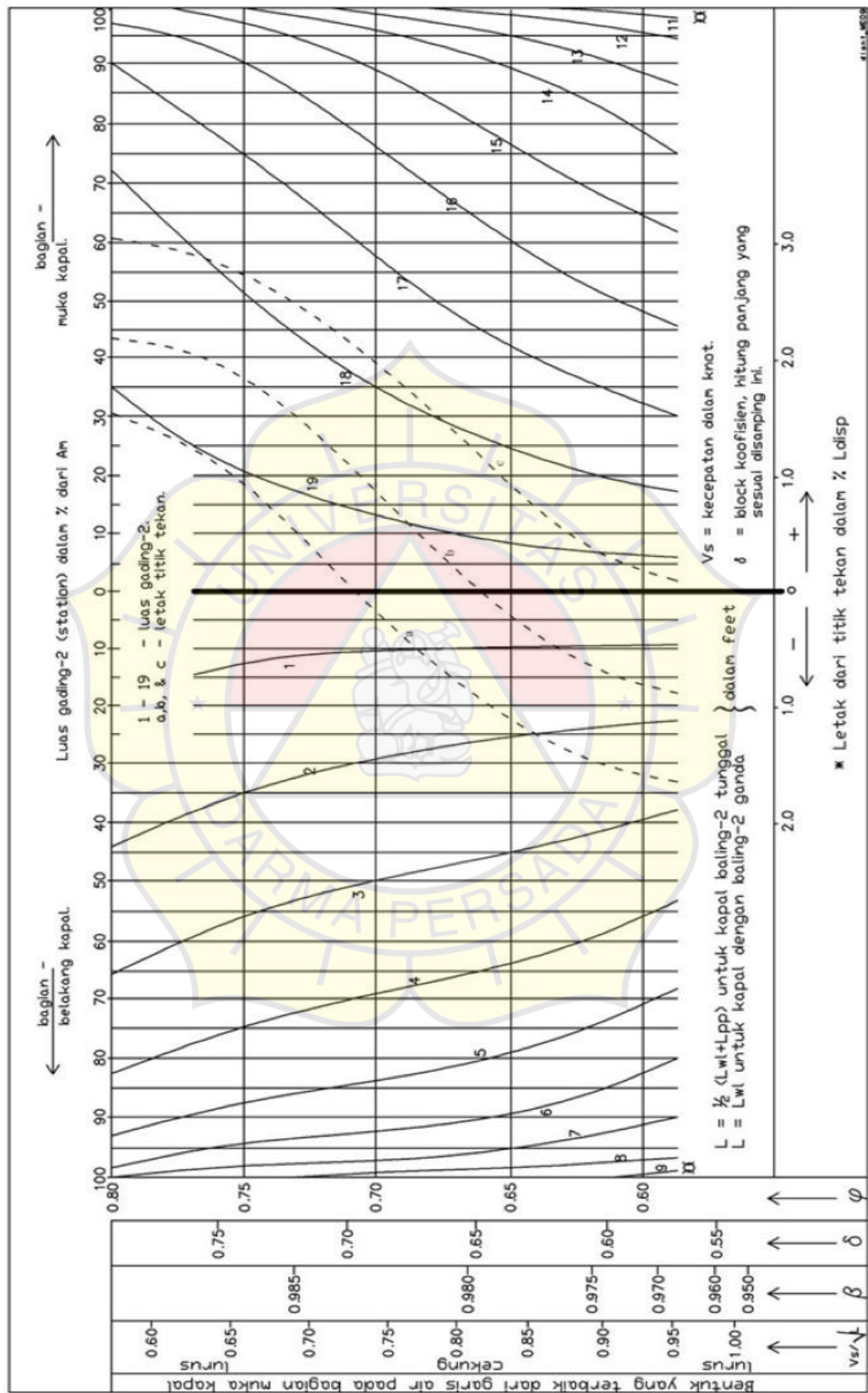


LAMPIRAN

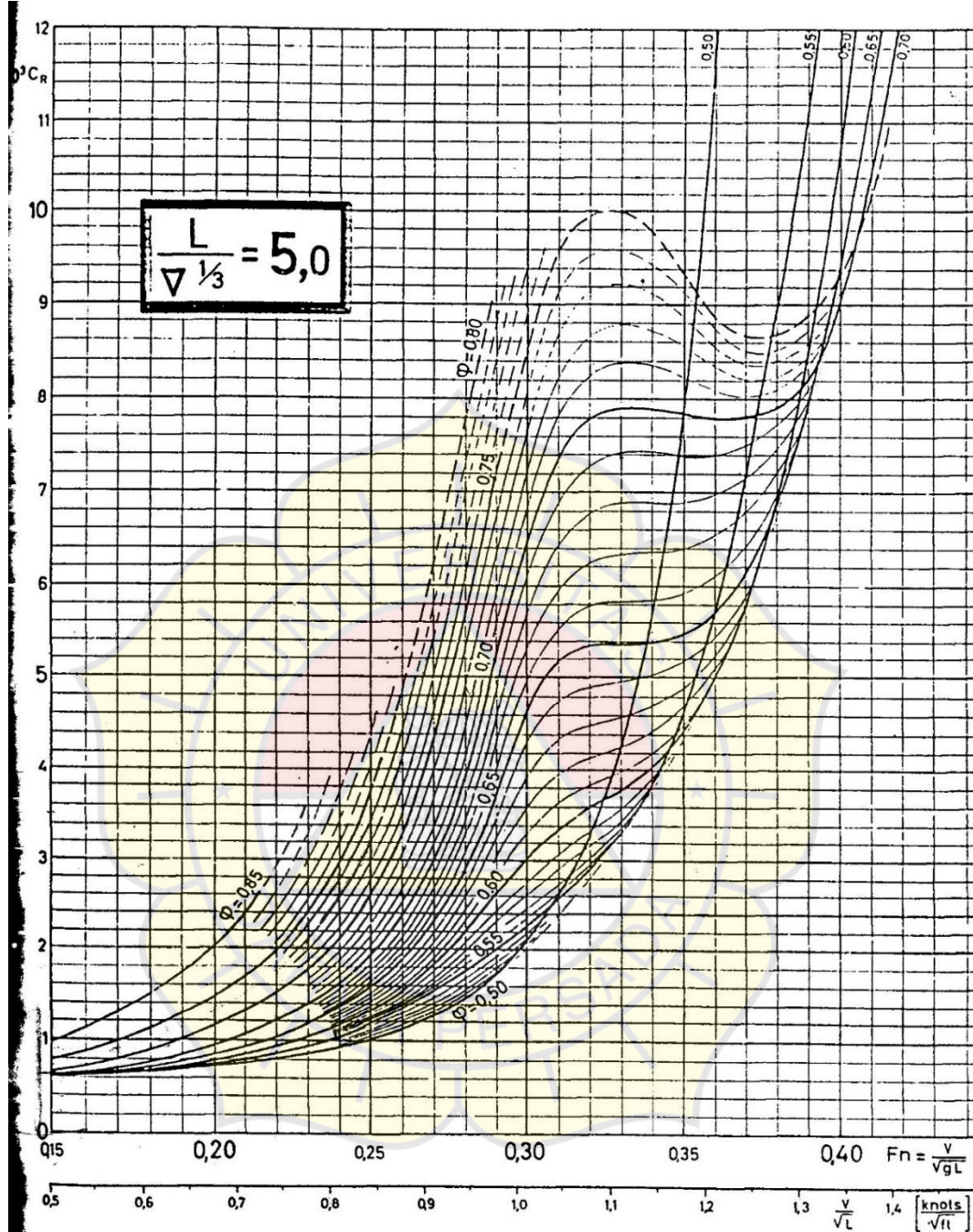
Lampiran 1. Grafik Prohaska.



Lampiran 2. Grafik NSP.

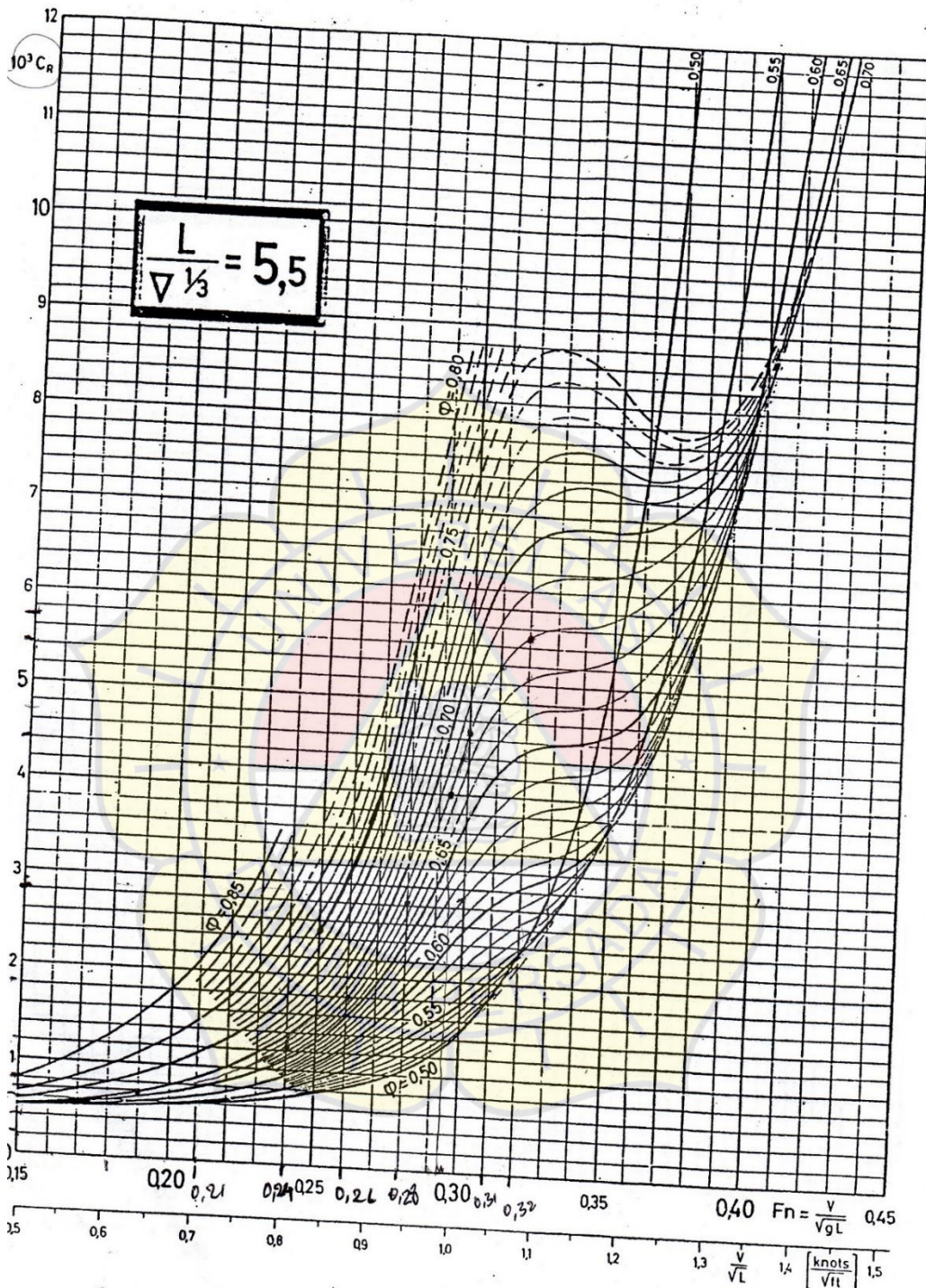


Lampiran 3. Grafik *Residual Resistance Coefficient* 5.0



Gb.9.9.3 Diagram kurva *Residual Resistance Coefficient*  $C_R$  vs Angka Froude  $Fr$  pada rentang harga *Prismatic Coefficient*  $\phi (= C_p) = 0,50 \sim 0,80$  untuk *Volumetric Coefficient*  $C_\nabla (= L / \nabla^{1/3}) = 5,0$  (8)

Lampiran 4. Grafik *Residual Resistance Coefficient* 5.5



Gb.9.9.4 Diagram kurva *Residual Resistance Coefficient*  $C_R$  vs Angka Froude  $Fr$  pada rentang harga *Prismatic Coefficient*  $\phi (= C_p) = 0,50 \sim 0,80$  untuk *Volumetric Coefficient*  $C_V (= L / \Delta^{1/3}) = 5,5$  Ⓢ

Lampiran 5. Standar LCB kapal berdasar dari Guldhamer dan Harvald.

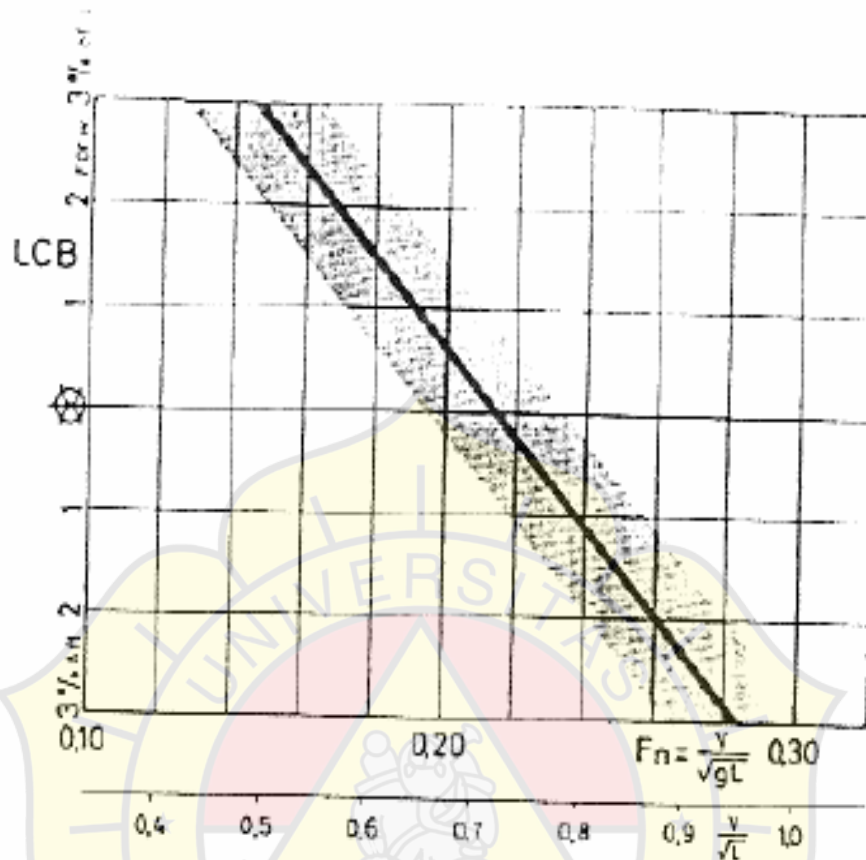
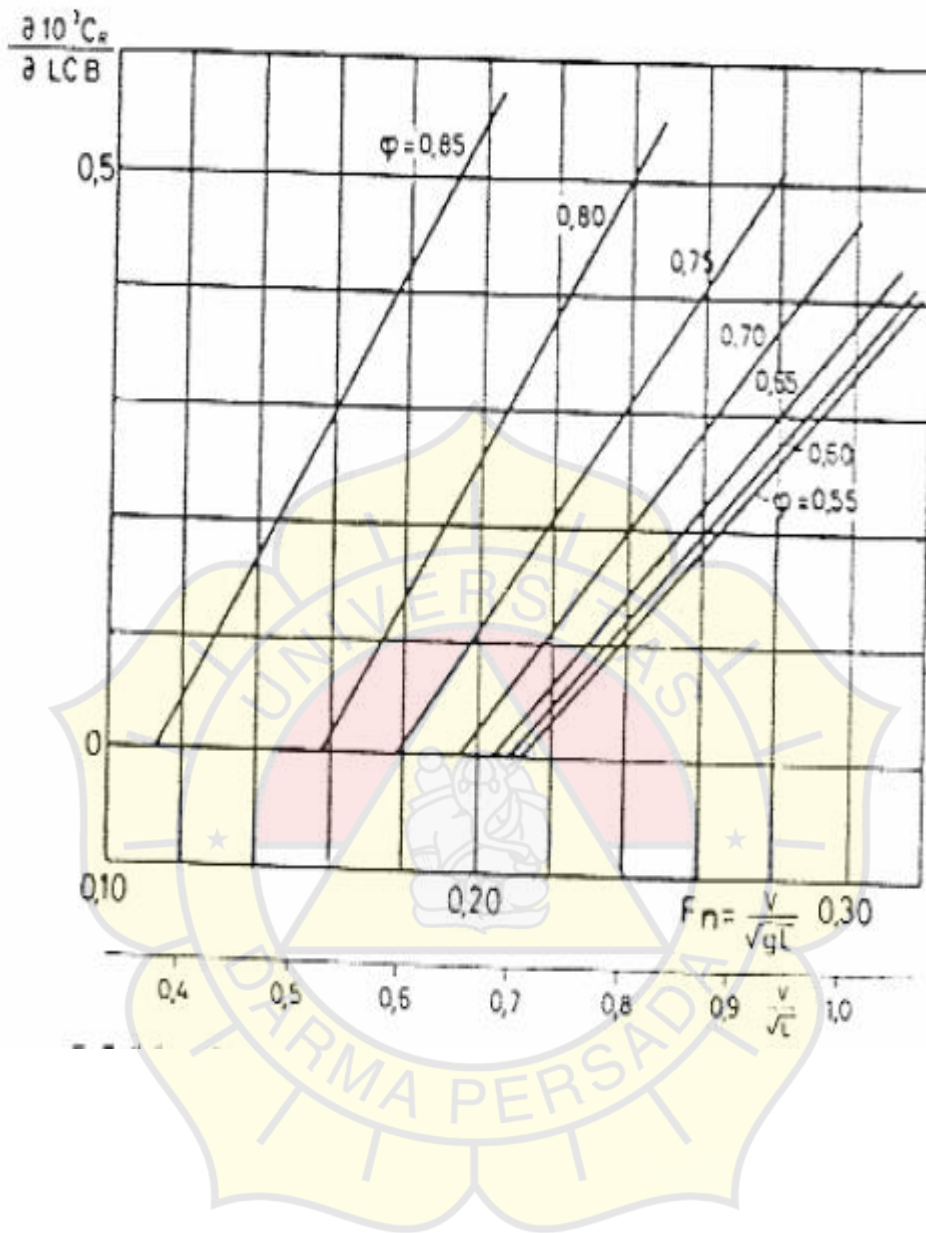
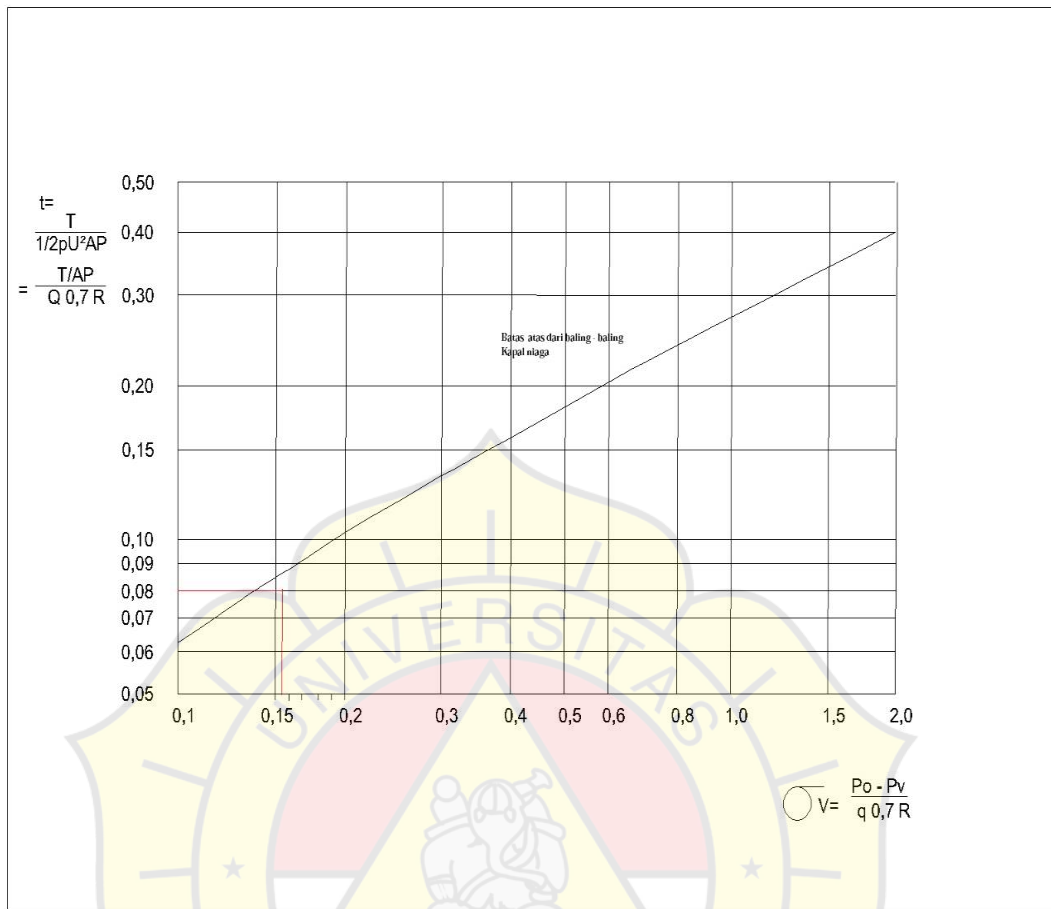


Figure 5.5.15. Standard LCB. The longitudinal position of the center of buoyancy that is considered the best possible.

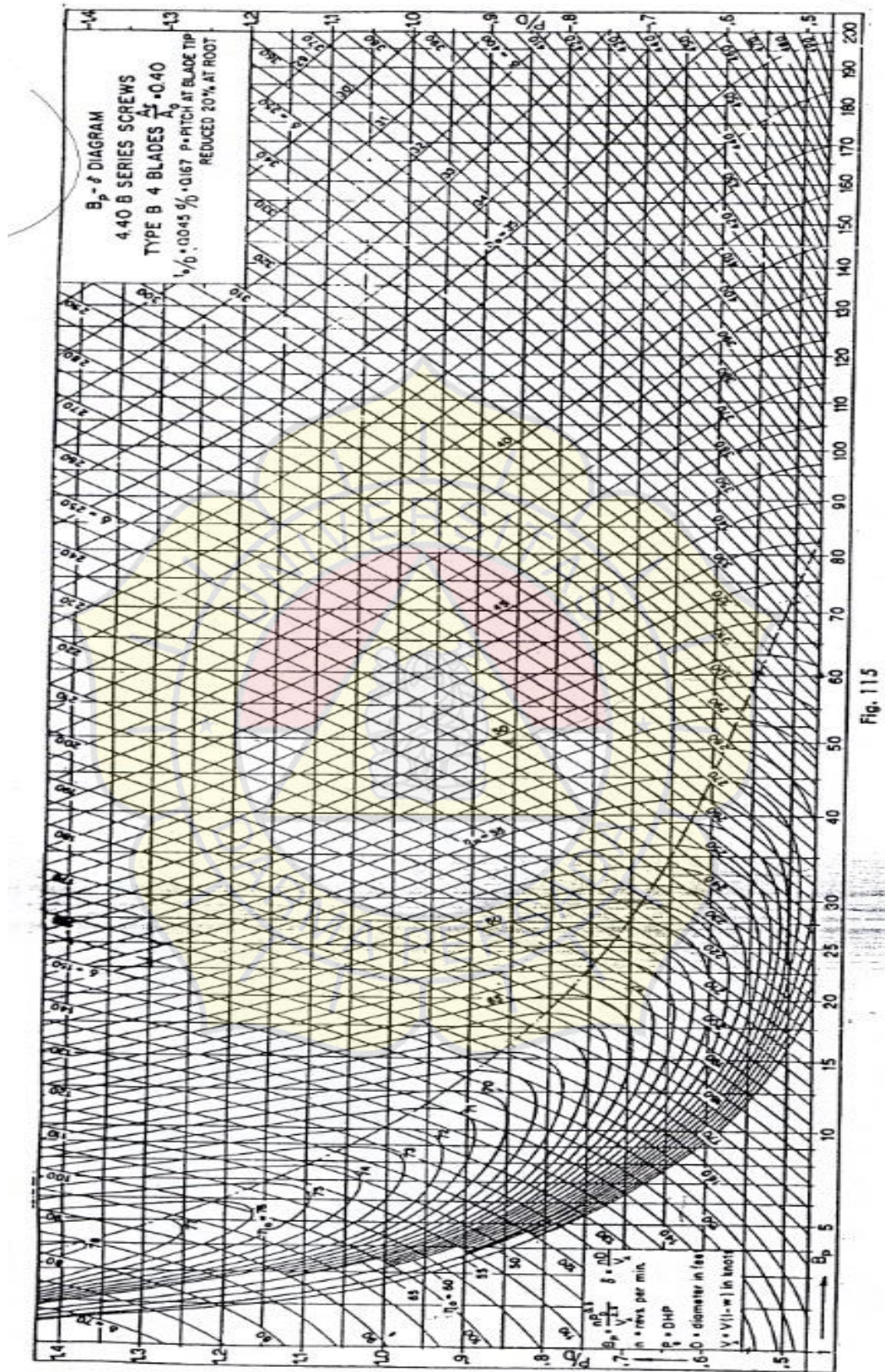
Lampiran 6. Koreksi  $C_r$  LCB kapal Standar Guldhammer dan Harvald.



Lampiran 7. Diagram Burril.

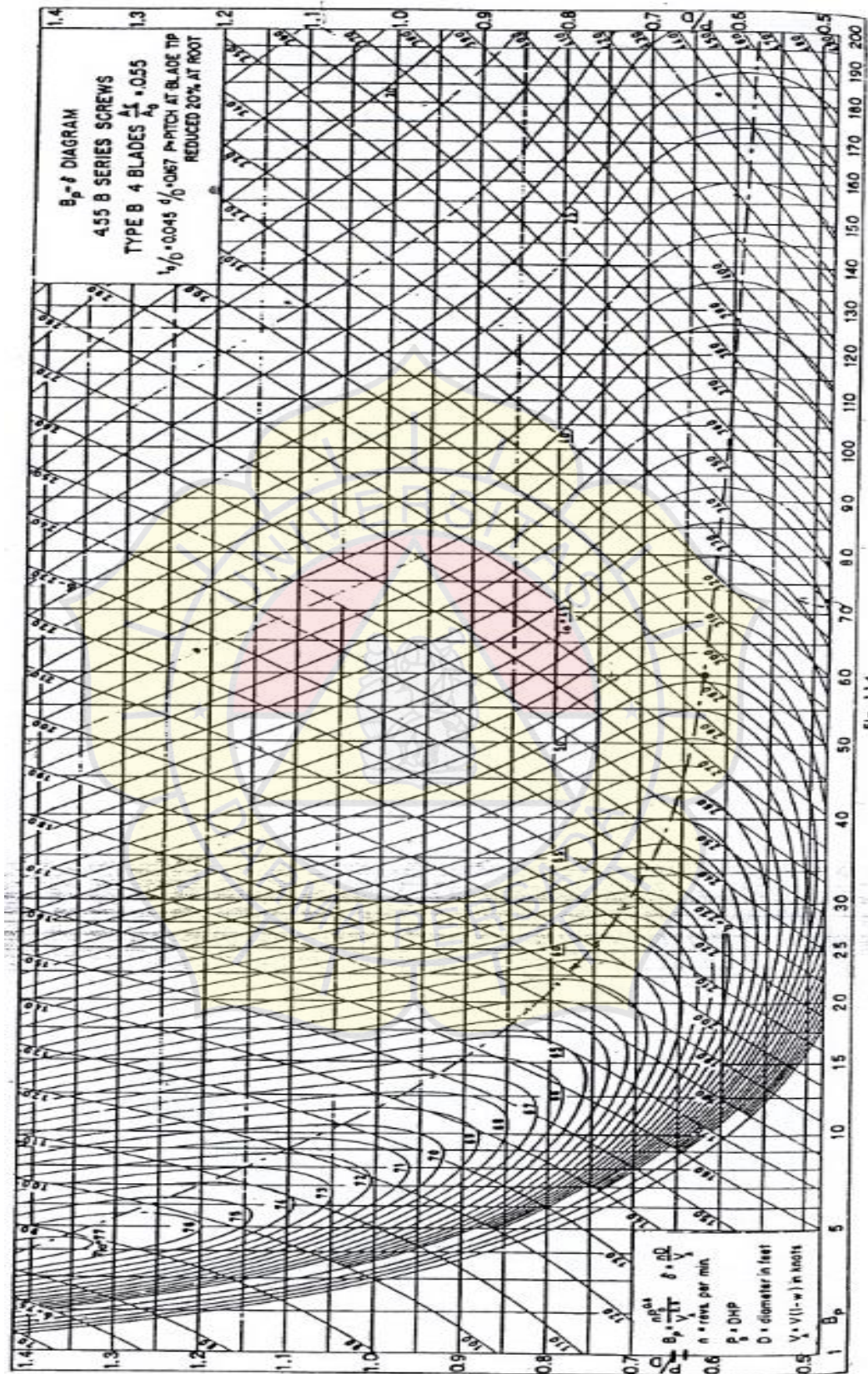


Lampiran 8. Diagram B4-40.





Lampiran 9. Diagram B4-55.



Lampiran 10. Diagram b4-70.

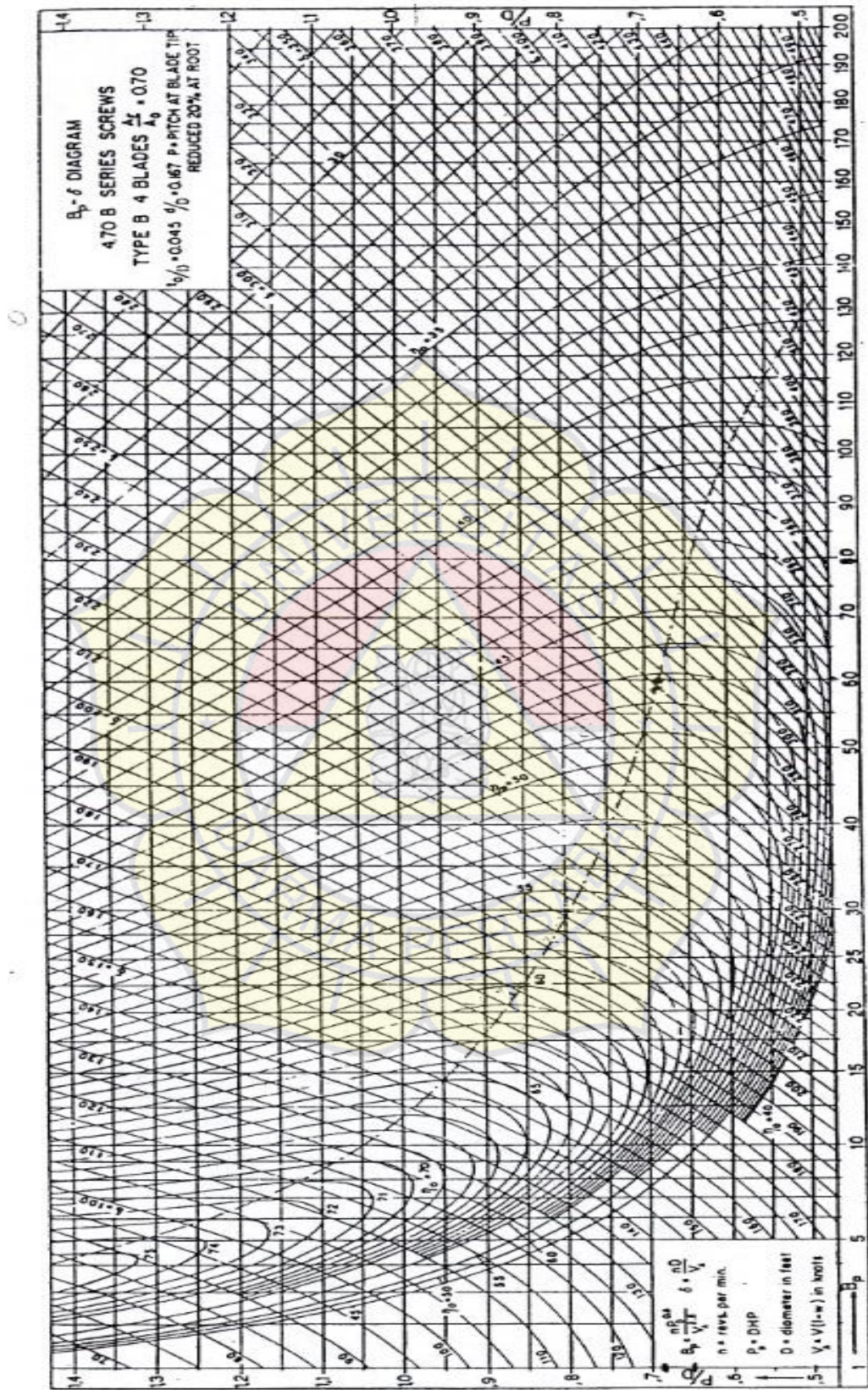
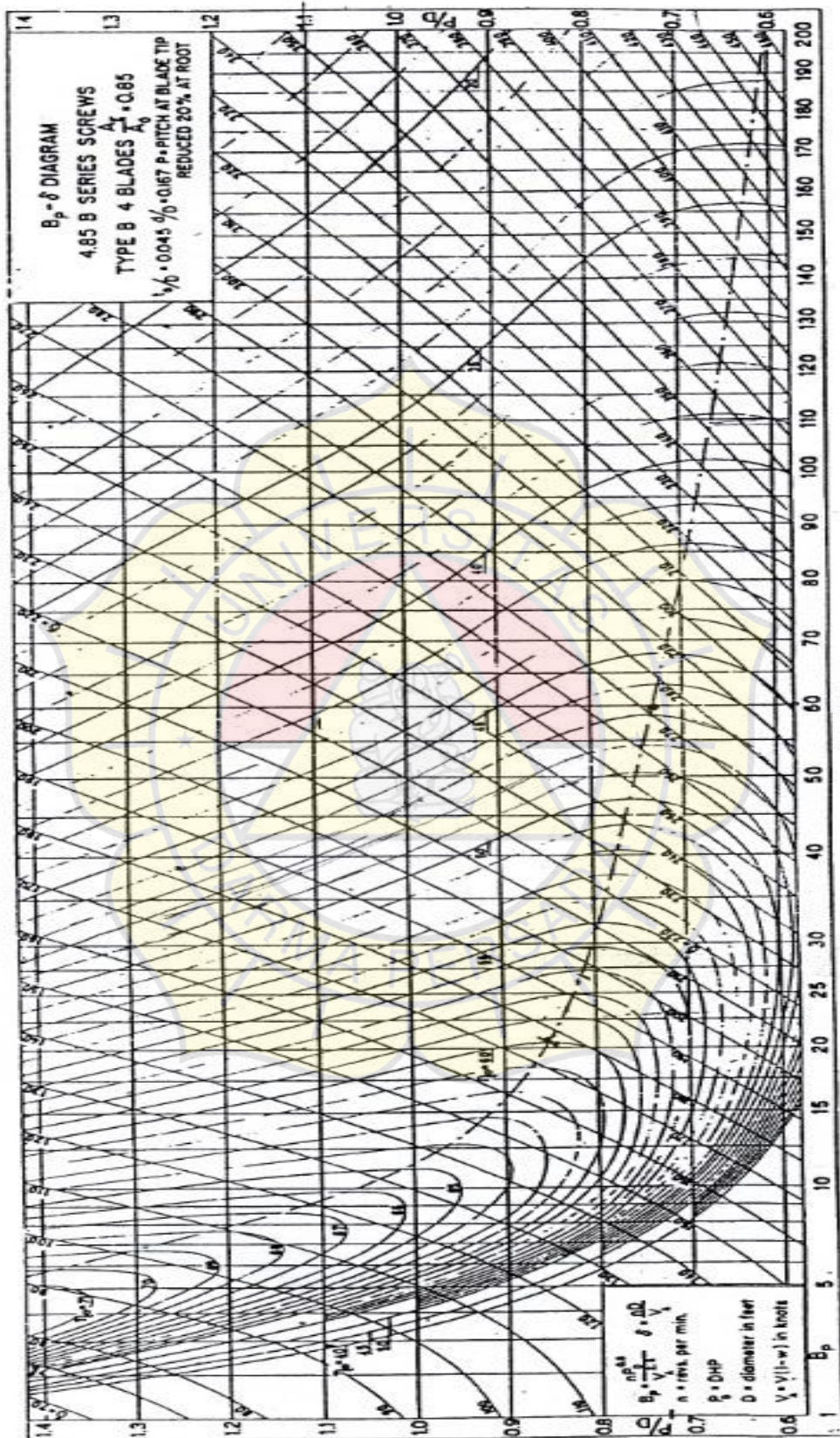


Fig. 117

Lampiran 11. Diagram B4-85.



Lampiran 12. Katalog Mesin Utama.



### L+V48/60CR technical data

Engine cycle:	four-stroke
Turbocharging system:	constant-pressure
Number of cylinders, In-line engine:	6, 7, 8, 9
Number of cylinders, V-engine:	12, 14, 16, 18
Bore:	480 mm
Stroke:	600 mm
Swept volume per cyl:	108.6 dm <sup>3</sup>
Power-to-weight ratio (MCR)	
In-line engine:	13.7 – 14.7 kg/kW
V-engine:	12.3 – 13.1 kg/kW
Cylinder output (MCR) at 514/500 rpm:	1,200 kW
Cooling	
Cylinder cooling (one-stage):	cooling water
Charge-air cooler (two-stage):	fresh water
Fuel injector cooling:	fresh water
Starting method:	compressed air

**Power unit output (maximum continuous rating)**

Engine speed	514 rpm	500 rpm
Mean piston speed	10.3 m/s	10.0 m/s
Mean effective pressure	25.8 bar	26.5 bar

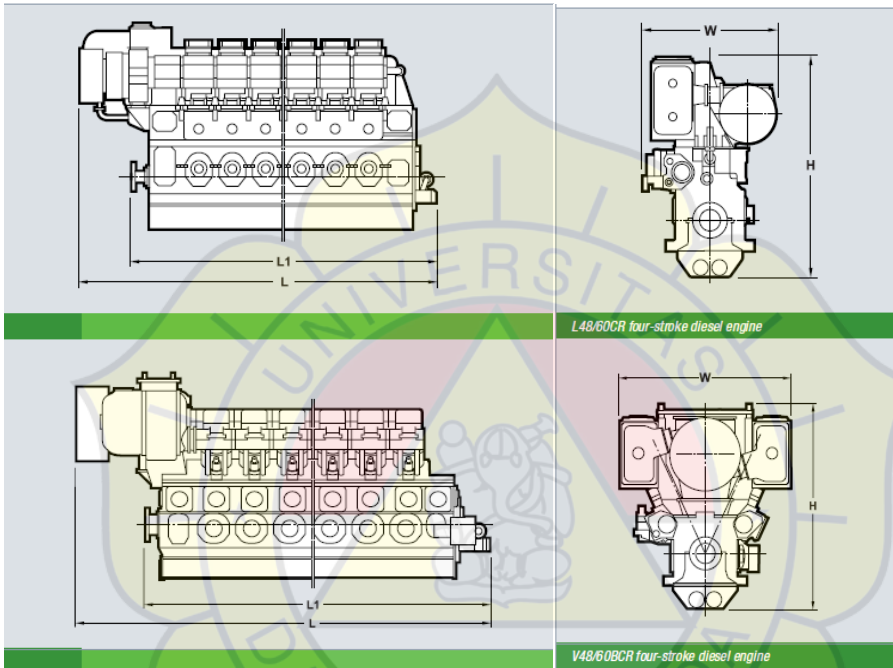
**Specific fuel consumption**

		kW		100% P		85% P	
6L48/60CR	6 cyl.	7,200	7,200	L48/60CR	180 g/kWh	176 g/kWh	
7L48/60CR	7 cyl.	8,400	8,400	V48/60CR	178 g/kWh	174 g/kWh	
8L48/60CR	8 cyl.	9,600	9,600	<small>The fuel consumption rates are based on a lower calorific value (LHV) of the fuel of 42,700 kJ/kg without engine driven pumps. Tolerance 5%.</small>			
9L48/60CR	9 cyl.	10,800	10,800				
12V48/60CR	12 cyl.	14,400	14,400				
14V48/60CR	14 cyl.	16,800	16,800				
16V48/60CR	16 cyl.	19,200	19,200				
18V48/60CR	18 cyl.	21,600	21,600				

**Specific lubricating oil consumption**

L+V48/60CR	0.8 g/kWh
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The lube oil consumption is given with a tolerance of 20%.

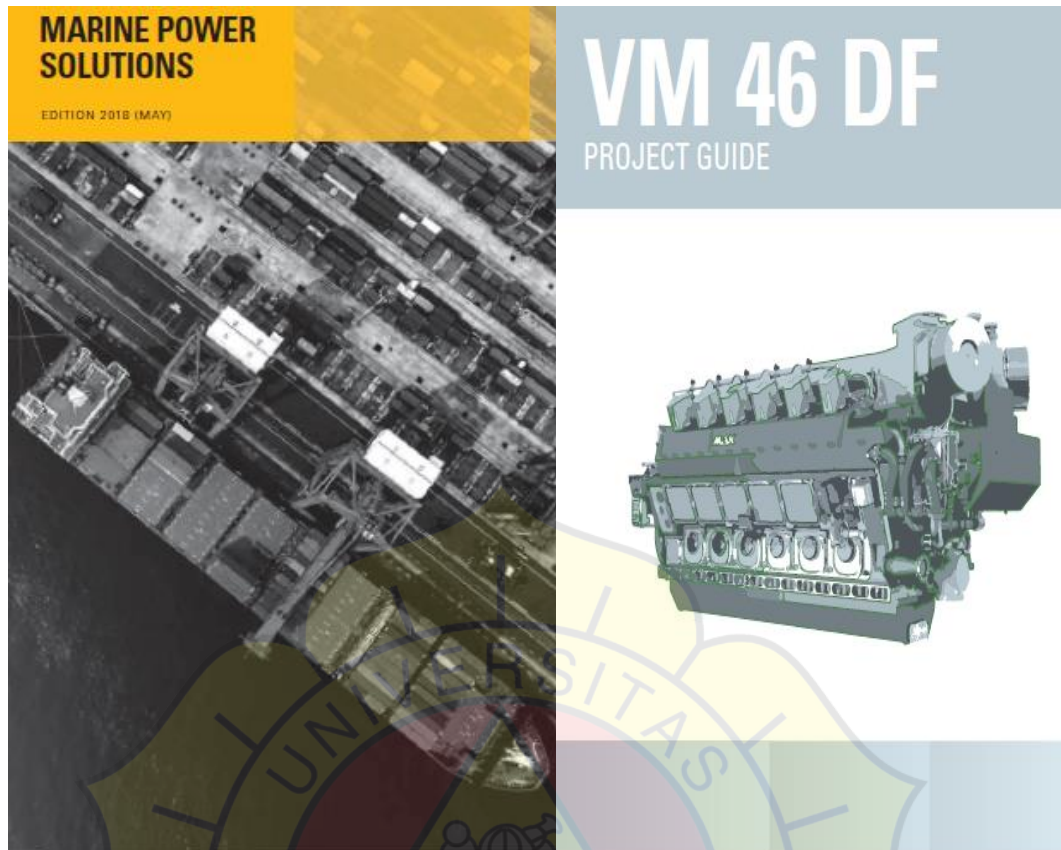


## Dimensions and weights

**L+V48/60CR engine**

Engine type	No. of cyl.	L	L1	W	H	Wt.
		mm	mm	mm	mm	t
6L48/60CR	6	8,615	7,290	3,195	5,360	106
7L48/60CR	7	9,435	8,110	3,195	5,360	119
8L48/60CR	8	10,460	8,930	3,325	5,360	135
9L48/60CR	9	11,425	9,895	3,325	5,360	148
12V48/60CR	12	10,760	8,915	4,700	5,355	189
14V48/60CR	14	11,760	9,915	4,700	5,355	213
16V48/60CR	16	13,100	10,915	4,700	5,355	240
18V48/60CR	18	14,100	11,915	4,700	5,355	265

*All weights and dimensions are for guidance only and apply to dry engines without flywheel.*  
 Minimum centreline distance for twin engine installation:  
 – In-line engine: 3,200 mm  
 – V-type engine: 4,800 mm  
 More information available upon request.



# VM 46 DF

Propulsion Engine

### DIMENSIONS (mm) AND WEIGHTS (t)

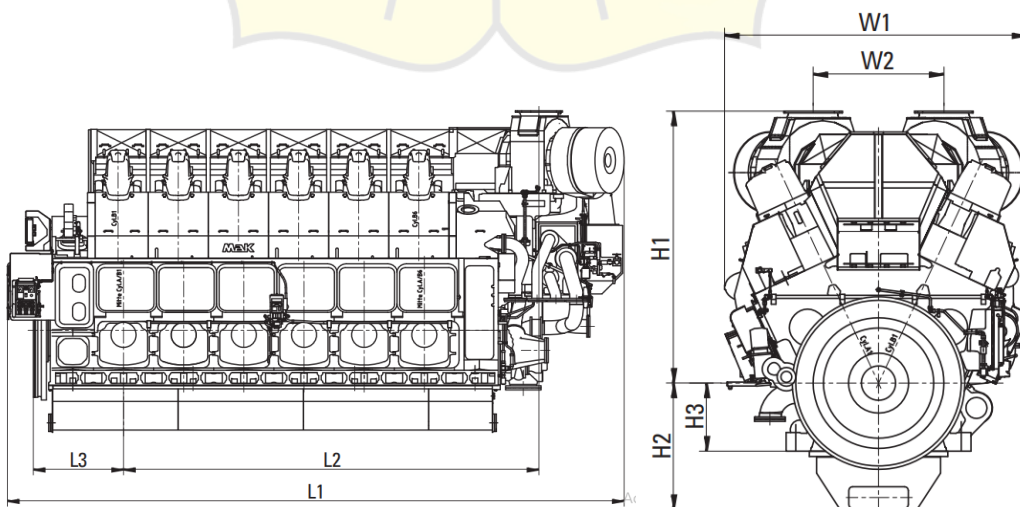
Type	L1	L2	L3	H1	H2	H3	W1	W2	Weight
12 M 46 DF	9947	6628	1440	3497	1625	875	3950	1685	160.0
16 M 46 DF	11943	8523	1440	3473	1625	875	4027	1670	220.0

### TECHNICAL DATA


Type	Output range		Speed		Max eff. gross m	Max gross speed	Spec. fuel consumption (diesel mode)		Net spec. eff. consumption (in mto)	
	kW	ml/gp	rpm	bar			ml/h	100% 85%	100% 85%	
12 M 46 DF	10800	14698	500	21.3	10.2	184/184	772/7417			
	10800	14698	514	20.7	10.5	184/184	772/7417			
	11560	15749	500	22.8	10.2	184/182	736/7370			
	11560	15749	514	22.2	10.5	185/183	736/7370			
16 M 46 DF	14400	19594	500	21.3	10.2	184/184	772/7417			
	14400	19594	514	20.7	10.5	184/184	772/7417			
	15440	20988	500	22.8	10.2	184/182	736/7370			
	15440	20988	514	22.2	10.5	185/183	736/7370			

Stroke: 610 mm  
Bore: 450 mm

Specific lubricating oil consumption 0.6 g/kWh



Lampiran 13. Katalog *Gear box*.



**REINTJES**  
POWER TRAIN SOLUTIONS

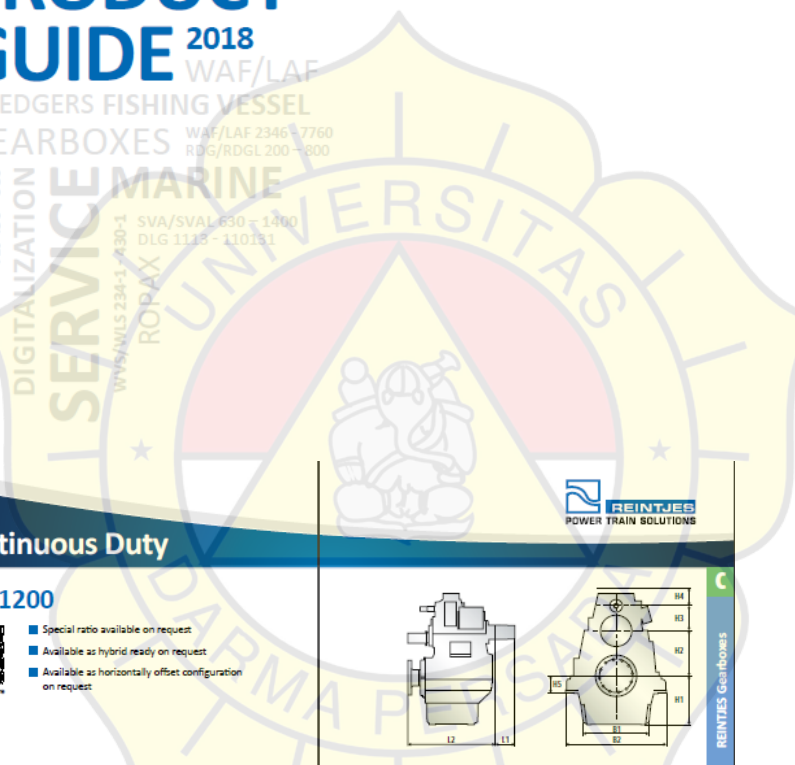
POWER TRAIN SOLUTIONS  
WVSA 240 - 1540  
**FORTJES®**  
INDUSTRY 4.0  
SALES  
WAF/LAF 164 - 573  
VA 2451 - 4855  
WORK BOATS  
COASTGUARD FAST FERRIES  
REINTJES HYBRID SYSTEM 60-630


**PRODUCT GUIDE 2018**

WAF/LAF  
DREDGERS FISHING VESSEL  
GEARBOXES WAF/LAF 2346 - 7760  
RDG/RDGL 200 - 800

WAF/LAF 665 - 1963  
VLJ 430 - 930  
DIGITALIZATION  
**SERVICE MARINE**  
WWS/WLS 234-1 - 430-1  
ROPAX  
SVA/SVAL 630 - 1400  
DLG 1115 - 110151

POWER TRAIN SOLUTIONS  
WVSA 240 - 1540  
**FORTJES®**  
INDUSTRY 4.0  
SALES  
WAF/LAF 164 - 573  
VA 2451 - 4855  
WORK BOATS  
COASTGUARD FAST FERRIES  
REINTJES HYBRID SYSTEM 60-630






**REINTJES**  
POWER TRAIN SOLUTIONS

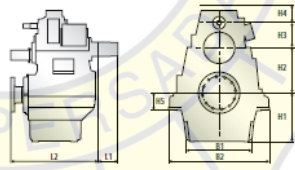
### Continuous Duty

**SVA 1200**



- Special ratio available on request
- Available as hybrid ready on request
- Available as horizontally offset configuration on request

Product brochure



REINTJES Gearboxes

**Main Dimensions mm (Vertically offset configuration)**

Model	B1	B2	H1	H2	H3	H4	H5	L1	L2
SVA 1200	2112	3100	1245	1200	650	750	70	-	2280

kW/rpm	WEIGHT			REDUCTION RATIOS			
	BHP (KW)	BHP (KW)	BHP (KW)	kg	(lbs)		
<b>SVA 1200</b>	<b>500 rpm</b>			<b>750 rpm</b>		<b>1000 rpm</b>	
44,00	29480 (22000)	44220 (33000)	58960 (44000)	31000 (68200)	2,023		
38,00	25460 (19000)	38190 (28500)	50920 (38000)	31000 (68200)	2,514		
33,85	22680 (16926)	34020 (25388)	45360 (33851)	31000 (68200)	2,939		
29,56	19805 (14780)	29707 (22169)	39609 (29559)	31000 (68200)	3,483		
26,20	17553 (13099)	26329 (19648)	35105 (26198)	31000 (68200)	3,962		
24,25	16250 (12126)	24374 (18190)	32499 (24253)	31000 (68200)	4,417		
24,06	16122 (12032)	24183 (18047)	32244 (24063)	31000 (68200)	4,375		
20,68	13854 (10338)	20780 (15508)	27707 (20677)	31000 (68200)	3,296		
17,50	11725 (8750)	17588 (13125)	23450 (17500)	31000 (68200)	4,864		
16,90	11323 (8450)	16984 (12675)	22646 (16900)	31000 (68200)	5,083		

Dry weight including all accessories.

148
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Lampiran 14. Katalog Pelat.

**CALCULATED PLATE WEIGHT (FROM THICKNESS & SIZE)**

Width x Length (in mm)	1219 x 2438	1524 x 3048	1524 x 6096	1524 x 9144	1829 x 6096	1829 x 12192	2133 x 6096	2133 x 12192	2438 x 6096	2438 x 12192	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'	6' x 20'	6' x 40'	7' x 20'	7' x 40'	8' x 20'	8' x 40'	9' x 40'	9' x 20'	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	72 x 240	72 x 480	84 x 240	84 x 480	96 x 240	96 x 480	108 x 480	108 x 240	120 x 240	120 x 480	132 x 240	132 x 480
Thickness (mm)																
6	187	467	292	583	875	1.167	700	1.400	1.633	3.266	1.867	3.733	2.100	2.334	4.667	5.134
9	210	525	328	656	985	1.313	788	1.575	1.837	3.675	2.100	4.200	2.363	4.725	5.251	2.888
10	233	583	365	729	1.094	1.459	875	1.750	1.021	2.041	1.167	2.333	1.313	2.625	1.459	2.917
12	280	700	438	875	1.313	1.750	1.050	2.101	1.225	2.450	1.400	2.800	1.575	3.150	1.750	3.501
12.7	296	741	463	926	1.389	1.852	1.412	2.223	1.296	2.593	1.482	2.963	1.657	3.314	1.852	3.705
14	327	817	511	1.021	1.532	2.042	1.225	2.451	1.429	2.858	1.633	3.267	1.838	3.675	2.042	4.084
15	350	875	547	1.094	1.641	2.188	1.313	2.626	1.531	3.062	1.969	3.938	2.188	4.376	2.246	4.493
16	373	933	583	1.167	1.750	2.334	1.400	2.801	1.633	3.266	1.867	3.733	2.100	4.200	2.334	4.667
18	420	1.050	656	1.313	1.969	2.625	1.575	3.151	1.837	3.675	2.100	4.200	2.363	4.725	2.625	5.251
19	443	1.108	695	1.386	2.078	2.771	1.663	3.326	1.939	3.879	2.217	4.433	2.494	4.988	2.771	5.543
20	467	1.167	729	1.459	2.188	2.917	1.750	3.501	2.041	4.083	2.333	4.667	2.625	5.250	2.917	5.834
22	513	1.283	802	1.604	2.407	3.209	1.926	3.851	2.246	4.491	2.567	5.133	2.888	5.776	3.209	6.418
24	560	1.400	875	1.750	2.625	3.501	2.101	4.201	2.450	4.899	2.800	5.600	3.150	6.301	3.501	7.001
25	583	1.458	912	1.823	2.735	3.646	2.188	4.376	2.552	5.104	2.917	5.833	3.282	6.563	3.646	7.293
25.4	593	1.482	926	1.852	2.779	3.705	2.223	4.445	2.593	5.185	2.963	5.927	3.334	6.668	3.705	7.410
26	607	1.517	948	1.896	2.844	3.792	2.276	4.551	2.654	5.308	3.033	6.067	3.413	6.826	3.792	7.585
28	653	1.633	1.021	2.042	3.063	4.084	2.451	4.901	2.858	5.716	3.267	6.533	3.675	7.351	4.084	8.168
30	700	1.750	1.094	2.188	3.282	4.376	2.626	5.251	3.062	6.124	3.500	7.000	3.938	7.876	4.376	8.751
32	747	1.867	1.167	2.334	3.501	4.667	2.801	5.602	3.266	6.533	3.733	7.467	4.200	8.401	4.667	9.335
36	840	2.100	1.313	2.625	3.938	5.251	3.451	6.902	3.675	7.349	4.200	8.400	4.725	9.451	5.251	10.502
38	887	2.217	1.386	2.771	4.157	5.543	3.326	6.652	3.879	7.757	4.433	8.867	4.976	5.543	11.085	6.097
40	933	2.333	1.459	2.917	4.376	5.834	3.501	7.002	4.083	8.166	4.667	9.333	5.250	10.501	5.834	6.418
45	1.050	2.625	1.641	3.282	4.923	6.564	3.939	7.877	4.593	9.186	5.250	10.500	5.907	11.814	6.564	7.220
50	1.166	2.917	1.823	3.646	5.470	7.293	4.376	8.752	5.104	10.207	5.833	11.667	6.363	13.126	7.293	8.023
55	1.283	3.208	2.006	4.011	6.017	8.022	4.814	9.628	5.614	11.228	6.417	12.833	7.219	14.439	8.022	8.825
60	1.400	3.500	2.188	4.376	6.564	8.751	5.251	10.503	6.124	12.249	7.000	14.000	7.876	15.751	8.751	9.627
65	1.516	3.792	2.370	4.740	7.111	9.481	5.689	11.378	6.635	13.269	7.583	15.167	8.532	17.064	9.481	10.429
70	1.633	4.083	2.553	5.105	7.658	10.210	6.327	12.253	7.145	14.290	8.167	16.333	9.188	18.377	10.210	11.232
75	1.750	4.375	2.735	5.470	8.204	10.939	6.564	13.129	7.655	15.311	8.750	17.500	9.845	19.689	11.879	12.034
80	1.866	4.667	2.917	5.834	8.751	11.669	7.002	14.004	8.166	16.331	9.333	18.667	10.501	21.002	11.669	12.836
85	1.983	4.958	3.099	6.199	9.298	12.398	7.440	14.879	8.676	17.352	9.917	19.833	11.157	22.315	12.398	13.639
90	2.100	5.250	3.282	6.564	9.845	13.127	7.877	15.754	9.186	18.373	10.500	21.500	11.667	23.627	13.127	14.441
95	2.216	5.542	3.464	6.928	10.392	13.856	8.315	16.630	9.697	19.394	11.083	22.167	12.470	24.940	13.856	15.243
100	2.333	5.833	3.646	7.293	10.939	14.586	8.752	17.505	10.207	20.414	11.667	23.333	13.126	26.252	14.586	16.045

Calculated considering specific gravity of steel as 7.85 Kg/mm<sup>2</sup>, and dimension in mm.

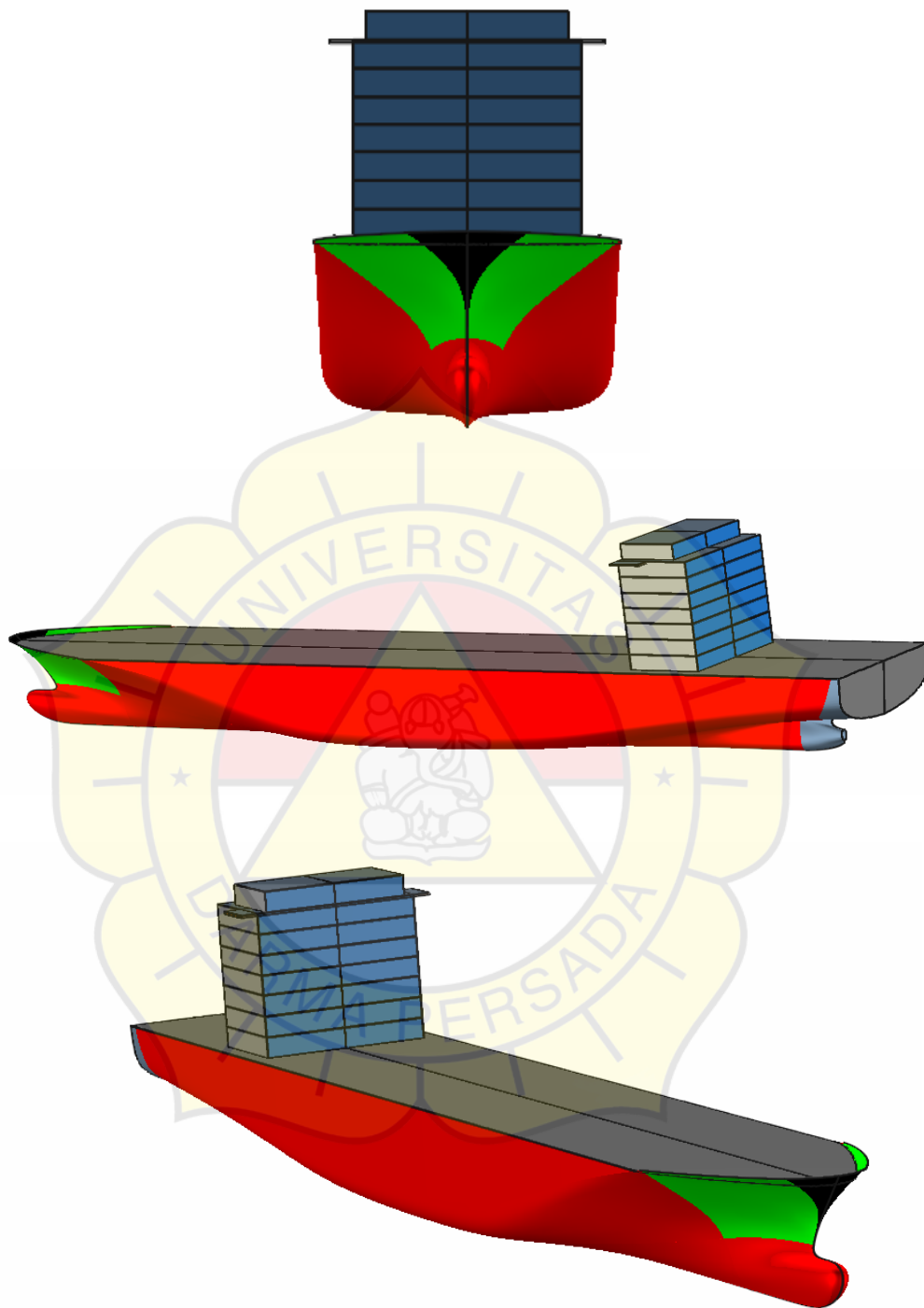
Not Available Sizes

Flat Products | Steel Plate

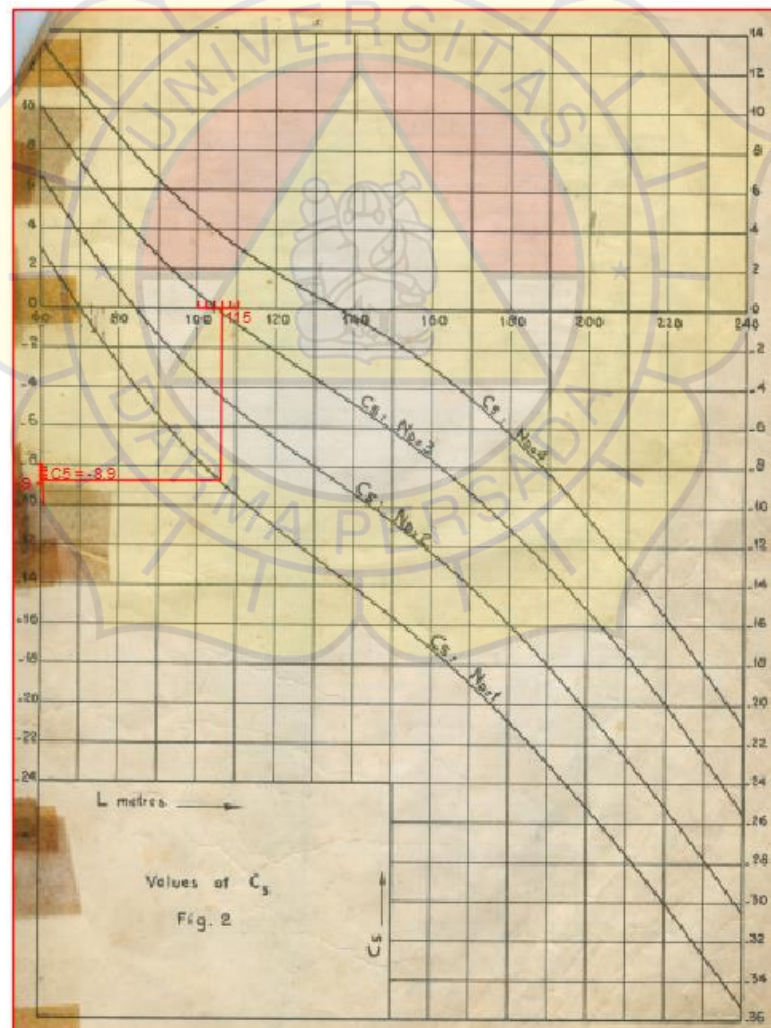
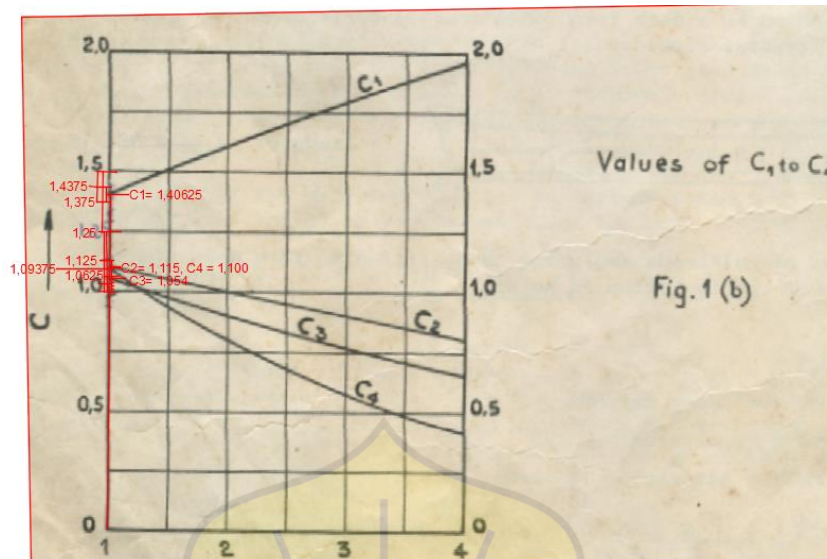
07



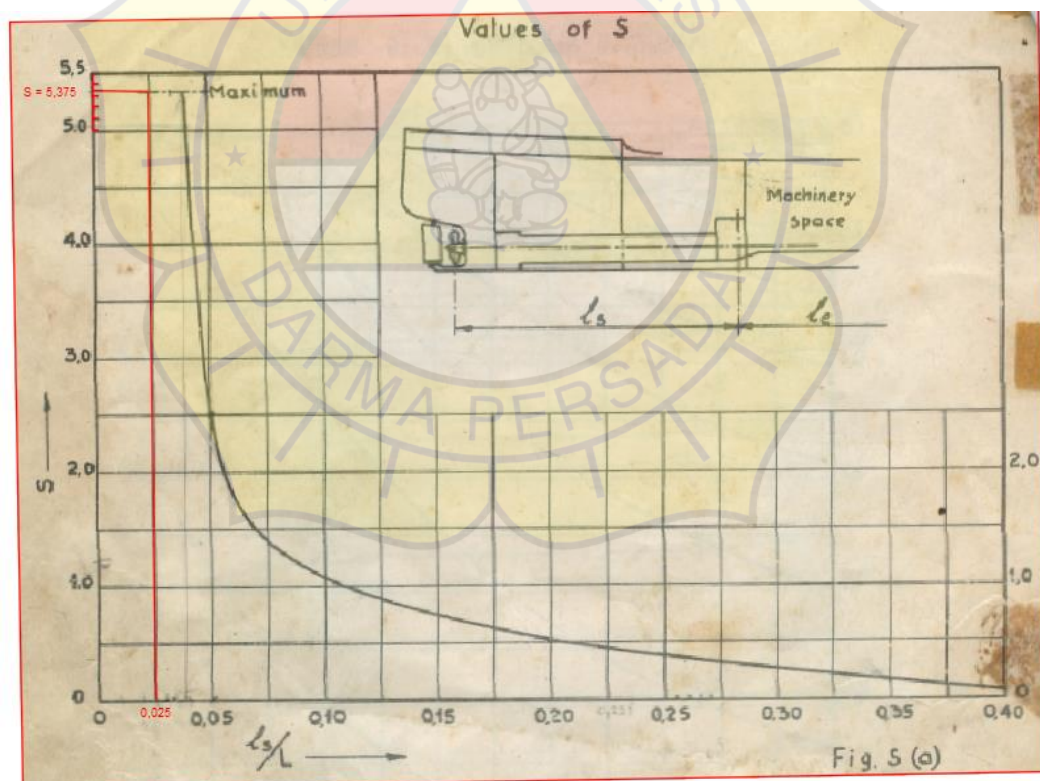
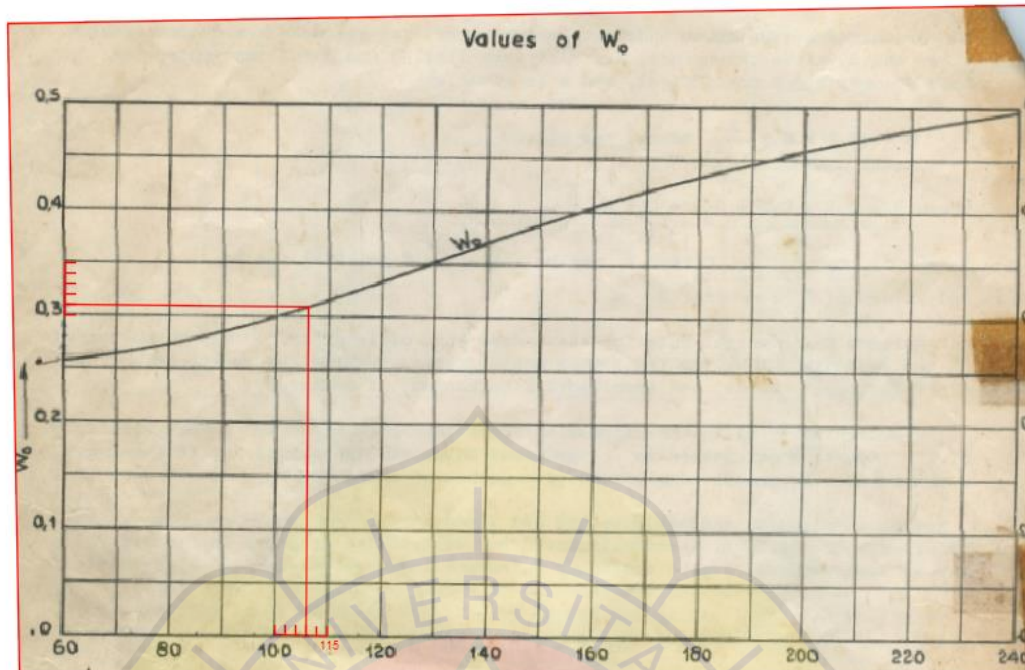
Lampiran 15. 3D Kapal Rancangan.



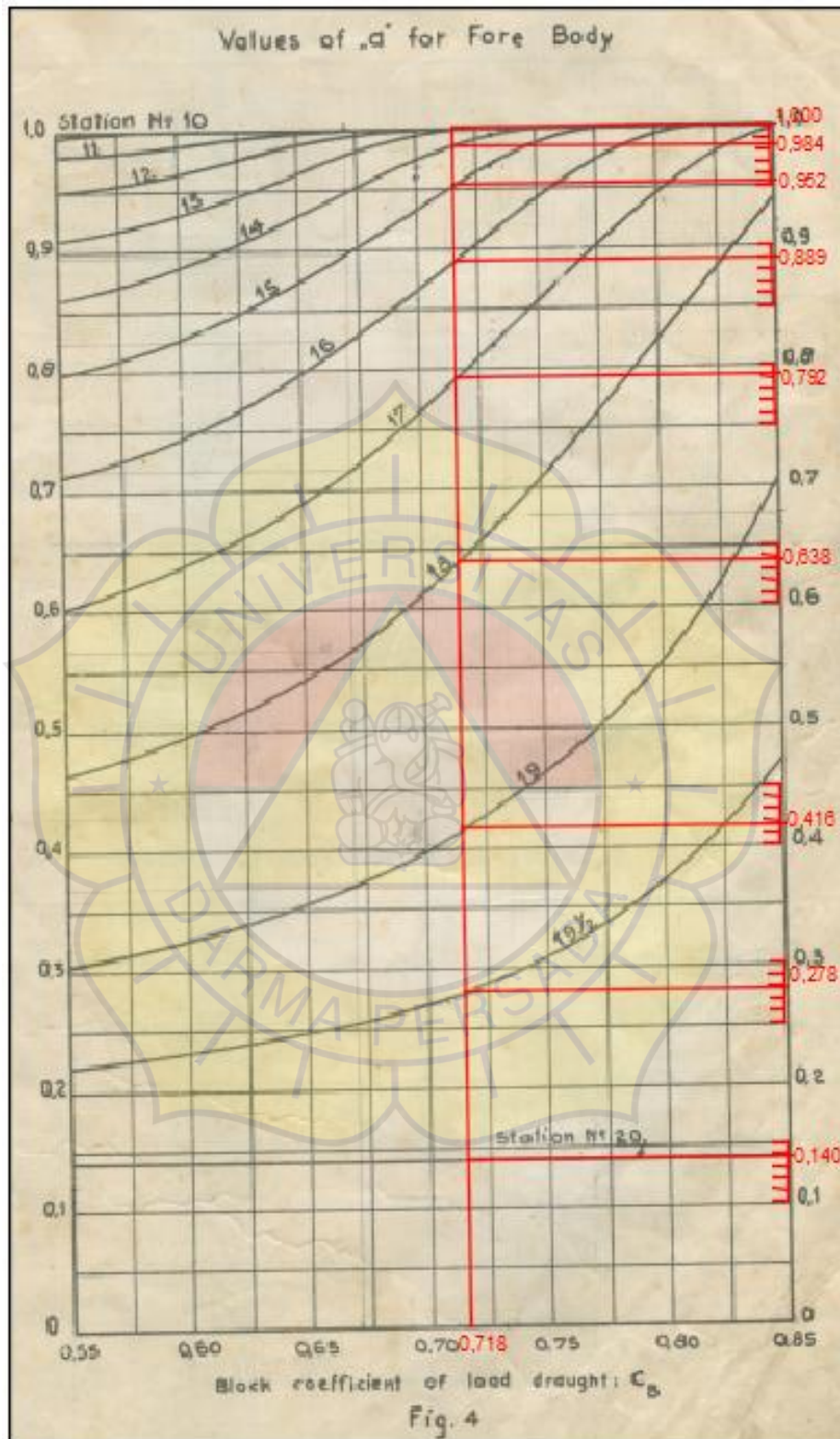
Lampiran 16. Penentuan nilai  $C_1 - C_5$ .



Lampiran 17. Penentuan Nilai  $W_0$ , Nilai S



Lampiran 18. Penentuan nilai "a" untuk *fore body*



Lampiran 19. Penentuan nilai "a" untuk *after body*

