BAB V
PENUTUP

V.1. Kesimpulan

Dari hasil perhitungan yang telah dilakukan, pada kapal rancangan yaitu kapal penumpang 2400 GT Twin Screw dengan dimensi sebagai berikut :

Untuk dapat menentukan besarnya motor induk sebagai penggerak utama kapal, maka faktor kecepatan, daerah pelayaran serta dimensi dari kapal rancangan mempunyai pengaruh yang sangat besar. Dari hasil perhitungan diketahui bahwa untuk mencapai kecepatan 15 Knots hambatan total yang dialami kapal adalah sebesar 18180,129 kg, dan daya penggerak yang dibutuhkan adalah sebesar 2200 HP,dan didapat karakteristik mesin yang dipilih adalah:

- Merk = MAN B & W
- Type = V20/27
- Daya = 1620 kW/2200 HP
- Putaran Mesin = 900 Rpm
- Bore & Stroke = 200 mm x 270 mm
- SFOC = 199 g/kW.h
- SLOC = 1,2 g/kW.h
- Ukuran = Panjang x Lebar x Tinggi
  = 4500 mm x 1510 mm x 2750 mm
- Jumlah = 2 (dua) unit

Pada pemilihan generator set didasarkan pada pembebanan penggunaan daya yang terbesar yaitu pada kapal saat melakukan manuver sebesar 210,438 kW dengan menggunakan 2 buah generator masing-masing 255 kW dan didapat karakteristik mesin sebagai berikut:

- Merk = YANMAR
- Type = 6HAL 2-DTN
- Daya Motor = 305 kW (414 HP)
- RPM = 1800 rpm
- No. Cylliders = 6

Dalam perancangan kamar mesin, tidak terlepas dari adanya asumsi-asumsi yang diberikan untuk mempermudahan dalam perhitungan dengan tidak mengabaikan tanggung jawab secara teknis, ekonomis serta peraturan-peraturan yang ada sehingga hasil perhitungan dapat mendekati keadaan yang sebenarnya.

Tata letak mesin induk, mesin bantu serta permesinan lainnya diatur seefisien mungkin, hal ini untuk mempermudah dalam hal perawatan dan perbaikan peralatan yang ada di kamar mesin.

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LAMPIRAN

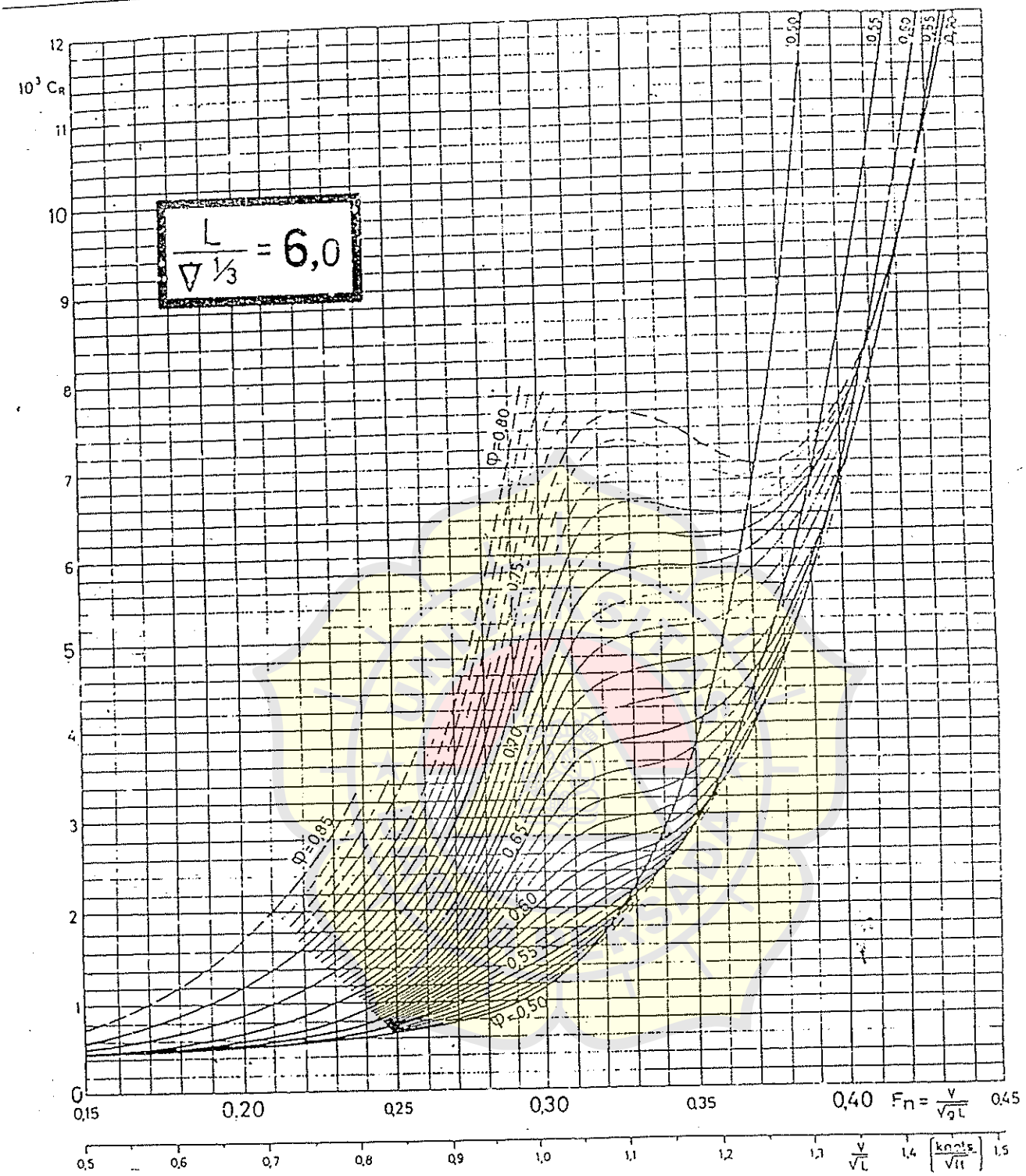
Table 18.2 Anchor, Chain Cables and Ropes

No. for Reg.	Equipment numeral Z	Stockless anchor			Stud link chain cables						Recommended ropes				
		Bower anchor		Stream anchor	Bower anchors				Stream wire or chain for stream anchor		Towline		Mooring ropes		
		Number [1]	Mass per anchor		Total length	Diameter d_1	Diameter d_2	Diameter d_3	Length	Br. load [2]	Length	Br. load [2]	Number	Length	Br. load [2]
			[kg]		[m]	[mm]	[mm]	[mm]	[m]	[kN]	[m]	[kN]		[m]	[kN]
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
101	up to - 50	2	120	40	165	12,5	12,5	12,5	80	65	180	100	3	80	35
102	50 - 70	2	180	60	220	14	12,5	12,5	80	65	180	100	3	80	35
103	70 - 90	2	240	80	220	16	14	14	85	75	180	100	3	100	40
104	90 - 110	2	300	100	247,5	17,5	16	16	85	80	180	100	3	110	40
105	110 - 130	2	360	120	247,5	19	17,5	17,5	90	90	180	100	3	110	45
106	130 - 150	2	420	140	275	20,5	17,5	17,5	90	100	180	100	3	120	50
107	150 - 175	2	480	165	275	22	19	19	90	110	180	100	3	120	55
108	175 - 205	2	570	190	302,5	24	20,5	20,5	90	120	180	110	3	120	60
109	205 - 240	3	660		302,5	26	22	20,5			180	130	4	120	65
110	240 - 280	3	780		330	28	24	22			180	150	4	120	70
111	280 - 320	3	900		357,5	30	26	24			180	175	4	140	80
112	320 - 360	3	1020		357,5	32	28	24			180	200	4	140	85
113	360 - 400	3	1140		385	34	30	26			180	225	4	140	95
114	400 - 450	3	1290		385	36	32	28			180	250	4	140	100
115	450 - 500	3	1440		412,5	38	34	30			180	275	4	140	110
116	500 - 550	3	1590		412,5	40	34	30			190	305	4	160	120
117	550 - 600	3	1740		440	42	36	32			190	340	4	160	130
118	600 - 660	3	1920		440	44	38	34			190	370	4	160	145
119	660 - 720	3	2100		440	46	40	36			190	405	4	160	160
120	720 - 780	3	2280		467,5	48	42	36			190	440	4	170	170
121	780 - 840	3	2460		467,5	50	44	38			190	480	4	170	185
122	840 - 910	3	2640		467,5	52	46	40			190	520	4	170	200
123	910 - 980	3	2850		495	54	48	42			190	560	4	170	215
124	980 - 1060	3	3060		495	56	50	44			200	600	4	180	230
125	1060 - 1140	3	3300		495	58	50	46			200	645	4	180	250
126	1140 - 1220	3	3540		522,5	60	52	46			200	690	4	180	270
127	1220 - 1300	3	3780		522,5	62	54	48			200	740	4	180	285
128	1300 - 1390	3	4050		522,5	64	56	50			200	785	4	180	305
129	1390 - 1480	3	4320		550	66	58	50			200	835	4	180	325
130	1480 - 1570	3	4590		550	68	60	52			220	890	5	190	525
131	1570 - 1670	3	4890		550	70	62	54			220	940	5	190	335
132	1670 - 1790	3	5250		577,5	73	64	56			220	1025	5	190	350
133	1790 - 1930	3	5610		577,5	76	66	58			220	1110	5	190	375
134	1930 - 2080	3	6000		577,5	78	68	60			220	1170	5	190	400
135	2080 - 2230	3	6450		605	81	70	62			240	1260	5	200	425
136	2230 - 2380	3	6900		605	84	73	64			240	1355	5	200	450
137	2380 - 2530	3	7350		605	87	76	66			240	1455	5	200	480
138	2530 - 2700	3	7800		632,5	90	78	68			260	1470	6	200	480
139	2700 - 2870	3	8300		632,5	92	81	70			260	1470	6	200	490
140	2870 - 3040	3	8700		632,5	95	84	73			260	1470	6	200	500
141	3040 - 3210	3	9300		660	97	84	76			280	1470	6	200	520
142	3210 - 3400	3	9900		660	100	87	78			280	1470	6	200	555
143	3400 - 3600	3	10500		660	102	90	78			280	1470	6	200	590
144	3600 - 3800	3	11100		687,5	105	92	81			300	1470	6	200	620
145	3800 - 4000	3	11700		687,5	107	95	84			300	1470	6	200	650
146	4000 - 4200	3	12300		687,5	111	97	87			300	1470	7	200	650
147	4200 - 4400	3	12900		715	114	100	87			300	1470	7	200	660
148	4400 - 4600	3	13500		715	117	102	90			300	1470	7	200	670
149	4600 - 4800	3	14100		715	120	105	92			300	1470	7	200	680
150	4800 - 5000	3	14700		742,5	122	107	95			300	1470	7	200	685
151	5000 - 5200	3	15400		742,5	124	111	97			300	1470	8	200	685
152	5200 - 5500	3	16100		742,5	127	111	97			300	1470	8	200	695
153	5500 - 5800	3	16900		742,5	130	114	100			300	1470	8	200	705
154	5800 - 6100	3	17800		742,5	132	117	102			300	1470	9	200	705
155	6100 - 6500	3	18800		742,5		120	107			300	1470	9	200	715
156	6500 - 6900	3	20000		770		122	111			300	1470	9	200	725
157	6900 - 7400	3	21500		770		127	114			300	1470	10	200	725
158	7400 - 7900	3	23000		770		132	117			300	1470	11	200	725
159	7900 - 8400	3	24500		770		137	122			300	1470	11	200	735
160	8400 - 8900	3	26000		770		142	127			300	1470	12	200	735
161	8900 - 9400	3	27500		770		147	132			300	1470	13	200	735
162	9400 - 10000	3	29000		770		152	132			300	1470	14	200	735
163	10000 - 10700	3	31000		770			137			300	1470	15	200	735
164	10700 - 11500	3	33000		770			142			300	1470	16	200	735
165	11500 - 12400	3	35500		770			147			300	1470	17	200	735
166	12400 - 13400	3	38500		770			152			300	1470	18	200	735
167	13400 - 14600	3	42000		770			157			300	1470	19	200	735
168	14600 - 16000	3	46000		770			162			300	1470	21	200	735

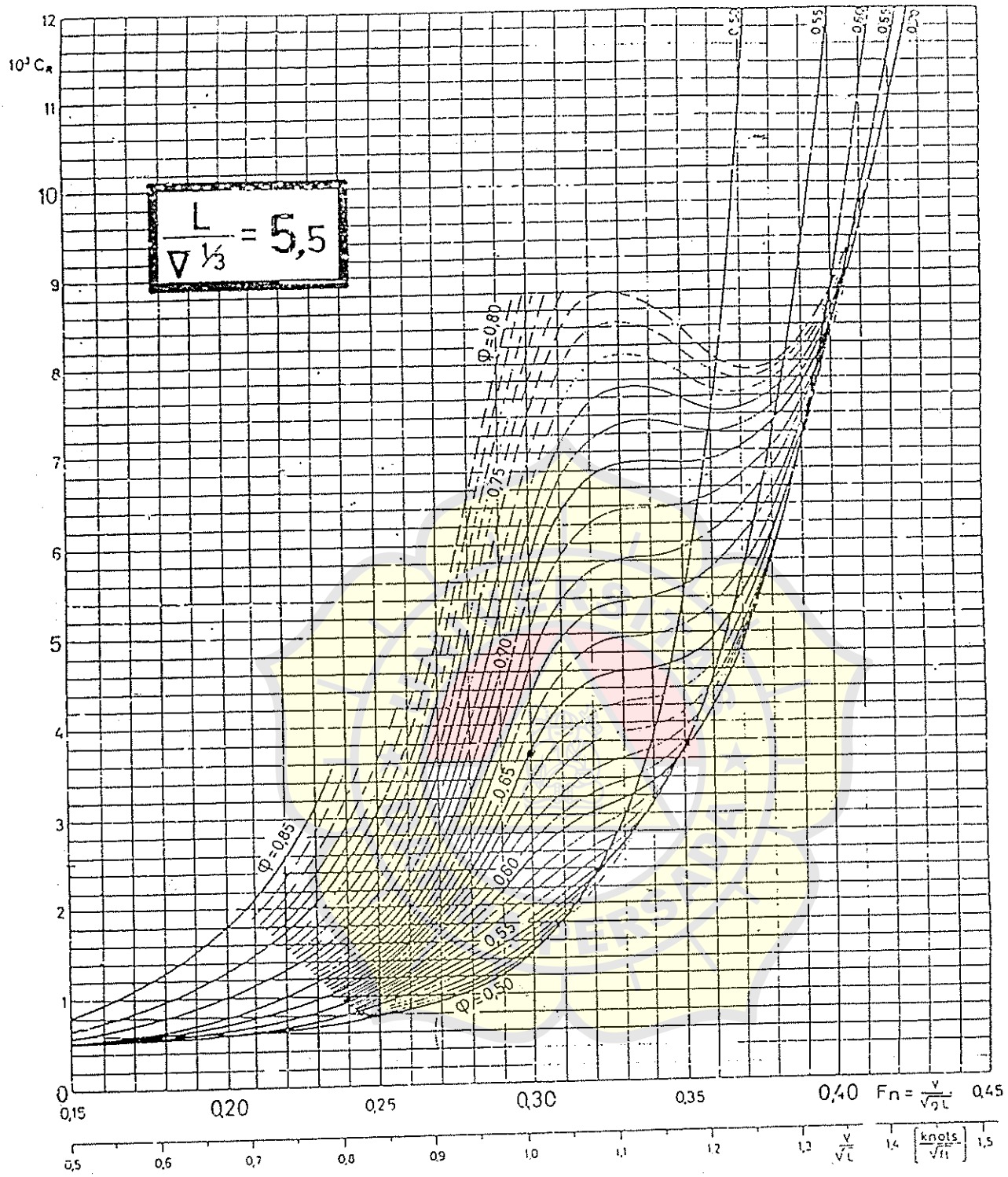
d_1 = Chain diameter Grade K 1 (Ordinary quality)
d_2 = Chain diameter Grade K 2 (Special quality)
d_3 = Chain diameter Grade K 3 (Extra special quality)

} See also D

[1] see C.1.
[2] see F.1.2



Gambar 5.5.9. Koefisien tahanan sisa terhadap rasio kecepatan-panjang untuk harga koefisien prismatik longitudinal yang berbeda-beda. $L/\nabla^{1/3} = 6{,}0$.

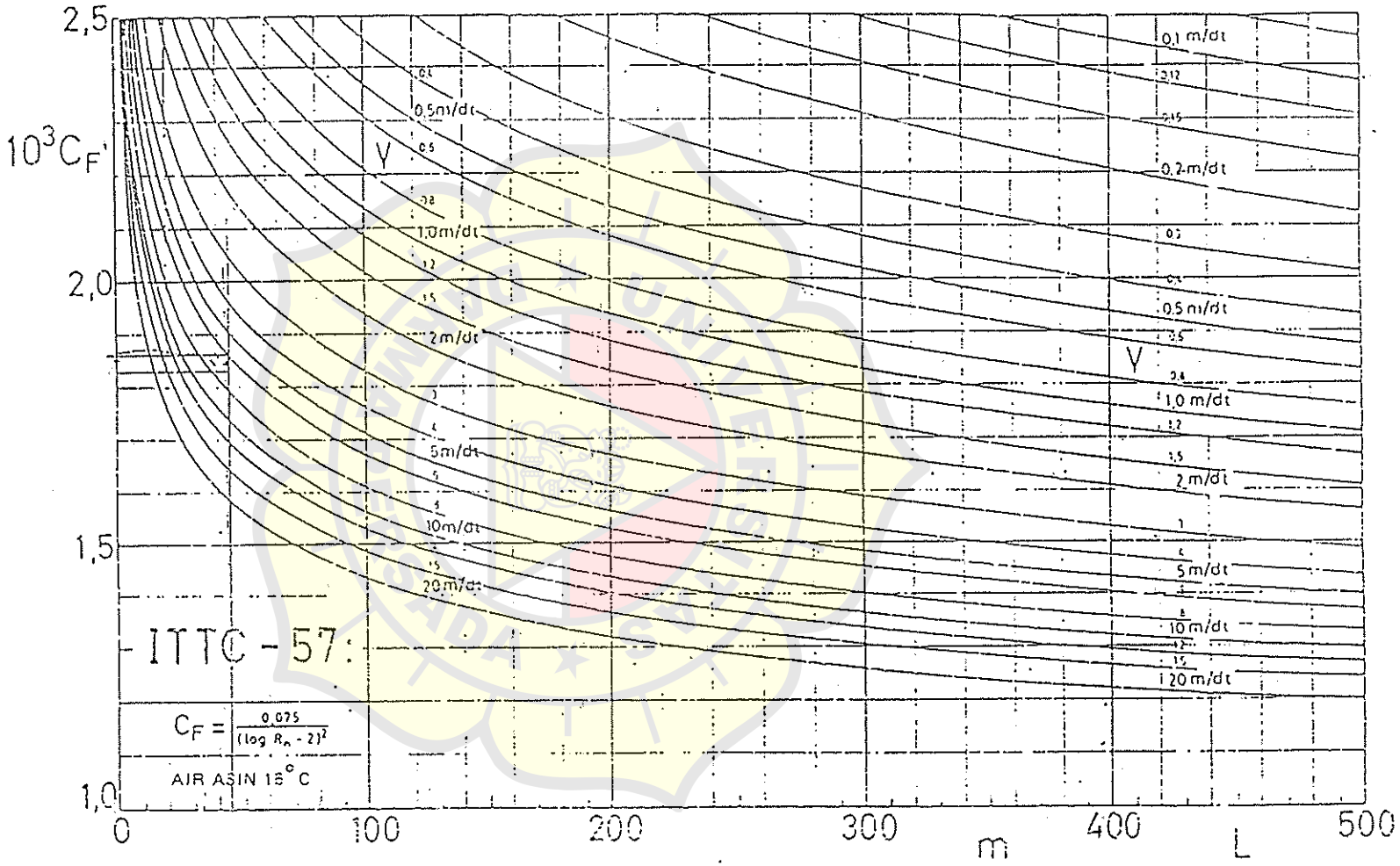


Gambar 5.5.8. Koefisien tahanan sisa terhadap rasio kecepatan–panjang untuk harga koefisien prismatik longitudinal yang berbeda-beda. $L/\nabla^{1/3} = 5{,}5$.

Lampiran 16. Diagram Bp δ Series B4-40

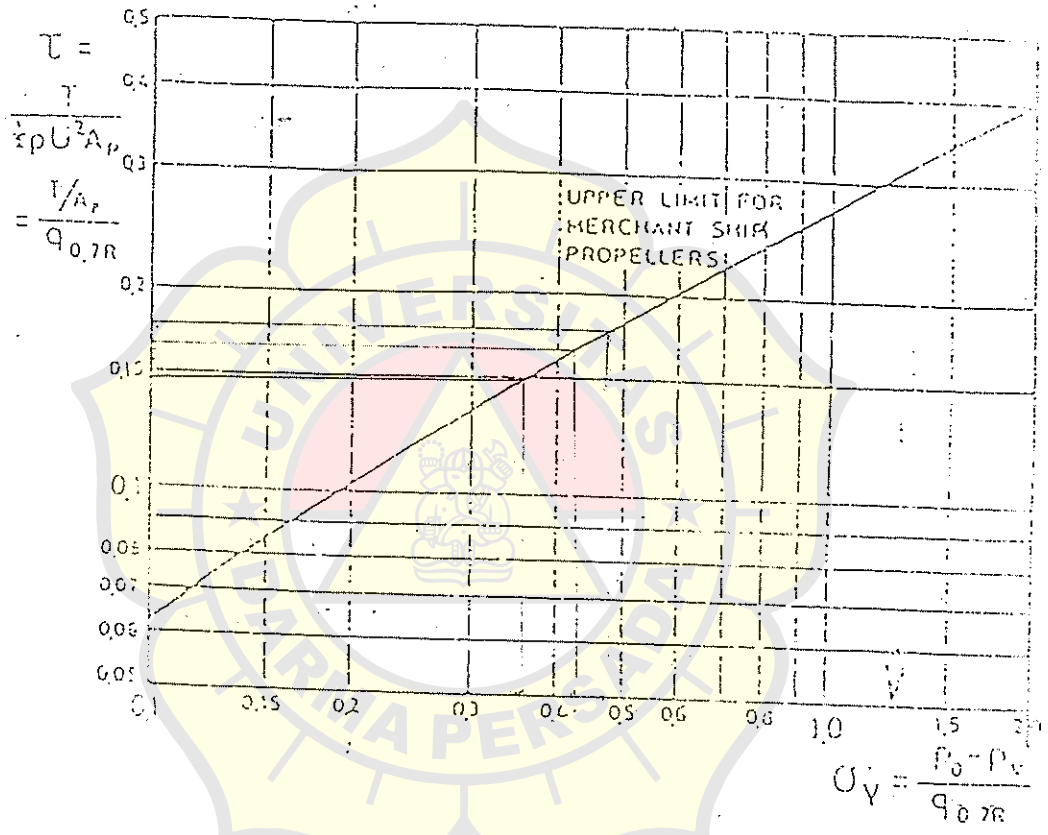
Lampiran 17. Diagram Bp – δ Series B4-55

Lampiran 18. Diagram Bp δ Series B4-70

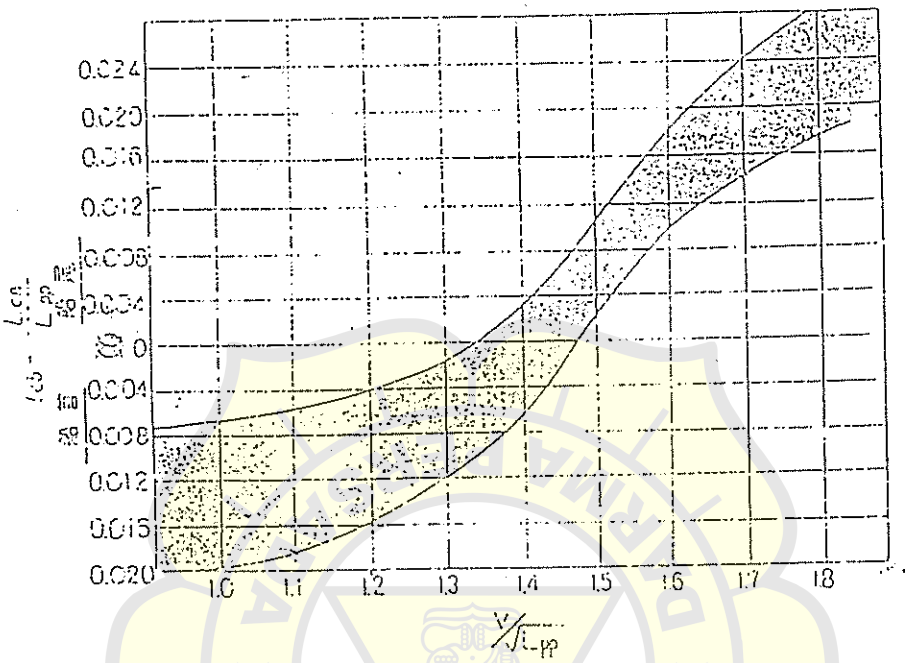


Gambar 5.5.14. Koefisien tahanan gesek C_F (menurut ITTC 1957) sebagai fungsi panjang kapal L dan kecepatan V.

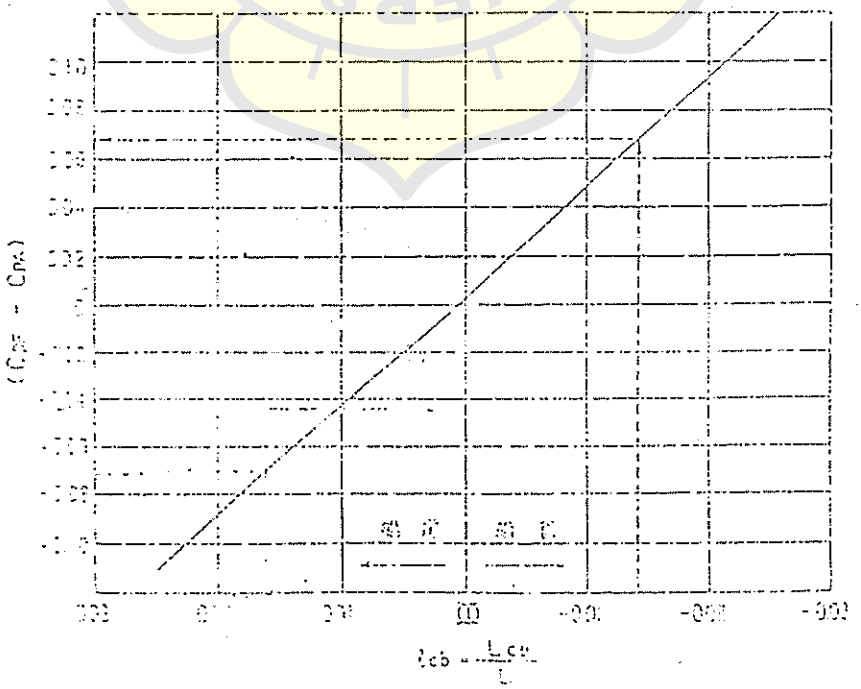
GRAFIK BURRIL



Lampiran 3. Diagram untuk menentukan letak LCB



Lampiran 4. Diagram untuk menetukan koefisien depan dan belakang (Cpf - Cpa)



STANDART UKURAN SEKOCI BERMOTOR :

Tabel I1I

L	B	H	Kapasitas	Jumlah orang	Berat sekoci dari kayu	Berat sekoci dari plat	Berat motor	Berat perlengkapan	Berat total
8,00	2,60	1,16	14,5	34	1700	1900	820	460	2550
8,50	2,60	1,16	15,4	39	1800	2100	820	480	2925
9,00	2,70	1,22	17,8	46	1900	2300	870	510	3450
9,50	2,80	1,22	19,4	50	2100	2500	1120	530	3750

STANDART UKURAN SEKOCI KERJA

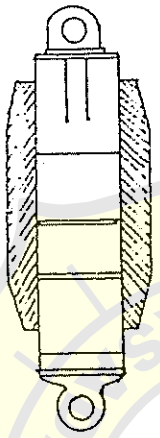
L1	L	B	H	Kapasitas	Jumlah orang	Berat penumpang	Berat perlengkapan	Berat sekoci	Berat total
3,60	3,76	1,55	0,6	2,0	4	300	60	300	660
3,80	3,96	1,65	0,66	2,5	5	375	60	360	795
4,00	4,16	1,75	0,70	3,0	6	450	60	420	930
4,50	4,66	1,80	0,78	3,5	7	5,25	70	450	1045
5,00	5,18	1,85	0,72	4,0	8	600	70	500	1170
5,50	5,68	1,90	0,75	4,7	9	675	80	600	1355
6,00	6,18	2,00	0,80	5,8	11	825	80	700	1605

STANDART UKURAN SEKOCI OLEH BOT (BOARD OF TRADE) ENGLAND

Tabel II

L. B. H (m)	L. B. H (ft3)	Kapasitas (ft3)	Jumlah orang	berat sekoci (kg)	Berat Orang (kg)	berat perlengkapan (kg)	Total berat (kg)
9,4 x 2,74 x 1 x 1,114	30 x 9 x 3,75	607	60	2205	4500	356	7061
8,84 x 2,74 x 1,10	29 x 8,75 x 3,60	545	54	1976	4050	356	6382
8,53 x 2,59 x 1,07	28 x 8,50 x 3,50	500	50	1824	3750	330	5894
8,23 x 2,51 x 1,04	27 x 8,25 x 3,40	454	45	1646	3376	330	5351
7,92 x 2,44 x 0,99	26 x 8,00 x 3,25	405	40	473	3000	305	4778
7,62 x 2,36 x 0,96	25 x 7,75 x 3,15	366	36	1326	2700	305	4331
7,31 x 22,9 x 0,91	24 x 7,50 x 3,00	324	32	1180	2400	254	3843
7,01 x 2,29 x 0,88	23 x 7,50 x 2,90	300	30	1087	2250	254	3591
6,71 x 2,21 x 0,84	22 x 7,25 x 2,75	236	26	955	1950	229	3134
6,40 x 2,13 x 0,82	21 x 7,00 x 2,70	238	23	864	1725	229	2818
6,10 x 2,06 x 0,79	20 x 6,75 x 2,60	210	21	762	1575	203	2540
5,79 x 1,98 x 0,76	19 x 6,50 x 2,50	182	18	650	1350	178	2178
5,49 x 1,90 x 0,73	18 x 6,25 x 2,40	162	16	590	1200	152	1942
5,18 x 1,83 x 0,715	17 x 6,00 x 2,30	143	14	508	1050	152	1710
4,88 x 1,75 x 0,70	16 x 5,75 x 2,30	127	12	475	900	127	1484

Untuk kapal-kapal tangki jenis Holmes Light harus dinyalakan dengan listrik (baterai). Bagian luarnya adalah sebagai pengapung yang terbuat dari kayu balsa.



Gambar 107.

Sebelah dalam ialah tabung dari kuningan yang berisi batery. Sebuah lampu yang tertutup pelindung gelas dengan gasket karet yang kedap air, yang akan menyala segera setelah lampunya berada disisi atas, yaitu kedudukan pada waktu terapung di atas air. Lampu tersebut akan menyala kira-kira 3 jam. Lampu tersebut harus selalu diperiksa apakah menyala dengan baik, yaitu dengan cara meletakan lampu disisi atas.

Jumlah pelampung penolong yang harus dimiliki oleh kapal ditentukan oleh tabel sebagai berikut :

Panjang kapal		Minimun jumlah life bouys
dalam feet	dalam meter	
dibawah 200	dibawah 61	8
200 - 400	60 - 122	12
400 - 600	122 - 183	18
600 - 800	183 - 244	24
diatas 800	diatas 244	30

Baju penolong (life jacket or life belts).

Gunanya : Sebagai pelindung tambahan (extra bagi para pelayar) pada waktu meninggalkan kapal, agar dapat terapung dalam waktu yang cukup lama dengan bagian kepala tetap berada di atas permukaan air.

Perubahan zat dari wujud padat menjadi wujud cair pada titik leburnya disebut *mencair* atau *melebur*. Pada waktu melebur harus ditambahkan kalor laten lebur, sedangkan suhunya tetap tidak berubah. Suhu itu disebut *titik cair* atau *titik lebur*.

Membeku (Solidification)

Perubahan zat dari wujud cair menjadi wujud padat pada titik bekunya disebut *membeku*. Pada waktu membeku dilepaskan kalor laten beku, sedangkan suhunya tetap tidak berubah. Suhu tersebut dinamakan *titik beku* zat itu.

KALOR JENIS & KALOR BEKU DARI MAKANAN

Nama Makanan	KALOR JENIS		KALOR BEKU		TITIK BEKU	
	Sebelum beku Btu/lb°F	Setelah beku Btu/lb°F	kkal/kg	Btu/lb	°C	°F
Daging sapi	0,75	0,40	54,7	90,0	−0,5	31,3
Daging kambing	0,67	0,30	46,6	83,5	−1,7	29
Daging babi	0,68	0,38	48,3	86,5	−2,2	28
Ham asap	0,60	0,32	48,3	86,5	−0,5	31,3
Ikan segar	0,76	0,41	56,4	101,0	−2,2	28
Ayam	0,79	0,37	59,2	106,0	−2,8	27
Mentega	0,64	0,34	8,4	15,0	−1,1	30
Keju	0,64	0,36	44,1	79,0	−8,3	17
Telur	0,85	0,45	55,8	100,0	−0,5	31,6
Susu	0,90	0,49	69,2	124,0	−0,6	31
Anggur	0,90	0,61	62,5	112,0	−2,2	28
Apel	0,89	0,43	68,1	122,0	−1,7	28,9
Advokat	0,91	0,49	75,9	136,0	−2,8	27,2
Jeruk	0,91	0,44	69,8	125,0	−2,2	28
Nenas	0,90	0,50	71,5	128,0	−1,7	29,2
Tomat	0,92	0,46	73,7	132,0	−0,9	30,6
Jeruk	0,86	0,47	63,1	113,0	−1,7	29
Semangka	0,93	0,48	76,5	137,0	−0,8	30,5
Seledri	0,91	0,46	75,9	136,0	−1,3	29,7
Kubis	0,93	0,47	73,7	132,0	−0,5	31,2
Bunga kool	0,90	0,46	74,3	133,0	−1,1	30,1
Wortel	0,86	0,45	70,4	126,0	−0,6	31
Air	1,00	0,504	80,4	144,0	0,0	32

Luas daun kemudi dapat pula dinyatakan dalam % LT sebagai berikut :

Type Kapal	% LT
1. Kapal barang, single screw dengan kecepatan sedang.	1,5 - 2,5
2. Kapal barang, single screw dengan kecepatan tinggi.	1,6 -2,0
3. Kapal barang kecil, single screw.	2,0 - 2,5
4. Kapal barang, twin screw, single rudder.	1,5 - 2,1
5. Kapal barang, twin screw, twin rudder.	2,1 - 3,0
6. Kapal tangker ukuran sedang.	1,3 - 1,9
7. Super tangker.	1,7 - 2,1
8. Kapal penumpang, kecepatan tinggi (L 60 m).	1,2 - 1,7
9. Kapal penumpang & barang besar kecepatan sedang.	1,6 - 2,0
10. Kapal penumpang ukuran sedang, kecepatan tinggi.	1,7 - 2,0
11. Kapal penumpang ukuran kecil kecepatan lambat.	1,7 - 2,3
12. Kapal pelayaran pantai (*coaster*).	2,0 - 3,3
13. Kapal ikan.	2,5 - 5,5
14. Kapal tunda.	3,0 - 6,0
15. Kapal layar besar.	2,0 - 2,5
16. Kapal layar sedang.	2,0 - 3,0
17. Kapal pandu.	2,3 - 4,0
18. Kapal kecil.	4,0 - 4,5
19. Kapal tak bermotor.	4,0 - 5,0

Bentuk sayap kemudi diperhitungkan menurut bentuk bagian belakang kapal (cruiser stern, biasa dan lain-lain dan ukuran bentuk sepatu linggi).

Umumnya pada teknologi pembuatan kapal dipilih bentuk sayap yang sederhana, empat persegi, tetapi untuk mendapat gaya tekan air yang maximum pada sayap kemudi, kadang-kadang dibagian atas dibuat miring membesar.

Untuk kapal-kapal yang mempunyai satu baling-baling dimana bentuk bagian belakang yang agak runcing, biasanya memakai kemudi yang setengah menggantung dengan bentuk trapesium termasuk rongga porosnya, dengan lebar bagian bawahnya kedil dengan demikian juga tebal profilnya makin ke bawah makin berkurang.

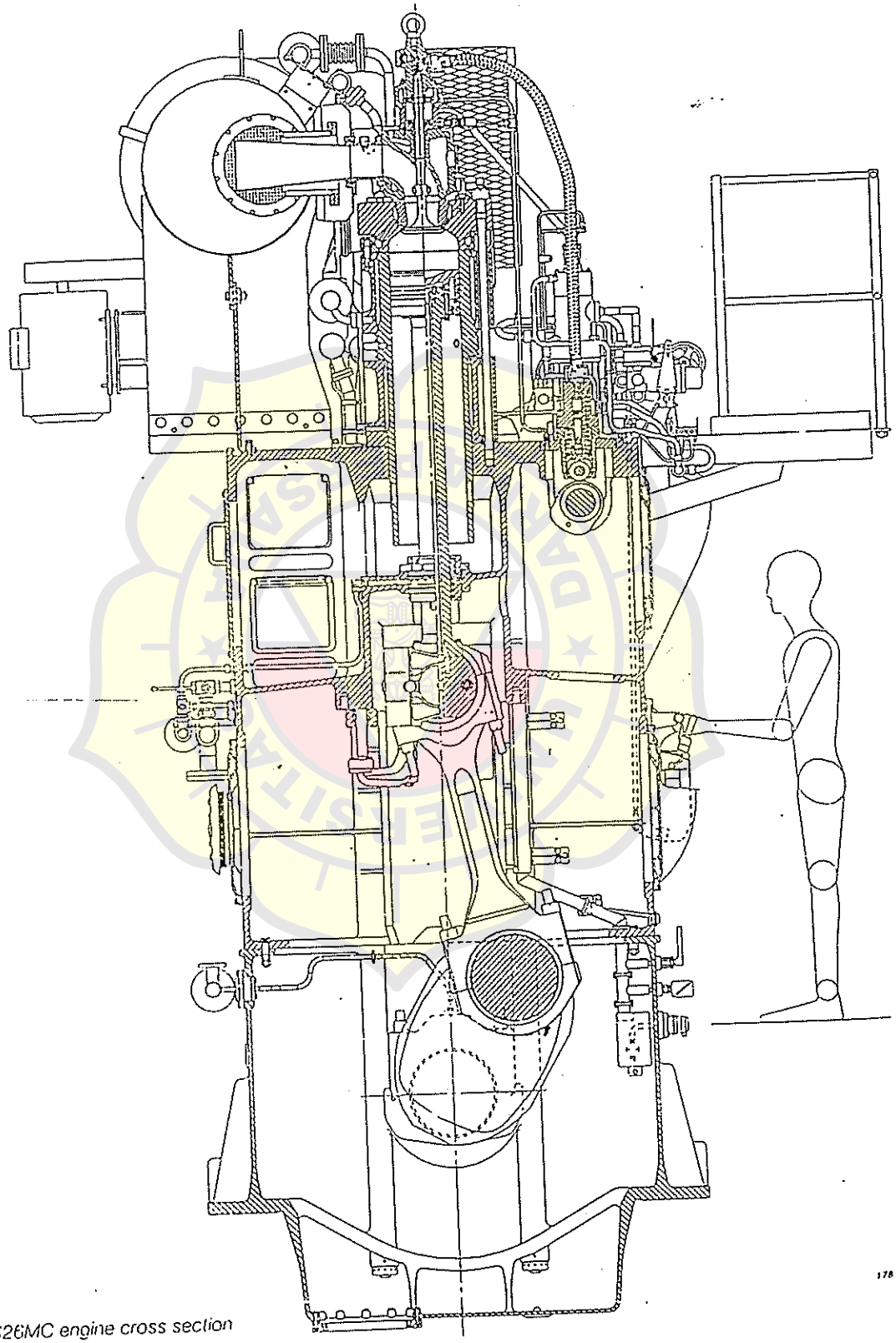


Fig. 1.11: S26MC engine cross section

L 20/27
V 20/27

No. of cyl.	Continuous rating P MCR kW/HP diesel and heavy fuel operation n (1/min) 1000	900	Dimensions mm L1/L2	W	H	Weight** tons
5 L	500 / 680	450 / 610	2700 / 1710	1350	1900	5.0
6 L	600 / 815	540 / 730	3000 / 2000	1350	1900	5.9
7 L	700 / 950	630 / 855	3300 / 2450	1350	1950	6.6
8 L	800 / 1090	720 / 980	3550 / 2730	1350	2150	7.4
9 L	900 / 1225	810 / 1100	3805 / 3010	1350	2150	8.0
12 V	1200 / 1630	1080 / 1470	3600 / 3400	1510	2600	10.6
14 V	1400 / 1900	1260 / 1715	3950 / 3000	1510	2750	11.8
16 V	1600 / 2100	1440 / 1960	4300 / 4150	1510	2750	13.1
18 V	1800 / 2450	1620 / 2200	4650 / 4500	1510	2750	14.4

Bore (mm)	Stroke (mm)		n (1/min)	kW/cyl. (HP/cyl.)	Pe (bar)	cm (m/s)
200	270	MCR	1000	100 (136)	14.15	9.0
			900	90 (122)		8.1

Fuel consumption (to ISO conditions):*

		100% P		85% P	
L 20/27	MCR	200 g/kWh	147 g/HPh	200 g/kWh	147 g/HPh
V 20/27	MCR	199 g/kWh	146 g/HPh	199 g/kWh	146 g/HPh

Lube oil consumption: approx. 1.2 g/kWh 0.9 g/HPh

*/** Definitions see page 4/5

L 32/40
V 32/40

No. of cyl.	Continuous rating P MCR kW/HP diesel and heavy fuel operation n (1/min) 750	720	Dimensions mm L1/L2	W	H	Weight** tons
5 L	2200 / 3000	2200 / 3000	5095 / 3500	2100	3890	33
6 L	2640 / 3600	2640 / 3600	5625 / 4480	2100	3890	38
7 L	3080 / 4200	3080 / 4200	6156 / 5010	2570	4410	42
8 L	3520 / 4800	3520 / 4800	6685 / 5540	2570	4410	47
9 L	3960 / 5400	3960 / 5400	7215 / 6070	2570	4410	52
12 V	5280 / 7200	5280 / 7200	6760 / 5100	3100	3900	61
14 V	6160 / 8400	6160 / 8400	7100 / 5750	3100	4200	70
16 V	7040 / 9600	7040 / 9600	7750 / 6400	3100	4200	78
18 V	7920 / 10800	7920 / 10800	8400 / 7000	3100	4200	86

Bore (mm)	Stroke (mm)		n (1/min)	kW/cyl. (HP/cyl.)	Pe (bar)	cm (m/s)
320	400	MCR	750	440 (600)	21.9	10.0
			720	440 (600)	22.8	9.6

Fuel consumption (to ISO conditions):*

		100% P		85% P	
L 32/40	MCR	182 g/kWh	134 g/HPh	179 g/kWh	132 g/HPh
V 32/40	MCR	181 g/kWh	133 g/HPh	178 g/kWh	131 g/HPh

Lube oil consumption: approx. 1.0 g/kWh 0.7 g/HPh

*/** Definitions see page 4/5

LAAL

Engine output
243–669 kW (330–910 PS)

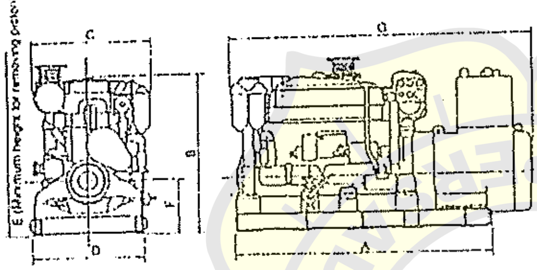
Specifications

Engine model		6LAAL-DTN	6LAAL-UTN			12LAAL-DTN		12LAAL-UTN	
No. of cylinders		6				V12			
Cylinder bore × stroke	mm	148×165				148×165			
Continuous rated output	kW (PS)	243 (330)	265 (360)	309 (420)	353 (480)	530 (720)	618 (840)	574 (780)	669 (910)
Engine speed	rpm	1200	1200	1500	1800	1500	1800	1500	1800
Generator capacity	kW	220	240	280	320	480	560	520	600
Starting system		Electric starting (Air-motor starting is available.)				Electric starting (Air-motor starting is available.)			
Dry weight	kg	1990	2050			3660		3680	

The engine dry weight may differ depending upon the specifications and attached accessories.

Dimensions (Units: mm)

Depending on the specifications or options that have been chosen, your model may differ slightly from the one in the photograph.



Engine model	6LAAL-DTN	6LAAL-UTN		12LAAL-DTN	12LAAL-UTN
Engine speed (rpm)	1200	1200	1500 1800	1500 1800	1500 1800
A	2340	2530	2340	2900	2900
B	1469	1469		1610	1610
C	1061	1061		1452	1452
D	1000	1000		1060	1030
E	1414	1414		1315	1315
F	489	489		640	640
G	2725	2765	2825	3544	3544
Dry weight of generating equipment (kg)	3363	3710	3620	6400	6470

Please confirm all specifications, etc. on the separate delivery specifications sheet.

4HAL2/6HAL2

Engine output
72~305 kW (98~414 PS)

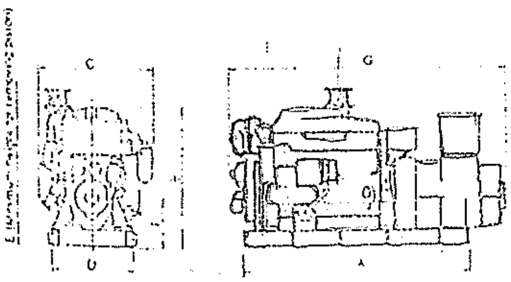
Specifications

Engine model		4HAL2-TN1			4HAL2-TN			6HAL2-N			6HAL2-TN			6HAL2-HTN			6HAL2-DTN		
No. of cylinders		4						6											
Cylinder bore × stroke	mm	130×165						130×165											
Continuous rated output	kW (PS)	72 (98)	89 (121)	116 (157)	90 (122)	115 (156)	135 (183)	90 (122)	115 (156)	135 (183)	120 (163)	150 (204)	180 (244)	160 (217)	220 (299)	265 (360)	200 (271)	255 (346)	305 (41
Engine speed	rpm	1200	1500	1800	1200	1500	1800	1200	1500	1800	1200	1500	1800	1200	1500	1800	1200	1500	180
Generator capacity	kW	64	80	104	80	100	120	80	100	120	104	136	160	144	200	240	180	232	25
Starting system		Electric starting (Air-motor starting is available.)																	
Dry weight	kg	1030			1030			1380			1395			1410			1420		

The engine dry weight may differ depending upon the specifications and attached accessories.

Dimensions (Units: mm)

Depending on the specifications or options that have been chosen, your model may differ slightly from the one in the photograph.



Engine model	4HAL2-TN1		4HAL2-TN		6HAL2-N		6HAL2-TN		6HAL2-HTN		6HAL2-DTN	
Engine speed (rpm)	1200	1500 1800	1200	1500 1800	1200	1500 1800	1200	1500 1800	1200	1500 1800	1200	1500 1800
A	1800		1800		1976		1970	2050	2150		2180	
B	1206		1206		1285		1351		1351		1351	
C	1013		1013		1115		1115		1115		1115	
D	800		800		800		800		800		800	
E	1233		1233		1268		1268		1268		1268	
F	450		450		485		485		485		485	
G	2071	2047	[illegible]	2047	2133	2115	2481	2524	2625	2513	[illegible]	2642
Dry weight of generating equipment (kg)	1750	1820	1810	1820	2180	2190	2290	2340	2600	2680	2750	2790

Please confirm all specifications, etc. on the separate delivery specifications sheet.

CENTRIFUGAL PUMPS

HORIZONTAL

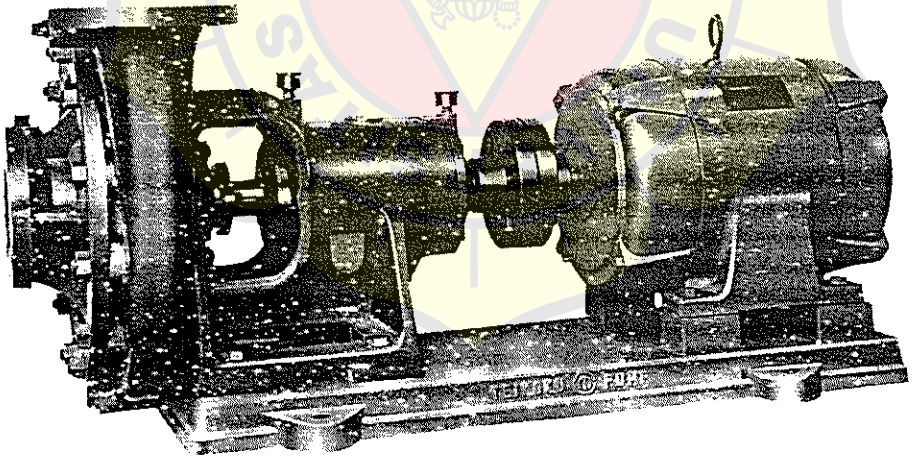
SINGLE STAGE

SINGLE SUCTION

TYPE MS

APPLICATION

- FUEL VALVE COOLING
- FRESH WATER
- POTABLE WATER
- SANITARY
- HOT WATER CIRCULATING & ETC.



TEIKOKU MACHINERY WORKS, LTD.

OSAKA, JAPAN

GENERAL CONSTRUCTION

MS Pump is of single-stage single-suction horizontal type.

CASING of the volute type is vertically split. The suction nozzle is on the end, directing the liquid straight into the impeller eye.

IMPELLER of balanced type are applied to the type 65 MS-G, 100 MS-B, 100 MS-D, 125 MS-A and 125 MS-B and impellers of unbalanced type to all type of pump excepting those above mentioned. Impellers are sealed by renewable stationary wearing rings. The impellers are completely turned and ground.

RIGID SHAFT is extra heavy. The shaft sleeve and impeller are keyed to the shaft and held in place by a nut on the end of the shaft. "O" ring under the shaft sleeve prevents leakage under the sleeve.

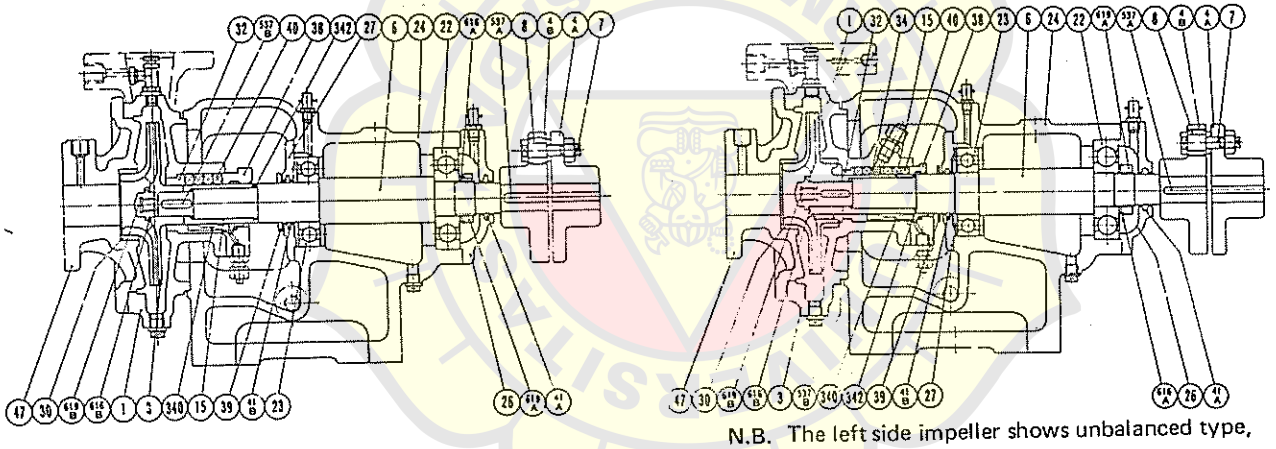
STUFFING BOX accommodates 4 rings of conventional soft packing on standard pumps, but mechanical shaft seals can be fitted if necessary. The stuffing box gland is of two-piece split type which can be entirely removed from the shaft.

BALL BEARINGS are of single-row deep-groove type, and grease-lubricated, the one which is placed at the coupling side takes the axial thrust load.

BEARING HOUSING is of extra heavy barrel type construction. This design gives rigid support to the pump casing and shaft. Perfect alignment of all parts is assured by this design, which permits machining of all bearings and rabbet fits at one setting. Supporting head has large stuffing box opening on each side. The side-opening permits maximum stuffing box accessibility and provides more usable space for packing adjustment.

BEDPLATE The pump and motor are mounted on a common sturdy bedplate of box construction. The bottom of the bedplate is planed.

SECTIONAL ARRANGEMENT

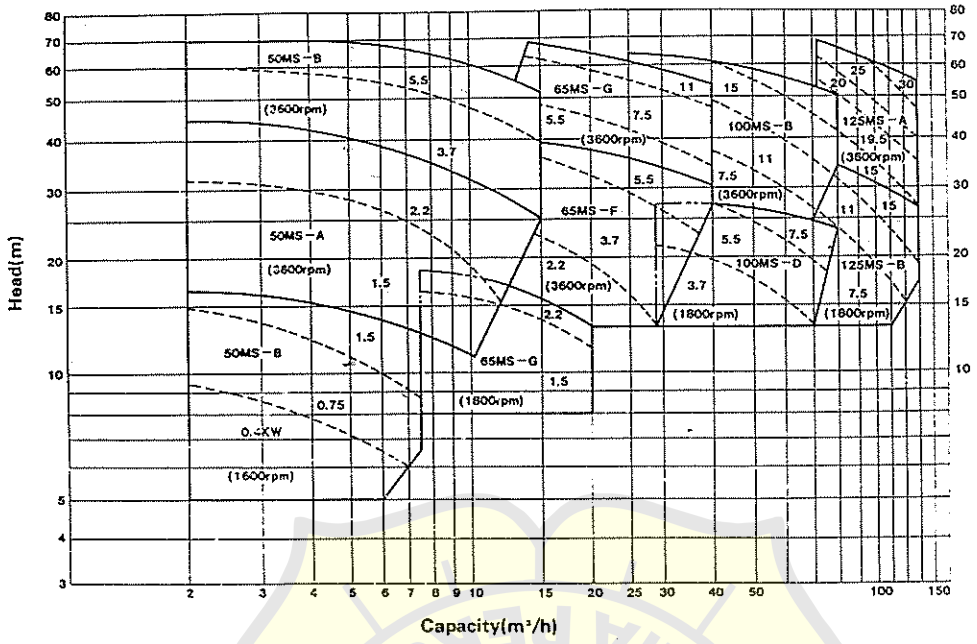


N.B. The left side impeller shows unbalanced type, while the right side one balanced type.

STANDARD MATERIAL

PART NO.	NAME OF PART	QUANTITY PER 1 PUMP	FOR FRESH WATER		FOR SEA WATER	
			NAME OF MATERIAL	JIS	NAME OF MATERIAL	JIS
1	CASING	1	CAST IRON	FC20	BRONZE	BC3
3	IMPELLER	1	PHOSPHOR BRONZE	PBC2A	PHOSPHOR BRONZE	PBC2A
4A	COUPLING	1	CAST IRON	FC20	CAST IRON	FC20
4B	"	1	"	"	"	"
6	SHAFT	1	STAINLESS STEEL	SUS50B	STAINLESS STEEL	SUS27B
7	COUPLING BOLT & NUT	1 SET	ROLLED STEEL	SS41	ROLLED STEEL	SS41
8	COUPLING RING	1 SET	RUBBER		RUBBER	
15	SLEEVE	1	STAINLESS STEEL	SUS50B	STAINLESS STEEL	SUS32B
22	BALL BEARING	1	SPECIAL STEEL		SPECIAL STEEL	
23	"	1	"		"	
24	BEARING CASE	1	CAST IRON	FC20	CAST IRON	FC20
26	BEARING COVER	1	"	"	"	"
27	"	1	"	"	"	"
30	CASING RING	1 or 2	LEAD BRONZE	LBC4	LEAD BRONZE	LBC4
32	NECK BUSH	1	"	"	"	"

PART NO	NAME OF PART	QUANTITY PER 1 PUMP	FOR FRESH WATER		FOR SEA WATER	
			NAME OF MATERIAL	JIS	NAME OF MATERIAL	JIS
38	GLAND	1	BRONZE	BC3	BRONZE	BC3
39	FLINGER	1	BRASS	BBF2	BRASS	BsBF2
40	GLAND PACKING	1 SET	SEMI-METALLIC		SEMI-METALLIC	
41A	FELT PACKING	1	FELT		FELT	
41B	"	1	"		"	
47	SUCTION COVER	1	CAST IRON	FC20	BRONZE	BC3
342	"O" RING	1	RUBBER		RUBBER	
537A	COUPLING KEY	1	FORGED STEEL	SF60	FORGED STEEL	SF60
537B	IMPELLER KEY	1	STAINLESS STEEL	SUS50B	STAINLESS STEEL	SUS27B
616A	LOCK WASHER FOR B.N.	1	ROLLED STEEL	SS41P	ROLLED STEEL	SS41P
616B	LOCK WASHER FOR I.N.	1	COPPER PLATE	CUP	COPPER PLATE	CUP
619A	BEARING NUT	1	ROLLED STEEL	SS41	ROLLED STEEL	SS41
619B	IMPELLER NUT	1	NAVAL BRASS	NBsB2	NAVAL BRASS	NBsB2
340	MECHANICAL SEAL	1SET	STAINLESS STEEL		STAINLESS STEEL	



EXPLANATION ON PERFORMANCE CHART

In selecting the size of a pump pattern, if the required specified point of Q-H falls just on the boundary line in the performance chart, please select the small size of nominal bore of the pattern from the adjoining ones.

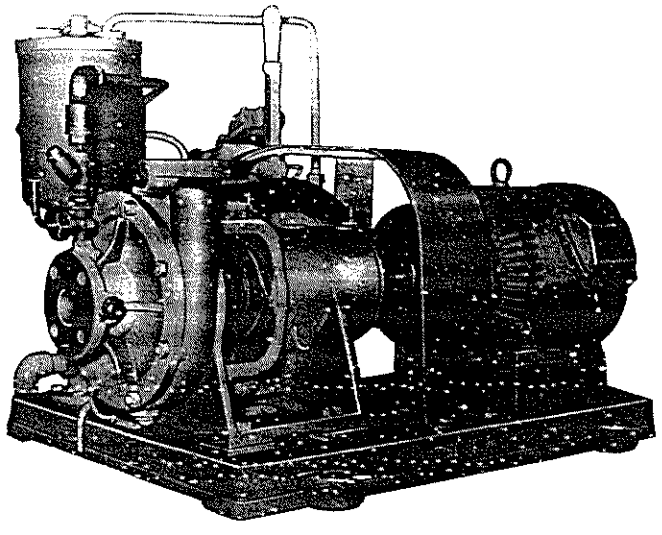
The numerals entered between diagonal dotted lines in the performance chart show the required capacity of the driver in KW. The driver with this capacity will never be overloaded at any point on the Q-H curve developed by the pump at the rated speed.

Ex. In case, the specified capacity, total head and speed are 30 m³/h, 15 m and 3,450 rpm, respecitivery,
Select 50 MS-5 from between the adjoining patterns of 50 MS-B and 65MS-F. capacity of driver, 3.7 KW.

The pump can be supplied, if required, with automatic priming equipment including its necessary accessories such as sealing water tank, non-return valve, float valve and piping.

The feature of this automatic priming system is as follws:-

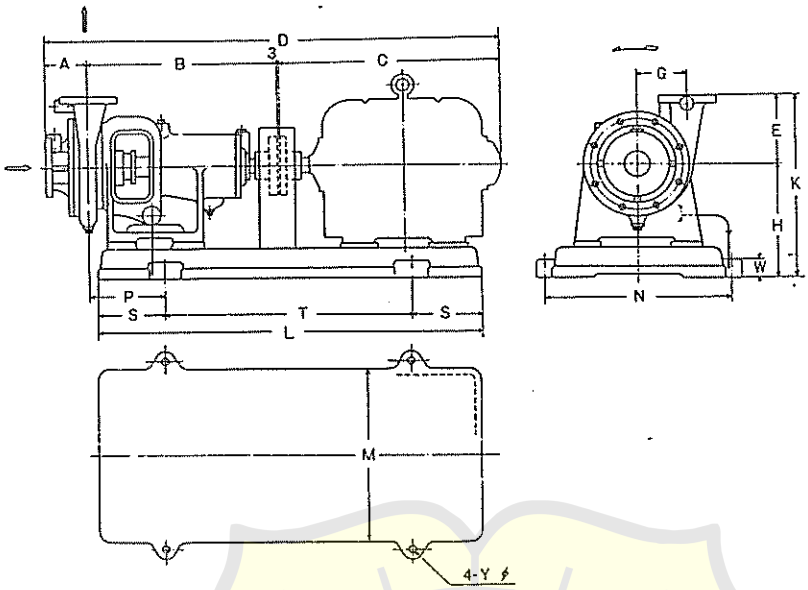
The primer is driven from the main pump shaft through combination coupling and friction pulley. The engagement and disengagement of the pulley are controlled automatically by means of a mechanism which is subjected to the discharge pressure developed by the main pump.



The primer ceases operation automatically on the accomplishment of the priming of the main pump and remains idle during the main pump is in service.

If the air breaks into the main pump for some reason, resulting in going down of the discharge pressure developed by the main pump, the primer begins to work automatically and the cycle recommences.

DIMENSIONS



TYPE	MOTOR		NOMINAL BORE		DIMENSIONS (mm)																WEIGHT (kg) PUMP WITH BED	
	KW	rpm	SUC.	DEL.	A	B	C*	D*	E	G	H	K	L	M	N	P	S	T	W	Y	FC CASING	BC CASING
50MS-A	1.5	3600	50	50	95	400	297	795	150	105	230	380	760	290	320	150	125	510	25	15	102	105
	2.2	"	"	"	"	"	325	823	"	"	"	"	"		"	"	"	"	"	"	"	"
50MS-B	0.4	1800	"	"	"	"	207	705	160	120	230	390	760	290	320	150	125	510	25	15	107	110
	0.75	"	"	"	"	"	248	746	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	1.5	"	"	"	"	"	297	795	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	3.7	3600	"	"	"	"	355	853	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	5.5	"	"	"	"	"	414	912	"	"	"	"	"	"	"	"	"	"	"	"	"	"
65MS-F	2.2	3600	65	65	105	400	325	833	160	105	230	390	760	290	320	150	125	510	25	15	132	136
	3.7	"	"	"	"	"	355	863	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	5.5	"	"	"	"	"	414	922	"	"	"	"	"	"	"	"	"	"	"	"	"	"
65MS-G	1.5	1800	65	65	105	490	297	895	170	120	310	480	930	360	390	182	140	650	40	15	174	180
	2.2	"	"	"	"	"	325	923	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	5.5	3600	"	"	"	"	414	1012	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	7.5	"	"	"	"	"	452	1050	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	11	"	"	"	"	"	556	1154	"	"	"	"	"	"	"	"	"	"	"	"	"	"
100MS-B	7.5	3600	100	100	136	490	452	1081	180	125	320	500	1060	360	390	167	160	740	40	19	210	216
	11	"	"	"	"	"	556	1185	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	15–18.5	"	"	"	"	"	600	1229	"	"	"	"	"	"	"	"	"	"	"	"	"	"
100MS-D	3.7	1800	100	100	130	488	355	976	220	160	310	530	850	330	360	175	140	570	40	15	199	205
	5.5	"	"	"	"	"	414	1035	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	7.5	"	"	"	"	"	452	1073	"	"	"	"	"	"	"	"	"	"	"	"	"	"
125MS-A	15–18.5	3600	125	125	150	493	600	1246	220	150	320	540	1080	400	430	170	160	760	40	19	240	247
	22	"	"	"	"	"	625	1271	"	"	"	"	"	"	"	"	"	"	"	"		"	"
	25–30	"	"	"	"	"	663	1309	"	"	"	"	"	"	"	"	"	"	"	"		"	"
125MS-B	7.5	1800	125	125	150	493	452	1098	250	195	320	570	1060	360	390	170	160	740	40	19	245	246
	11	"	"	"	"	"	556	1202	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	15	"	"	"	"	"	600	1246	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

Note: Asterisked dimensions vary somewhat with driver.

TEIKOKU MACHINERY WORKS, LTD.

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CABLE: TEIKOKUPUMP OSAKA TELEX: 524-5432 TKPUMP J

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NAGASAKI OFFICE
1-15, FUJIMI-CHO, NAGASAKI 852, JAPAN
PHONE: 0958-61-8080

CENTRIFUGAL PUMPS

VERTICAL

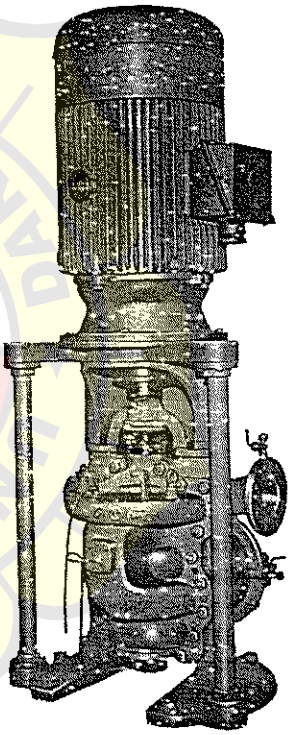
- SINGLE / TWO STAGE
- SINGLE / DOUBLE SUCTION
- VERTICALLY SPLIT

TYPE

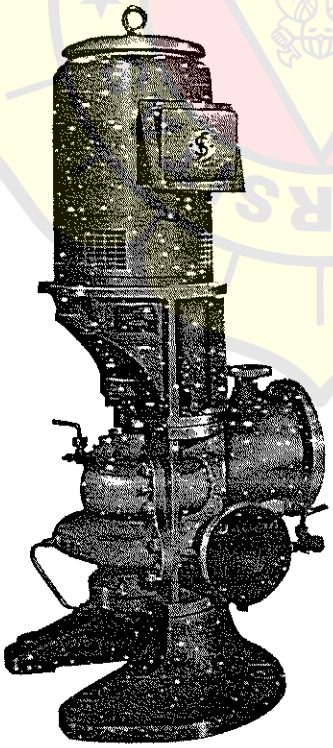
VCSE
2VCSE
2VCDS

APPLICATION

- MAIN CONDENSATE
- AUXILIARY CONDENSATE
- DRAIN TRANSFER



TYPE 2VCDS



TYPE VCSE

TEIKOKU MACHINERY WORKS, LTD.

OSAKA, JAPAN

GENERAL CONSTRUCTION

CASING of each pump is split on the vertical center line, permitting access into the interior of the pump for inspection or dismantle of motor without disturbing pipe connection or alignment with the driver. The stationary rear half of casing has the suction and discharge connections located 90° apart.

A liberal vent which permits escape of entrained vapor is provided on the suction nozzle.

BALL BEARING of grease lubricated double-row angular-contact type is fitted to the pump of each type. This ball bearing carries the weight of the hydraulically balanced rotor and residuary axial thrust load, permitting the use of a flexible coupling.

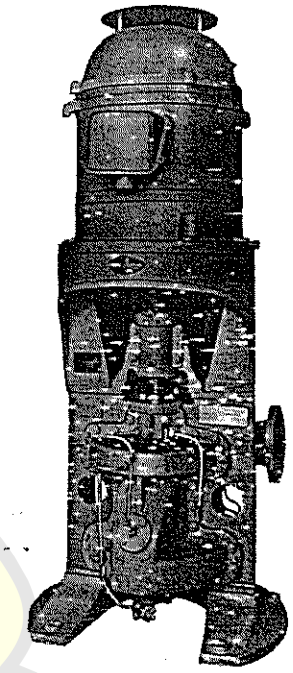
At the bottom of the casing is equipped with internal water-lubricated plane bearing.

IMPELLERS are completely turned and ground. The statical balancing test of the impellers is fully carried out. Impellers are sealed by renewable wearing rings.

RIGID SHAFT is extra heavy. The sleeves and impellers are keyed to the shaft and held in place by an impeller nut (VCSE) or impeller nut and sleeve nut (2VCSE and 2VCDS). "O" ring under the sleeve prevents leakage under the sleeve.

STUFFING BOX accommodates five or more rings of conventional soft packing, which is a standard fitting, but mechanical shaft seal can be fitted if necessary. It is advisable that when the unit is used as the condensate pump, the stuffing box shall be water-sealed by introducing sealing-water from an external source even while the pump remains idle, lest the air should break into the condenser passing through the passage within the pump.

The stuffing box gland is of two-piece split type which can be entirely removed from the shaft.



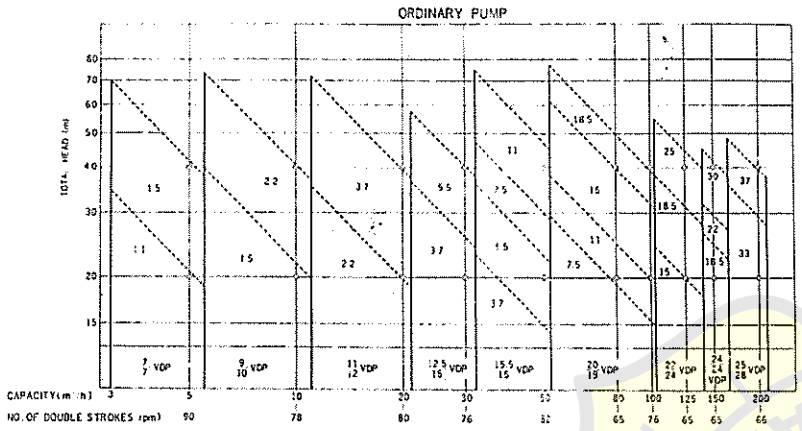
TYPE 2VCSE

STANDARD MATERIALS

PART No.	NAME OF PART	QUANTITY PER 1 PUMP	NAME OF MATERIAL	JIS	PART No.	NAME OF PART	QUANTITY PER 1 PUMP	NAME OF MATERIAL	JIS
1	CASING	1	CAST IRON	FC20	30B	CASING RING	1	LEAD BRONZE	LBC4
2	CASING COVER	1	"	"	32	NECK BUSH	1	"	"
3	IMPELLER	1	PHOSPHOR BRONZE	PBC2A	33	STAGE BUSH	1	"	"
3A	"	1	"	"	34	SEAL RING	1	BRONZE	BC3
3B	"	1	"	"	36	BOTTOM COVER	1	CAST IRON	FC20
4A	COUPLING	1	CAST IRON	FC20	38	GLAND	1	BRONZE	BC3
4B	"	1	"	"	40	GLAND PACKING	1 SET	SEMI-METALLIC	
6	SHAFT	1	STAINLESS STEEL	SUS50B	43	BEARING METAL	1	HIGH LEAD BRONZE	HLBC
7	COUPLING BOLT & NUT	1 SET	ROLLED STEEL	SS41B	44	BLIND COVER	1	CAST IRON	FC20
8	COUPLING RING	1 "	RUBBER		45	FRONT STAY	2	STEEL PIPE	SGP
14	COLLAR	1	ROLLED STEEL	SS41B	84	STAGE RING	1	CAST IRON	FC20
15	SLEEVE	1	STAINLESS STEEL	SUS50B	342	"O" RING	1	RUBBER	
16	SLEEVE NUT	1	NAVAL BRASS	NBsB2	537A	COUPLING KEY	1	FORGED STEEL	SF60
17	STAGE SLEEVE	1	STAINLESS STEEL	SUS50B	537B	IMPELLER KEY	1	STAINLESS STEEL	SUS50B
20	PUMP BED	1	CAST IRON	FC20	537C	"	1	"	"
21	MOTOR STAND	1	"	"	616A	LOCK WASHER FOR P.N	1	ROLLED STEEL	SS41P
22	BALL BEARING	1	SPECIAL STEEL		616B	LOCK WASHER FOR I.N	1	COPPER PLATE	CUP
24	BEARING CASE	1	CAST IRON	FC20	619A	BEARING NUT	1	ROLLED STEEL	SS41B
26	BEARING COVER	1	"	"	619B	IMPELLER NUT	1	NAVAL BRASS	NBsB2
30	CASING RING	1	LEAD BRONZE	LBC4	340	MECHANICAL SEAL	1 SET	STAINLESS STEEL	
30A	"	1	"	"					

PERFORMANCE CHART

ORDINARY PUMP



EXPLANATION ON PERFORMANCE CHART

Mark "○" shows the standard specified point of head against capacity.

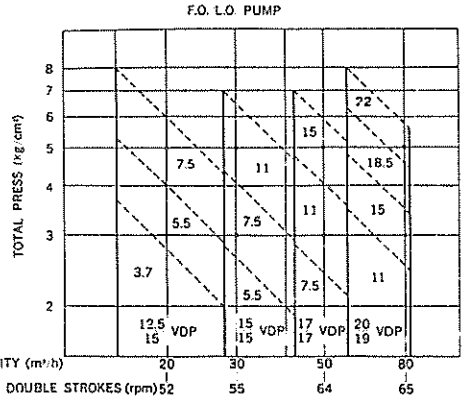
The capacity range delivered by an identical type is divided by bold lines.

In case the service specific point will come on the dividing range chart line, it is recommendable in principle to select the smaller type from adjoining ones in the performance chart.

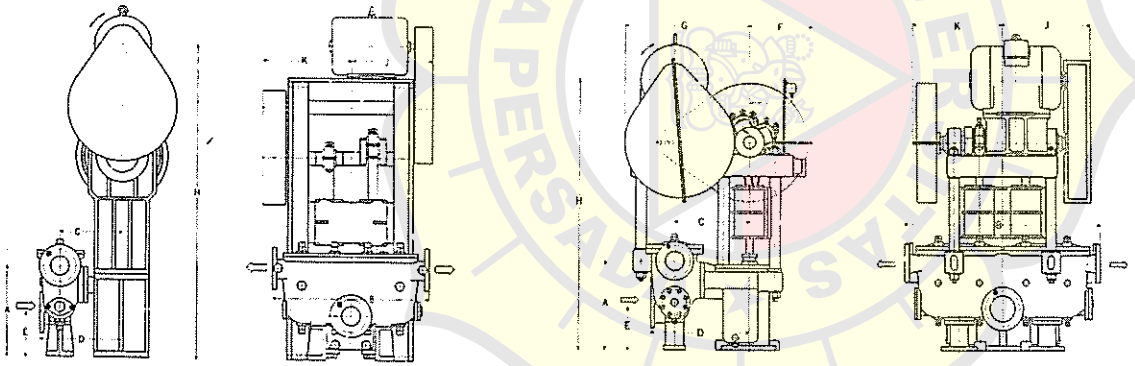
Numbers of double strokes corresponding to any other capacity than the standard can be obtained by calculation proportioning to the number of double strokes corresponding to the standard capacity.

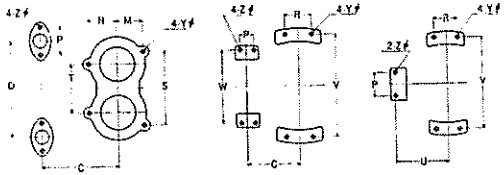
In the case of F.O. or L.O. pump, capacity, total pressure and motor output are based on the oil whose viscocity is 260 cst (1000 sec. by Redwood NO. 1).

F.O. L.O. PUMP



DIMENSIONS

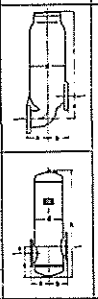




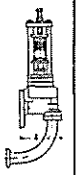
UNIT; mm

TYPE	PUMP CYL. DIA	LENGTH OF STROKE	BORE SUCTION	BORE DELIVERY	A	B	C	D	E	F	G	H	J	K	M	N	O	P	R	S	T	U	V	W	Y	Z	WEIGHT(kg) PUMP (CAST IRON LIQUID END)	AIR CHAMBER c	l	a	b	e	f	ESCAPE VALVE g
7/7 VDP	70	70	50	40	257	510	205	275	122	—	—	928	265	285	—	—	—	100	110	—	—	265	345	—	19	15	350	106	—	80	70	90	344	138
9/10 "	90	100	65	50	330	570	225	300	160	—	—	1148	305	325	—	—	—	60	130	—	—	—	400	260	"	19	370	128	—	90	90	120	410	145
11/12 "	110	120	80	60	350	"	250	330	175	—	—	1292	340	365	—	—	—	"	160	—	—	—	450	"	23	"	445	160	—	150	110	"	457	180
12.5/15 "	125	150	100	80	415	670	290	385	210	—	—	1525	360	390	—	—	—	55	180	—	—	—	490	330	"	"	700	194	—	140	105	160	510	285
15.5/15 "	155	150	125	100	455	810	330	440	212	—	—	1612	405	445	—	—	—	70	190	—	—	—	550	400	"	"	"	272	—	160	155	180	675	360
17/17 "	170	170	150	125	520	1100	380	520	245	355	695	1650	455	490	140	145	480	135	-	380	280	—	—	—	27	23	1510	356	1500	240	240	50	270	"
20/19 "	200	190	150	125	555	1280	480	630	265	400	800	1757	600	600	160	180	570	180	—	460	300	—	—	—	"	27	2200	"	"	"	"	"	"	395
22/24 "	220	240	200	150	620	1540	490	565	300	475	990	2105	635	660	175	205	670	"	-	580	400	—	—	—	33	"	2983	"	1650	230	230	100	300	462.5
24/24 "	240	240	200	150	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	—	"	"	—	—	—	"	"	"	"	"	"	"	"
25/28 "	250	280	200	200	690	1630	525	720	350	"	965	2101	700	715	"	210	730	220	—	560	480	—	—	—	"	"	3540	378	1850	270	270	"	325	505

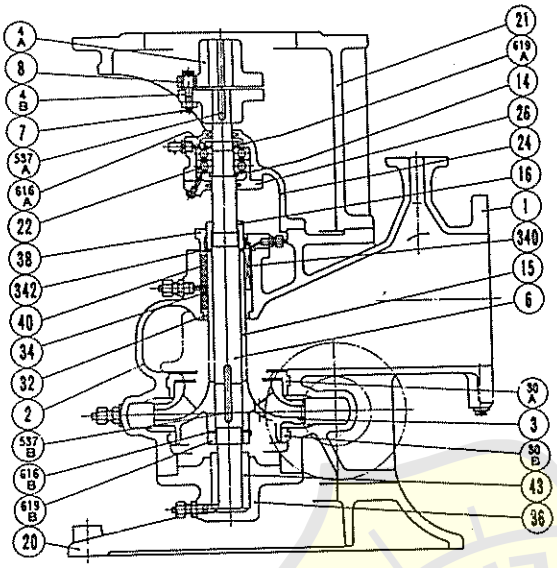
AIR CHAMBER



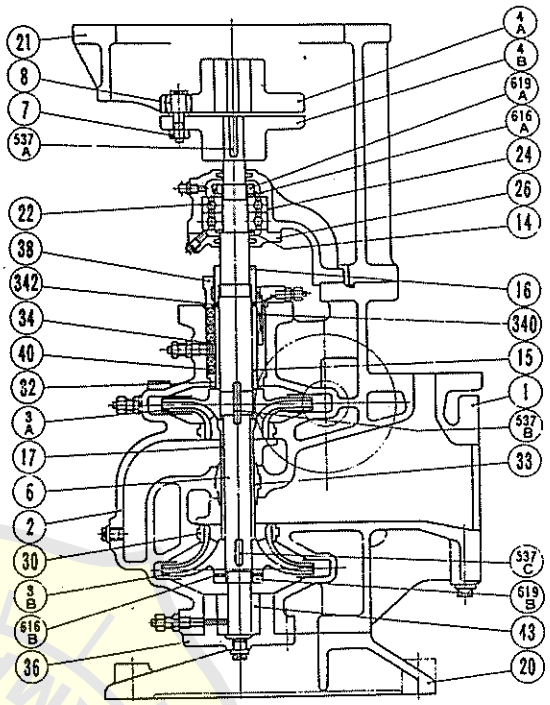
ESCAPE VALVE



SECTIONAL ARRANGEMENT

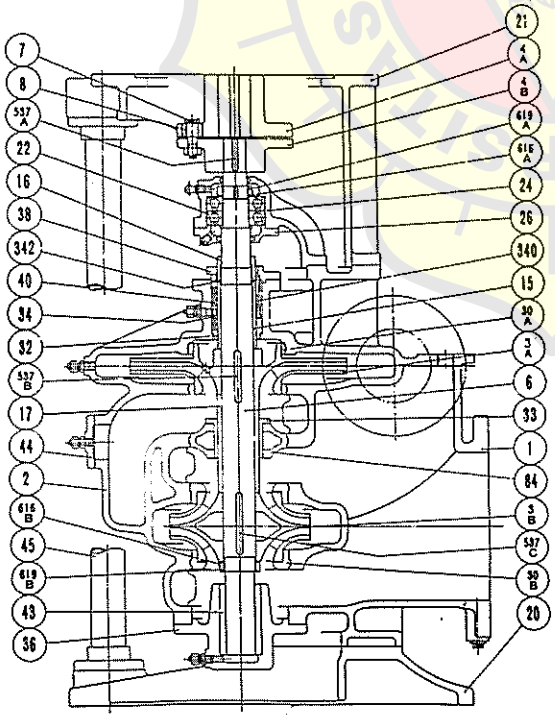


VCSE pump is of single-stage vertical type having a single-suction impeller of balanced type. The impeller eye faces upward.

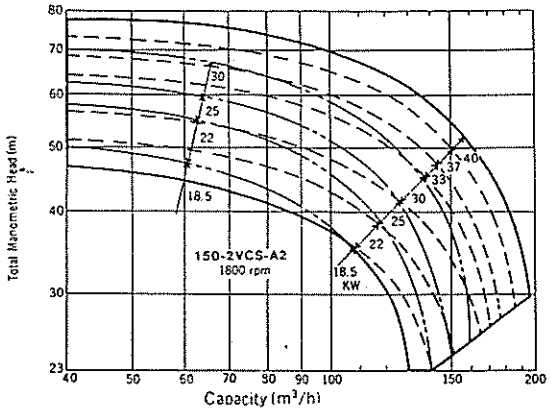


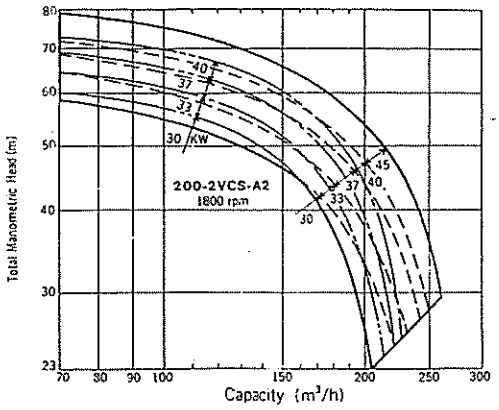
2VCSE pump is of two-stage vertical type having two single-suction impellers of balanced type placed face to face to hold the pump in axial hydraulic balance.

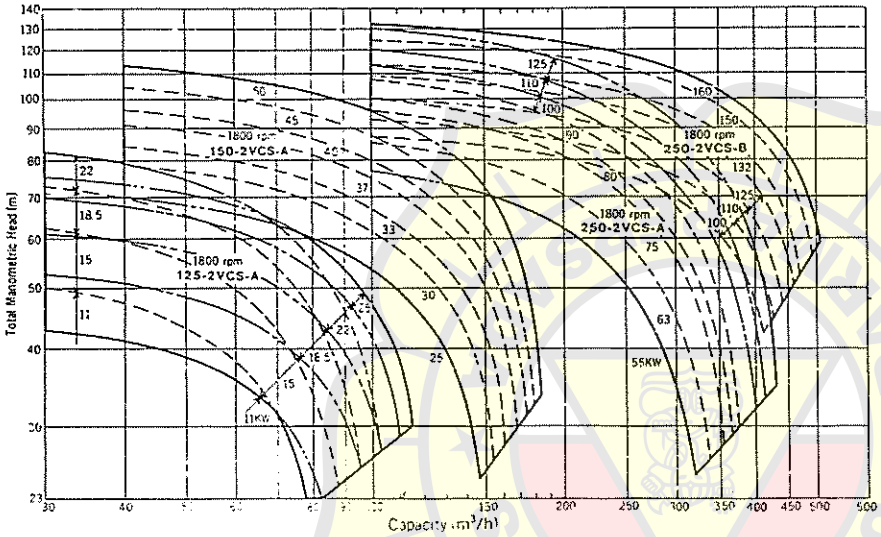
The first-stage impeller of each pump is placed at the lowest possible level, thereby permitting the condenser or suction tank to be located low in the ship and still to provide sufficient submergence for successful performance of the pump.

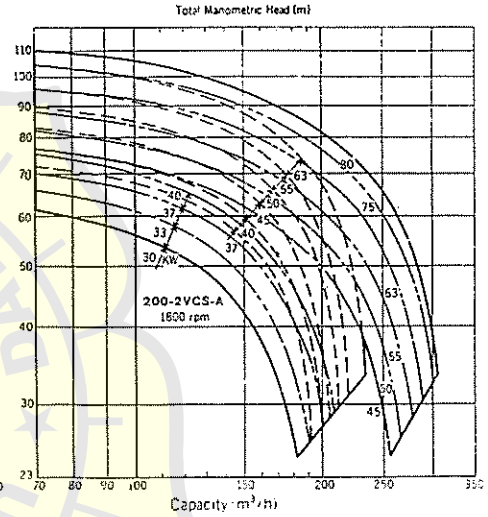


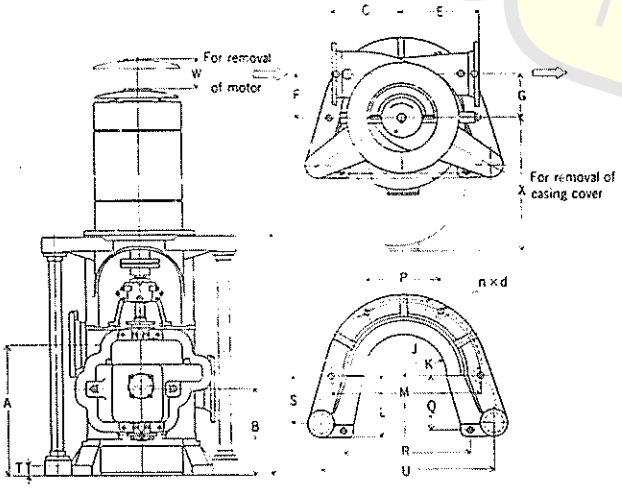
2VCDS pump is of two-stage vertical type having the 1st. stage impeller of double-suction type and the 2nd. stage impeller of single-suction balanced type.











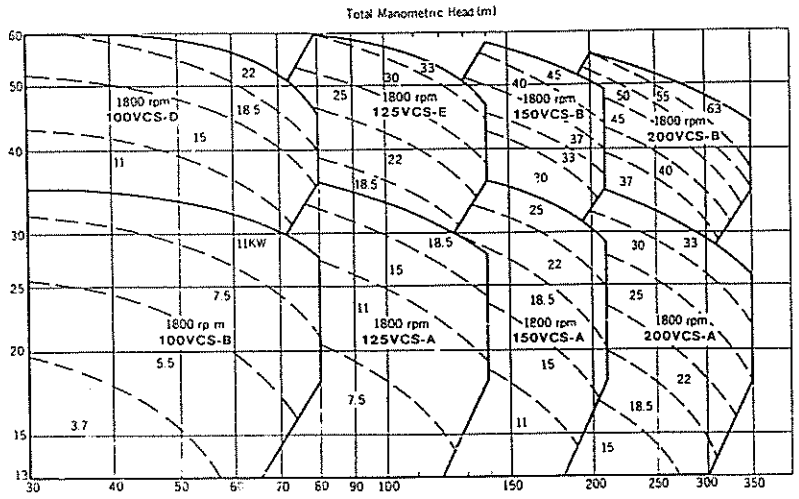
In selecting the size of pump pattern, if the required specified point of Q-H falls just on the boundary lines in the performance chart, please select the smaller size of the nominal bore of the pattern from the adjoining ones.

Dotted and chain lines show the limit of the required motor output, and additionally the tendency of the characteristic Q-H curves of the pump. If the specified point of Q-H falls on one of these lines, the numeral entered (in kw) just below that line shall be taken as the rated motor output.

Further, the applicable impellers will be different depending upon the variation in combination of required Q and H, such as 2 or 3 points are specified for instance. Accordingly, the characteristic curves will become different as shown in dotted or chain lines in the figures.

TYPE	MOTOR		NOMINAL BORE		DIMENSIONS (mm)																			WEIGHT (kg) PUMP	
	KW	rpm	SUC.	DEL.	A	B	C	E	F	G	H	J	K	L	M	P	Q	R	S	T	U	n×d	W	X	FC CASING	BC CASING
125-2VCS-A	11 ~ 25	1800	125	125	538	370	320	320	180	180	1117	340	190	280	630	315	255	470	220	30	650	6×23	140	570	602	612
150-2VCS-A	18.5~50		150	150	556	366	350	300	220	230	1109	"	"	"	"	"	"	"	"	"	"	"	"	"	705	720
200-2VCS-A	30 ~ 30		200	200	638	417	"	370	"	220	1191	400	205	340	740	370	310	560	270	34	780	6×27	"	620	762	772
250-2VCS-A	55~125		250	250	730	465	400	430	245	245	1298	"	"	"	"	"	"	"	"	"	"	"	"	720	902	907
250-2VCS-B	90~160				750	485	"	"	"	"	1354	450	250	440	840	420	410	630	355	"	930	8×27	176	850	965	975

PERFORMANCE CHART



EXPLANATION ON PERFORMANCE CHART

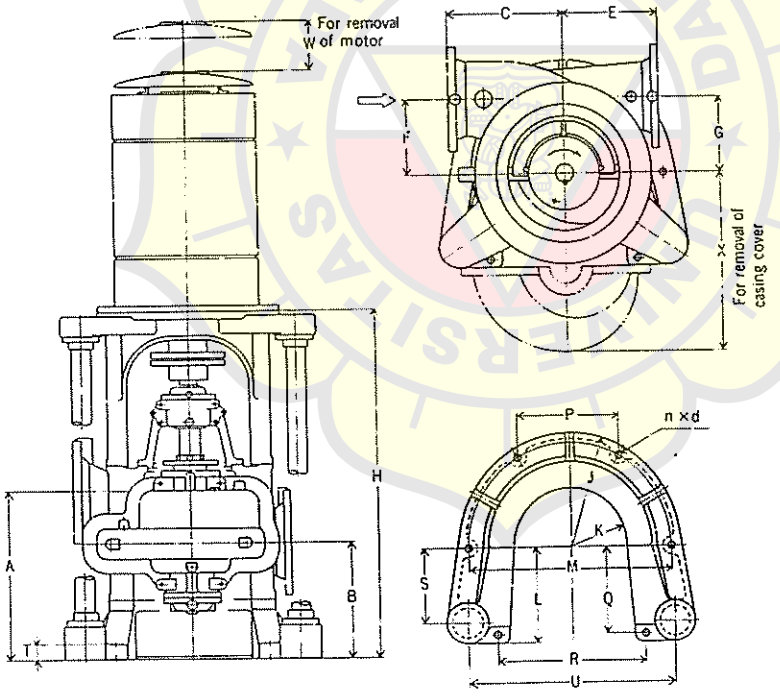
In selecting the size of a pump pattern, if the required specified point of Q-H falls just on the boundary line in the performance chart, please select the smaller size of the nominal bore of the pattern from the adjoining ones.

The numerals entered between diagonal dotted lines, show the required capacity of the driver in Kw.

The driver with this capacity will never be overloaded at any point on the Q-H curve developed by the pump at the rated speed.

Ex. In case, the specified capacity, total head and speed are 125m³/h, 30m and 1,750 rpm respectively,
Select 125 VCS-A from the adjoining patterns of 125 VCS-A, 125 VCS-E and 150 VCS-A.
Capacity of the driver, 18.5 KW.

DIMENSIONS



TYPE	MOTOR		NOMINAL BORE		DIMENSIONS (mm)																			WEIGHT (kg) PUMP	
	KW	rpm	SUC	DEL	A	B	C	E	F	G	H	J	K	L	M	P	Q	R	S	T	U	nxd	W	X	FC CASING	BC CASING
100 VCS-B	3.7~11	1800	100	100	357	270	250	220	180	180	790	280	150	260	510	255	235	420	-	30	-	6×23	110	330	218	218
100 VCS-D	11~22				377	290	280	250	210	210	850	"	"	"	"	"	"	"	"	"	"	"	"	400	228	248
125 VCS-A	7.5~18.5		125	125	374	270	250	220	200	200	797	"	"	"	"	"	"	"	"	"	"	"	"	340	248	251
125 VCS-E	18.5~33				394	290	290	260	230	230	880	"	"	"	"	"	"	"	"	"	"	"	"	420	268	275
150 VCS-A	11~25		150	150	456	326	310	270	210	210	901	340	190	280	630	315	255	470	-	"	-	"	360		361	371
150 VCS-B	30~45				493	373	340	300	220	220	1061	"	"	"	"	"	"	"	"	"	"	"	500		417	427
200 VCS-A	15~33		200	200	486	326	320	280	230	230	953	"	"	"	"	"	"	"	220	"	650	"	"	490	422	427
200 VCS-B	37~63				485	325	350	300	"	"	1022	"	"	"	"	"	"	"	"	"	"	"	"	520	462	472

RECIPROCATING PUMPS

VERTICAL

MOTOR DRIVEN

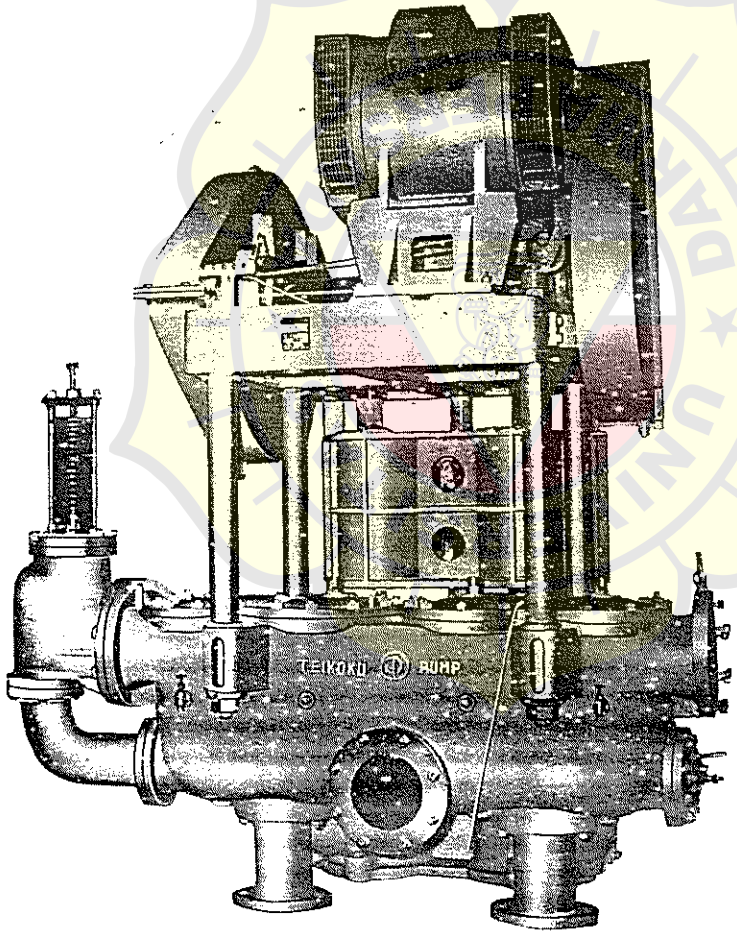
DUPLEX · DOUBLE ACTING

TYPE

VDP

APPLICATION

- BILGE
- FIRE
- STRIPPING
- FRESH WATER TRANSFER
- F.O./L.O. TRANSFER



TEIKOKU MACHINERY WORKS, LTD.

OSAKA, JAPAN

GENERAL CONSTRUCTION

The type VDP pump is of motor driven two throw double acting vertical piston type. The motion of pump is effected by motor, speed of which is reduced in two stages and conveyed through connecting rod and crosshead moving piston up and down. The pump cylinder and valve box are of separate casting and rigidly fixed together with bolts. The driver is mounted on motor stand which is placed on cast iron frame, which has also metal for crank shaft and seat for counter shaft. On the back of the frame there is a rectangular support which is intended to prevent the unit from vibration while it is in operation. Frame, pump cylinder and valve box are connected rigidly with carbon steel stays, number of which are from four to nine depending on the size of unit.

Pump cylinder is of cast iron having bronze liner, and top is opened with flange for cover and plug of rolled steel is placed at bottom. Valve box fitting holes are placed in the upper frontal part of cylinder. The lower part is box type support and is made to secure with four setting bolts. Cylinder cover is of cast iron and is bolted to top of cylinder. Stuffing box is located at the part where pump rod penetrates through and together with gland leakage is prevented by neck bush and soft packing in the stuffing box.

Valve box is of cast iron and consists of suction chamber, suction valve chamber and discharge valve chamber. The suction valve chamber, is divided in two rooms at center. Suction valve seat and discharge valve seat are fixed on partition walls between suction chamber and suction valve chamber and between suction valve chamber and discharge valve chamber; and together with valves divide these chambers. Two cast iron covers are bolted to the top of valve box and suction nozzle flange is located in frontal lower central part, with snifting valve seat in front face of suction valve chamber. Pet valve seat is placed rightward on valve box cover. At the lower part of valve box, there are seats for legs, the form of the seat is different depending on the size of unit.

Reduction gears (1st, and 2nd,) are of cast iron and pinions are of bakelite, both being covered by steel plate gear covers respectively.

Pump valve device is provided in the valve box, suction and discharge valves are bolted to the valve box bottom and cover respectively. (Push and pull type)

Escape valve is provided on the pump discharge side in order to avoid trouble due to mishandling. The capacity of the escape valve is so chosen that the limit in pressure rise becomes less than 150% of the normal discharge pressure when the discharge valve is entirely closed. But, when the rated discharge pressure is less than 5kg/cm² pressure rise is less than the specified discharge pressure plus 2.5kg/cm².

Air chamber shall be supplied, on the customer's request, with the unit which has high discharge pressure and long piping, for the purpose of keeping the pressure surge as small as possible. Its capacity is more than 4 times the displacement of the pump cylinder.

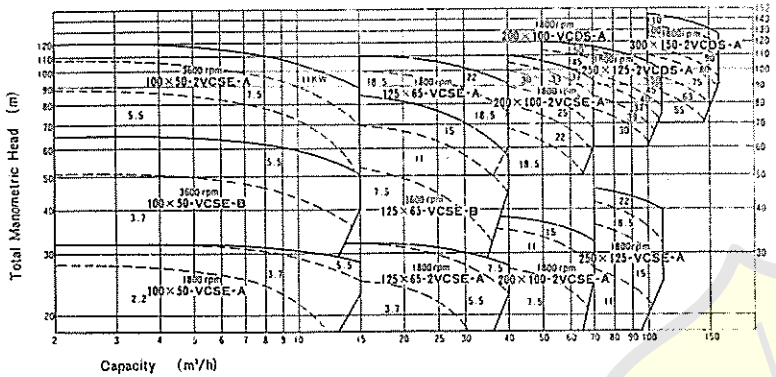
STANDARD MATERIAL

PART NO.	NAME OF PART	QUANTITY PER 1 PUMP	NAME OF MATERIAL	JIS
31	FRONT STAY	2	CARBON STEEL	[illegible]
33	BACK STAY	2	〃	〃
41	CROSSHEAD	2	CAST IRON	FC20
42	CROSSHEAD PIN	2	FORGED STEEL	SF50
43	CROSSHEAD LINER	2 SETS	LEAD BRONZE	LBC4
45	GUIDE	1	CAST IRON	FC20
61	PUMP CYLINDER	1	〃	〃
62	PUMP CYLINDER COVER	2	〃	〃
76	NECK BUSH	2	BRONZE	BC3
77	GLAND	2	〃	
78	PACKING	2 SETS	SEMI-METALLIC	
81	VALVE BOX	1	CAST IRON	[illegible]
82	VALVE BOX COVER	2	〃	
84	VALVE BOX FOOT	2	〃	〃
86	PUMP VALVE	8/32	MANGANESE BRONZE	HBsB1
87	VALVE SPRING	8/32	PHOSPHOR BRONZE	PBW1H
88	SUCTION VALVE SEAT	4	BRONZE	BC3
89	DELIVERY VALVE SEAT	4	〃	〃
90	SUCTION VALVE SEAT RING	4	〃	〃
91	DELIVERY VALVE SEAT RING	4	〃	
92	SUCTION VALVE GUARD	4	〃	
93	DELIVERY VALVE GUARD	4	〃	
94	LIFT BOLT	8/32	NAVAL BRASS	NBs52
96	TENSION BOLT	4	〃	〃
101	CONNECTING ROD	2	CAST STEEL	SC46
102	CONNECTING ROD BOLT	4	ROLLED STEEL	SS41B
103	CONNECTING ROD LINER	4 SETS	BRASS PLATE	BsP3
104	CRANK PIN METAL	2 SETS	LEAD BRONZE	LBC4
105	CROSSHEAD PIN METAL	2	PHOSPHOR BRONZE	[illegible]
106	CRANK SHAFT	1	FORGED STEEL	[illegible]
112A	BALL BEARING	2	SPECIAL STEEL	
112B	〃	2	〃	
114	BEARING CASE	2	CAST IRON	FC20
115A	BEARING CASE COVER	1	〃	〃
115B	〃	1	〃	〃
116	COUNTER SHAFT	1	CARBON STEEL	S45C
119	BEARING CASE	2	CAST IRON	FC20
120	BEARING CASE COVER	2	〃	〃
125	CRANK FRAME	1 2	〃	〃
127	MOTOR STAND	2	〃	〃
130	1ST STAGE PINION	1	BAKELITE	
131	1ST STAGE GEAR	1	CAST IRON	FC20
133	2ND STAGE PINION	1	BAKELITE	
134	2ND STAGE GEAR	1	CAST IRON	FC20
351	OIL BOX	1 SET	CAST ALUMINIUM	AC

The material of some parts shall be changed as follows according to the liquid handled. The pump cyl. and valve box are of cast iron or bronze in accordance with customer's request.

PART NO.	NAME OF PART	QUANTITY PER 1 PUMP	FRESH WATER & SEA WATER		LUB. OIL & FUEL OIL	
			NAME OF MATERIAL	JIS	NAME OF MATERIAL	JIS
63	PUMP CYLINDER LINER	2	STAINLESS STEEL	SCS13	CAST IRON	FC20
65	BUCKET	2SETS	AUSTENITE CAST IRON	〃	〃	〃
67	BUCKET RING	4	BAKELITE		BAKELITE	
70	PUMP ROD	2	MANGANESE BRONZE	HBsB2	CARBON STEEL	S45C

PERFORMANCE CHART



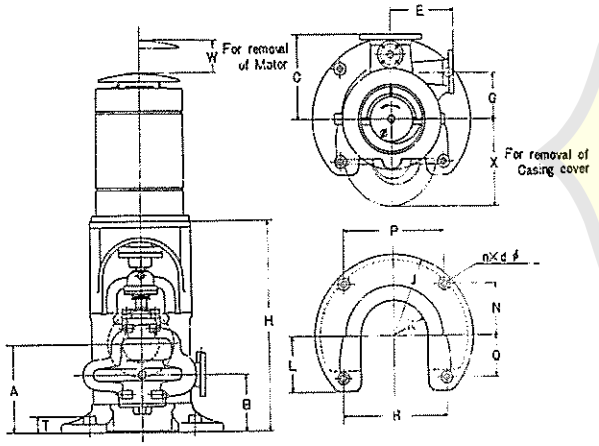
In selecting the size of a pump pattern, if the required specified point of Q-H falls just on the boundary line in the performance chart, please select the smaller size of the nominal bore of the pattern from the adjoining ones.

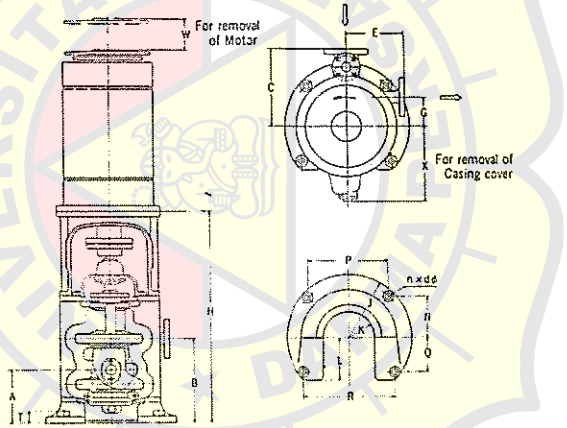
The numerals entered between diagonal dotted lines in the performance chart show the required capacity of the driver in KW.

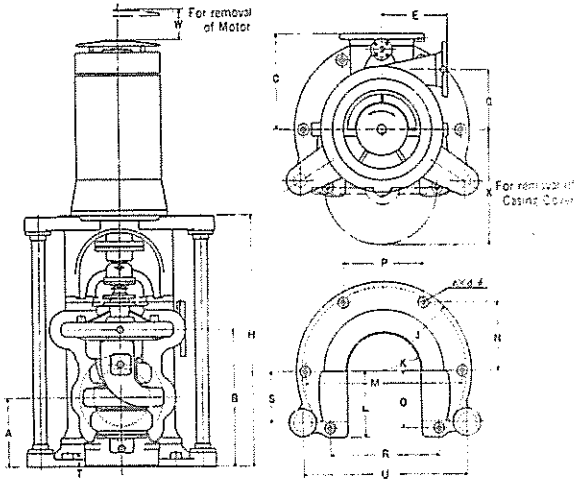
The driver with this capacity will never be overloaded at any point on the Q-H curve developed by the pump at the rated speed.

Ex, in case, the specified capacity, total head and speed are 40 m³/h, 27.5m and 1,750 rpm respectively,
Select 125x65 VCSE-A from adjoining patterns of 125x65 VCSE-A and 200x100 VCSE-A.
Capacity of the driver, 7.5 Kw.
in case the specified capacity, total head and speed are 70 m³/h, 78m and 1,750 rpm respectively,
Select 200x100-2VCSE-A from adjoining patterns of 200-100-2VCSE-A, 200x100-2VCDS-A and 250x125-2VCDS-A.
Capacity of the driver, 30 Kw.

DIMENSIONS

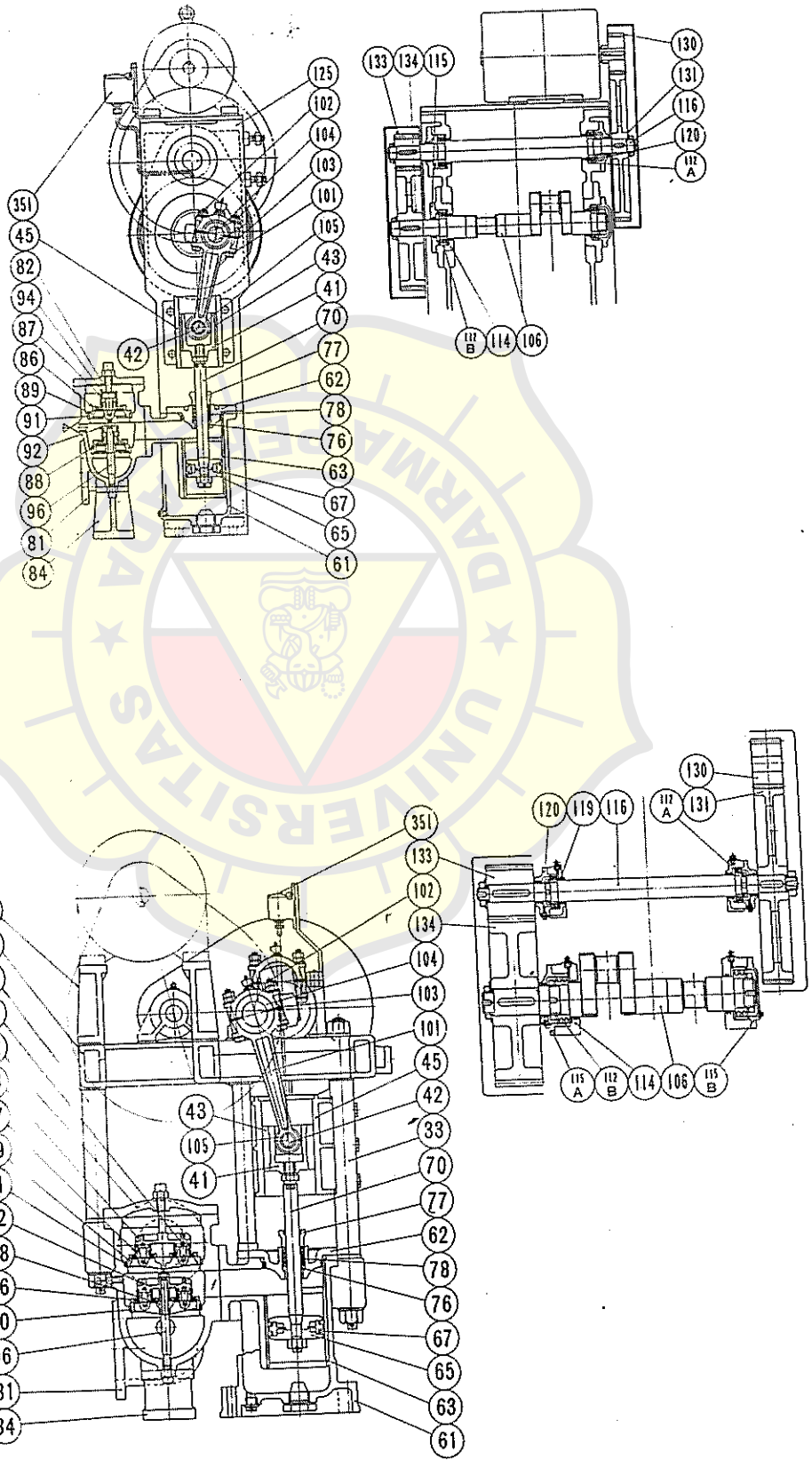






TYPE	MOTOR		NOMINAL BORE		DIMENSIONS (mm)																			WEIGHT (kg)
	KW	rpm	SUC.	DEL.	A	B	C	O	G	H	J	K	L	M	N	P	Q	R	S	T	U	n×d	W	X	PUMP
100x50VCSE-A	2.2~5.5	1800	100	50	230	140	270	230	160	633	220	90	150	–	140	286	120	320	–	40	–	4x19	60	310	160
100x50VCSE-B	3.7~5.5	3600			"	"	"	"	130	603	"	"	"	–	"	"	"	"	–	"	–	"	80	200	"
125x65VCSE-A	3.7~7.5	1800	125	65	310	200	300	"	165	813	290	130	200	–	184	367	150	380	–	65	–	4x23	"	315	180
125x65VCSE-B	7.5~15	3600			"	"	"	"	130	833	"	"	"	–	"	"	"	"	–	"	–	"	110	220	165
200x100VCSE-A	7.5~15	1800	200	100	375	210	400	270	165	813	350	145	250	660	285	330	220	400	–	50	–	6x19	"	320	250
250x125VCSE-A	11~22		250	125	430	230	"	"	200	850	"	"	"	"	"	"	"	"	–	"	–	"	"	350	300
100x50-2VCSE-A	5.5~11	3600	100	50	230	325	270	200	100	763	220	90	150	–	140	286	120	260	–	40	–	4x19	"	260	145
125x65-2VCSE-A	7.5~22	1800	125	65	295	420	400	260	240	948	400	170	300	720	310	366	260	500	–	60	–	6x23	"	440	380
200x100-2VCSE-A	18.5~37		200	100	375	477	430	320	230	1047	"	"	"	"	"	"	"	"	230	"	750	"	140	490	480
200x100-2VCDS-A	22~50				310	592	"	300	270	1137	"	"	"	"	"	"	"	"	"	"	"	"	"	"	540	600
250x125-2VCDS-A	30~55		250	125	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	610	
300x150-2VCDS-A	55~110		300	150	365	720	520	370	320	1333	"	"	"	"	"	"	"	"	235	"	850	"	170	600	700

SECTIONAL ARRANGEMENT

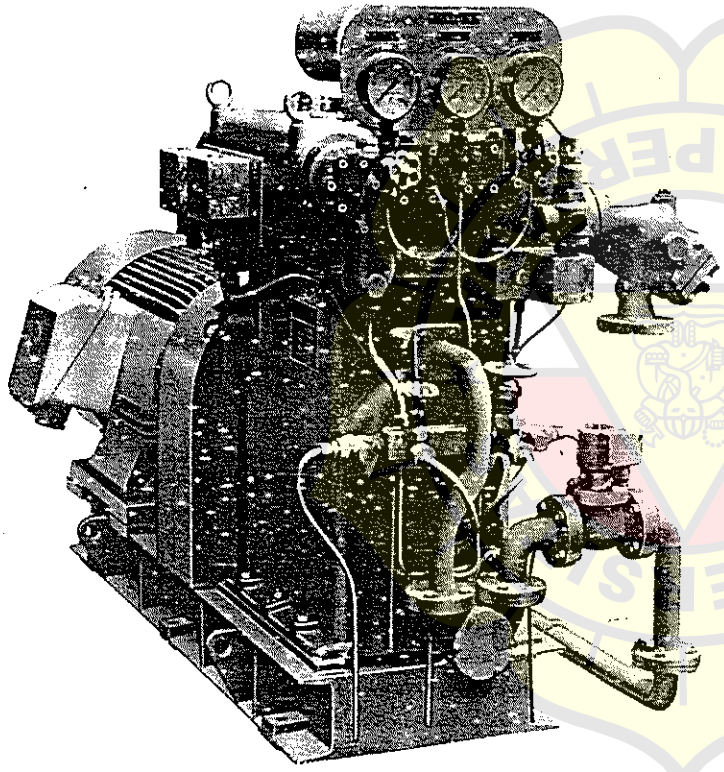


TEIKOKU-HAMWORTHY COMPRESSOR TEIKOKU-HAMWORTHY COMPRESSOR

2TF5

and 2TF54

2 STAGE



Designed to provide a competitive unit in the 80~140 c.f.m. (135~240 m^3/Hr) F.A.D. range, this machine incorporates all the features which have made TEIKOKU-HAMWORTHY compressors famous throughout the world:

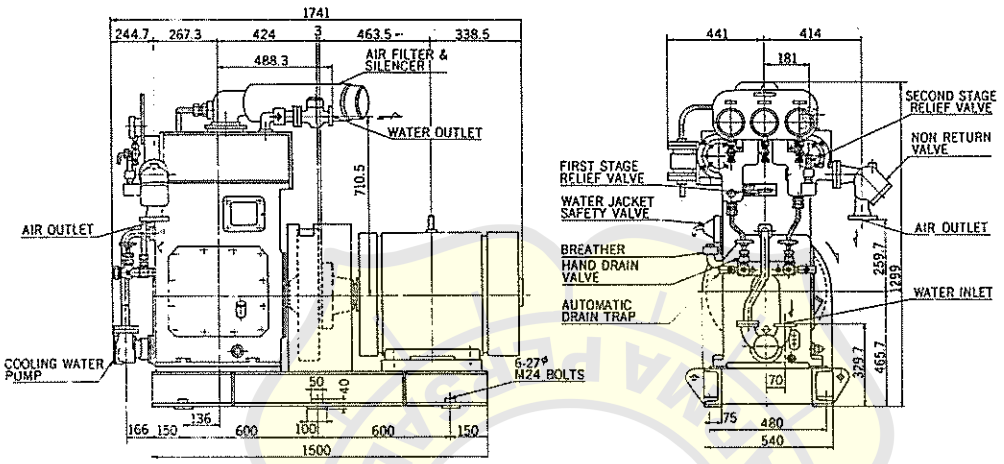
* Ease of accessibility to moving parts, coolers and valves.
* Neat workmanlike appearance.
* Complete reliability at all speeds.
* Balanced motionwork.
* Built in aftercooler
* First class spares service throughout the world.

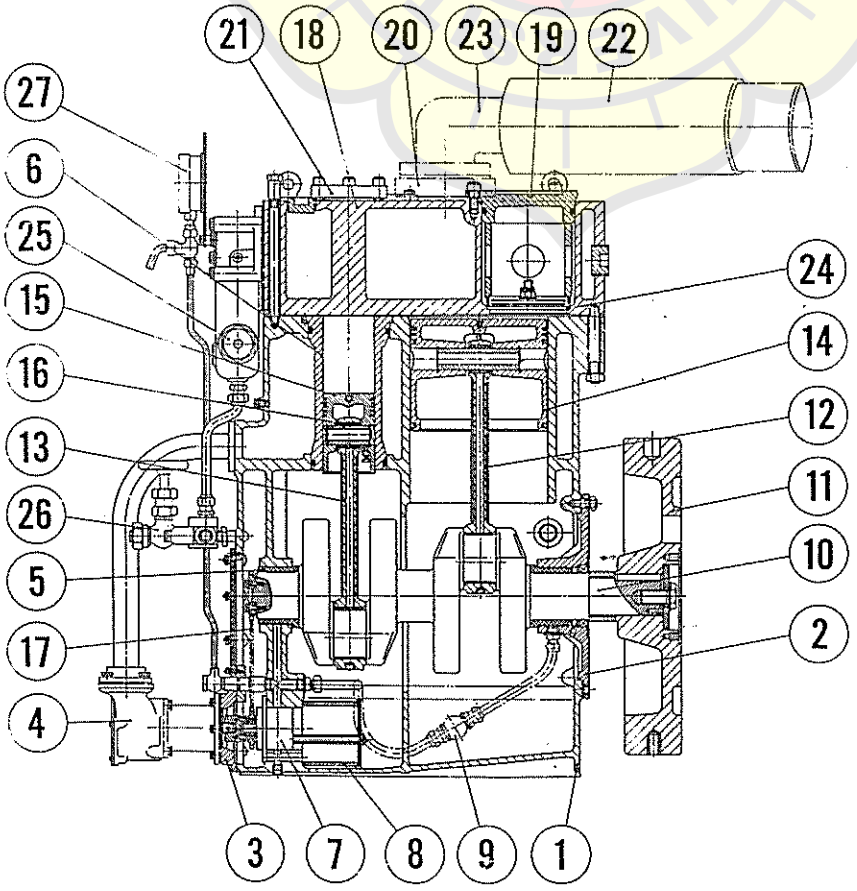
Externally the 2TF5 and 2TF54 are identical. The 54 is, however, a smaller bore version having reduced capacity.

Alternative prime movers are available and complete motor or engine driven sets mounted on fabricated baseplates can be supplied. Various methods of drive may be employed, such as flexible coupling, vee belt, clutch coupling, etc.

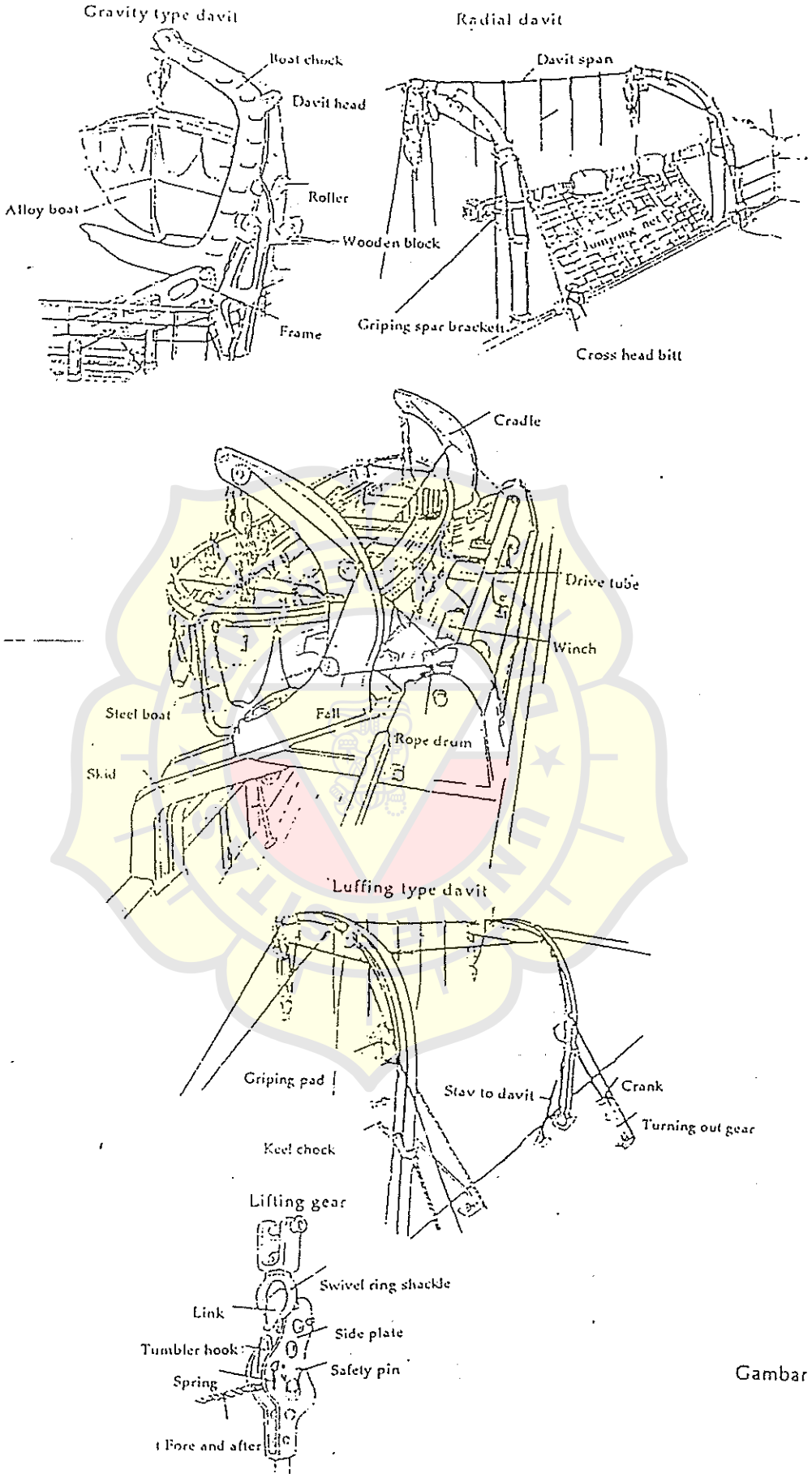
FREE AIR DELIVERY IN CUBIC METER AND KW REQUIRED AT VARIOUS SPEEDS AND PRESSURES (BOTTLE CHARGING)

Compressor Type	Speed R.P.M.	9 kg/cm² F.A.D.		25 kg/cm² F.A.D.		30 kg/cm² F.A.D.		35 kg/cm² F.A.D.	
		m^3/h	net kw	m^3/h	net kw	m^3/h	net kw	m^3/h	net kw
2TF54	720	118.0	15.0	107.0	19.5	106.0	20.5	105.0	21.1
	875	143.0	18.0	130.0	23.8	128.0	25.0	127.0	25.7
	970	159.0	20.0	144.0	26.3	142.0	27.5	140.0	28.4
	1160	190.0	24.0	172.0	31.5	170.0	33.0	168.0	34.0
2TF5	720	161.0	19.4	148.0	25.4	146.0	26.0	144.0	26.7
	875	196.0	23.5	180.0	30.9	177.0	31.7	175.0	32.5
	970	217.0	26.0	199.0	34.3	196.0	35.1	194.0	36.0
	1160	260.0	31.0	238.0	41.0	235.0	42.0	232.0	43.0





1. Crank Case
2. Bearing Housing
3. Front Cover
4. Water Pump
5. Main Bearing
6. 2nd Stage Cylinder Lin
7. Oil Pump
8. Oil Filter Element
9. Relief Valve for Lubric ing Oil
10. Crank Shaft
11. Flywheel
12. 1st Stage Connecting F
13. 2nd Stage Connectin Rod
14. 1st Stage Piston
15. 2nd Stage Piston
16. Small End Bush
17. Driving Chain for Wat and Oil Pump
18. Cylinder Head
19. 1st Stage Delivery Val Cage
20. 1st Stage Suction Val Cage
21. 2nd Stage Suction Val Cage
22. Silencer
23. Silencer Elbow
24. 1st Stage Delivery Val
25. Safety Valve
26. Hand Drain Valve
27. Pressure Gauge


Gravity type davit
Boat chock
Davit head
Roller
Alloy boat
Wooden block
Frame
Radial davit
Davit span
Jumping net
Griping spar bracket
Cross head bitt
Cradle
Drive tube
Winch
Steel boat
Fall
Rope drum
Skid
Luffing type davit
Griping pad
Stay to davit
Crank
Turning out gear
Keel chock
Lifting gear
Swivel ring shackle
Link
Side plate
Tumbler hook
Safety pin
Spring
Fore and after

Gambar

III.2. Susunan Anak Buah Kapal

Terlebih dahulu direncanakan jumlah anak buah kapal (ABK) dalam hal ini jumlah ABK ditentukan sebanyak 30 orang adapun perinciannya sebagai berikut :

Captain	1 orang
Dek Departemen	
Chief Officer	1 orang
2nd Officer	1 orang
3rd Officer	1 orang
Boat Swain	3 orang
Sea Man	4 orang +
Jumlah	11 orang

Engine Departemen	
Chief Engineer	1 orang
1st Engineer	1 orang
2nd Engineer	1 orang
3rd Engineer	1 orang
Oil Man	2 orang
Engine Crew	5 orang +
Jumlah	11 orang

Catring Depertemen	
Chief Cock	1 orang
Assisten Cook	1 orang
Boys	6 orang +
Jumlah	8 Orang

III.3. Sistem dan Perlengkapan Keselamatan Kapal

Sistem dan perlengkapan keselamatan kapal telah diatur dalam Konveresi Internesional tentang keselamatan jiwa dilaut yang diadakan di London pada tahun 1978 yang terkenal dengan