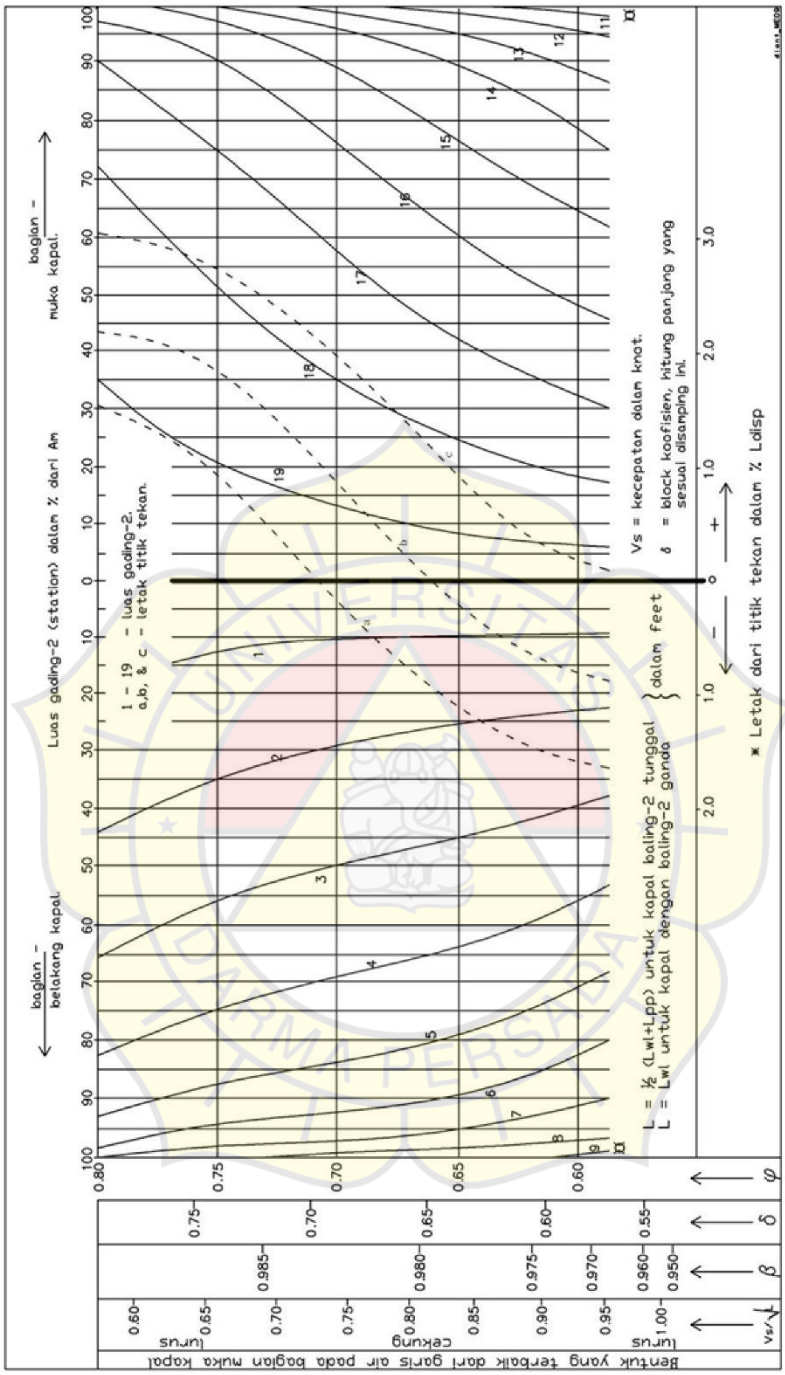
DAFTAR LAMPIRAN

Lampiran 1 Grafik NSP



Sumber : "Resistance, Propulsion and Steering of Ships", H. Stam, Haarlem, 1948, p. 92

Lampiran 2 Katalog Mesin Utama

SPECIFICATIONS

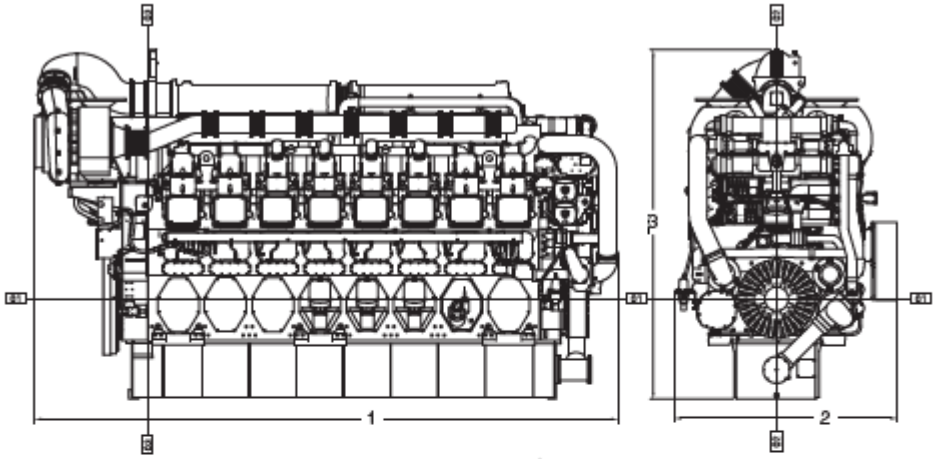
In-Line 8, 4-Stroke-Cycle-Diesel

Emissions	IMO II/EPA Tier 2 compliant
Displacement	148 L (9,031 cu. in.)
Low Idle Speed	350 rpm
Rated Speed	1000 rpm
Bore	280 mm (11.0 in.)
Stroke	300 mm (11.8 in.)
Compression Ratio	13:1
Aspiration	Turbocharged-Aftercooled
Governor	Electronic
Cooling System	Keel or Heat Exchanger
Weight, Dry	19,000 kg (41,800 lbs)
Refill Capacities	
Cooling System	1030-1205 L (272-318 gal)
Lube Oil System	760 L (201 gal)
Oil Change Interval*	925 hours
Rotation (from flywheel end)	CCW or CW
Serial Number Prefix	PKA

*A new S•O•S℠ analysis must be done to determine actual oil change intervals.

Sumber : *CAT Marine Propulsion Engine 2020*

ENGINE DIMENSIONS



Engine Dimensions		
(1) Overall Length	4958 mm	195.2 in.
(2) Overall Width	1804 mm	71.0 in.
(3) Overall Height	2648 mm	104.2 in.

Note: Do not use for installation design. See general dimension drawings for detail.

Engine Weights		
Engine Dry Weight	19,000 kg	41,800 lb
Shipped Loose Items		
Torsional Coupling	319 kg	702 lb
Plate-Type Heat Exchanger	420 kg	924 lb
Instrument/Alarm Panel	200 kg	440 lb
Fluids		
Lube Oil	691 kg	1,520 lb
Jacket Water	530 kg	1,166 lb
Heat Exchanger (FW, SW, LO)	70 kg	154 lb

Sumber : *CAT Marine Propulsion Engine 2020*

Lampiran 3 Katalog *Gear Box*

PRODUCT	Ratios	Power factor		Input power capacity						Max. kW	Max. hp	Max. rpm	Weight		Bell hsgs. & notes
		kW/rpm	hp/rpm	kW	hp	kW	hp	kW	hp				kg	lb	
				500 rpm		600 rpm		750 rpm							
ZF W83100 NR2 [5]	2.486, 3.031, 3.300	10.2000	13.6784	5100	6839	6120	8207	7650	10259	7650	10259	750	16600	36597	
	3.962	9.6001	12.8739	4800	6437	5760	7724	7200	9655	7200	9655	750			
	4.333	8.9651	12.0224	4483	6011	5379	7213	6724	9017	6724	9017	750			
	4.609	8.4927	11.3889	4246	5694	5096	6833	6370	8542	6370	8542	750			
	4.818	8.1922	10.9859	4096	5493	4915	6592	6144	8239	6144	8239	750			
	5.095	7.6629	10.2761	3831	5138	4598	6166	5747	7707	5747	7707	750			
	5.450	6.8613	9.2012	3431	4601	4117	5521	5146	6901	5146	6901	750			
	5.950	5.7110	7.6586	2856	3829	3427	4595	4283	5744	4283	5744	750			
	6.364	5.1711	6.9346	2586	3467	3103	4161	3878	5201	3878	5201	750			
				1000 rpm		1150 rpm		1300 rpm							
ZF 83700 NR2H [9, 10]	2.867, 3.462, 4.227, 4.800	8.0000	10.7282	8000	10728	9200	12337	10400	13946	10400	13946	1350	15500	34172	
	5.042*	7.6160	10.2132	7616	10213	8758	11745	9900	13276	9900	13276	1350			
	5.591	6.7200	9.0117	6720	9012	7728	10363	8736	11715	8736	11715	1350			
				900 rpm		1000 rpm		1150 rpm							
ZF 83750 NR2H [9, 10]	2.867, 3.462, 4.227	10.0000	13.4102	9000	12069	10000	13410	11500	15421	11500	15421	1350	15500	34172	
	4.800	9.0800	12.1765	8172	10959	9080	12177	10442	14002	10442	14002	1350			
	5.042*	8.6860	11.6481	7817	10483	8686	11648	9989	13395	9989	13395	1350			
	5.591	7.8000	10.4600	7020	9414	7800	10460	8970	12028	8970	12028	1350			

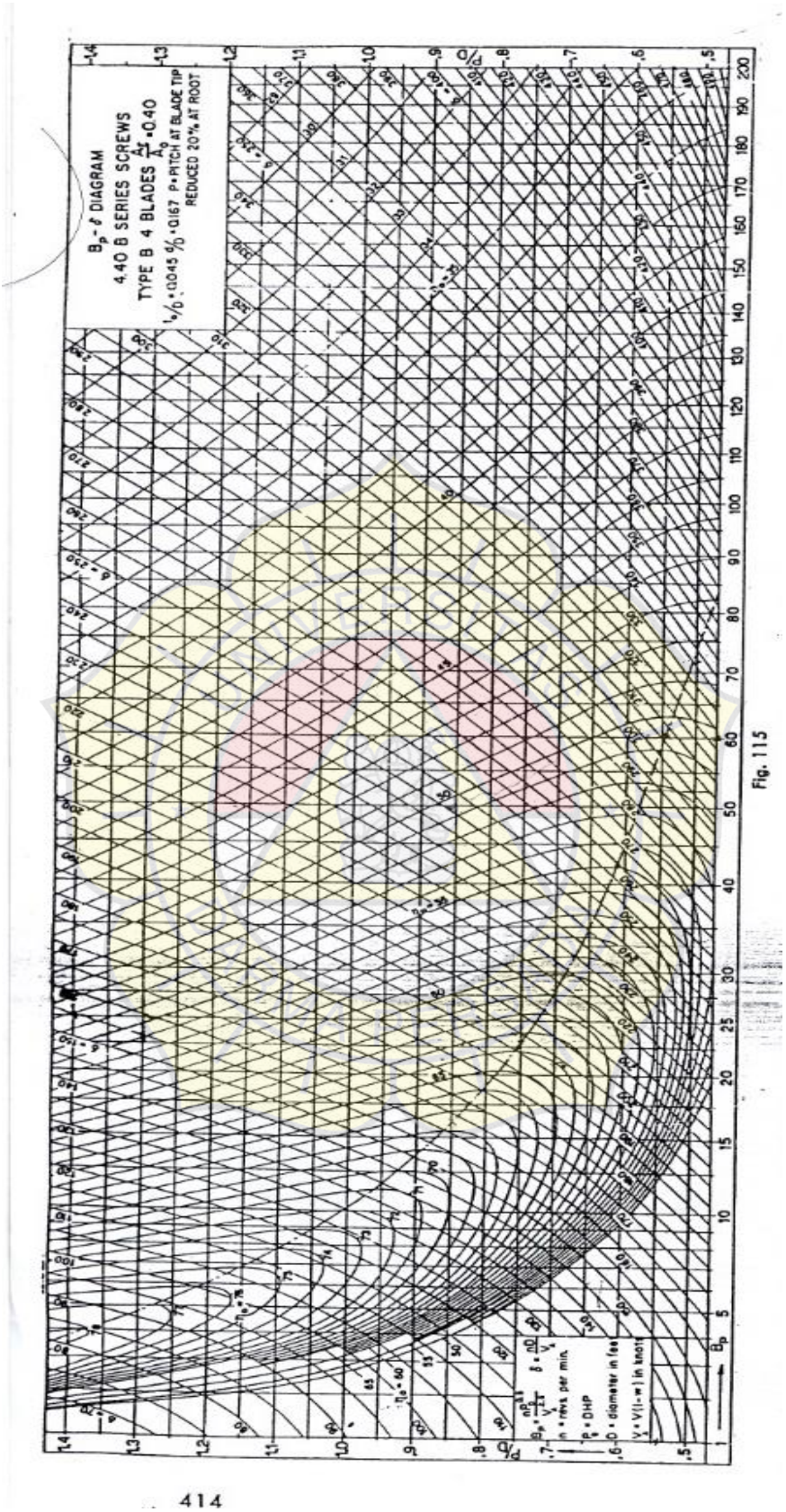
Sumber : *ZF Marine "Product Selection Guide 2021"*

Transmissions drawings and dimensions

PRODUCT	A		B1		B2		H1		H2		L		L1		L2		WEIGHT		OIL	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lb	L	US qt
ZF 53000 NR2H	600	23.6	730	28.7	515	20.3	535	21.1	770	30.3	705	27.8	995	39.2	716	28.2	3,750	8,267	200	212
ZF 53500 NR2H	600	23.6	730	28.7	515	20.3	535	21.1	770	30.3	705	27.8	995	39.2	746	29.4	3,825	8,433	200	212
ZF 53600 NR2H	670	26.4	948	37.3	772	30.4	770	30.3	1,146	45.1	759	29.9	996	39.2	1,136	44.7	9,900	21,826	300	318
ZF 53800 NR2H	600	23.6	730	28.7	515	20.3	535	21.1	770	30.3	705	27.8	995	39.2	761	30.0	3,925	8,653	200	212
ZF 60000 NR2H	665	26.2	750	29.5	590	23.2	600	23.6	819	32.2	715	28.2	1,045	41.1	817	32.2	4,650	10,251	200	212
ZF 60500 NR2H	665	26.2	750	29.5	590	23.2	600	23.6	819	32.2	715	28.2	1,045	41.1	817	32.2	4,650	10,251	200	212
ZF W63000 NR2H	670	26.4	948	37.3	772	30.4	770	30.3	1,146	45.1	1,531	60.3	1,768	69.6	364	14.3	9,900	21,826	300	318
ZF 83700 NR2H	880	34.7	1,135	44.7	825	32.5	950	37.4	1,217	47.9	910	35.8	1,229	48.4	1,147	45.2	15,500	34,172	500	530
ZF 83750 NR2H	880	34.7	1,135	44.7	825	32.5	950	37.4	1,217	47.9	910	35.8	1,229	48.4	1,147	45.2	15,500	34,172	500	530

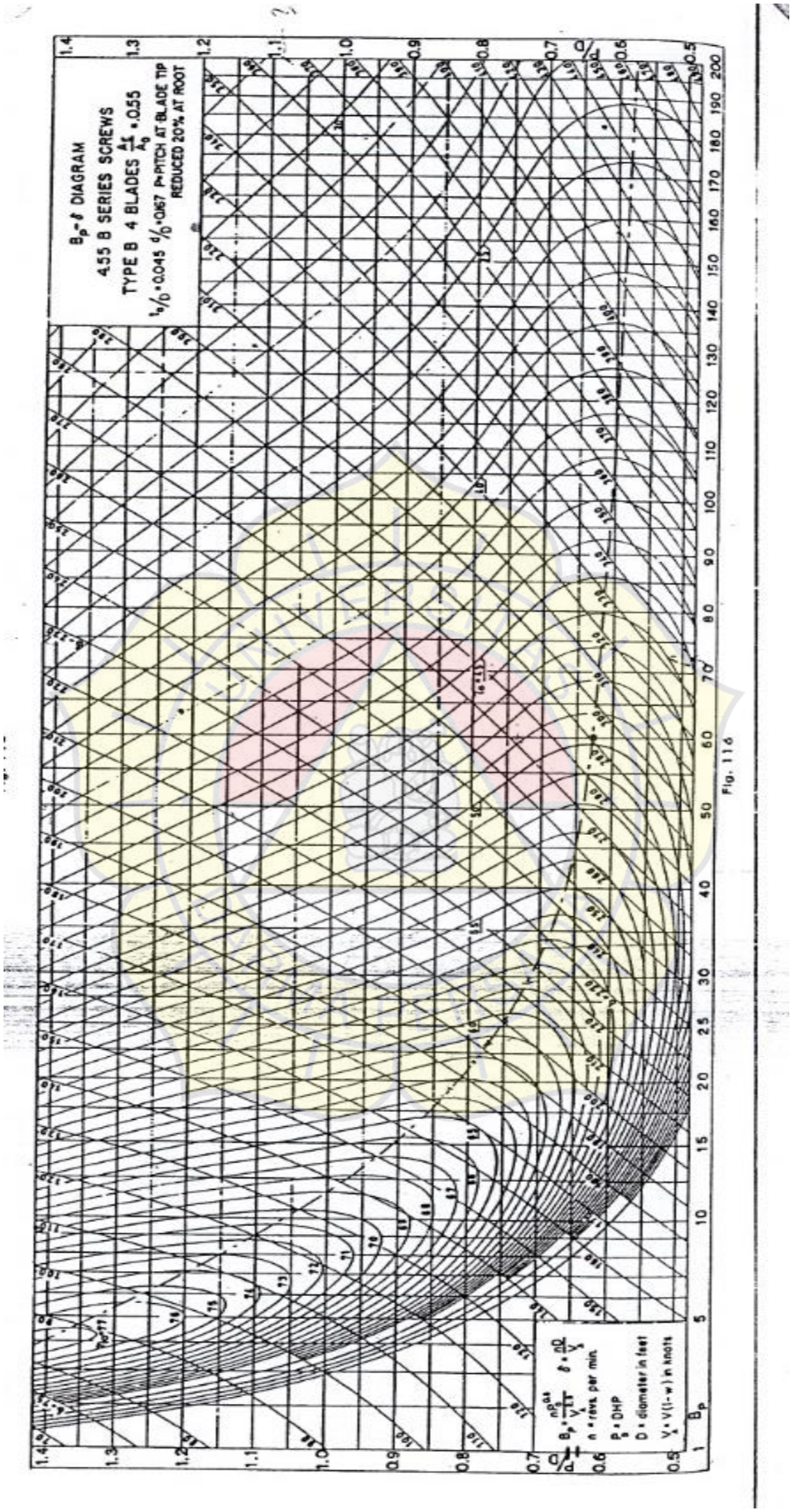
Sumber : *ZF Marine "Product Selection Guide 2021"*

Lampiran 4 Diagram B4- 40



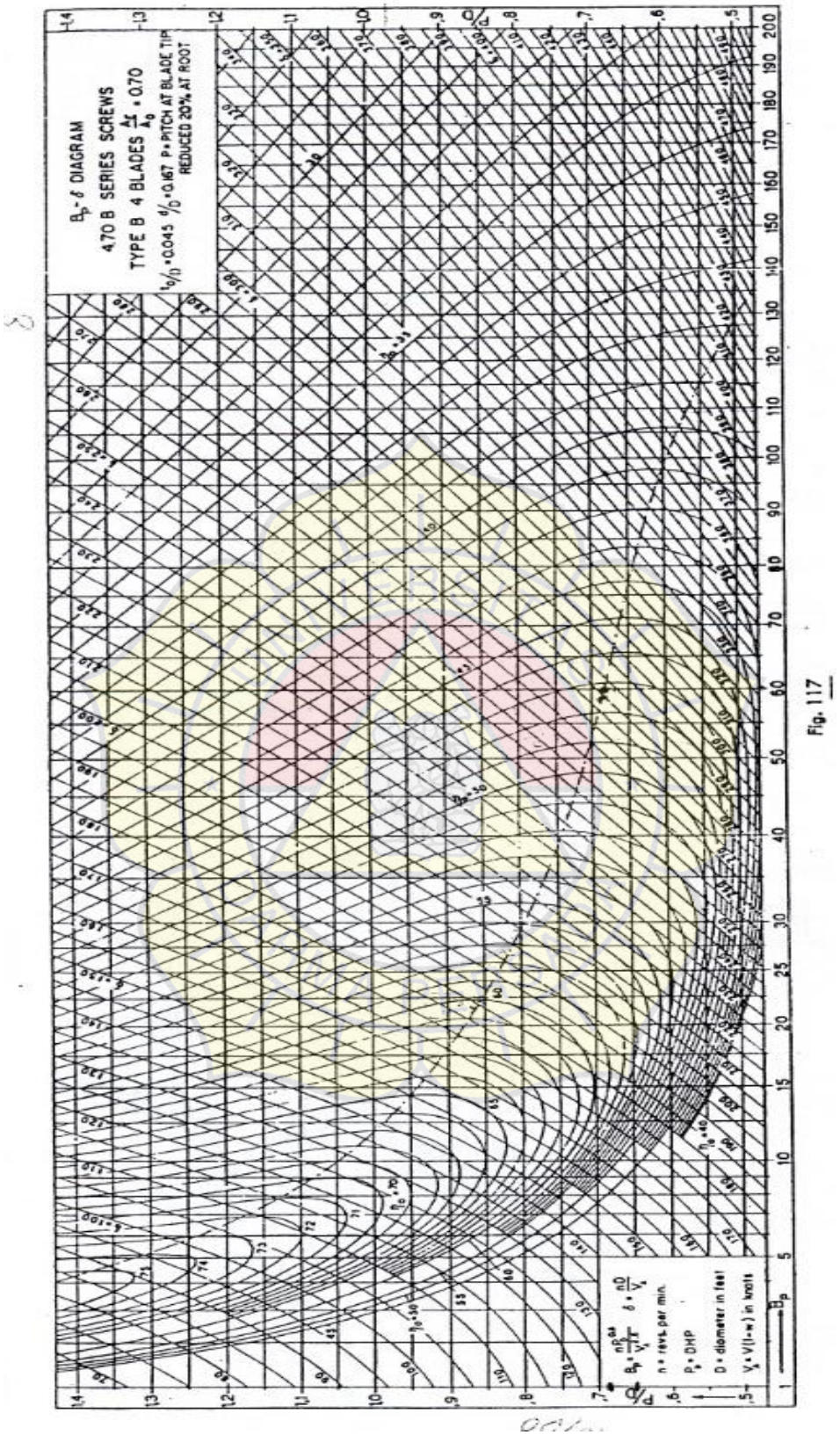
Sumber : *Wageningen B-Series Charts*

Lampiran 5 Diagram B4- 55



Sumber : *Wageningen B-Series Charts*

Lampiran 6 Diagram B4 -70



Sumber : *Wageningen B-Series Charts*

Lampiran 7 Diagram B4 -85

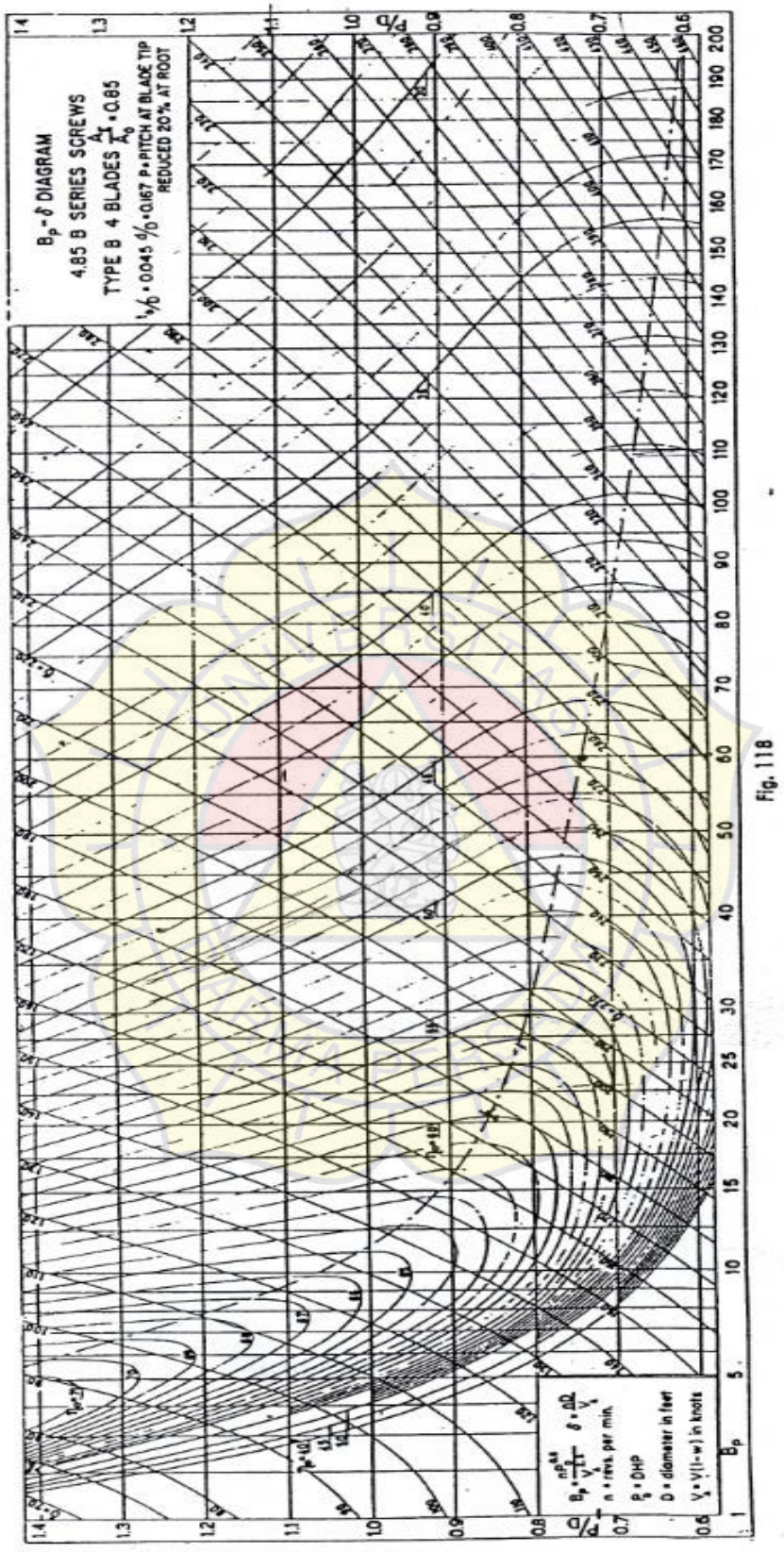


Fig. 118

Sumber : *Wageningen B-Series Charts*

Lampiran 8 Diagram Kurva *Residual Resistance Coefficient* 4.5

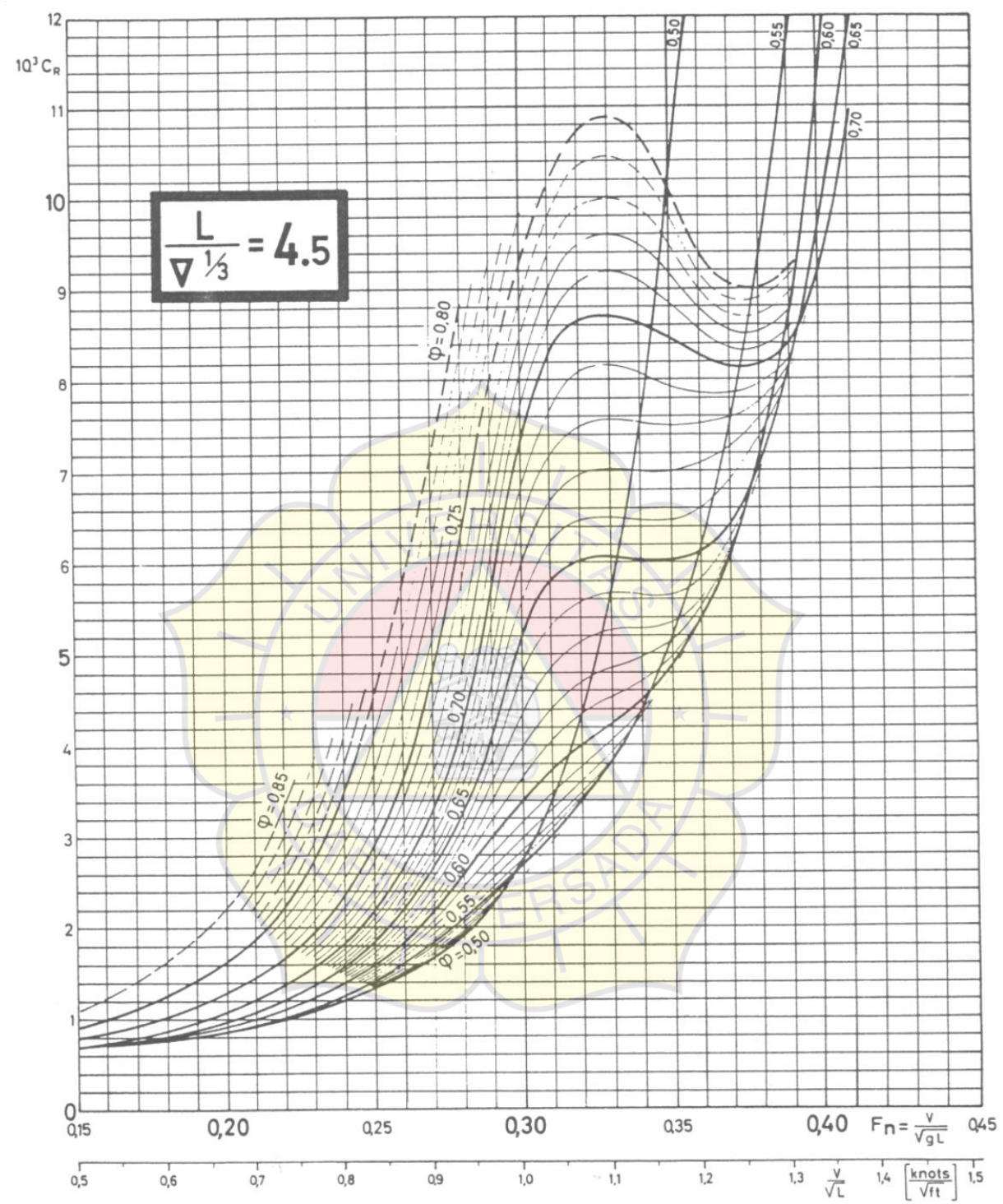


Figure 5.5.6. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 4.5$.

Lampiran 8.

Sumber : *Ship Resistance - Guldhammer & Harvald 1965, 1974*

Lampiran 9 Diagram Kurva *Residual Resistance Coefficient 5.0*

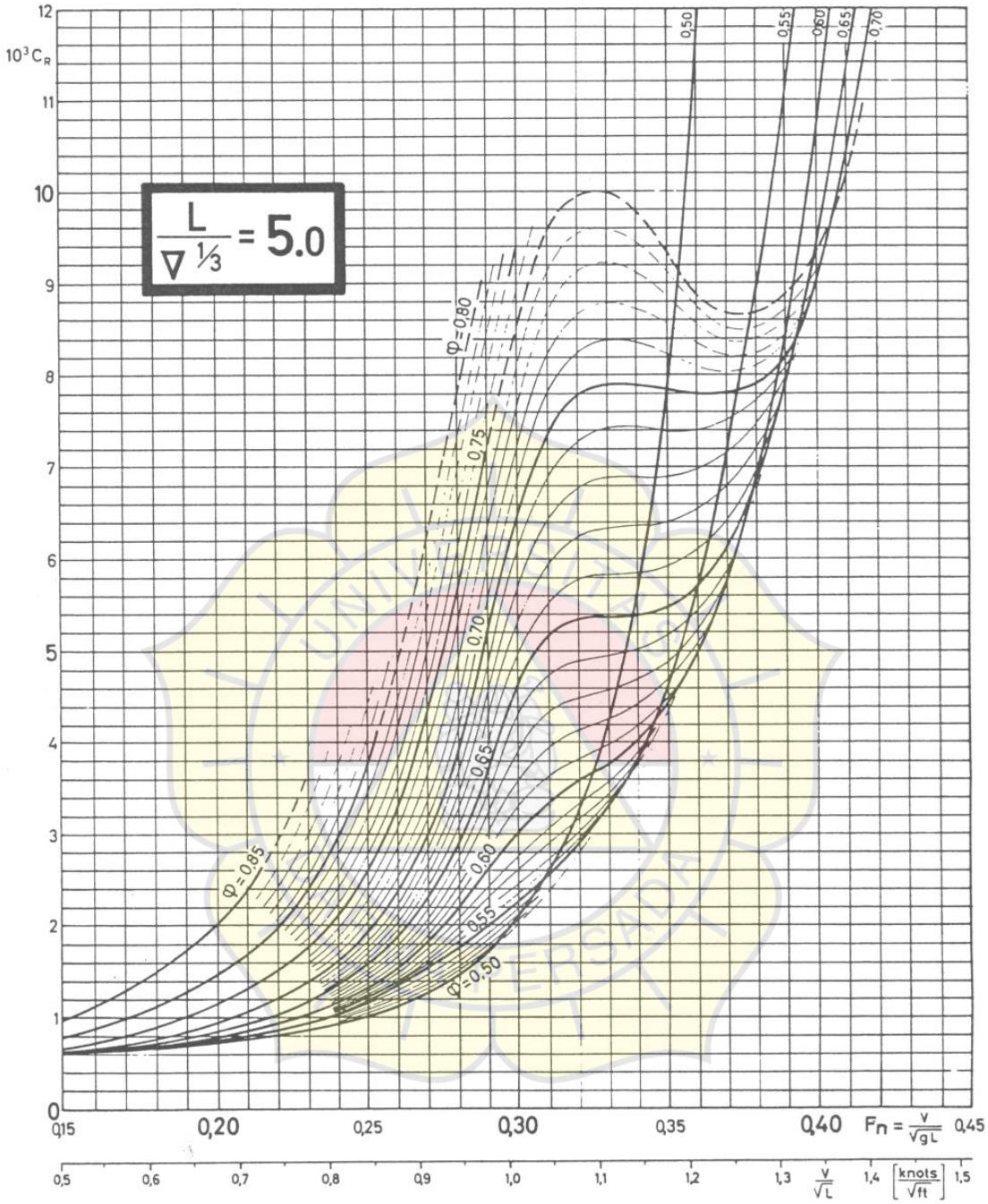
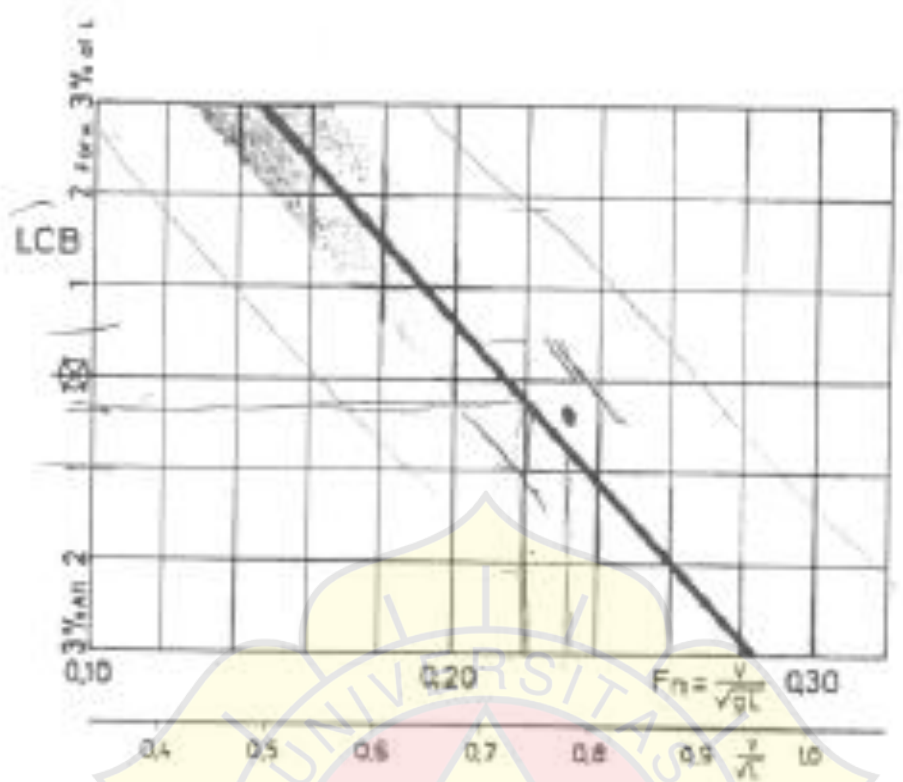


Figure 5.5.7. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 5.0$.

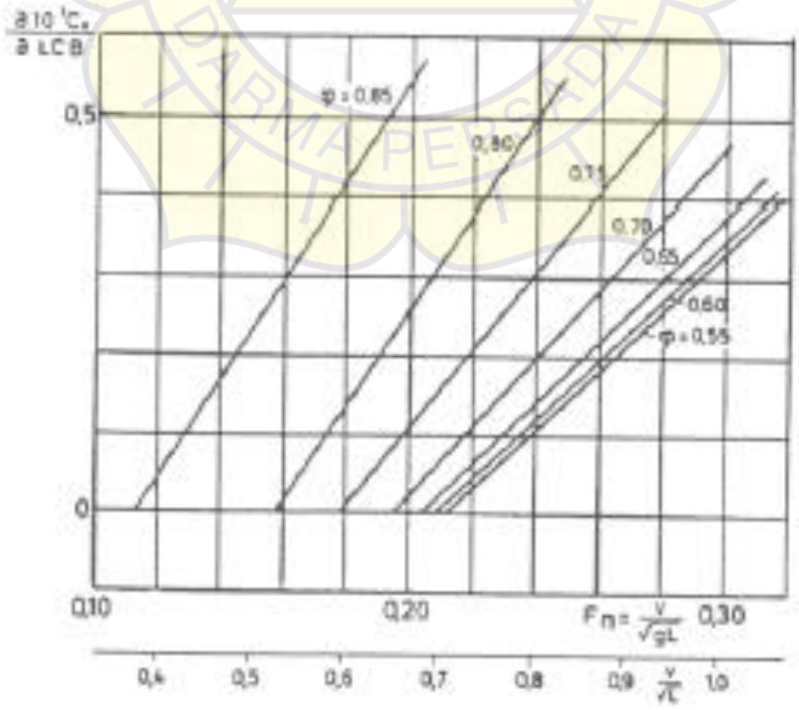
Sumber : *Ship Resistance - Guldhammer & Harvald 1965, 1974*

Lampiran 10 Standar LCB Kapal Standard *Guldhamer* dan *Harvarld*



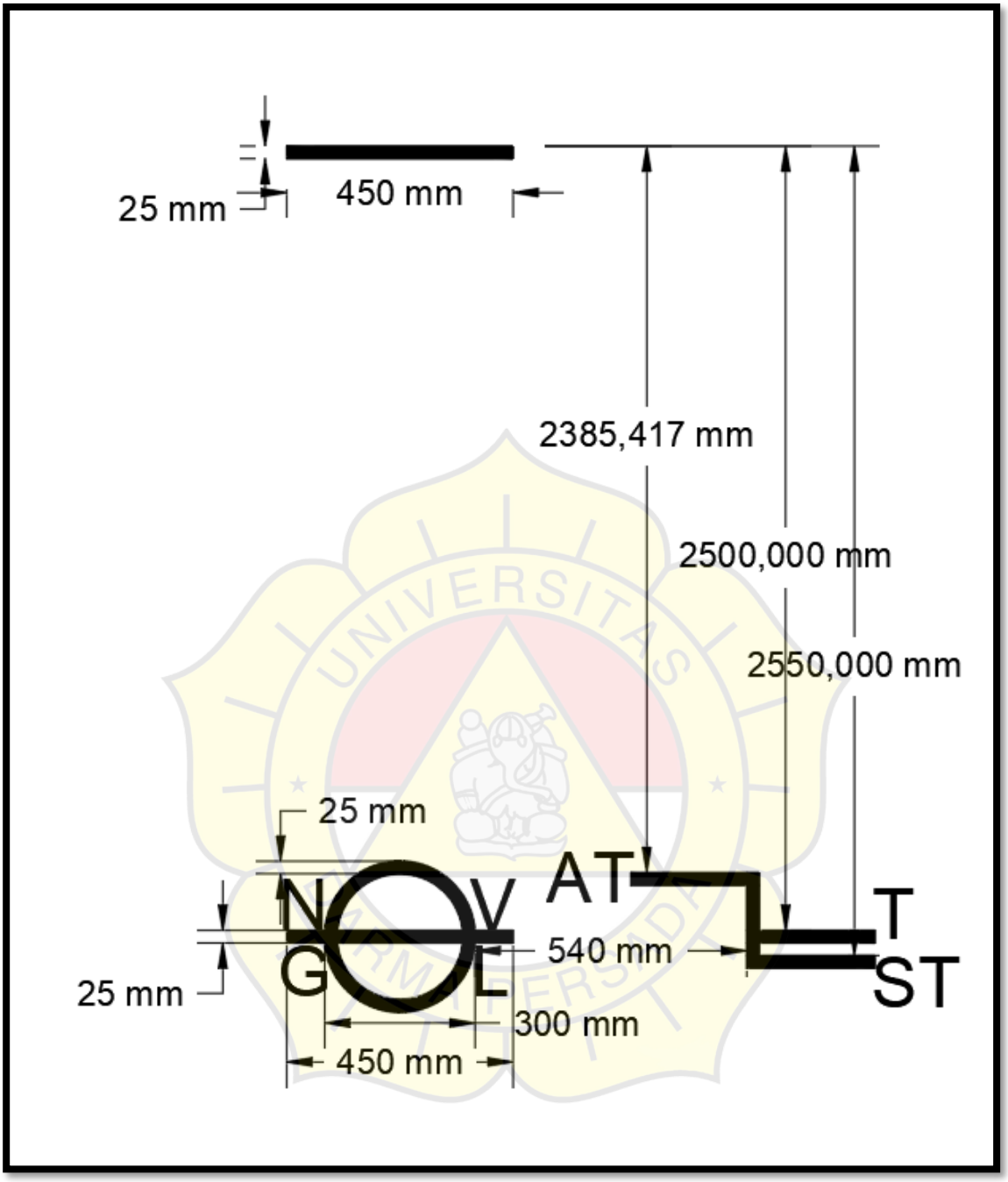
Sumber : *Ship Resistance - Guldhammer & Harvald 1965, 1974*

Lampiran 11 Koreksi CR LCB Kapal Standard *Guldhamer* dan *Harvarld*



Sumber : *Ship Resistance - Guldhammer & Harvald 1965, 1974*

Lampiran 12 Lambung Timbul Kapal Rancangan



Lampiran 13 Katalog Plat

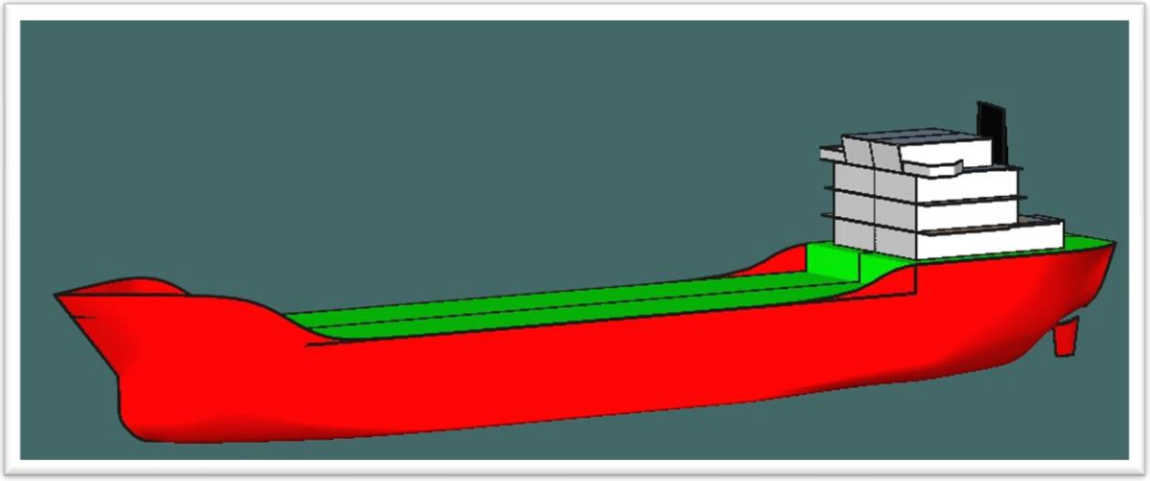
CALCULATED PLATE WEIGHT (FROM THICKNESS & SIZE)

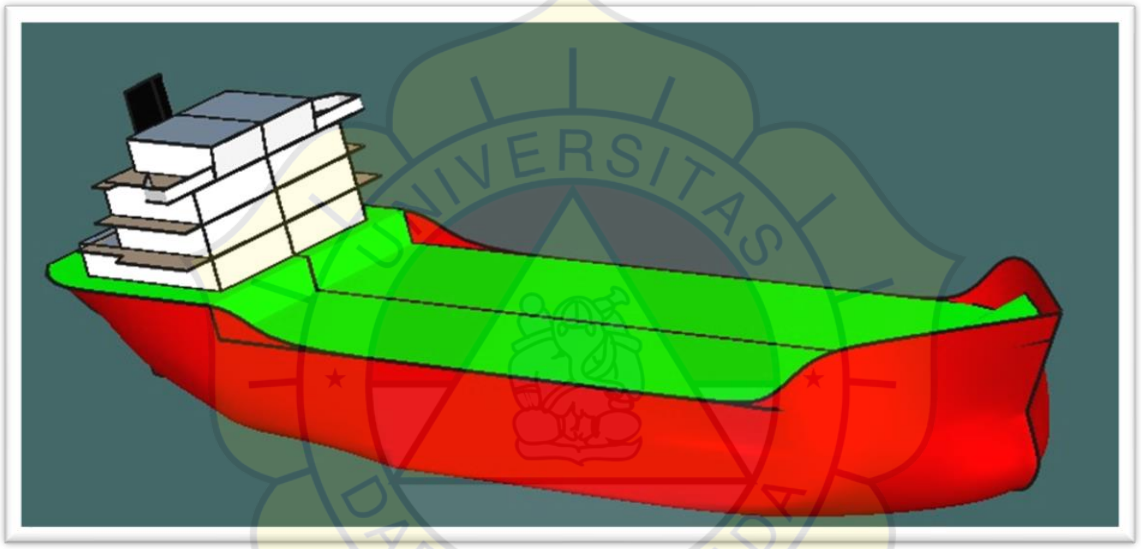
Width x Length (in mm)	1219 x 2438	1219 x 6096	1524 x 3048	1524 x 6096	1524 x 9144	1524 x 12192	1829 x 6096	1829 x 12192	2133 x 6096	2133 x 12192	2438 x 6096	2438 x 12192	2743 x 6096	2743 x 12192	3048 x 6096	3048 x 12192	3353 x 6096	3353 x 12192
Width x Length (in ft)	4' x 8'	4' x 20'	5' x 10'	5' x 20'	5' x 30'	5' x 40'	6' x 20'	6' x 40'	7' x 20'	7' x 40'	8' x 20'	8' x 40'	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	48 x 240	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
Thickness (mm)																		
8	187	467	292	583	875	1.167	700	1.400	817	1.633	933	1.867	1.050	2.100	1.167	2.334	1.284	2.567
9	210	525	328	656	985	1.313	788	1.575	919	1.837	1.050	2.100	1.181	2.363	1.313	2.625	1.444	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	1.605	3.209
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	1.925	3.851
12.7	296	741	463	926	1.389	1.852	1.112	2.223	1.296	2.593	1.482	2.963	1.667	3.334	1.852	3.705	2.038	4.076
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	2.246	4.493
15	350	875	547	1.094	1.641	2.188	1.313	2.626	1.531	3.062	1.750	3.500	1.969	3.938	2.188	4.376	2.407	4.814
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	2.567	5.134
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	2.888	5.776
19	443	1.108	693	1.386	2.078	2.771	1.663	3.326	1.938	3.879	2.217	4.433	2.494	4.988	2.771	5.543	3.049	6.097
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	3.209	6.418
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	3.530	7.060
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	3.851	7.702
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	4.011	8.023
25.4	593	1.482	926	1.852	2.779	3.705	2.223	4.446	2.593	5.185	2.963	5.927	3.334	6.668	3.705	7.410	4.076	8.151
26	607	1.517	948	1.896	2.844	3.792	2.276	4.551	2.654	5.306	3.033	6.067	3.413	6.826	3.792	7.585	4.172	8.344
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	4.493	8.985
30	700	1.750	1.094	2.188	3.282	4.376	2.626	4.251	3.062	6.124	3.500	7.000	3.938	7.876	4.376	8.751	4.814	9.627
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	5.134	10.269
36	840	2.100	1.313	2.625	3.938	5.251	3.151	6.302	3.675	7.349	4.200	8.400	4.725	9.451	5.251	10.502	5.776	11.553
38	887	2.217	1.386	2.771	4.157	5.543	3.326	6.652	3.879	7.757	4.433	8.867	4.988	4.976	5.543	11.085	6.097	12.194
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	11.669	6.418	12.836
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	13.127	7.220	14.441
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	6.563	13.126	7.293	14.586	8.023	16.045
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	16.044	8.825	17.650
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	17.503	9.627	19.254
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	18.962	10.429	20.859
70	1.633	4.083	2.553	5.105	7.658	10.210	6.127	12.253	7.145	14.290	8.167	16.333	9.188	18.377	10.210	20.420	11.232	22.463
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	10.939	21.879	12.034	24.068
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	23.337	12.836	25.672
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	24.796	13.639	27.277
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	11.814	23.627	13.127	26.254	14.441	28.882
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	27.713	15.243	30.486
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	29.172	16.045	32.091

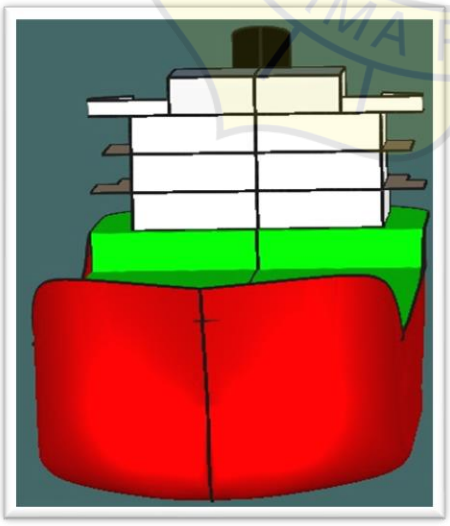
Concluded considering specific gravity of steel as 7.85 Kg/mm2, and dimension in mm.

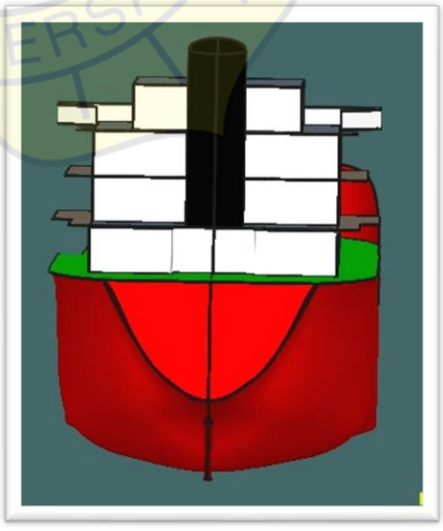
Not Available Sizes

Lampiran 14 3D *Maxsurf Product Oil Carrier 5000 DWT*

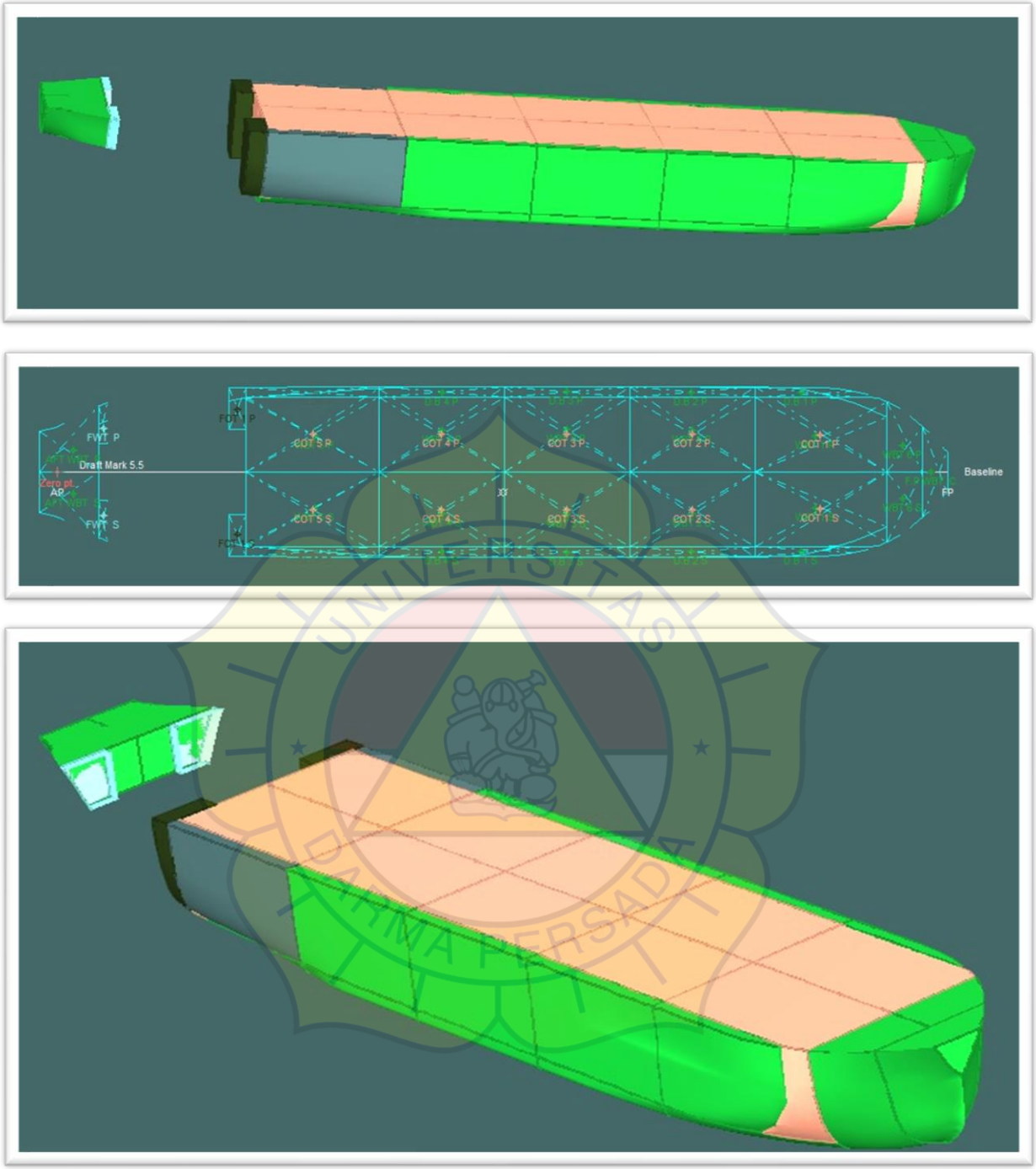








Lampiran 15 3D Maxsurf Tangki Kapal Perencanaan



Sumber : Data Pribadi

Lampiran 16 Jadwal Jam Kerja ABK

Jadwal Dinas Jaga MT.Precado				
Regu	Jam Kerja	Nama Jaga	Petugas Deck	Petugas Mesin
1	00.00-04.00	Jaga Subuh	*Second Officer, QM*	*Second Engginer,Oiler 2*
	12.00-16.00	Jaga Sore		
2	04.00-08.00	Jaga Pagi	*First Officer,QM*	*First Engginer,Oiler 1*
	16.00-20.00	Jaga Sore		
3	08.00-12.00	Jaga Siang	*Third Officer,QM*	*Third Engginer,Oiler 3*
	20.00-24.00	Jaga Malam		