BAB V
PENUTUP

V.1 Kesimpulan

Dari hasil perhitungan yang telah dilakukan pada kapal rancangan yaitu Kapal Tanker 14.000 ton dengan dimensi utama kapal sebagai berikut :

Panjang keseluruhan (L_{OA}) : 158 m
Panjang antara garis tegak (L_{PP}) : 150 m
Lebar kapal (B) : 27,70 m
Sarat kapal (T) : 6,875 m
Kecepatan (V_s) : 15,00 Knot
Dead Wight (DWT) : 14.000 Ton
Radius Pelayaran : 525 mil
Klasifikasi : BKI

⇨ Untuk dapat menetukan besarnya daya motor induk sebagai penggerak utama kapal, maka faktor kecepatan daerah pelayaran serta dimensi dari kapal mempunyai pengaruh sangat besar.

⇨ Di dalam perancangan kamar mesin, tidak terlepas dari adanya asumsi – asumsi yang diberikan untuk mempermudah dalam perhitungan dengan tidak mengabaikan tanggung jawab secara teknis, ekonomis dan peraturan peraturan yang ada, sehingga hasil perhitungan dapat mendekati keadaan yang sebenarnya.

⇨ Tata letak mesin induk, mesin bantu, maupun peralatan peralatan lain hendaknya diatur seefesien mungkin, hal ini untuk mempermudah dalam perawatan dan perbaikan peralatan yang ada di kamar mesin itu sendiri.

⇨ Peletakan permesinan berpengaruh pada stabilitas kapal.

⇨ Pemilihan mesin bantu tergantung dari jumlah daya yang harus disuplai pada kondisi operasi kapal yang berbeda beda.

V.2 Saran – Saran

Kesempurnaan dari hasil penulisan adalah merupakan tujuan yang ingin dicapai penulis. Untuk itu penulis telah berusaha semaksimal mungkin dengan bantuan dan bimbingan dari dosen pembimbing.

Tetapi dalam hal ini penulis menyadari bahwa dalam penulisan masih banyak terdapat kesalahan dan kekurangan, maka dari itu penulis berharap adanya sumbangan pikiran untuk memperbaikan dalam mengerjakan tugas merancang ini.

Akhirnya, semoga tugas merancang ini dapat berguna bagi pembaca sekalian.

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DAFTAR NOTASI

Tabulasi berikut menunjukkan simbol yang digunakan pada tugas merancang kapal ini. Karena huruf terbatas, kadang kala huruf yang sama digunakan untuk menyatakan lebih dari satu konsep.

a_o : Jarak gading – gading dalam (mm)
A : Luas pandangan samping lambung kapal dalam (m^2).
A_{rudder} : Luas daun kemudi (m^2).
A_M : Luas penampang melintang tengah kapal (midship area) dalam (m^2).
A_{wl} : Luas bidang garis air (water line area) dalam (m^2).
b : Lebar daun kemudi dalam (m).
B : Lebar kapal, lebar tangki dalam (m).
B_{me} : SFOC (Pemakaian bahan bakar spesifik untuk mesin induk) dalam (gr/kW.h).
B/T : Perbadingan lebar dan sarat kapal.
c : Lebar daun kemudi dalam (m).
C_A : Koefisien penambahan hambatan untuk korelasi model - kapal.
C_{AA} : Koefisien hambatan udara.
C_{AS} : Koefisien hambatan kemudi.
C_B : Koefisien blok.
C_{fww} : Kebutuhan air tawar untuk cuci dan mandi dalam (ton).
C_F : Koefisien hambatan gesek.
C_m : Koefisien tengah kapal.
C_P : Koefisien prismatik memanjang.
C_R : Koefisien hambatan sisa.
C_T : Koefisien hambatan total.
C_w : Koefisien garis air kapal.
d : Diameter poros dalam (m), diameter rantai dalam (inch).
d_w : Diameter tali tambat dalam (mm)
$d\varphi$: Sudut kemiringan.
D : Displasemen kapal dalam (ton).

D_{cl} : Diameter efektif cable lifter dalam (mm).

D_h : Diameter pipa utama dalam (mm).

Do : Diameter optimum baling-baling dalam (m).

D_{prop} : Diameter baling-baling dalam (m).

D_t : Diameter tongkat kemudi dalam (mm).

D_w : Diameter penggerak tali.

D_z : Diameter pipa cabang dalam (mm).

F : Faktor untuk instalasi propulsi.

F_{disk} : Area of the screw dalam (m^2), letak lambung timbul untuk fresh water load line dalam (m).

F_a : Developed blade area dalam (m^2).

F_a/F : Blade area ratio propeller.

F_n : Angka froude $\left(\frac{Vs}{\sqrt{g \times Lpp}}\right)$

F_P : Fore perpendicular (garis tegak haluan).

F_p : Projected area of the blades dalam (m^2).

F_p' : Projected blade area dalam (m^2).

F_p/F_a : Developed blade area ratio.

g : Gaya gravitasi 9,81 m/dt^2.

G_a : Berat jangkar dalam (N).

h : Jarak ordinat (Lpp/station), tinggi bangunan atas, tinggi centre girder, tinggi efektif diukur dari garis muat sampai puncak teratas rumah geladak dalam (m), deck load (beban geladak) dalam kN/m^2.

h' : Tinggi dari uppermost continuous deck sampai ke puncak rumah geladak dalam (m).

H : Tinggi kapal dalam (m).

H_a : Head statis total dalam (m).

H_{lf} : Hed loss karena pipa hisap dalam (m).

H_{li} : Head loss karena peralatan pipa hisap dalam (m).

H_{rudder} : Tinggi daun kemudi dalam (m).

H_o/D : Pitch ratio baling-baling.

i_a : Ratio mekanisme.

J : Kapasitas total bejana dalam (dm^3).

k : Faktor tipe dari poros.

k_1 : Koefisien luas daun kemudi.

k_2 : Koefisien profile / model kemudi.

k_3 : Koefisien letak daun kemudi.

k_r : Faktor bahan.

L : Jarak memanjang tangki, panjang ruangan dalam (m), dalam (N).

L' : Panjang poop/forecastle, panjang untuk ruangan dalam (m).

$L/\nabla^{1/3}$: Rasio panjang - displasemen.

L_a : Panjang rantai jangkar yang menggantung dalam (m).

L_{CB} : Jarak/letak titik tekan memanjang dari tengah kapal dalam (m).

L_{oa} : Length over all (panjang keseluruhan) dalam (m).

L_{pp} : Length between perpendicular (panjang antara garis tegak) dalam (m).

L_{wl} : Panjang garis air dalam (m).

M_{cl} : Momen putar pada cable lifter dalam (N.m).

M_m : Momen putar pada poros motor dalam (N.cm).

n : Jumlah station, putaran baling-baling per detik (rps).

n_m : Putaran motor untuk electric windlass.

N : Putaran baling-baling (rpm).

N_e : Daya efektif windlass dalam (KW).

N_m : Daya motor penggerak dalam (KW).

N_W : Putaran poros penggulung tali dalam (rpm).

$P - e$: Tekanan statik pada sumbu baling-baling dalam (lbs/sg.ft).

P : Berat rata-rata ABK dalam (kg).

P_a : Berat rantai jangkar pada saat bergerak dalam (N/mm).

P_B : Brake Horse Power dalam (KW).

P_C : Propulsive coefisient.

P_D : Delivery Horse Power dalam (KW).

P_E : Efektif Horse Power dalam (KW).

P_m : Tekanan maksimum dalam tangki (m^3/jam).

P_{maks} : Daya maksimum dari pemakaian beban dalam (kW).

P_{me} : Tekanan kerja effektif silinder dalam (bar).

P_n : Gaya yang bekerja pada daun kemudi dalam (N).

P_o : Tekanan minimum dalam tangki (N/m^3).

P_S : Shaft Horse Power dalam (KW).

Q : Kapasitas kompresor.

Q_{displ} : Coefisien Prismatic displacement.

Q_r : Momen torsi.

R_{AA} : Hambatan udara dalam (N).

R_{br} : Tegangan putus tali dalam (N/m^2).

R_F : Hambatan gesek dalam (N).

Re : Angka Reynolds.

R_m : Kekuatan tarik material dalam (N/mm^2).

Rr : Hambatan sisa dalam (N).

R_T : Hambatan total dalam (N).

S : Luas permukaan basah badan kapal dalam (m^2).

S' : Permukaan basah badan dan anggota badan kapal sepanjang garis air dalam (m^2).

T : Sarat kapal, lambung timbul untuk tropical load line dalam (m), gaya dorong (thrust) dalam N.

t : Tebal pelat dalam (mm).

T_{cl} : Gaya tarik pada cable lifter.

T_W : Tegangan putus tali.

V_a : Kecepatan maju baling-baling dalam (knot).

V_{ca} : Kandungan CO_2 tiap m^3 udara luar yang masuk ruangan.

V_{do} : Volume bahan bakar motor bantu dalam (m^3).

V_{db} : Volume total tangki ballast dalam (m^3).

Ve : Kecepatan air masuk ke baling – baling dalam (m/dtk).

V_{fo} : Volume bahan bakar motor induk dalam (m^3).

V_h : Volume langkah torak tiap – tiap silinder dalam (dm^3).

V_{lo} : Volume tangki minyak lumas dalam (m^3).

V_o : Volume fluida sisa dalam (m^3).

V_r : Kandungan maksimum CO_2 yang dihasilkan dari ruangan dalam (lt/m^3).

V_{rc} : Volume CO_2 yang dihasilkan tiap – tiap m^3 dari ruangan dalam (lt/m^3).

Vs : Kecepatan kapal dalam (knot, m/dt).

V_{setl} : Volume tangki settling dalam (m^3).

V_{serv} : Volume tangki service dalam (m^3).

V_w : Kecepatan tarik capstan dalam (m/s).
w : Faktor arus ikut Taylor.
W_{do} : Berat bahan bakar motor bantu dalam (N).
W_{fo} : Weight of fuel oil (berat bahan bakar) dalam (ton).
W_{fw} : Weight of fresh water (berat air tawar) dalam (ton).
W_{fww} : Kebutuhan air tawar untuk cuci dan mandi dalam (ton).
W_{lo} : Weight of lubricating oil (berat minyak pelumas) dalam (ton).
$W_{lo\ cyl}$: Berat minyak pelumas untuk konsumsi silinder dalam (ton).
W_{fwd} : Kebutuhan air tawar untuk makan dan minum dalam (ton).
Z : Angka petunjuk untuk jangkar; jumlah daun baling-baling; jumlah ABK;
α : Sudut putar daun kemudi
Δ : Displasemen kapal dalam (ton).
Δp : Head perbedaan tekanan dalam (bar).
γ : Berat jenis air laut 1,025 ton/m^3.
γ_{fo} : Berat jenis bahan bakar diesel oil 0,85 ton/m^3.
η_a : Efisiensi mekanis dengan spin gear.
η_{cl} : Efisiensi cable lifter.
η_g : Efisiensi generator.
η_H : Efisiensi badan kapal (1 - t) / (1 - w).
η_{po} : Efisiensi baling-baling.
η_{rr} : Efisiensi rotary relatif.
μ : Koefisien permeabilitas.
σ : Angka kavitasi.
υ : Faktor pengisapan.
∇_{Displ} : Volume Displacement dalam (m^2).
λ : Koefisien gesek pipa.
ρ : Massa density 104,49 kg S^2/m^4.
ρ_u : Massa density udara.
ψ_h : Head factor.

REFERENSI

results from towing tests have been coordinated. The analysis of the collected basis material has been carried out in the following way:

1. All data have been referred to the model area, and the model resistance (R_{Tm}) has been determined as a function of speed.
2. The specific total resistance coefficient of the model (C_{Tm}) has been determined:

$$C_{Tm} = \frac{R_{Tm}}{\frac{1}{2}\rho V_m^2 S_m} \qquad (5.5.5)$$

   where ρ is the mass density, V_m is velocity of model, S_m is wetted surface of model (= mean girth × length on waterline).
3. The specific residual resistance coefficient has been determined from

$$C_R = C_{Tm} - C_{Fm} \qquad (5.5.6)$$

   where C_{Fm} is the specific frictional resistance coefficient. The "ITTC 1957 model–ship correlation line" has been used to determine the frictional resistance coefficient

$$C_F = \frac{0.075}{(\log_{10} R_n - 2)^2} \qquad (5.5.7)$$

   where R_n is the Reynolds Number (VL/ν, where ν is coefficient of kinematic viscosity and L is the length on waterline). In Fig. 5.5.4 contours of C_F are given for different values of V and F_n. The abscissa is the length L of the model. The diagram corresponds to $\nu = 1.139 \times 10^{-6}$ m s^{-1}, $\rho = 1.000$ t/m^3, and $T = 15$°C. The diagram may therefore be used at other conditions, that is, other densities and temperatures, only if the length is altered before entering the diagram to

$$L_1 = \frac{1.139}{10^6 \nu} L \qquad (5.5.8)$$

4. C_R has been expressed as a function of Froude number

$$F_n = \frac{V}{\sqrt{gL}} \qquad (5.5.9)$$

   (the speed–length ratio $V/\sqrt{L}$, where V is measured in knots and L is in feet, is found as a subscale on the C_R diagrams).

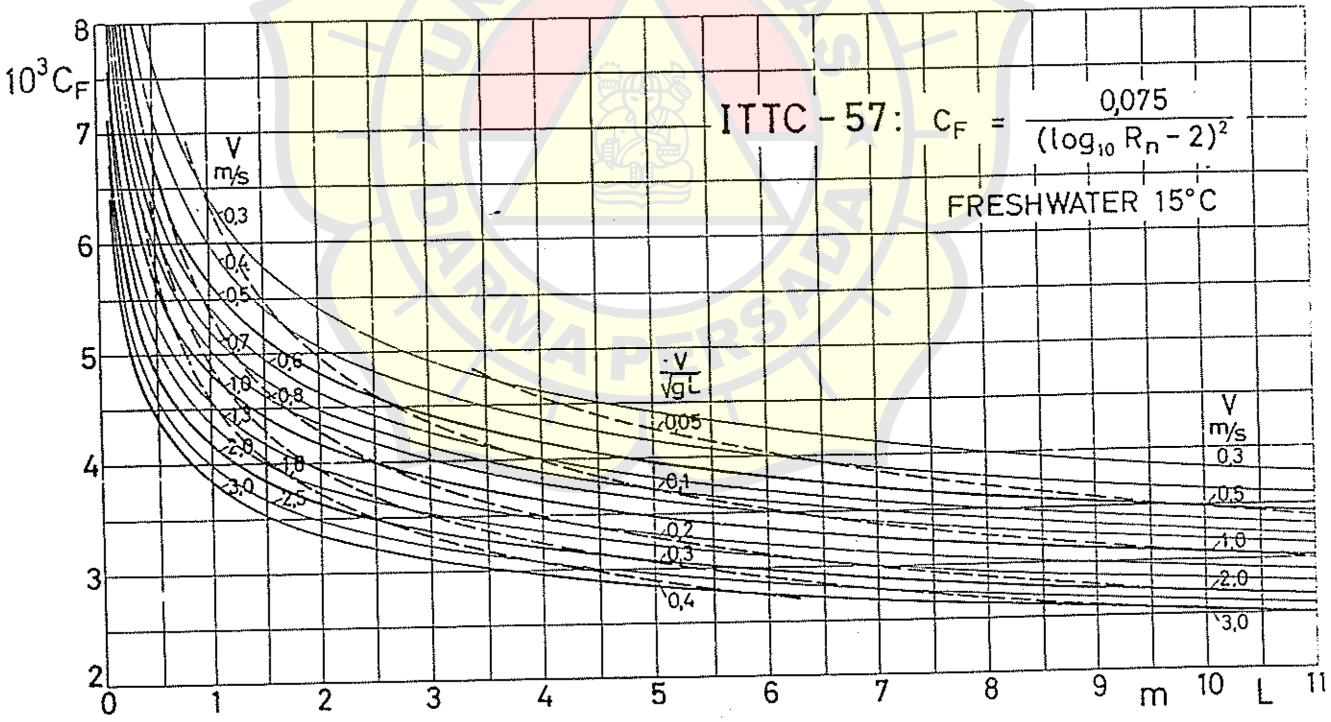


Figure 5.5.4. The frictional resistance coefficient C_F (according to ITTC 1957) as a function of ship–model length L and speed V.

5. The results have been arranged in groups according to length–displacement ratio $L/\nabla^{1/3}$ and the prismatic coefficient φ of the model. Here ∇ is the volumetric displacement and

$$\varphi = \frac{\nabla}{LBT\beta} \qquad (5.5.10)$$

where B is breadth, T is draught, and β is midship section area coefficient.
6. The main diagrams have been drawn giving the mean curves of C_R for the breadth–draught ratio $B/T = 2.5$. The diagrams are shown in Figs. 5.5.5–5.5.13.

In some places in the diagram the curves are dotted in order to indicate that they have been based either on very few test results or determined by extrapolation. The uncertainty is therefore comparatively great in these areas. Furthermore, it should be noted that the uncertainty is also great in and near the areas where the curves have pronounced humps, especially where the slope becomes negative. Small alterations in the hull form in these areas can considerably influence the C_R value.

It must also be mentioned that the resistance curves correspond to vessels with a standard form, that is, a standard position of the center of buoyancy, standard B/T, normally shaped sections, moderate cruiser stern, and raked stem.

The resistance R and the effective power P_E for a new ship can then be calculated by

$$R = C_T(\tfrac{1}{2}\rho V^2 S) \quad (\mathrm{N}) \qquad (5.5.11)$$

$$P_E = RV \quad (\mathrm{kW}) \qquad (5.5.12)$$

where the total ship resistance coefficient is

$$C_T = C_R + C_F + C_A \qquad (5.5.13)$$

where

C_R = residual resistance coefficient, which for the "standard" ship form can be taken from the diagrams (Figs. 5.5.5–5.5.13)

C_F = frictional resistance coefficient, which can be calculated by

$$C_F = \frac{0.075}{(\log_{10}R_n - 2)^2} \qquad (5.5.14)$$

or can be taken from Fig. 5.5.14 where contours of C_F are given from different values of V. The abscissa is the length L of the ship. The diagram corresponds to $\nu = 1.188 \times 10^{-6}\ \mathrm{m\ s^{-1}}$, $\rho = 1.025\ \mathrm{t/m^3}$, and $t = 15°\mathrm{C}$. The diagram may therefore be used at other conditions, that is, other densities and temperatures, only if the length is altered before entering the diagram to:

$$L_1 = \frac{1.188}{10^6\nu} L \qquad (5.5.15)$$

C_A = incremental resistance coefficient, which is a coefficient correcting for roughness of the surface and scale effect on the results from the model experiments. In this way C_A will depend on the way in which C_R and C_F are fixed.

If the ship has to tow, R must be replaced by $R + F$, where F is the two-rope pull.

As ships are generally different from the standard to a greater or lesser extent, the following corrections should be taken into account, when the ship resistance of the ship and the environments had to be taken into account.

B/T

As the diagrams have been prepared for a breadth–draught ratio corresponding to

$$B/T = 2.5 \qquad (5.5.16)$$

a correction must be made if C_R is desired for a ship with a larger or smaller breadth–draught ratio.

Examination of the present test material has shown that the following correcting formula can be recommended:

$$10^3 C_R = 10^3 C_{R(B/T=2.5)} + 0.16\ (B/T - 2.5) \qquad (5.517)$$

The correction may be positive as well as negative.

LCB

The C_R curves are intended to correspond to vessels with a longitudinal position of center of buoyancy (LCB) near to what is today considered the best possible position. The optimum LCB is a quantity that is in some doubt, and the available literature shows differences of opinion that make the picture rather confused. The dependence of ship

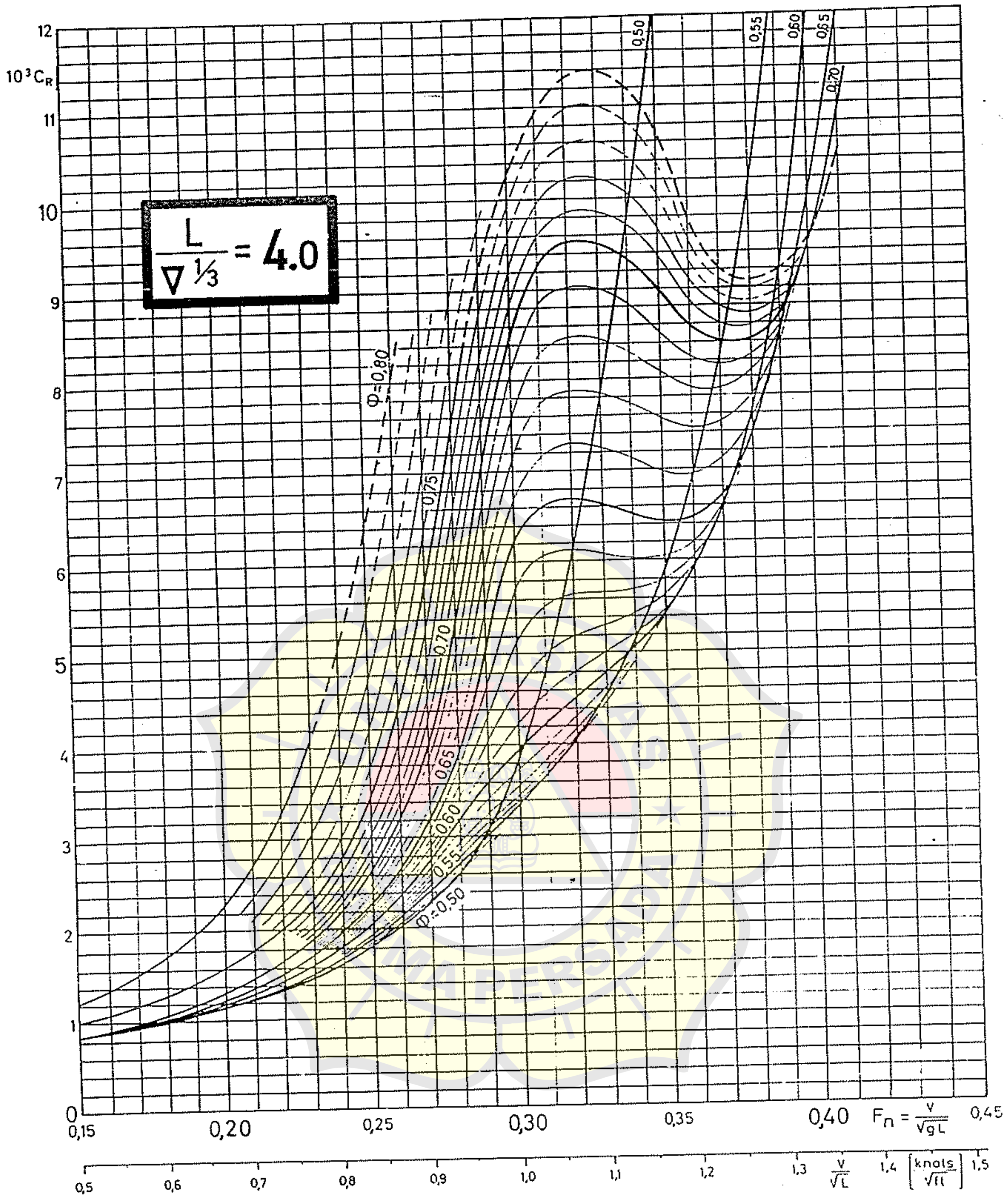
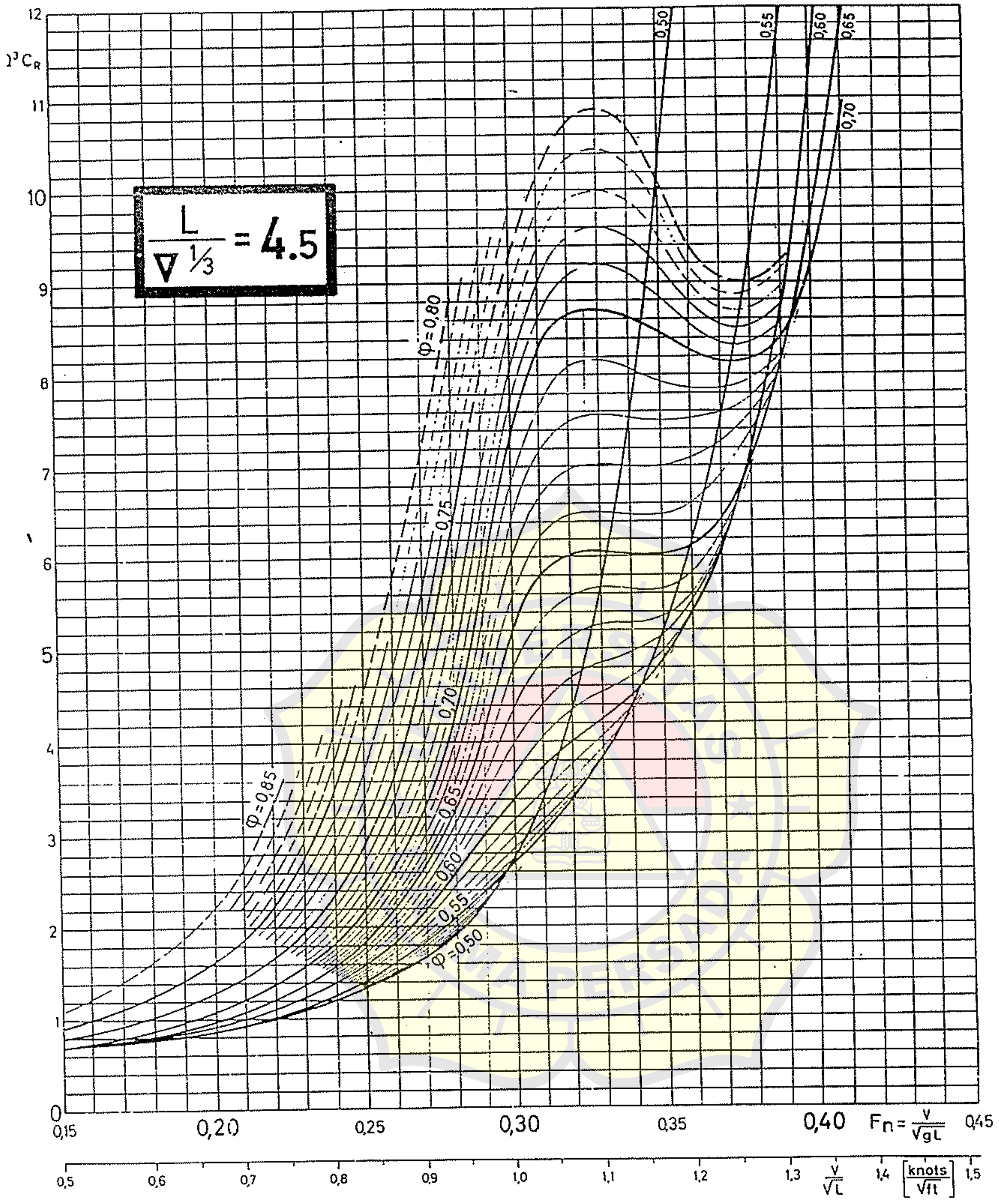


Figure 5.5.5. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 4.0$.



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

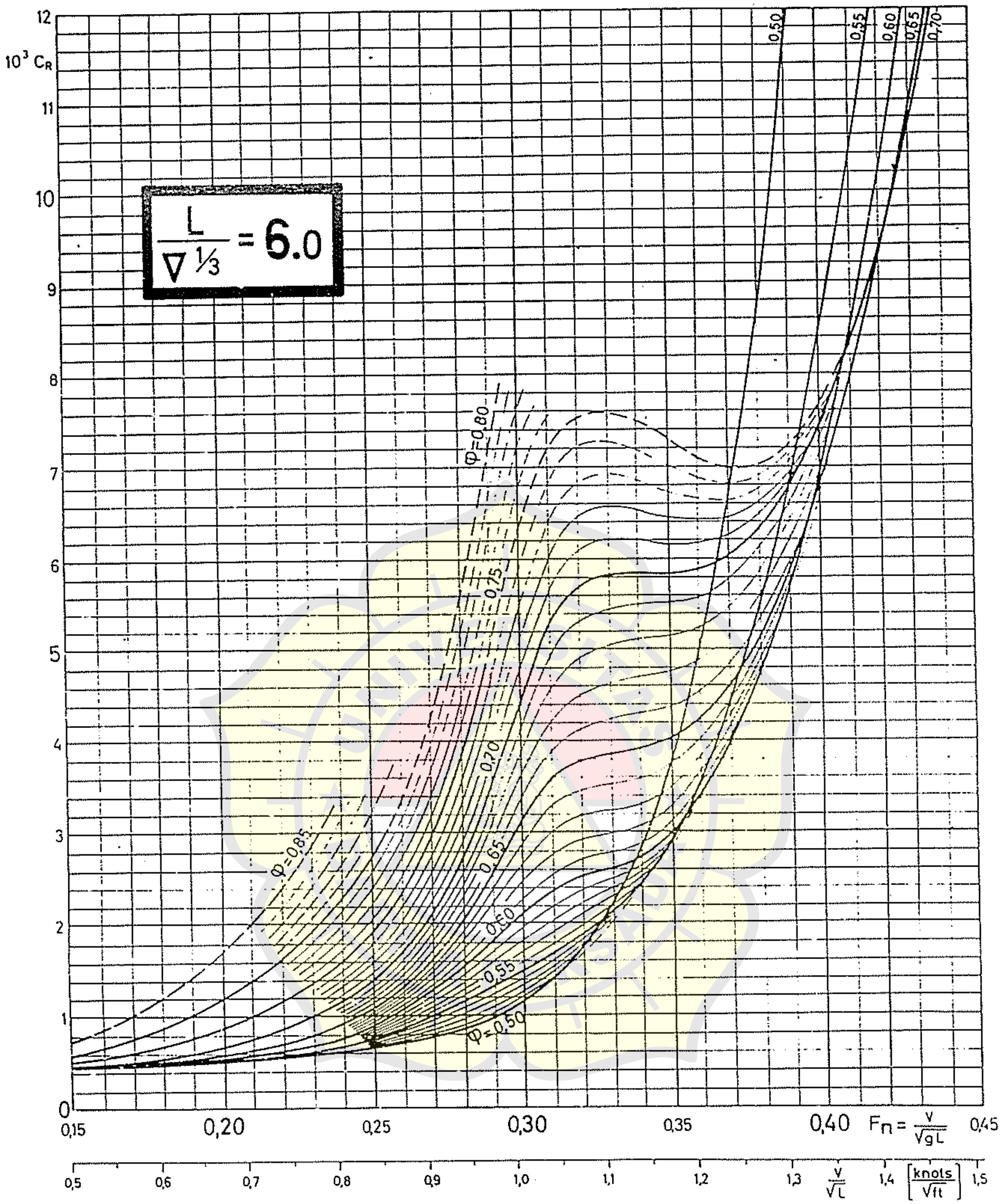


Figure 5.5.9. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 6.0$.

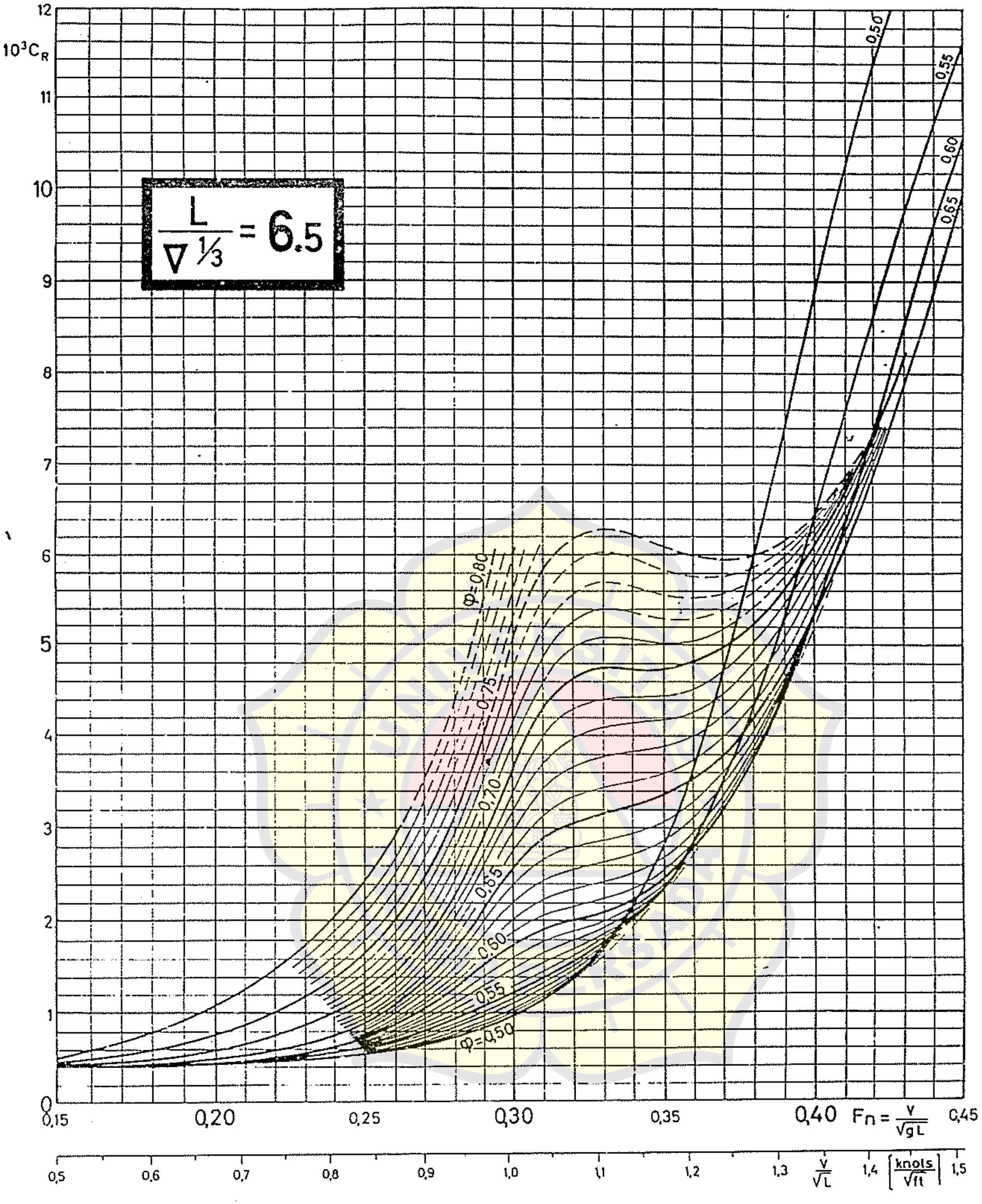


Figure 5.5.10. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 6.5$.

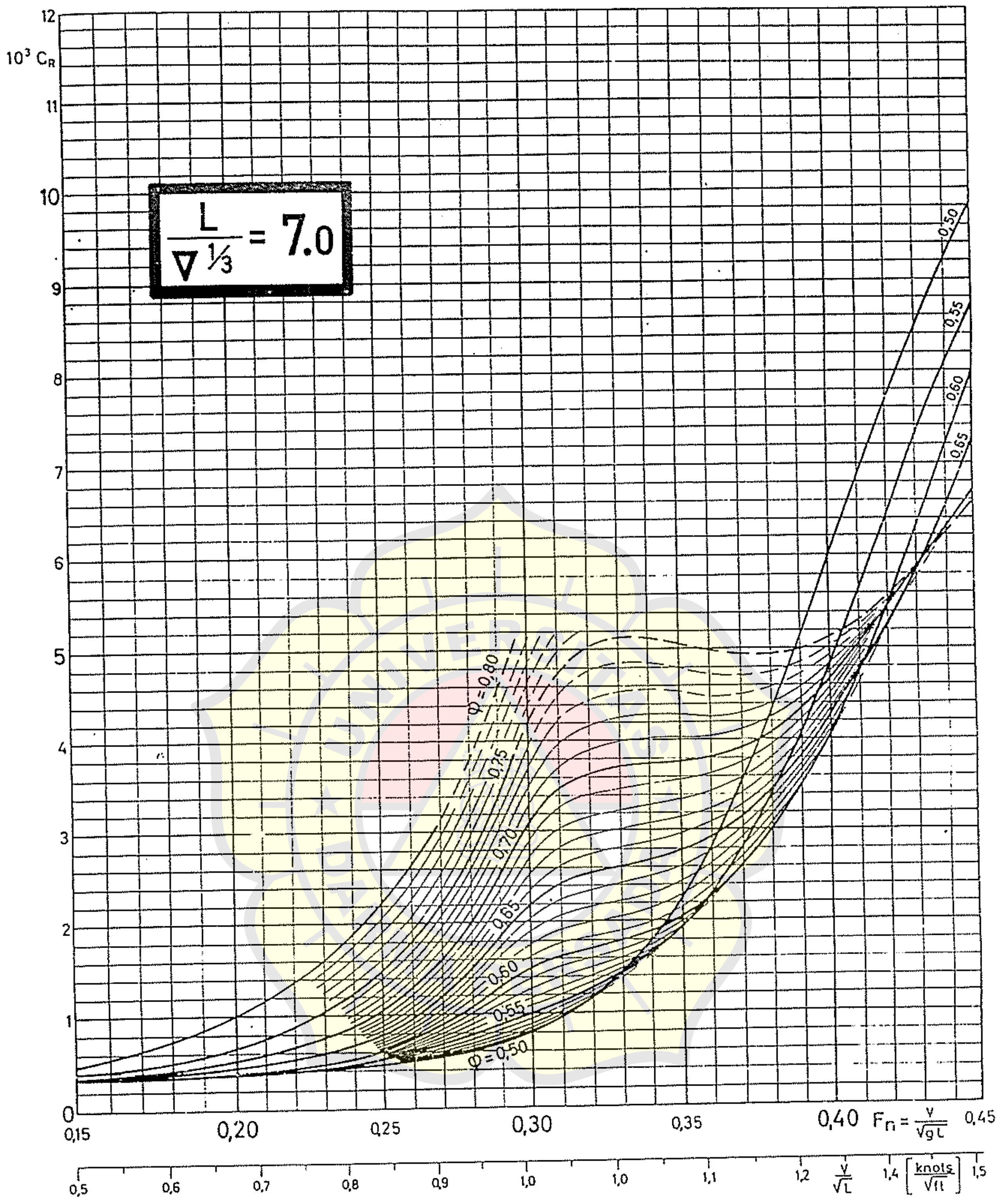
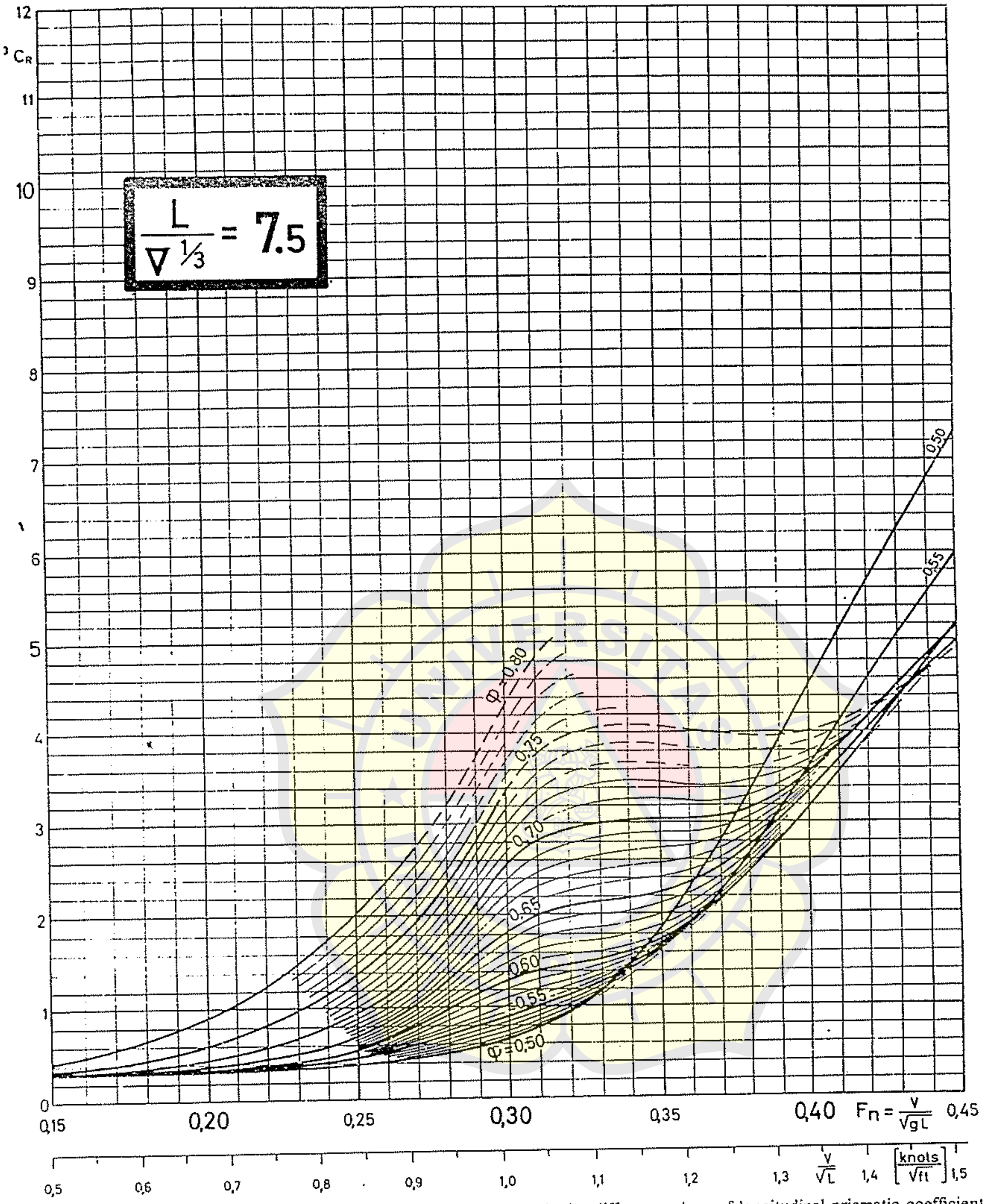


Figure 5.5.11. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 7.0$.



igure 5.5.12. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $/\nabla^{1/3} = 7.5$.

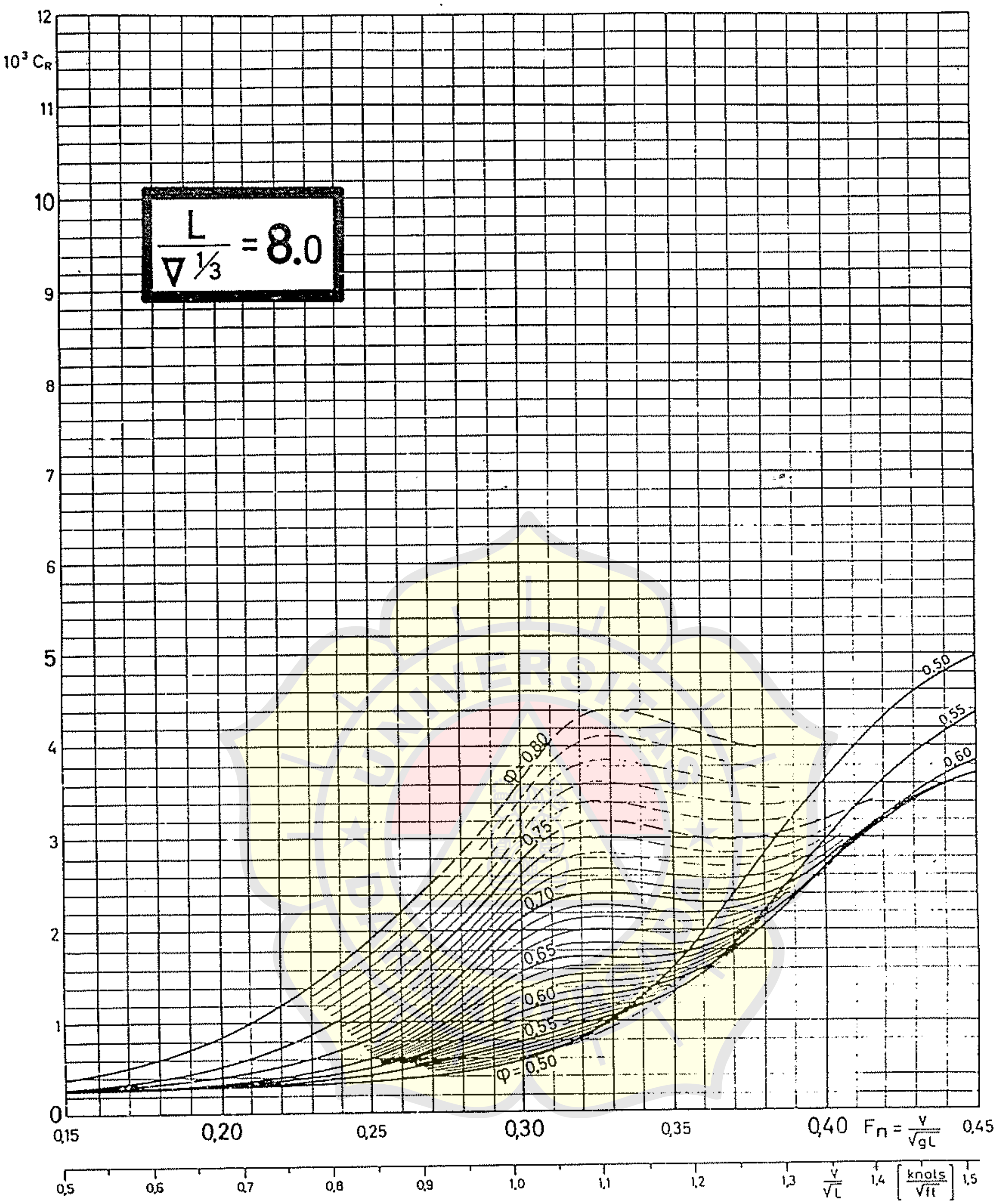
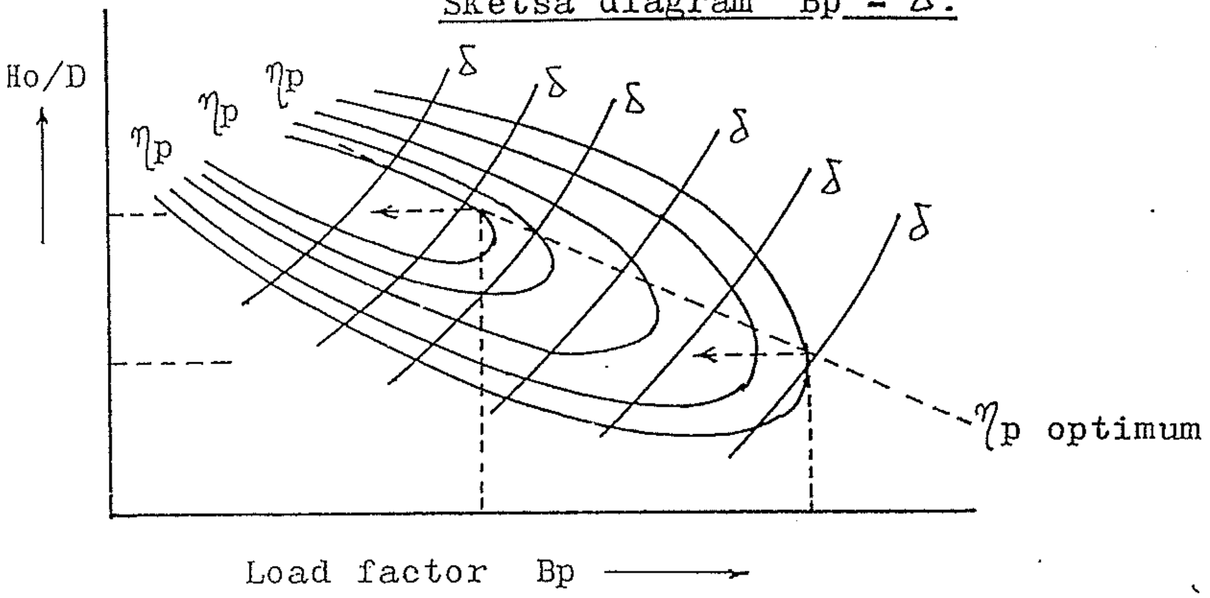


Figure 5.5.13. Residuary resistance coefficient versus speed–length ratio for different values of longitudinal prismatic coefficient. $L/\nabla^{1/3} = 8.0$.

Sketsa diagram Bp - δ.



Pemakaian Bp- δ Diagram dari Baling2 Type B-Series.

Data yang diperlukan untuk perencanaan baling baling dengan memakai diagram Bp- δ .

Baling-baling Troost series type B adalah :

1. Kecepatan kapal Vs dalam knots.
2. Besarnya tenaga kuda ditempat dimana baling2 berada P (= 1 HP Inggris = 76 kg.m/dt)
3. Besarnya perputaran baling2 N dalam rpm. pada keadaan kecepatan Vs dan tenaga P diatas.
4. Harga diameter maximum dari baling2 yang diperkenankan sehubungan dengan sarat air kapal serta ukuran dan bentuk stern frame serta posisi dari sumbu poros baling2, (dalam feet).

Selanjutnya beberapa koreksi harus diadakan sesuai petunjuk yakni untuk memperbaiki ketelitian dalam perhitungan yaitu sebagai berikut :

1. Koreksi karena adanya pengaruh skala (scale effect) Rpm dari baling2 harus dikoreksi sehubungan adanya pengaruh skala dalam komponen2 dari Propulsive efficiency (yaitu: wake, thrust deduction, dan propeller efficiency). Wake fraction untuk kapal2 yang baru selesai dibangun dan catnya masih segar dan sangat licin (trial condition) ternyata menurut pe-

nelitian harganya lebih kecil dari model parafin yang dipergunakan dalam towing test ditangki percobaan, karena harga itu besarnya turun bilamana angka Reynolds bertambah besar. Walaupun kapal2 baru yang baru selesai dicat itu mempunyai permukaan yang lebih kasar terhadap permukaan model parafin, tetapi penambahan besarnya harga wake fraction akibat kekasaran permukaan tidak lebih besar dari pengurangan harga wake fraction akibat bertambah besarnya angka Reynolds untuk kapal sebenarnya.

Berhubung data yang tersedia adalah hasil dari model kapal dari parafin yang permukaannya sangat licin (yaitu data harga2 wake, thrust deduction dan effisiensi baling2), sedangkan yang direncanakan adalah baling2 untuk kapal yang sebenarnya, maka perbedaan harga wake dimuka menyebabkan rpm dari baling2 yang direncanakan harus dikoreksi dengan mengurangi harganya.

Hal itu adalah agar supaya "propeller behind the ship" bekerja pada putaran yang dikehendaki dapat sama dengan yang dipakai pada percobaan yang menghasilkan diagram Bp-δ yang dipilih dalam perencanaan itu. Penurunan perputaran baling2 akibat adanya fouling kapal juga harus diperhitungkan.

Sampai saat ini NSMB mempergunakan harga2 koreksi untuk rpm sebagai berikut :

Kapal2 ber-baling2 tunggal :

Untuk service condition : - 2 %
Untuk trial condition : - 3 %

Kapal2 ber-baling2 ganda :

Untuk service condition : - 1 %
Untuk trial condition : - 2 %

2. Koreksi tenaga :

Koreksi ini adalah untuk memperhitungkan adanya kerugian2 gesekan pada stuffing dan bantalan2 lainnya dsb. pada shafting arrangement kapal.

Baik untuk kapal2 ber-baling2 ganda maupun tunggal besarnya koreksi untuk masing2 poros baling baling adalah :

Kamar mesin dibelakang : - 3 %

Kamar mesin ditengah : - 5 %

Untuk kapal2 perang destroyer, cruiser dsb. biasanya untuk kerugian gesekan pada shaftingnya diperkirakan hanya perlu koreksi - 1%.

Perlu diingat bahwa perhitungan P pada Bp-δ adalah memakai H.P. Inggris yaitu = 76 kg.m/detik, sehingga kapal data P yang diberikan adalam metric maka perlu adanya koreksi penyesuaian.

3. Koreksi air tawar menjadi air laut :

Bp - δ maupun diagram Bu - δ semuanya adalah hasil percobaan yang dilaksanakan ditangki percobaan memakai air tawar. Bilamana baling2 yang direncanakan adalah untuk kapal laut, maka perlu diadakan koreksi pada harga P untuk penyesuaian air tawar terhadap air laut tersebut.

Besarnya koreksi adalah :

$$P \times \frac{1,000}{1,025}$$

4. Koreksi harga δ :

Baik Bp - δ maupun diagram Bu - δ adalah dihasilkan dari open water tests dimana model baling2 bekerja pada kondisi terbuka atau open condition.

Karena baling2 yang direncanakan adalah nantinya bekerja pada behind condition, maka perlu adanya koreksi sebagai berikut :

Kapal ber-baling2 tunggal :

Untuk C_b besar : - 4% s/d - 5%
Untuk C_b kecil : - 2%

Kapal ber-baling2 ganda: - 2% s/d - 4%

Adapun prosedur perencanaannya adalah sbb. :

a). Hitung harga load factor Bp :

$$Bp = \frac{N\ P^{\frac{1}{2}}}{Va^{2\frac{1}{2}}}$$

Adakan koreksi2 seperti telah diterangkan di muka.

b). Dengan memakai Bp - δ diagram pada harga Bp yg telah didapat dari perhitungan diatas, maka dapatlah diketahui besarnya harga optimum advance coefficient δ yaitu dimana mempunyai harga ηp maximum (digaris putus2 pada Bp - δ diagram). Hitung beberapa harga untuk beberapa harga Fa/F.

c). Adakan koreksi untuk harga δ optimum dengan cara dan data yang telah diterangkan diatas.

d). Hitung besarnya D dari harga-harga δ yang telah dikoreksi yakni;

$$D = \frac{\delta \,.\, Va}{N}$$ dan baca pada diagram harga pitch ratio H/D pada harga δ yang telah dikoreksi tadi.

e). Periksa pada harga Fa/F bagaimana terhadap bahaya kavitasi. Bilamana perlu tentukan harga D dan H/D dengan cara interpolasi untuk harga Fa/F yang diingini.

f). Adakan pemeriksaan terhadap kekuatan baling2 yaitu apakah tebal daun yang direncanakan dengan meniru type yang dipilih sudah cukup kuat dan memenuhi persyaratan kekuatan dan Klasifikasi (Caranya akan diterangkan di paragrap kemudian).

3. Analisa Sebuah Baling2 pada Kondisi Penarikan/Beban Berlebihan.

Berikut ini adalah cara untuk dapat membuat estimasi besarnya gaya tarik tali atau tow rope force dari sebuah kapal pada kondisi penarikan (towing)ataupun pada kondisi beban berlebihan (overload condition) dimana ditentukan kecepatan kapal pada kondisi itu dan baling2 yang dipergunakannya adalah baling2 type B-series yang telah diketahui pula.

Seperti diketahui, pada saat kapal menarik kapal lain ataupun adanya beban lain yang melebihi dari keadaannya bila mana kapal tersebut bebas (free running) maka tahanan kapal (dengan beban tambahannya) akan bertambah dan walaupun mesin induk sebagai mesin penggerak kapal sudah dengan putaran max. yang dapat dicapai dengan kondisi tersebut, kecepatan kapal Vs jelas akan lebih rendah dari kecepatan kapal pada keadaan bebas.

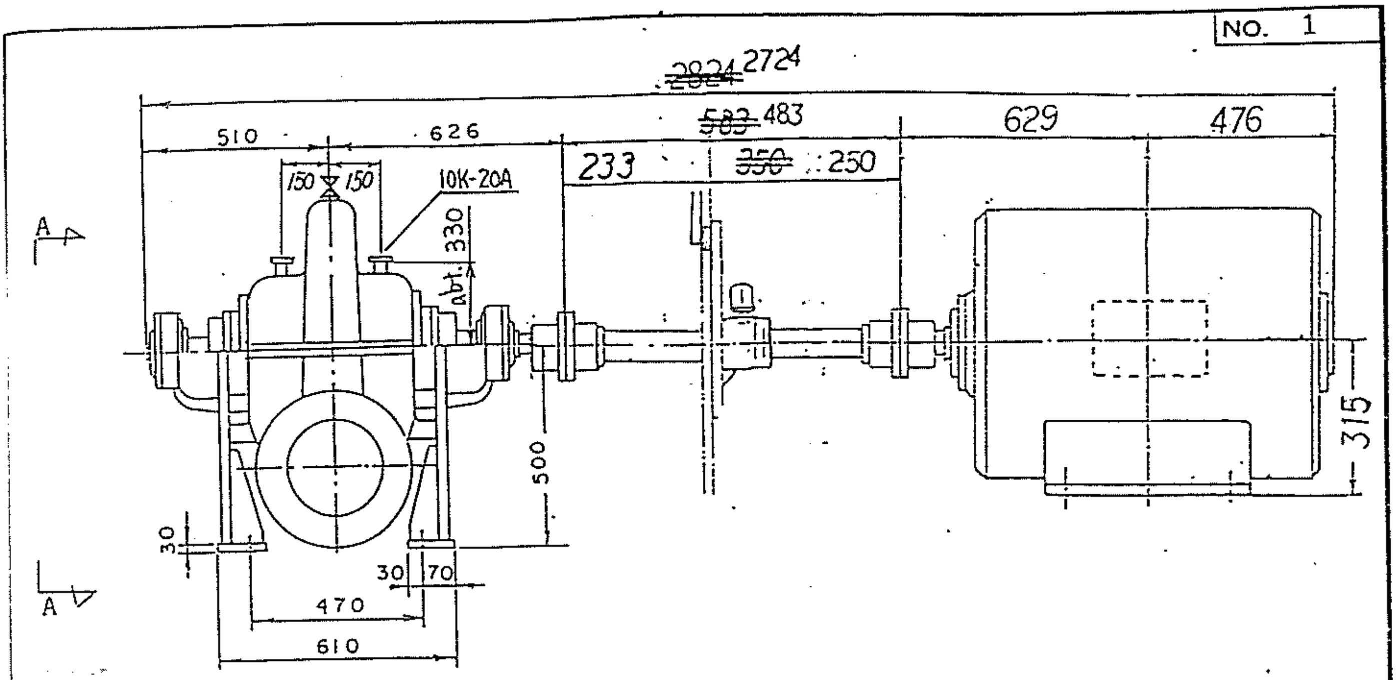
Jadi, dengan demikian harga Va pun akan turun. Untuk mesin2 internal combustion engines, putaran mesin akan turun walaupun sudah digas penuh.

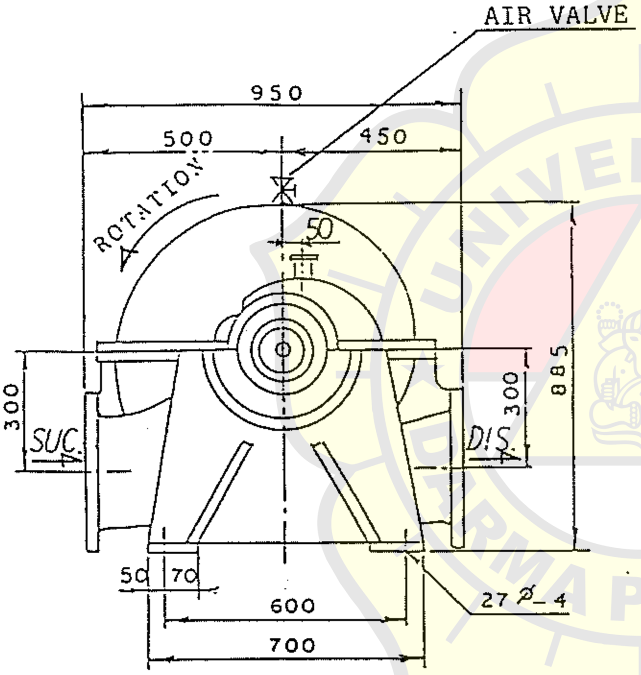
Sedangkan untuk bollard pull test kapal tunda, biasanya percobaan dengan maximum continuous rating (MCR) tidak lebih dari satu jam. Adapun cara perhitungannya mencari Tow Rope Force pada suatu kecepatan yang ditentukan adalah sebagai berikut :

1) Hitung harga koeffisien kecepatan;

$$J = \frac{Va}{n\ D}$$ pada

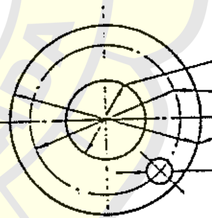
NO. 1





A-A ARROW VIEW

SUC. & DEL. FLANGE
吸込及吐出フランジ



JIS10kgf.cm² SUC. 吸込	JIS10gf.cm² DEL. 吐出
⌀300	⌀250
⌀400	⌀355
⌀445	⌀400
16 -⌀25	12-⌀ 25

WEIGHT 重量	
PUMP ポンプ	860 kg
MOTOR 電動機	850 kg
TOTAL 全重量	1710 kg

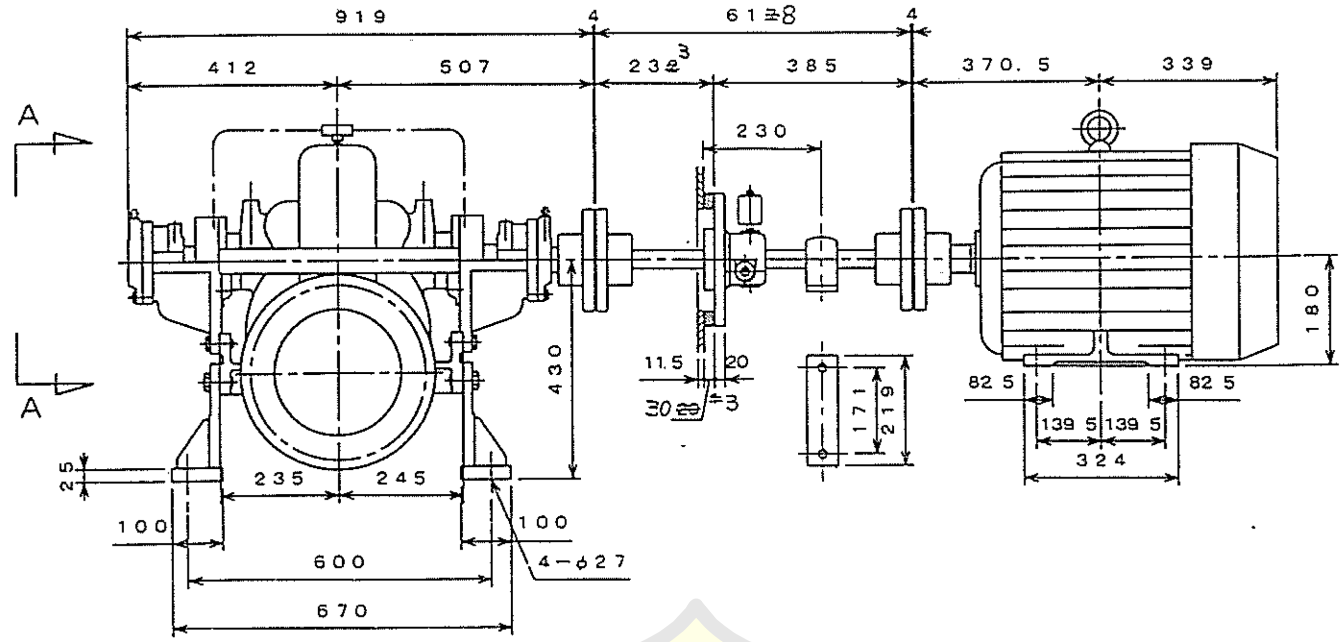
ACCESSORIES FOR I PUMP 附属品（ポンプ1台ニ付）	
NAME OF PART 部品名称	QUAN 数量
COUPLING カップリング	1 set
STUFFING BOX スタフィングボックス	1 set
DRAIN PLUG ドレンプラグ	1
AIR VALVE エアーバルブ	1

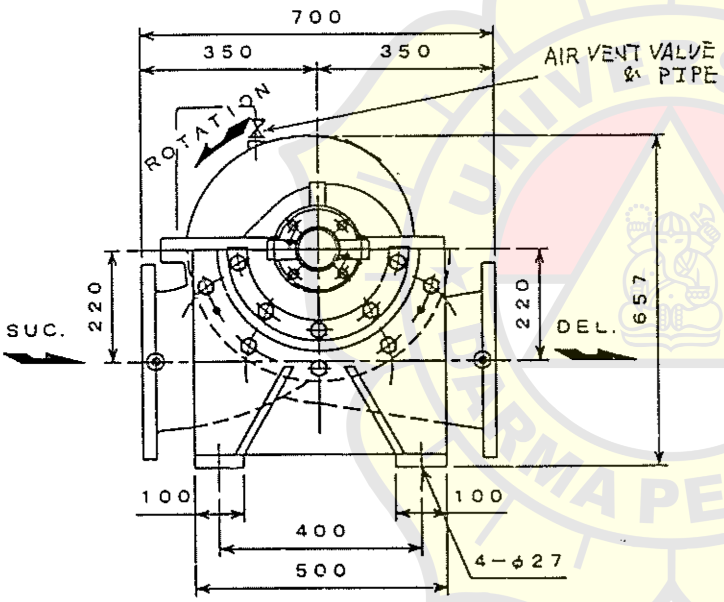
SPECIFICATION 仕様		
SUCTION BORE 吸込口径	300	mm
DELIVERY BORE 吐出口径	250	mm
CAPACITY 容量	600	m³/h
TOTAL HEAD 揚程	100	m
SUCTION HEAD 吸込揚程	-4.5	m
REVOLUTION 回転数	1750	r.p.m.
W. T. P. 水圧試験	20	kgf/cm²
MOTOR OUT PUT 電動機出力	250	KW
4 P. 440 V.	60	Hz.

NAME 名称	No.1 ~ No.3 CARGO OIL PUMP
TYPE 型式	FBWH-250
SHIP NO. 船番	439
SUPPLY 台数	3 SET 台
INSPECTION 検査	NK ~~BKI~~
ANGLE PROJ. 角法	3rd 第三角法
SCALE 尺度	FREE
DRAWING NO. 図番	97DG0182

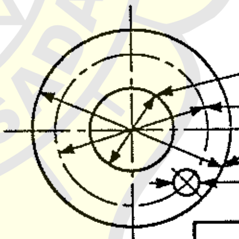
NANIWA PUMP MFG. CO., LTD.
MANUFACTURING DESIGN SECTION
株式会社 浪速ポンプ製作所

NO. 2





A−A ARROW VIEW



SUC. & DEL. FLANGE

JIS 5 K SUC.	JIS 5 K DEL.
ϕ250	ϕ250
ϕ345	ϕ345
ϕ385	ϕ385
12−ϕ23	12−ϕ23

WEIGHT	
PUMP	400 kg
MOTOR	200 kg
TOTAL	600 kg

ACCESSORIES FOR EACH 1 PUMP

DESCRIPTION	Q'TY
COUPLING	2 sets
AIR COCK & SEALING PIPE	1 set
DRAIN JOINT WITH HOSE	1 set
STUFFING BOX	1 set

SPECIFICATION

SUCTION BORE	250 mm
DELIVERY BORE	250 mm
CAPACITY	300 m³/h
TOTAL HEAD	20 m
SUCTION HEAD	m
REVOLUTION	1750 r.p.m
HYD. TEST PRESS.	4 Kgf/cm²
MOTOR OUTPUT	26 KW, 4 P
POWER SOURCE	440V. 60Hz. 3ph
REMARKS	

PUMP NAME

No. 1 & No. 2
BALLAST PUMP

PUMP MODEL	FBWV-250H
QUANTITY	2 SETS
RULE	NK, ~~BKI~~
ANGLE PROJ.	3 rd
SCALE	FREE
DRAWING NO.	97DG0508

NANIWA PUMP MFG. CO, LTD.
MANUFACTURING DESIGN SECTION

NANIWA PUMP
OSAKA JAPAN

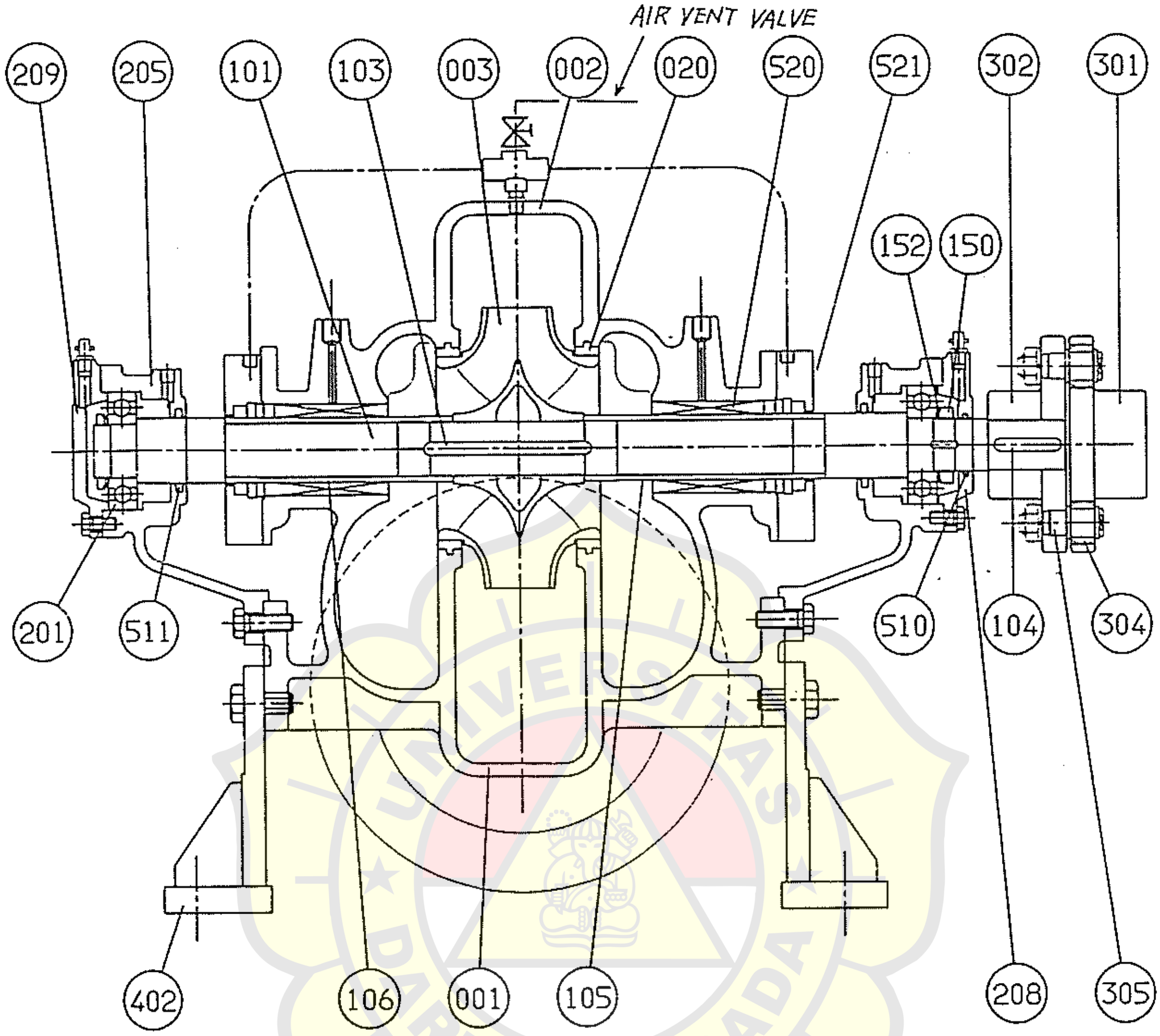
SECTIONAL DRAWING

HORIZONTAL CENTRIFUGAL PUMP

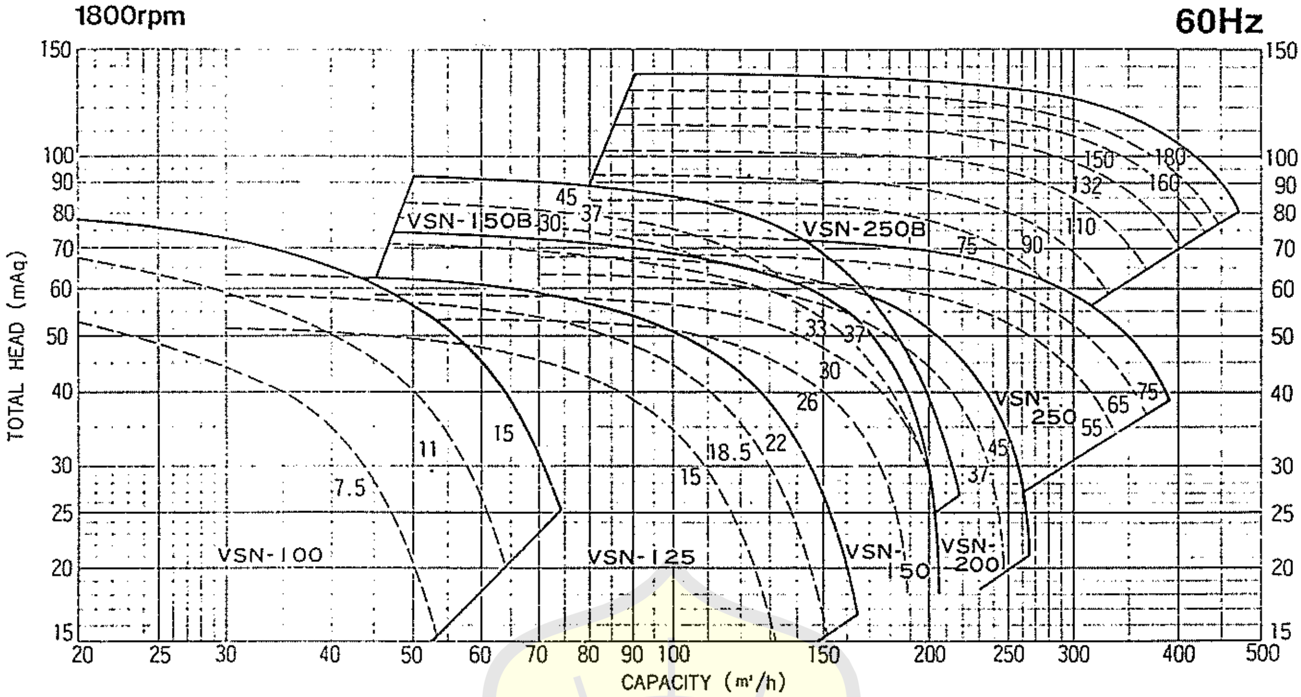
MODEL FBWV-250H

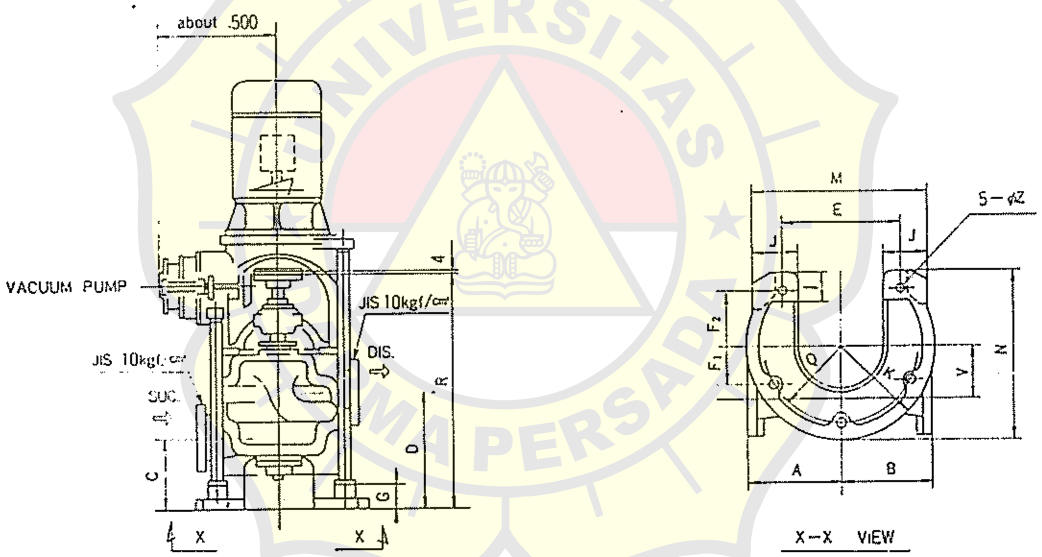
DRAWING NO. 97DS0245

DATE Dec. 10 1997



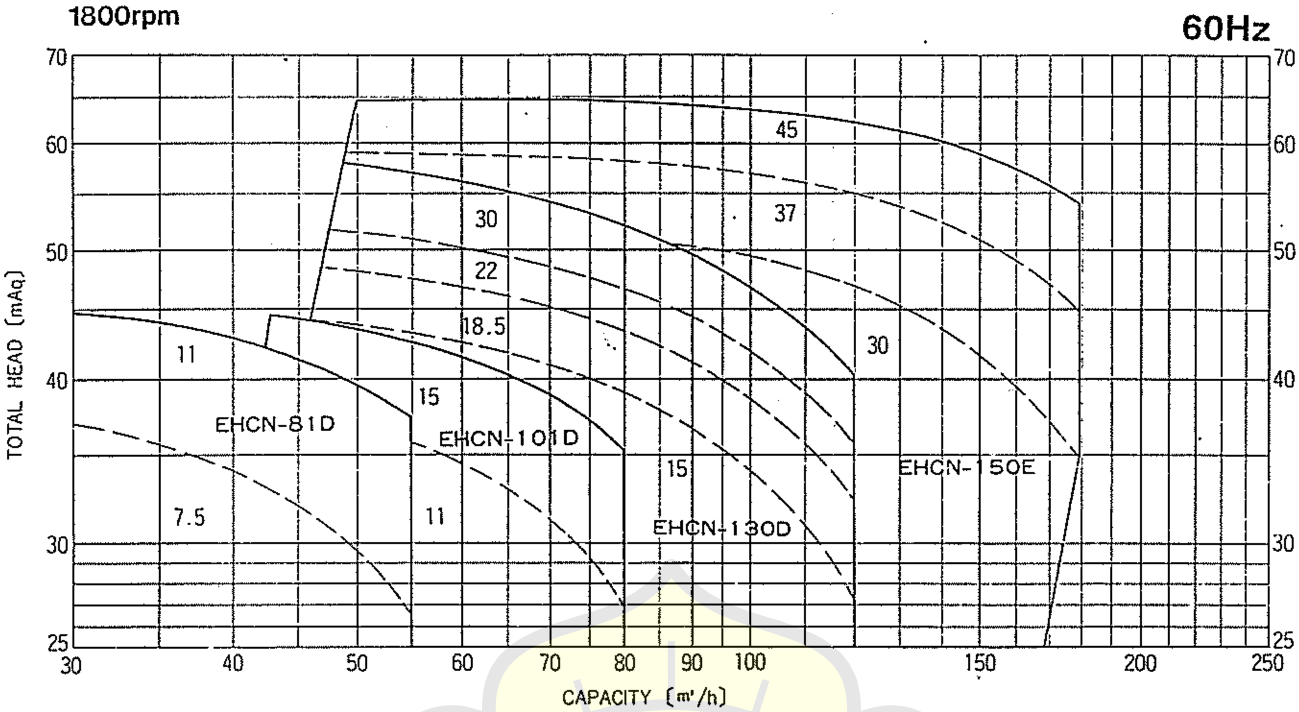
PART NO.	NAME OF PART	MATERIAL		Q TY	PART NO.	NAME OF PART	MATERIAL		Q TY
302	COUPLING	CAST IRON	FC200	2					
301	COUPLING	CAST IRON	FC200	2					
209	BEARING COVER	CAST IRON	FC200	1					
208	BEARING COVER	CAST IRON	FC200	1					
205	BEARING HOUSING	CAST IRON	FC200	2					
201	BALL BEARING		No. 6310	2					
152	BEARING WASHER	MILD STEEL	SS400	2					
150	BEARING NUT	MILD STEEL	SS400	2					
106	SLEEVE	STAINLESS STEEL	SUS316	1					
105	SLEEVE	STAINLESS STEEL	SUS316	1					
104	COUPLING KEY	CARBON STEEL	S45C	2	521	SEAL COVER	CAST BRONZE	BC3	2
103	IMPELLER KEY	STAINLESS STEEL	SUS304	1	520	MECHANICAL SEAL			2sets
101	SHAFT	STAINLESS STEEL	SUS304	1	511	PACKING RING	FELT		2
020	CASING RING	CAST BRONZE	BC6	2	510	PACKING RING	FELT		1
003	IMPELLER	PHOSPHOR BRONZE	PBC2	1	402	PUMP FOOT	MILD STEEL	SS400	1set
002	CASING COVER	CAST BRONZE	BC3	1	305	COUPLING BOLT & NUT	MILD STEEL	SS400	2sets
001	CASING	CAST BRONZE	BC3	1	304	COUPLING RING	RUBBER	N B R	2sets

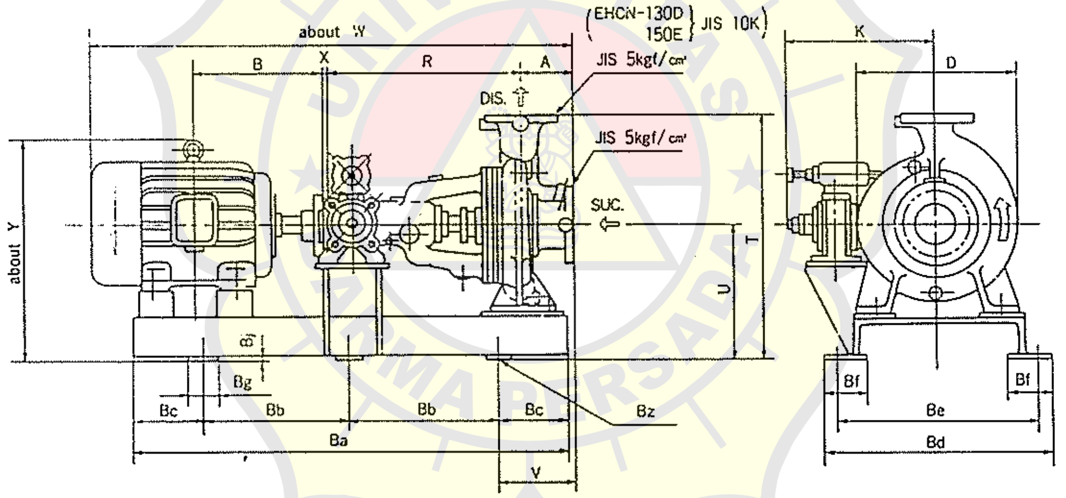




DIMENSION

TYPE	BORE		DIMENSION (mm)																
	SUC.	DIS.	A	B	C	D	E	F_1	F_2	G	I	J	K	M	N	Q	R	V	Z
VSN-100	100	100	300	270	220	380	368	130	184	80	80	175	310	590	550	260	846	170	24
VSN-125	125	125	290	320	262	442	354	125	177	90	76	140	300	550	525	250	970	175	26
VSN-150	150	150	370	350	245	428	424	150	212	90	120	215	360	750	663	300	976	210	28
VSN-150B	150	150	350	330	262	442	424	150	212	90	120	215	360	750	663	300	972	200	28
VSN-200	200	200	370	350	245	428	424	150	212	90	120	215	360	750	663	300	876	210	28
VSN-250	250	250	400	430	290	552	425	150	212	90	120	227	360	750	663	300	955	210	28
VSN-250B	250	250	430	430	290	49[illegible]	452	160	226	80	113	245	365	750	668	320	1095	330	28

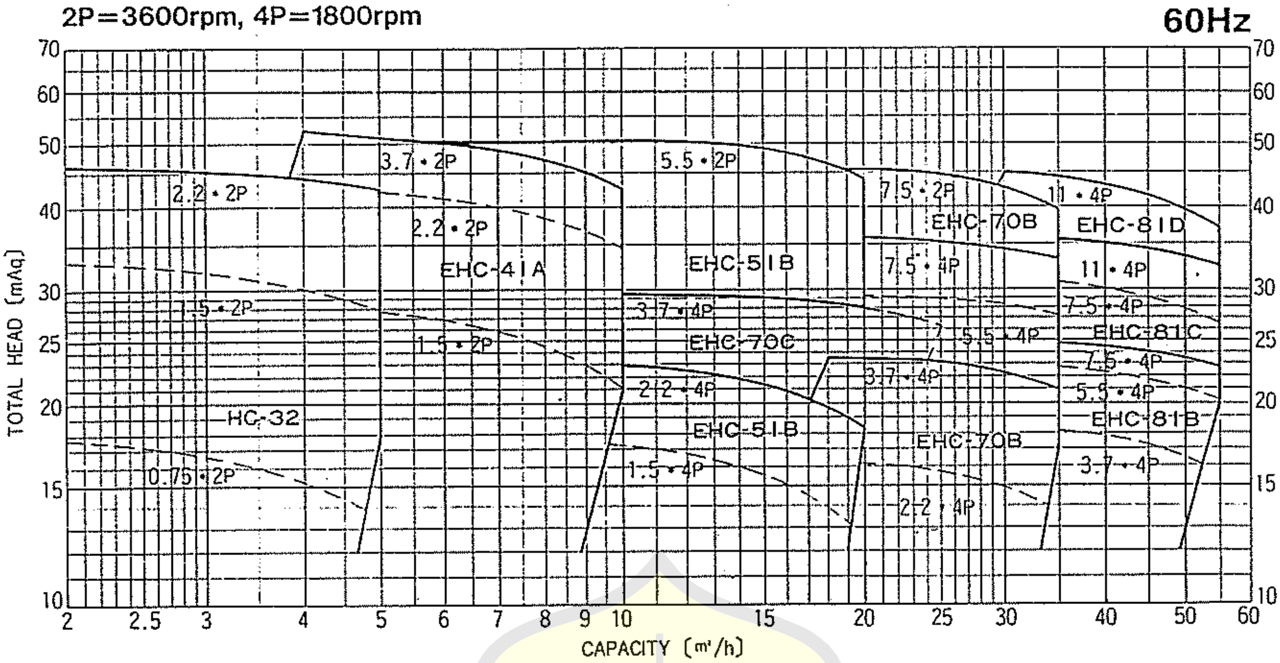


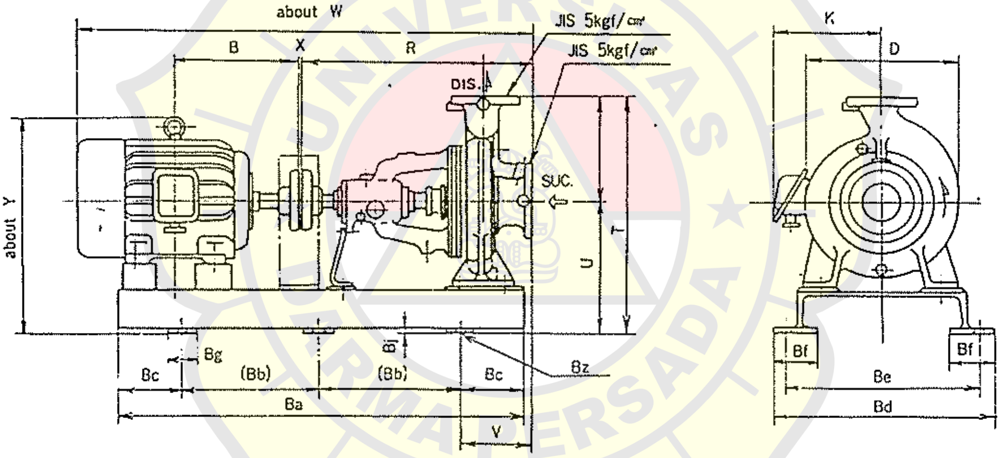


DIMENTION

TYPE	MOTOR		BORE		DIMENSION (mm)																			
	kw	r/m	SUC.	DIS.	A	B	D	K	R	T	U	V	W	X	Y	Ba	Bb	Bc	Bd	Be	Bf	Bg	Bj	Bz
EHCN- 81D	7.5	1800	80	80	125	258	413	206	470	625	345	185	1086	3	502	1000	350	150	470	430	65	60	12	6-ϕ19
	11					323		228					1199		534	1100	400							
EHCN-101D	11	1800	100	100	125	323	420	228	470	685	370	185	1237	3	584	1100	400	150	470	430	65	60	12	6-ϕ19
	15					345							1220											
EHCN-130D	15	1800	125	100	140	345	455	263	545	685	370	200	1308	3	590	1100	400	150	470	430	65	60	12	6-ϕ19
	18.5					351.5		296					1345		610									
	22					370.5		323					1382			1200	450							
	30					395.5		363					1450											
EHCN-150E	30	1800	150	125	140	395.5	576	363	530	865	465	170	1450	4	645	1300	500	150	550	500	65	60	30	6-ϕ24
	37					432		382					1500		690									
	45					444.5							1520		690									

EHC SERIES

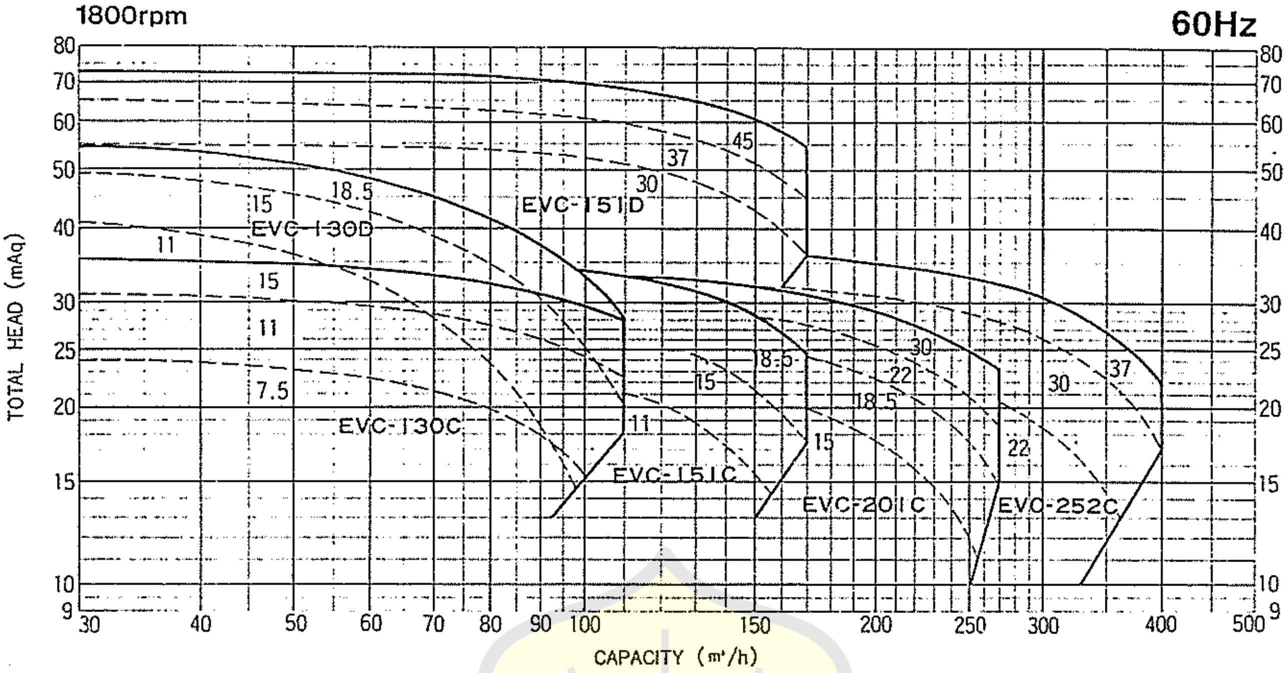


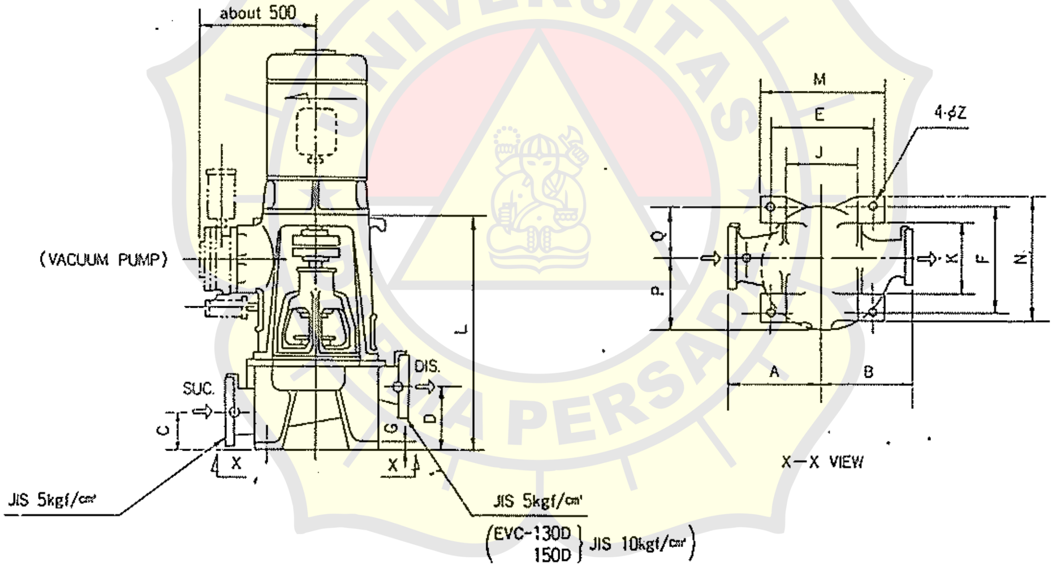


DIMENTION

TYPE	MOTOR		BORE		DIMENSION (mm)																			
	kw	r/m	SUC.	DIS.	A	B	D	K	R	T	U	V	W	X	Y	Ba	Bb	Bc	Bd	Be	Bf	Bg	Bj	Bz
HC-32	0.75	3600	32	32	80	140	270	139	260	330	190	180	610	3	273	500	350	75	275	240	55	50	12	4-φ15
	1.5					169		148					665		284									
	2.2					183		159					696		299	600	400	100						
EHC-41A	1.5	3600	40	40	80	169	207	143	360	400	240	145	618	3	334	700	450	125	325	290	55	50	12	4-φ15
	2.2					183		159					793		349									
	3.7					200		169					817		388	800	500	150						
EHC-41B	1.5	1800	40	40	80	169	260	148	360	455	275	145	762	3	368	700	450	125	325	290	55	50	12	4-φ15
EHC-51B	1.5	1800	50	50	100	169	268	148	360	450	270	165	782	3	368	700	450	125	325	290	55	50	12	4-φ15
	2.2					183		159					813		379									
	5.5	3600				239		206					913		438	800	500	150						
EHC-70B	2.2	1800	65	65	100	183	286	159	360	470	270	165	813	3	379	700	450	125	325	290	55	50	12	4-φ15
	3.7					200		169					937		418	800	500	150						
	7.5	3600				258		206					951		438	900	550	175	390	350	65	60		4-φ15
EHC-70C	3.7	1800	65	65	100	200	338	169	360	515	290	165	837	3	438	800	500	150	325	290	55	50	12	4-φ15
	5.5					239		206					906		458									
	7.5					258							951			900	550	175	390	350	65	60		4-φ15
EHC-81B	3.7	1800	80	80	100	200	326	206	360	515	290	165	937	3	438	800	500	150	325	290	55	50	12	4-φ15
	5.5					239							906		458									
	7.5					258							951			900	550	175	390	350	65	66		4-φ15
EHC-81C	7.5	1800	80	80	100	258	364	206	470	570	320	160	1054	3	502	1000	350	150	470	430	65	60	12	6-φ19
	11					323		228					1068		534	1100	400							
EHC-81D	7.5	1800	80	80	125	258	413	206	470	625	345	185	1086	3	502	1000	350	150	470	430	65	60	12	6-φ19
	11					323		226					1199		534	1100	400							

TAIKO KIKAI IND. CO., LTD.

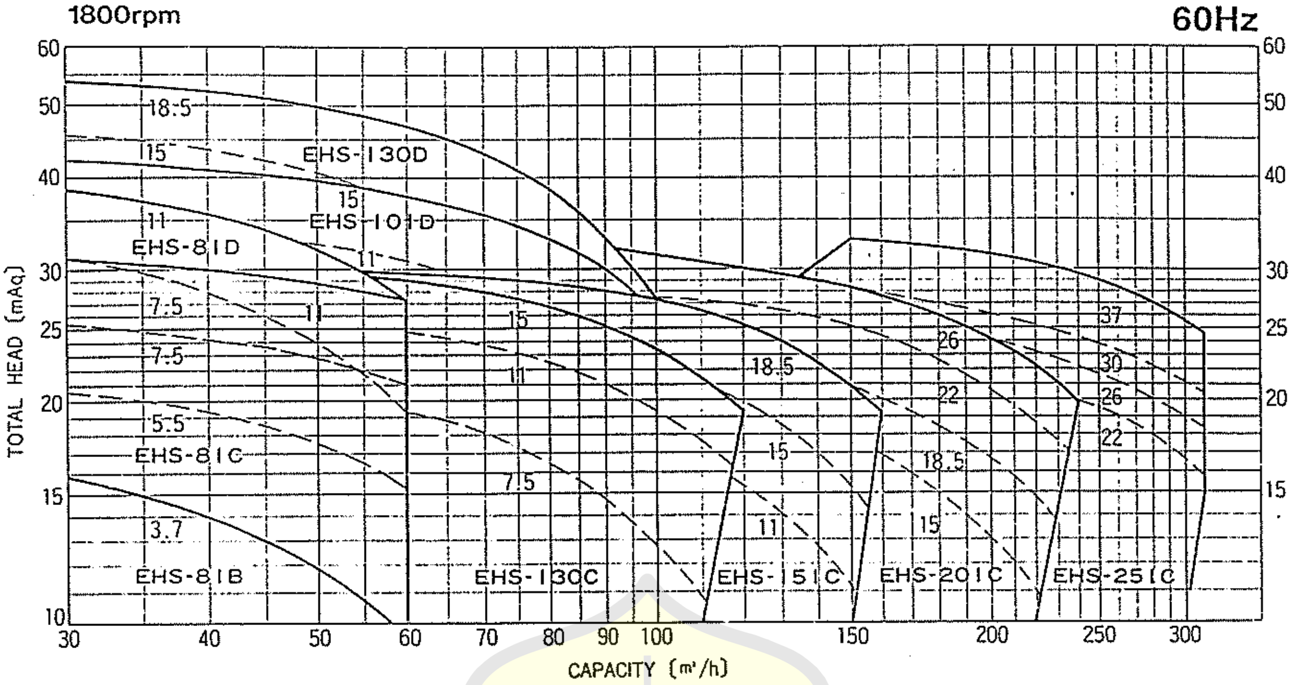


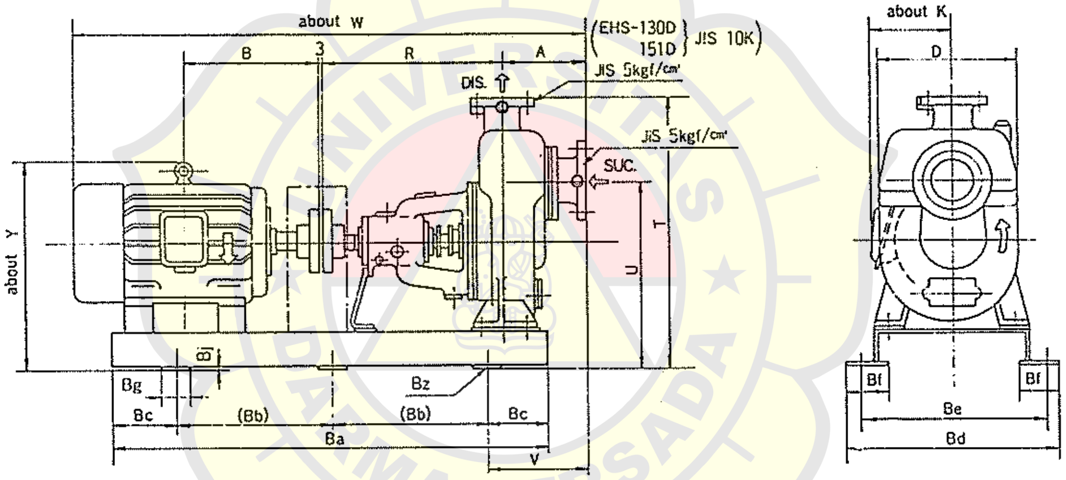


DIMENSION

TYPE	BORE		DIMENSION (mm)														
	SUC.	DIS.	A	B	C	D	E	F	G	J	K	L	M	N	P	Q	Z
EVC-130C	125	125	300	315	140	150	340	320	15	220	240	764	420	400	250	180	28
EVC-130D	125	100	345	345	150	190	380	380	25	250	250	882	450	450	305	225	28
EVC-151C	150	150	315	335	140	205	360	370	20	240	250	804	440	450	250	180	28
EVC-151D	150	125	345	345	150	190	380	380	23	250	250	980	450	450	290	290	28
EVC-201C	200	200	335	335	190	285	380	390	20	260	270	897	460	470	260	200	28
EVC-252C	250	250	380	400	215	285	420	420	25	260	280	1020	540	500	310	210	28

EHS SERIES





DIMENSION

TYPE	MOTOR		BORE		DIMENSION (mm)																		
	kw	r/m	SUC.	DIS.	A	B	D	K	R	T	U	V	W	Y	Ba	Bb	Bc	Bd	Be	Bf	Bg	Bj	Bz
EHS81B	3.7	1800	80	80	230	200	280	200	365	585	430	300	990	455	800	500	150	390	350	65	60	12	4-φ15
EHS81C	5.5	1800	80	80	205	239	340	210	470	670	470	265	1130	505	1000	350	150	470	430	65	60	12	6-φ19
	7.5					258							1170										
	11					323		315					1280	640	1100	400							
EHS81D	7.5	1800	80	80	215	258	385	210	470	720	520	275	1180	530	1000	350	150	470	430	65	60	12	6-φ19
	11					323		315					1290	665	1100	400							
EHS-101D	11	1800	100	100	215	323	384	228	470	720	520	275	1283	560	1100	400	150	470	430	65	60	12	6-φ19
	15					345		263					1327										
EHS-130C	7.5	1800	125	125	225	258	358	260	470	700	495	285	1060	560	1100	400	150	470	430	65	60	12	6-φ19
	11					323		228					1293										
	15					345		263					1337										
EHS-130D	15	1800	125	100	280	345	416	275	575	770	545	340	1480	535	1300	500	150	440	410	50	60	25	6-φ19
	18.5					351.5		315					1520	555									
EHS-151C	11	1800	150	150	285	323	355	275	470	790	570	385	1190	560	1100	400	150	470	430	65	60	12	6-φ19
	15					345		263					1397.	560									
	18.5					352		296					1413	595									
EHS-201C	15	1800	200	200	325	345	400	275	530	955	655	365	1190	575	1100	400	150	470	430	65	60	12	6-φ19
	18.5					352		296					1453	595									
	22					371							14911	620	1200	450							
	26					396		355					1615	635									
EHS-251C	22	1800	250	250	335	370.5	500	315	530	955	655	365	1350	605	1300	500	150	600	550	65	60	12	6-φ24
	26					396		355					1646	625									
	30																						
	37					432		395					1695	680									

図面番号
DWG.NO. 035-30545 △

工事番号
WORK NO. B-1-7-1048-△

DATE	1997. 12. 12		
CHIEF OF DEP	CHIEF	CHECKED BY	DRAWN BY
	E.MATSUBARA	Y.MATSUMOTO	S. TAKAHASHI

製品 NAME OF GOOD	油圧操舵機 HYDRAULIC STEERING GEAR
型式 TYPE	KE-K200
受注先 AGENCY	SASEBO HEAVY INDUSTRIES CO.,LTD. 殿
造船所 SHIP YARD	SASEBO HEAVY INDUSTRIES CO.,LTD. 殿
船番 SHIP NO.	439 | 船名 SHIP NAME | MT PEGARIN
船主 SHIP OWNER	殿

検査 INSPECTION	NK / BKI				
塗装色 PAINTED COLOR	BLUE GRAY T57-70D (7.5BG7/2)				
ネームプレート NAME PLATE	英文 ENGLISH				
装備電源 ELECTRIC SOURCE	三相交流 THREE-PHASE-ALTERNATING-CURRENT	AC 440 V 60 Hz×ϕ3			
	単相交流 SINGLE-PHASE-ALTERNATING-CURRENT	AC 220 V 60 Hz×ϕ1			
	直流 DIRECT CURRENT	DC 24 V			
御支給品明細 ARTICLES SUPPLIES	符号 NO.	品名 NAME	個数 NO.S	型式 TYPE	メーカー MAKER
記事 REMARKS					

KITAGA… CO.,LTD.
'98.7.24
DESIGN SECT
北川工業…

NO. 78709E	SPECIFICATION OF THE STEERING GEAR		
TYPE	KE-K200	WORK NO.	
AGENCY		INSPECTION	NK
SHIP YARD			
SHIP NO.			

PAPTICULAR		UNIT	
TORQUE OF THE STEERING GEAR		kN-m (t-m)	245.0(25.0)
WORKING PRESSURE		MPa (kg/cm^2)	12.7 (130)
RELIEF VALVE SET PRESSURE		MPa (kg/cm^2)	16.0 (163)
TEST PRESSURE		MPa (kg/cm^2)	24.0 (245)
DIA. OF PLUNGER		mm	200
DIA. OF PISTON ROD		mm	200
WORKING STROKE OF PLUNGER		deg/mm	70° /644
PRESSURE AREA		cm^2	314.2
CYLINDER CAPACITY		cm^3	20232
TILLER RADIUS		mm	460
MAX.STEERING ANGLE		deg	70°
STEERING SPEED	1PUMP	deg/sec	70° /45
	2PUMP		70° /23
ELECTRIC MOTOR	OUTPUT	kw	7.5
	VOLTAGE	V	440
	CYCLE	Hz	60
	A. M. P	P	4
	REVOLUTION	r.p.m.	1740
PUMP	TYPE	———	T7B-B05-2R00-A1M1
	QUANTITY	ℓ/min	27.0×2
	REVOLUTION	r.p.m.	1740
	V-PULLEY	———	
RUDDER STOCK AND KEY		mm	280
ELECTRIC SOURCE		AC-V	AC440×60Hz×3φ
		DC-V	DC24V

REMARKS	CHIEF	E.MATSUBARA
	CHECKD BY	Y. MATSUMOTO A. OGAWA
	DRAWN BY	S.TAKAHASHI
	INDEX.NO	78771E

KITAGAWA KOGYO CO.,LTD

2. SPECIFICATION

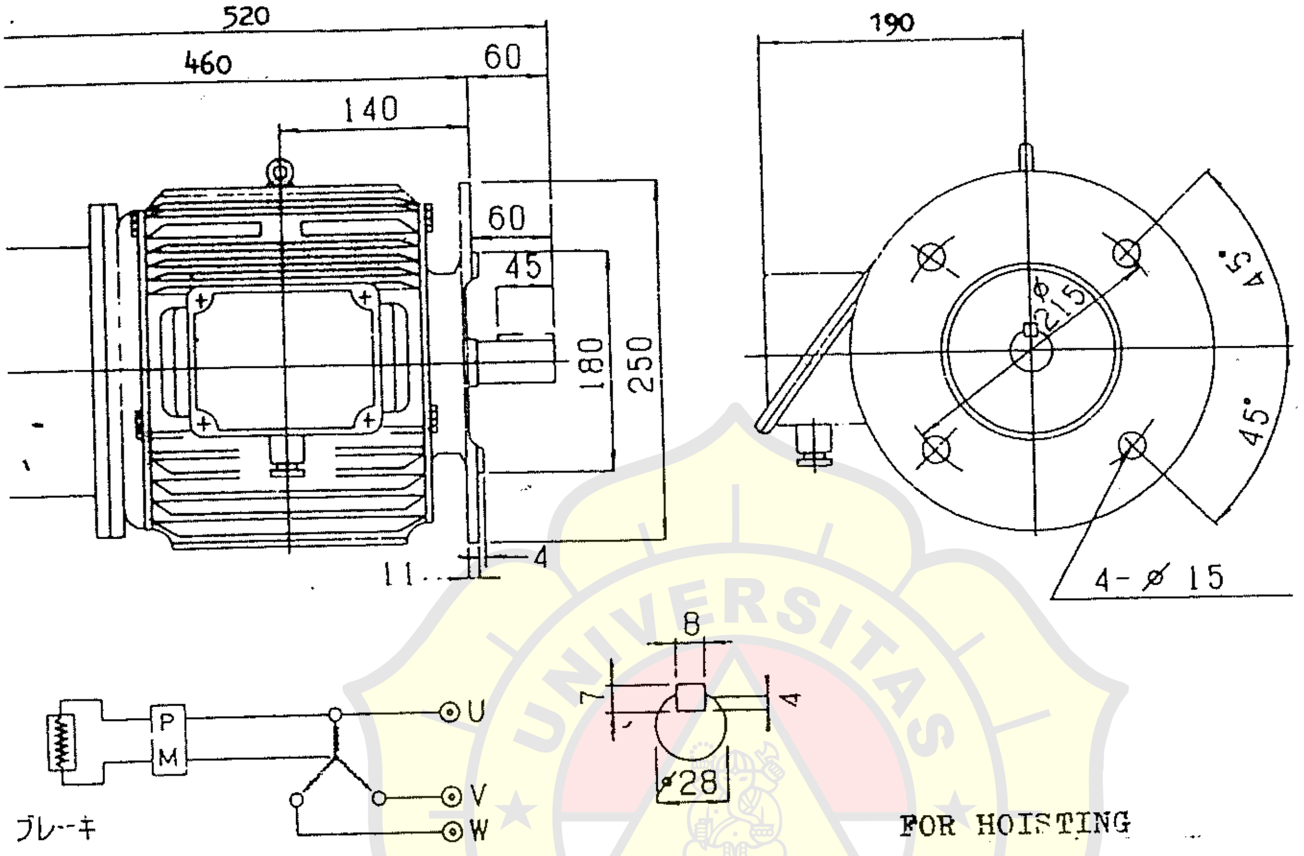
Model			HTB -20	HTB -40	HTB -50	HTB -75	HTB -100	HTB -125	HTB -150	HTB -175	HTB -200
Net Heat Output $\times 10^4$ kcal/h			20	40	50	75	100	125	150	175	200
Max. Working Temp.°C			250								
Circulating System			Liquid Forced Circulation								
Burner	Fuel Oil		C Heavy Oil								
	Ignition System		High Voltage Spark Ignition System								
	Flame Detector		Flame Eye System								
	Fuel Consumption		26.7	53.4	66.7	100.1	133.5	166.9	200.2	233.6	267.0
	Control System		ON-OFF Control			High-Low-Off Control					
	Electric Power	F.O. Heater	2	4	5	7	10	13	13	13	13
		Fan	0.4	0.75	1.5	2.2	3.7	5.5	5.5	7.5	7.5
		F.O. Pump	0.4	0.4	0.4	0.75	0.75	0.75	0.75	1.5	1.5
Circulating Pump	Capacity m^3/h		20	40	40	60	80	100	120	130	160
	Head mAq		40	40	40	40	40	40	40	40	40
	Motor KW		5.5	8.5	8.5	12	17	20	20	25	32
Vent & Inlet Pump	Capacity m^3/h		1.26								
	Head		40								
	Motor KW		0.75								
Electric Power Capacity KW			9.6	15	18	24	34	42.5	42.5	51	58

1.Source of Electric Power Ac-440V or 220V 60Hz 3P.

2.Baced C'Heavy Oil Lower Calorific Value 9500Kcal/kg and Specific Gravity 0.95.

3.Specifications are subject to change without notice due to improvements modifications.

注文主 DE ADDRESS	MARINE USE AC MOTOR	尺度 SCALE	
NO.439	SQUIRREL CAGE ROTOR TYPE	年月日 DATE	



SPECIFICATION	
TYPE	MIK-112M
OUT PUT	3. 7 KW
VOLT	440 V
AMPERE	6.6 A
PHASE	3 ∅
CYCLE	60 Hz
POLE	4 P
SPEED	1730 RPM
RATING	1/2 h
BRAKE TORQUE	0. 75 Kg-m
INSULATION	CLASS E
ENCLOSURE	IP 56
WEIGHT	63 Kg

BALL BEARING	
L. S	6207 zz
O. S	6206 zz

CABLE GLAND	
U. V. W	JIS 20b

PAINTING COLOR N-9.5

認 VED BY	検図 CHECKED BY	写図 TRACED BY	製図 DRAWN BY	製番 M. F. G NO.	図番 DRAWING NO.
					MT44-053133

影法 JECTION	第三角法 THE 3RD ANGLE METHOD	株式会社 都製作所 MIYAKO SEISAKUSHO CO., LTD.	1:N

図面番号 DWG.NO.	034−03437 △2
工事番号 WORK NO.	B - 1 - 7 - 2048 - △

DATE	DEC. 26. 1997		
CHIEF OF DEP	CHIEF	CHECKED BY	DRAWN BY
	E.MATSUBARA	A.OGAWA Y.MATSUMOTO	Y. TAKAHASHI

製品 NAME OF GOOD	HYDRAULIC DECK MACHINERY		
型式 TYPE	HWL−16−GHW−0−TT HMW−10−HW−0−TT		
受注先 AGENCY	SASEBO HEAVY INDUSTRIES CO.,LTD. 殿		
造船所 SHIP YARD	SASEBO HEAVY INDUSTRIES CO.,LTD. 殿		
船番 SHIP NO.	439	船名 SHIP NAME	
船主 SHIP OWNER	殿		

船級 CLASS	NK / BKI				
塗装色 PAINTED COLOR	EXPOSED PARTS : REDDISH BRAWN T09−30P (10R3/8) IN ACCOMMODATION PARTS : BLUE GRAY (7.5BG7/2)				
ネームプレート NAME PLATE	英文 ENGLISH				
装備電源 ELECTRIC SOURCE	三相交流 THREE-PHASE-ALTERNATING-CURRENT	AC 440 V 60 Hz×φ3			
	単相交流 SINGLE-PHASE-ALTERNATING-CURRENT	AC 110 V 60 Hz×φ1			
	直流 DIRECT CURRENT	DC V			
御支給品明細 ARTICLES SUPPLIES	符号 NO.	品名 NAME	個数 NO.S	型式 TYPE	メーカー MAKER
	1	ELECTRIC MOTOR	3	65KW×4P	NISHISHIBA
記事 REMARKS					

KITAGAWA CO.,LTD.
'98. 7. 24
DESIGN SECT.
北川工業株式会社

SPECIFICATIONS

MESSRS : SASEBO HEAVY INDUSTRIES LTD. Ship No. 439

1. PRINCIPAL PARTICULARS

Machine name		HYDRAULIC HOSE HANDLING CRANE
Model		KCH100160
Manufact		1 Set / Ship (KWS98063A)
Hoisting Load		10 TONS (Over load test : Rated load × 125 %
Working Radius	Maximum	16.0 m (0°)
	Minimum	3.1 m (75°)
Maximum lift		32m
Hoisting & Lowering speed		10 Ton × 10 m/min
Luffing time		ab. 100 sec. (0°~75°)
Slewing speed		0.4 rpm
Slewing range		360° End-less
Loading condition		Max. Heel 3° Trim 2°
Operated system		Valve control (to be done at platform on crane.)
Simultaneous Operation		2 Motion at full load and full speed.
Hydraulic source ※Parallel circuit		Ship's central hydraulic system. (max. 210kgf/cm2)
		Effective oil pressure 170kgf/cm2
		Maximum oil flow 180 ℓ /min
		Pressure for drain line --- less than 2 kgf/cm2
Wire rope for hoist		φ16 4×F (40) Galvanized・Anti twist type

. SCOPE OF OUR SUPPLY

1) Hydraulic hose handling crane	10 ton × 16.0m Radius --- 1set/ship
2) Hex. socket cap screws	Foundation bolt
3) Check valve	DWG No. CH7008MP P/No. ⑫
4) Stop valve	DWG No. CH7008MP P/No. ⑭
5) Spare parts & tool	Maker's standard
) Certificates of the classification society NK/BKI	

RULES

1) RULES

NK

2) Others

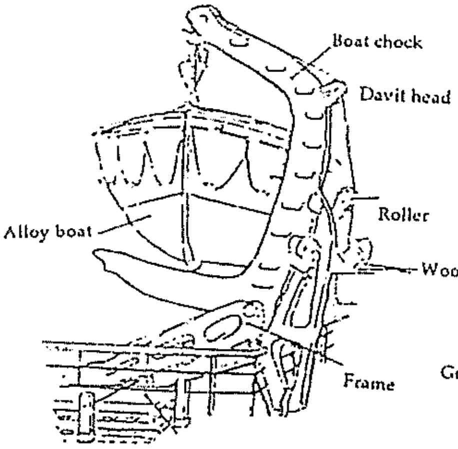
Japanese Industrial Standard. (JIS)
Maker's standard in detail.

STANDART UKURAN SEKOCI OLEH BOT (BOARD OF TRADE) ENGLAND

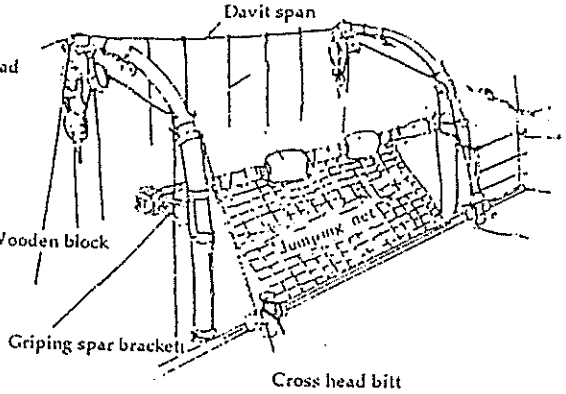
Tabel II

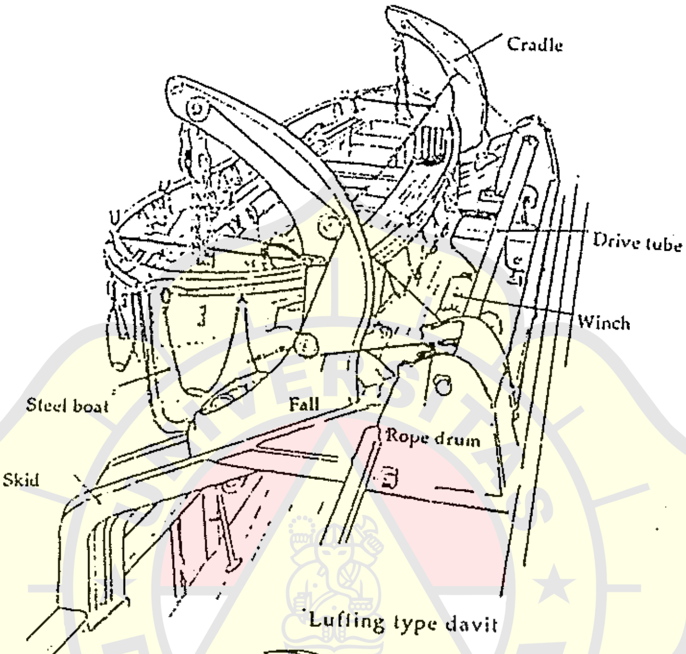
L. B. H (m)	L. B. H (ft3)	Kapasitas (ft3)	Jumlah orang	berat sekoci (kg)	Berat Orang (kg)	berat perlengkapan (kg)	Total berat (kg)
9,4 x 2,74 x 1 x 1,114	30 x 9 x 3,75	607	60	2205	4500	356	7061
8,84 x 2,74 x 1,10	29 x 8,75 x 3,60	545	54	1976	4050	356	6382
8,53 x 2,59 x 1,07	28 x 8,50 x 3,50	500	50	1824	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

Gravity type davit

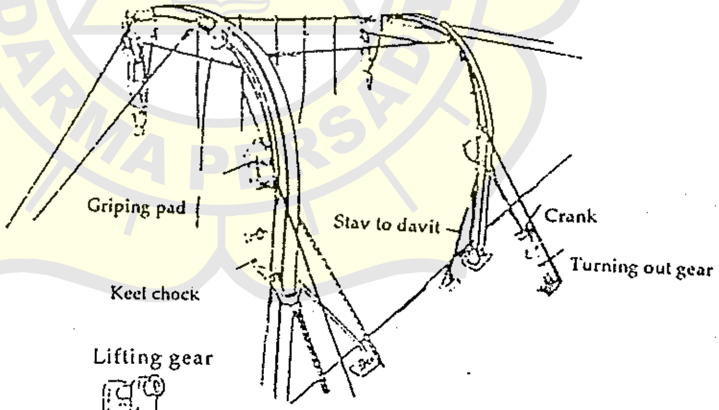


Radial davit

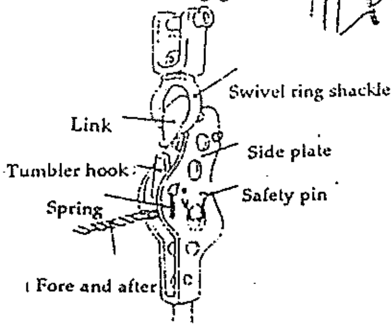




Lufting type davit

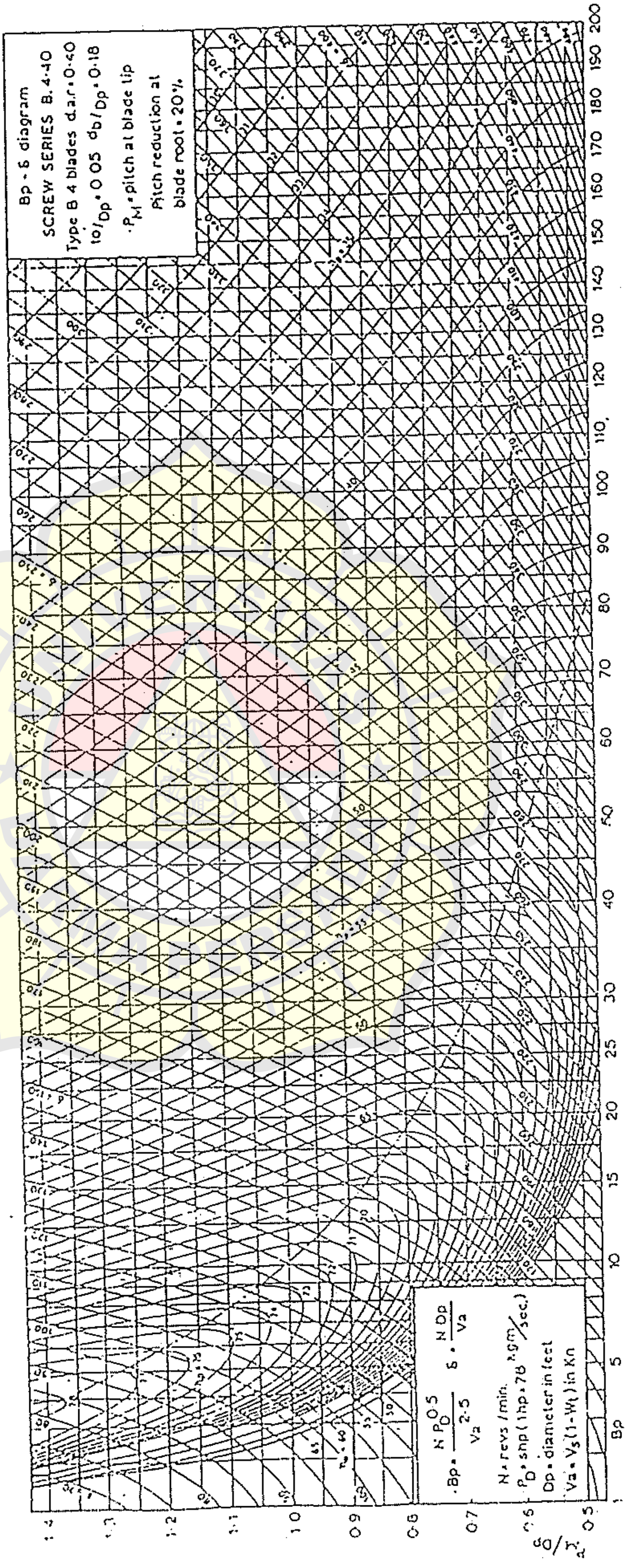


Lifting gear

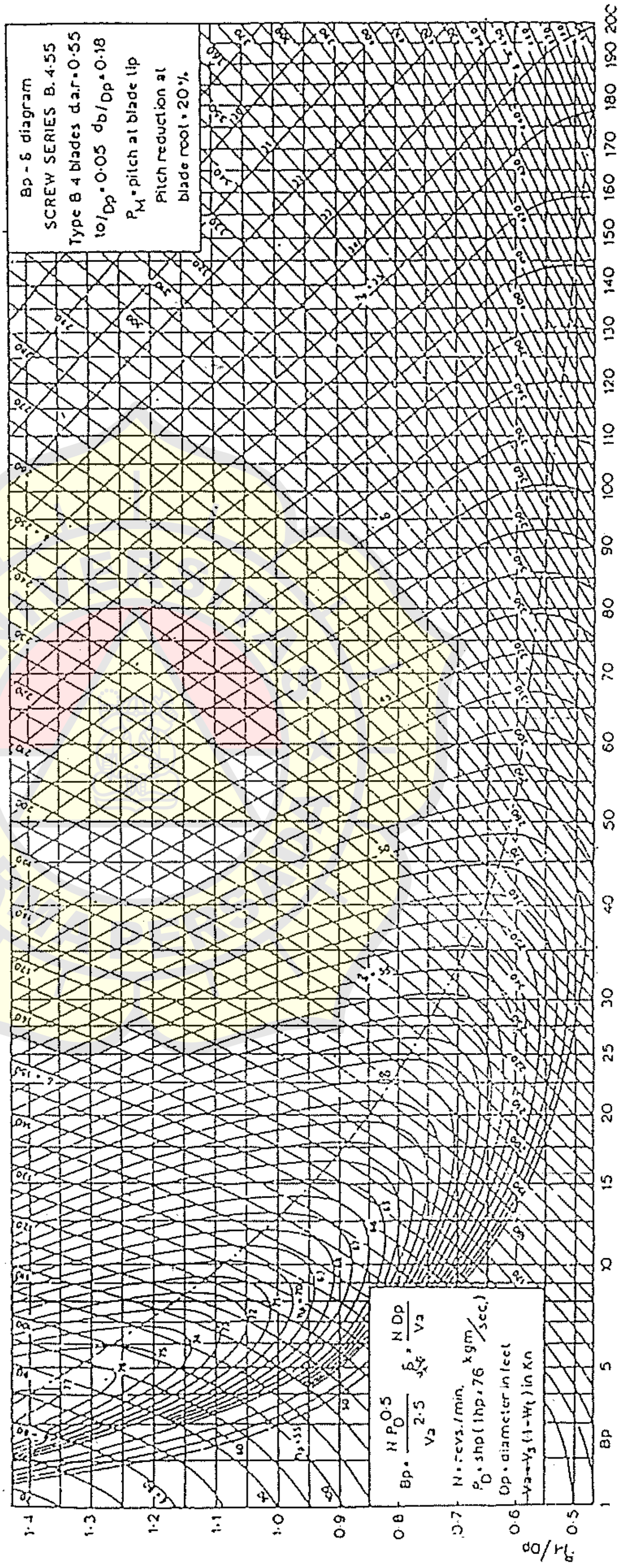


Gambar

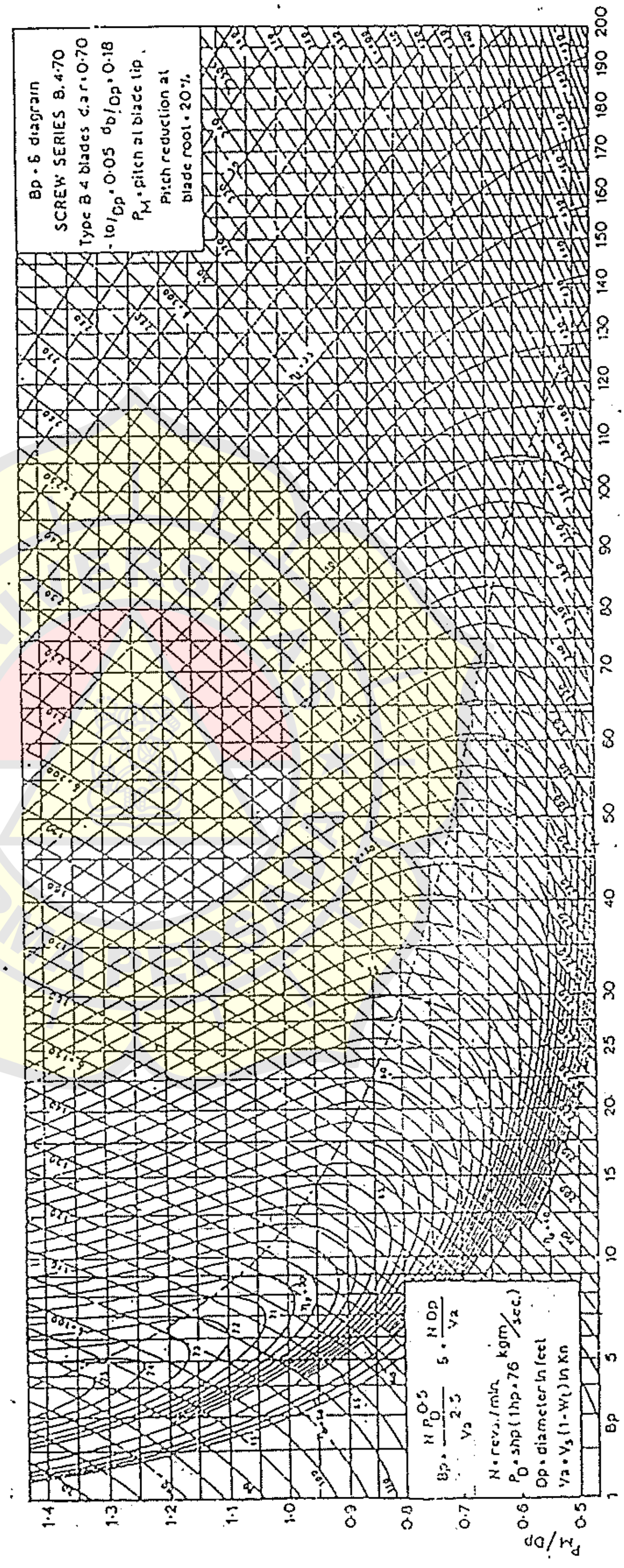
Lampiran 16. Diagram Bp δ Series B4-40



Lampiran 17. Diagram Bp – δ Series B4-55



Lampiran 18. Diagram Bp δ Series B4-70



Engine type	Layout point	Engine speed r/min	Mean effective pressure bar	Power kW BHP								
				Number of cylinders								
				4	5	6	7	8	9	10	11	12
S42MC Bore 420 mm Stroke 1764 mm	L_1	136	19.5	4320 5880	5400 7350	6480 8820	7560 10290	8640 11760	9720 13230	10800 14700	11880 16170	12960 17640
	L_2	136	15.6	3460 4700	4325 5875	5190 7050	6055 8225	6920 9400	7785 10575	8650 11750	9515 12925	10380 14100
	L_3	115	19.5	3660 4960	4575 6200	5490 7440	6405 8680	7320 9920	8235 11160	9150 12400	10065 13640	10980 14880
	L_4	115	15.6	2920 3980	3650 4975	4380 5970	5110 6965	5840 7960	6570 8955	7300 9950	8030 10945	8760 11940
L42MC Bore 420 mm Stroke 1360 mm	L_1	176	18.0	3980 5420	4975 6775	5970 8130	6965 9485	7960 10840	8955 12195	9950 13550	10945 14905	11940 16260
	L_2	176	11.5	2540 3460	3175 4345	3810 5190	4445 6055	5080 6920	5715 7785	6350 8650	6985 9515	7620 10380
	L_3	132	18.0	2980 4060	3725 5075	4470 6090	5215 7105	5960 8120	6705 9135	7450 10150	8195 11165	8940 12180
	L_4	132	11.5	1920 2600	2400 3250	2880 3900	3360 4550	3840 5200	4320 5850	4800 6500	5280 7150	5760 7800
S35MC Bore 350 mm Stroke 1400 mm	L_1	173	19.1	2960 4040	3700 5050	4440 6060	5180 7070	5920 8080	6660 9090	7400 10100	8140 11110	8880 12120
	L_2	173	15.3	2380 3220	2975 4025	3570 4830	4165 5635	4760 6440	5355 7245	5950 8050	6545 8855	7140 9660
	L_3	147	19.1	2520 3420	3150 4275	3780 5130	4410 5985	5040 6840	5670 7695	6300 8550	6930 9405	7560 10260
	L_4	147	15.3	2020 2740	2525 3425	3030 4110	3535 4795	4040 5480	4545 6165	5050 6850	5555 7535	6060 8220
L35MC Bore 350 mm Stroke 1050 mm	L_1	210	18.4	2600 3520	3250 4400	3900 5280	4550 6160	5200 7040	5850 7920	6500 8800	7150 9680	7800 10560
	L_2	210	14.7	2080 2820	2600 3525	3120 4230	3640 4935	4160 5640	4680 6345	5200 7050	5720 7755	6240 8460
	L_3	178	18.4	2200 3000	2750 3750	3000 4500	3850 5250	4400 6000	4950 6750	5500 7500	6050 8250	6600 9000
	L_4	178	14.7	1760 2400	2200 3000	2640 3600	3080 4200	3520 4800	3960 5400	4400 6600	4840 6600	5280 7200
S26MC Bore 260 mm Stroke 980 mm	L_1	250	18.5	1600 2180	2000 2725	2400 3270	2800 3815	3200 4360	3600 4905	4000 5450	4400 5995	4800 6540
	L_2	250	14.8	1280 1740	1600 2175	1920 2610	2240 3045	2560 3480	2880 3915	3200 4350	3520 4785	3840 5220
	L_3	212	18.5	1360 1860	1700 2325	2040 2790	2380 3255	2720 3720	3060 4185	3400 4650	3740 5115	4080 5580
	L_4	212	14.8	1100 1480	1375 1850	1650 2220	1925 2590	2200 2960	2475 3330	2750 3700	3025 4070	3300 4440

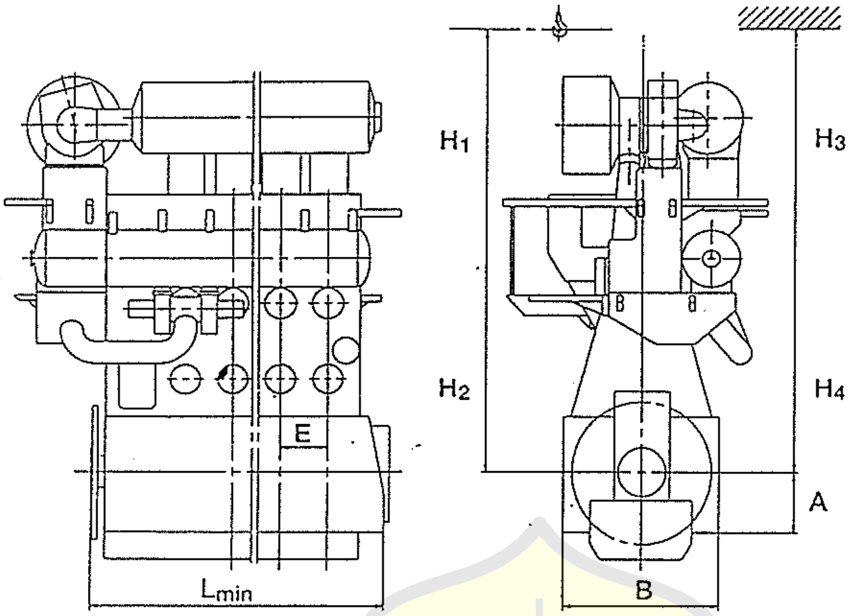
178 46 78-9.0

Fig. 1.03e: Power and speed

		Specific fuel oil consumption g/kWh g/BHPh		Lubricating oil consumption	
		With conventional turbochargers		System oil	Cylinder oil
At load layout point		100%	80%	Approx. kg/cyl. 24h	g/kWh g/BHPh
L42MC	L1	177 130	174 129	3-4	0.8-1.2 0.6-0.9
	L2	165 121	163 120		
	L3	177 130	174 129		
	L4	165 121	163 120		
S35MC	L1	178 131	177 130	2-3	0.95-1.5 0.7-1.1
	L2	173 127	171 126		
	L3	178 131	177 130		
	L4	173 127	171 126		
L35MC	L1	177 130	175 129	2-3	0.8-1.2 0.6-0.9
	L2	171 126	170 125		
	L3	177 130	175 129		
	L4	171 126	170 125		
S26MC	L1	179 132	178 131	1.5-3	0.95-1.5 0.7-1.1
	L2	174 128	173 127		
	L3	179 132	178 131		
	L4	174 128	173 127		

178 46 79-2.0

Fig. 1.05f: Fuel and lubricating oil consumption



178 16 76-0.0

	S50-C	S50	L50	S46-C	S42	L42	S35	L35	S26
Dimensions in mm									
A	1085	1085	944	986	900	690	650	550	420
B	3150	2950	2710	2924	2670	2460	2200	1980	1880
E	850	890	890	782	748	748	600	600	490
H1	8950	8800	7825	8600	8050	6700	6425	5200	4825
H2	8375	8250	7325	8075	7525	6250	6050	4850	4725
H3	8150	8100	7400	7850	7300	6350	5925	5025	4525
H4							5850	4825	4500
Lmin									
4 cyl.	4739	5730	5615	4357	4240	4661	3480	3445	2975
5 cyl.	5589	6620	6505	5139	4988	5409	4080	4045	3465
6 cyl.	6439	7510	7395	5921	5736	6157	4680	4645	3955
7 cyl.	7289	8400	8285	6703	6484	6905	5280	5245	4445
8 cyl.	8139	9290	9175	7485	7232	7653	5880	5845	4935
9 cyl.					7980	8401	6480	6445	5425
10 cyl.					9476	9897	7080	7645	6405
11 cyl.					10224	10645	8280	8245	6895
12 cyl.					10972	11393	8880	8845	7385
Dry masses in tons									
4 cyl.	155	171	163	133	109	95	57	50	32
5 cyl.	181	195	188	153	125	110	65	58	37
6 cyl.	207	225	215	171	143	125	75	67	42
7 cyl.	238	255	249	197	160	143	84	75	48
8 cyl.	273	288	276	217	176	158	93	83	53
9 cyl.					195	176	103	92	58
10 cyl.					232	210	122	108	68
11 cyl.					249	229	132	118	74
12 cyl.					269	244	141	126	79

he distances H_1 and H_2 are from the centre of the crankshaft to the crane hook. The distances H_3 and H_4 for the double b crane are from the centre of the crankshaft to the lower edge of the deck beam.

: - Cylinder distance H_1 - Vertical lift H_2 - Tilted lift H_3 - Electrical double jib crane H_4 Manual double jib crane

178 87 19-8.0

ig. 5.01b: Space requirements and masses

Starting air system: 30 bar (gauge)

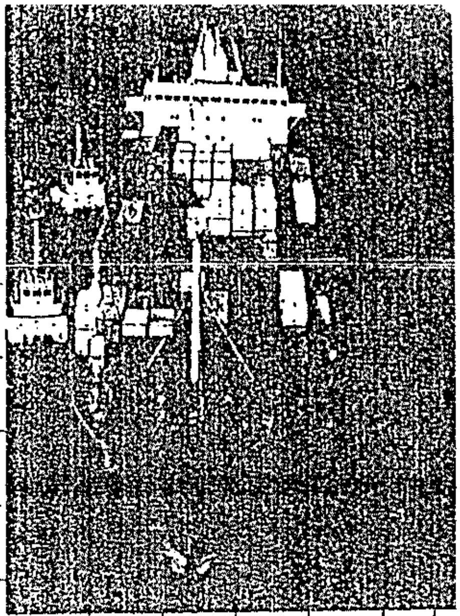
Cylinder No.		4	5	6	7	8	9	10	11	12
S42MC										
Reversible engine										
Receiver volume (12 starts)	m^3	2 x 3.0	2 x 3.0	2 x 3.0	2 x 3.0	2 x 3.5	2 x 3.5	2 x 3.5	2 x 3.5	2 x 3.5
Compressor capacity, total	m^3/h	180	180	180	180	210	210	210	210	210
Non-reversible engine										
Receiver volume (6 starts)	m^3	2 x 2.0	2 x 2.0	2 x 2.0	2 x 2.0	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5
Compressor capacity, total	m^3/h	120	120	120	120	150	150	150	150	150
L42MC										
Reversible engine										
Receiver volume (12 starts)	m^3	2 x 2.0	2 x 2.0	2 x 2.0	2 x 2.0	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5
Compressor capacity, total	m^3/h	120	120	120	120	150	150	150	150	150
Non-reversible engine										
Receiver volume (6 starts)	m^3	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5
Compressor capacity, total	m^3/h	90	90	90	90	90	90	90	90	90
S35MC										
Reversible engine										
Receiver volume (12 starts)	m^3	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5
Compressor capacity, total	m^3/h	60	60	60	60	90	90	90	90	90
Non-reversible engine										
Receiver volume (6 starts)	m^3	2 x 0.5	2 x 0.5	2 x 0.5	2 x 0.5	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0
Compressor capacity, total	m^3/h	30	30	30	30	60	60	60	60	60
L35MC										
Reversible engine										
Receiver volume (12 starts)	m^3	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5
Compressor capacity, total	m^3/h	60	60	60	60	90	90	90	90	90
Non-reversible engine										
Receiver volume (6 starts)	m^3	2 x 0.5	2 x 0.5	2 x 0.5	2 x 0.5	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0
Compressor capacity, total	m^3/h	30	30	30	30	60	60	60	60	60
S26MC										
Reversible engine										
Receiver volume (12 starts)	m^3	2 x 0.9	2 x 0.9	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0
Compressor capacity, total	m^3/h	54	54	60	60	60	60	60	60	60
Non-reversible engine										
Receiver volume (6 starts)	m^3	2 x 0.4	2 x 0.4	2 x 0.4	2 x 0.4	2 x 0.5	2 x 0.5	2 x 0.5	2 x 0.5	2 x 0.5
Compressor capacity, total	m^3/h	24	24	24	24	30	30	30	30	30

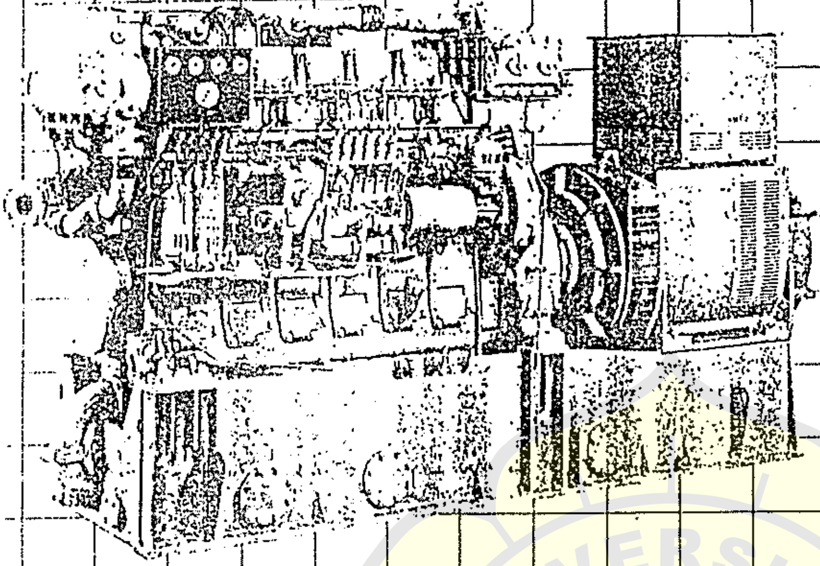
178 67 96-3.0

Fig. 6.01.05d: Capacities of starting air receivers and compressors for main engine

6NY16L

Engine output
200 441 kW (272–600 PS)





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

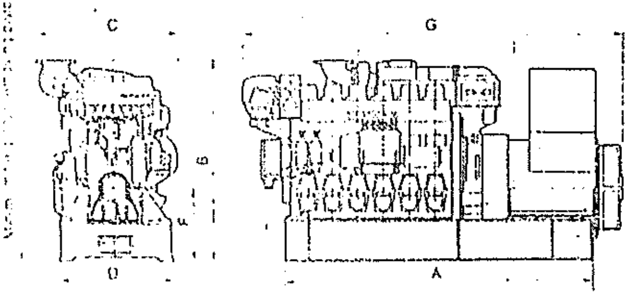
Specifications

Engine model		6NY16L-HN		6NY16L-DN		6NY16L-UN		6NY16L-SN		6NY16L-EN	
Type		Vertical water-cooled 4-cycle diesel engine									
No. of cylinders		6									
Cylinder bore × stroke	mm	160 × 200									
Total displacement	ℓ	24.13									
Continuous rated output	kW (PS)	200 (272)	265 (360)	235 (320)	310 (421)	270 (367)	355 (483)	310 (421)	400 (544)	353 (480)	441 (600)
Engine speed	rpm	1000	1200	1000	1200	1000	1200	1000	1200	1000	1200
Net mean effective pressure	MPa (kgf/cm²)	0.995 (10.15)	1.097 (11.19)	1.171 (11.94)	1.283 (13.09)	1.343 (13.69)	1.472 (15.01)	1.540 (15.70)	1.658 (16.91)	1.756 (17.90)	1.829 (18.65)
Generator capacity	kW	180	240	200	280	240	320	280	360	320	400
Combustion system		Direct Injection									
Starting system		Compressed air									
External dimensions — Overall length	mm	1996									
External dimensions — Overall width	mm	1085									
External dimensions — Overall height	mm	1532									
Dry weight	kg	2880									

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

Dimensions (Units: mm)

The dimensions and weights for the diesel engine generator sets are simply reference values. The values may differ for different generator manufacturers.

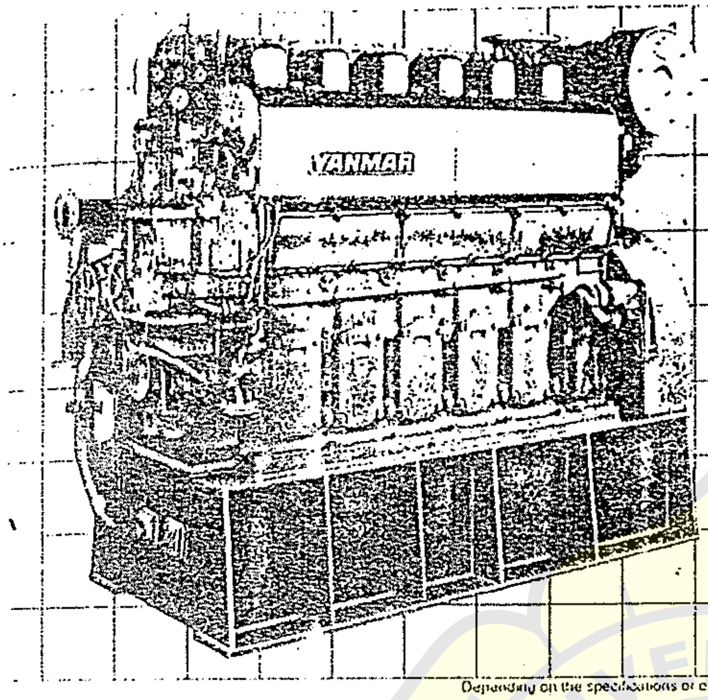


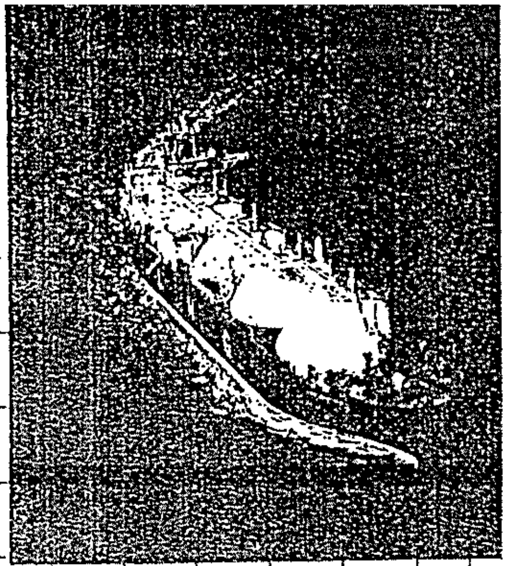
Engine model	6NY16L-HN	6NY16L-DN	6NY16L-UN	6NY16L-SN	6NY16L-EN
A	2530	2530	2530	2530	2530
B	1613	1613	1613	1613	1613
C	1136	1136	1136	1136	1136
D	940	940	940	940	940
E	1725	1725	1725	1725	1725
F	600	600	600	800	600
G	2991	2991	2991	2991	2991
Dry weight of generating equipment (kg)	5500	5500	5500	5500	5500

Please confirm [illegible] on the separate delivery specifications sheet.

6N21(A)L

Engine output
615 970 kW (836--1319 PS)





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

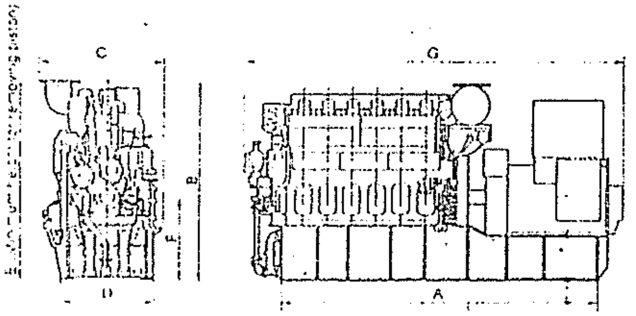
Specifications

Engine model			6N21L-DN		6N21L-UN		6N21L-SN		6N21L-EN		6N21AL-DN		6N21AL-UN		6N21AL-SN		6N21AL-EN	
Type			Vertical water-cooled 4-cycle diesel engine								Vertical water-cooled 4-cycle diesel engine							
No. of cylinders			6								6							
Cylinder bore×stroke		mm	210×290								210×290							
Total displacement		ℓ	60.27								60.27							
ontinuous rated output		kW (PS)	615 (836)		660 (897)		745 (1013)		800 (1088)		745 (1013)		800 (1088)		880 (1197)		970 (1319)	
ngine speed		rpm	720	750	720	750	720	750	720	750	900	1000	900	1000	900	1000	900	1000
et mean effective pressure		MPa (kgf/cm²)	1.700 (17.34)	1.633 (16.65)	1.824 (18.60)	1.751 (17.86)	2.060 (21.01)	1.978 (20.17)	2.213 (22.57)	2.124 (21.66)	1.648 (16.81)	1.484 (15.13)	1.770 (18.05)	1.594 (16.25)	1.948 (19.86)	1.752 (17.87)	2.146 (21.88)	1.932 (19.70)
enerator capacity		kW	560		600		680		720		680		720		800		900	
ombustion system			Direct injection								Direct injection							
tarting system			Air-motor starting								Air-motor starting							
xternal mensions	Overall length	mm	3156								3156				3167			
	Overall width	mm	1524								1524				1544			
	Overall height	mm	2026								2026							
ry weight		kg	8700								8500							

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

Dimensions (Units: mm)

The dimensions and weights for the diesel engine generator sets are simply reference values. The values may differ for different generator manufacturers.



Engine model	6N21L-DN/6N21L-UN 6N21L-SN/6N21L-EN	6N21AL-DN 6N21AL-UN	6N21AL-SN 6N21AL-EN
A	4100	4100	4100
B	2330	2330	2410
C	1524	1524	1544
D	1180	1180	1180
E	2752	2752	2752
F	950	950	950
G	4871	4871	4871
Dry weight of generating equipment (kg)	14800	14600	14600

Note: Above data shows the case of common bed and built-in L.O. sump tank.

[illegible] specifications sheet

STARTING COMPRESSOR (Vertical 2-stage Water-cooled)

Model No.	Speed (r.p.m)	25 kg/cm²			30 kg/cm²		
		m³/hr FA	PS	Motor (KW)	m³/hr FA	PS	Motor (KW)
HC-54A	720	38	11	11	37	11.5	11
	900	47	14	11	46	14.5	15
HC-65A	720	68	19.5	18.5	66	20	18.5
	900	85	24.5	18.5	82	26	22
HC-65AS	1200	105	28.5	22	100	30.5	25
HC-234A	900	136	37	30	132	41	33
HC-265A	720	135	38	30	132	40	33
	900	170	49	37	164	52	40
HC-275A	720	195	51.5	40	190	54.5	45
	900	240	63.5	50	230	67	55
HC-277A	720	260	67	55	250	70	55
	900	310	82.5	65	300	87	70

STARTING COMPRESSOR (V-type 2-stage Water-cooled)

Model No.	Speed (r.p.m)	25 kg/cm²			30 kg/cm²		
		m³/hr FA	PS	Motor (KW)	m³/hr FA	PS	Motor (KW)
VH-475D	720	390	103	80	380	109	85
	900	480	127	100	460	134	110
VH-477D	720	520	134	110	500	140	110
	900	620	165	125	600	174	132

STARTING COMPRESSOR (Vertical 2-stage Water-cooled)

Model No.	Speed (r.p.m)	25 kg/cm²			30 kg/cm²		
		m³/hr FA	PS	Motor (KW)	m³/hr FA	PS	Motor (KW)
SHC-295C-A	720	285	72	55	280	76	65
	900	360	94	75	350	98	80
SHC-495C-A	720	570	144	110	560	152	125
	900	720	188	150	700	196	150

STARTING COMPRESSOR (V-type 3-stage Air-cooled)

Model No.	Speed (r.p.m)	25 kg/cm²			30 kg/cm²		
		m³/hr FA	PS	Motor (KW)	m³/hr FA	PS	Motor (KW)
VLHH-64	900	78	18	15	75	19.5	19
	1200	105	24	19	100	26	22
VLHH-74	900	115	27	22	110	28.5	25
	1200	155	36	30	150	38	30
VLHH-94	900	170	38	30	165	42	37
	1200	230	52	40	220	56	45
VLHH-114	900	260	57	45	250	62	50
	1200	350	78	60	340	83	65
VLHH-2114	720	410	94	70	400	198	75
	900	520	118	90	500	124	95

CONTROL and GENERAL SERVICE COMPRESSOR

(Vertical V-type 2-stage Air-cooled)

Model No.	Speed (r.p.m)	7 kg/cm²			9 kg/cm²		
		m^3/hr FA	PS	Motor (KW)	m^3/hr FA	PS	Motor (KW)
LHC-54A	720	40	6.7	5.5	38	7.2	5.5
	900	53	8.5	7.5	50	9.2	7.5
LHC-254A	720	80	13.5	11	76	14.5	11
	900	106	17.0	15	100	18.5	15
VLH-64	1200	95	16	15	90	18	15
	1500	120	20	19	115	22	19
VLH-74	1200	145	24	19	140	26	22
	1500	180	30	25	175	32	25
VLH-94	900	165	27	22	155	30	25
	1200	220	35	30	210	40	33
VLH-114	900	225	32	25	217	35	25
	1200	330	48	37	320	52	40
VLH-2114	900	450	64	50	435	70	55
	1200	660	94	75	640	103	80

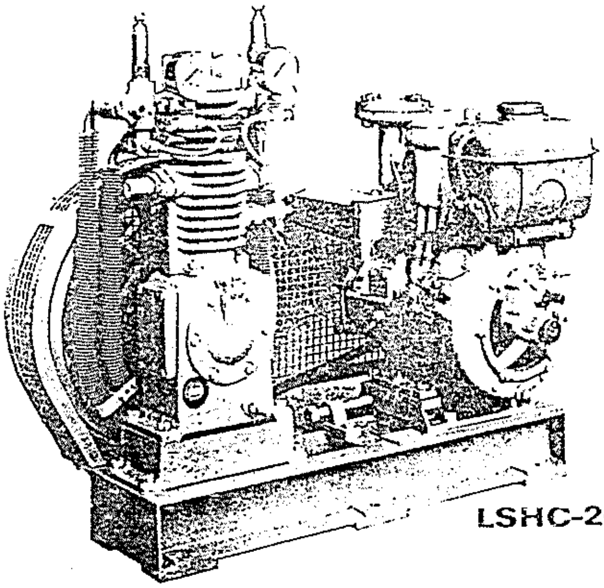
CONTROL COMPRESSOR (Vertical 1-stage Water-cooled Oil Free)

Model No.	Speed (r.p.m)	4 kg/cm²			7 kg/cm²		
		m^3/hr FA	PS	Motor (KW)	m^3/hr FA	PS	Motor (KW)
OS-54A	600	65	8.3	7.5	52	9.5	7.5
	720	78	9.9	7.5	62	11.5	11
OS-254B	600	130	17	15	104	19	15
	720	156	20.4	15	125	23	19
OS-265B	580	175	26	19	141	29	22
	660	201	29.5	22	160	33	25
OS-97A	560	290	43	25	250	49.5	40
	660	340	51	37	295	58	40
OS-297B	560	580	85	40.	500	98	45
	660	680	100	75	590	116	90

CONTROL COMPRESSOR (V-type 2-stage Air-cooled Oil Free)

Model No.	Speed (r.p.m)	7 kg/cm²			9 kg/cm²		
		m^3/hr FA	PS	Motor (KW)	m^3/hr FA	PS	Motor (KW)
VLHOS-64	780	66	11	11	62	12	11
VHOS-64	1000	85	13.5	11	80	14	11
VLHOS-74	780	98	15.5	15	94	16	15
VHOS-74	1000	125	19.5	19	120	20	19
VLHOS-94	780	150	22	19	140	23.5	19
VHOS-94	1000	190	27	22	180	30	25
VLHOS-114	780	220	32	25	210	35	27
VHOS-114	1000	280	41	33	270	45	37
VLHOS-2114	780	440	64	50	420	70	55
VHOS-2114	1000	560	82	75	540	90	75

VLHOS: Air cooled　VHOS: Water cooled



LSHC-20B

Single cylinder 2-stage air-cooled
emergency starting compressor

EMERGENCY AND SMALL STARTING COMPRESSOR
(Vertical 2-stage Air and Water-cooled)

Model No.	Speed (r.p.m)	15kg/cm²		25~30kg/cm²	
		m³/hr FA	PS	m³/hr FA	PS
LSHC-20B	900	4.7	1.4	4.3	1.6
	1000	5.2	1.5	5.0	1.7
LSHC-30A	900	13.6	4.8	12.8	5.3
	1000	14.8	5.3	13.8	5.8
LSHC-40A	900	20.4	7.2	19.4	8.0
	1000	22.3	7.9	21.2	8.9
SHC-30C	900	13.8	4.7	13.0	5.2
	1000	15.0	5.2	14.0	5.7

LSHC: Air cooled SHC: Water cooled

GENERAL SERVICE COMPRESSOR (V-type 2-stage Water-cooled)

Model No.	Speed (r.p.m)	7kg/cm²			9kg/cm²		
		m³/hr FA	PS	Motor (KW)	m³/hr FA	PS	Motor (KW)
VH-114	900	225	32	25	217	35	25
	1200	300	48	37	320	52	37
VH-2114	900	450	64	50	435	70	55
	1200	600	94	75	640	103	75
VH-145	900	1050	140	110	1034	139	110
	1000	1050	140	110	1035	139	110
VH-165	900	1410	185	150	1344	187	150
	1000	1410	185	150	1362	187	150

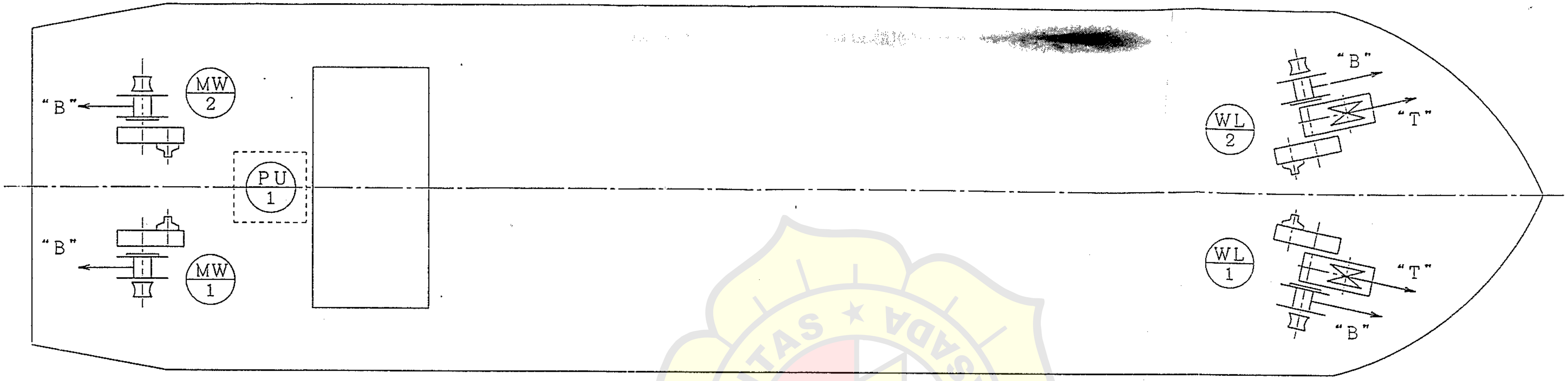
GENERAL SERVICE COMPRESSOR
(V-type 2-stage Water-cooled Oil Free)

Model No.	Speed (r.p.m)	7kg/cm²			9kg/cm²		
		m³/hr FA	PS	Motor (KW)	m³/hr FA	PS	Motor (KW)
VHOS-145	600	780	95	75	750	105	80
	720	930	110	90	900	125	95
VHOS-165	600	970	125	95	950	135	110
	720	1170	150	120	1140	160	125

KITAKO

CAREER	4－A－G			
MFG NO.		DATE	DETAILS OF REVISION	SIGN
	△			
	△			
	△			

S.NO. : 439
RULE : NK
PRDUCT CARRIER : D.W.T.17500



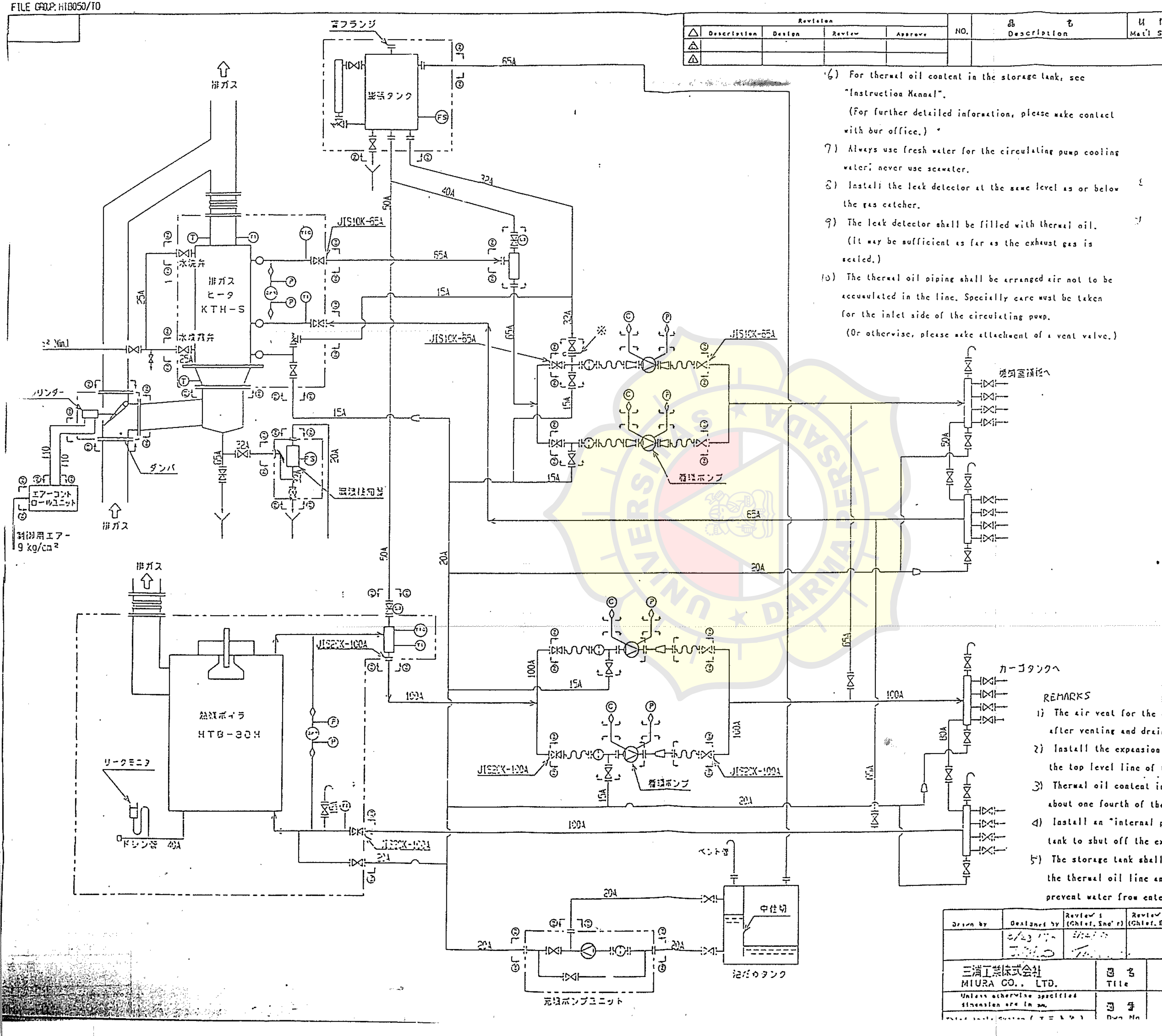
DM NO.	NO. OF SET	ITEM	DRUM AND CHAIN WHEEL						WARPING END				REMARKS
			NO.	CAPACITY	DIA.×LENGTH	CLUTCH / BRAKE	DIA.×LENGTH OF ROPE	BRAKE FORCE	NO.	CAPACITY	DIA.×LENGTH	CLUTCH / BRAKE	
WL－1, 2	2	WINDLASS	1	16.3t×9m/min	P.C.D.754mm	WITH	φ58mm G3	119.3t	1	10t	φ400mm×450mm	WITHOUT / WITHOUT	JOINING SHACKLE 4208t AC14ANCHOR
		MOORING WINCH	1	10t×15m/min	φ406.4mm×900mm	WITH	φ70mm×190m	26.51t					
MW－1, 2	2	MOORING WINCH	1	10t×15m/min	φ406.4mm×900mm	WITH / WITH	φ70mm×190m	26.51t	1	10t	φ400mm×450mm	WITHOUT / WITHOUT	
PU－1	1	PUMP UINT											ELEC.MOTOR 65KW 4P CONT. 3SET/SHIP

NOTE

1. IN THE ABOVE ARRANGEMENT, "T" MEANS TAKING THE ROPE FROM ABOVE THE DRUM AND "B" MEANS TAKING THE ROPE FROM BELOW THE DRUM.
2. TOTAL CAPACITY OF THE POWER UNITS TO BE SUFFICIENT TO DRIVE FOUR (4) MOORING WINCHES SIMULTANEOUSLY OR ONE (1) WINDLASS.

CHIEF	CHECKED BY	DRAWN BY	SCALE	
	A.OGAWA Y.MATSUMOTO	Y.TAKAHASHI	/	ROUGH ARRANGEMENT OF DECK MACHINERY
KITAGAWA KOGYO CO., LTD.	DATE 1997.12.27 WEIGHT kg		PROJECTION 3	WA3 — 02242 △

FILE CODE: H10050/T0



Revision					NO.	品名 Description	材質 Mat'l Spec	数量 Qty	備考 Remarks
△	Description	Design	Review	Approve					
△									
△									

6) For thermal oil content in the storage tank, see "Instruction Manual".
(For further detailed information, please make contact with our office.)

7) Always use fresh water for the circulating pump cooling water; never use seawater.

8) Install the leak detector at the same level as or below the gas catcher.

9) The leak detector shall be filled with thermal oil.
(It may be sufficient as far as the exhaust gas is sealed.)

10) The thermal oil piping shall be arranged air not to be accumulated in the line. Specially care must be taken for the inlet side of the circulating pump.
(Or otherwise, please make attachment of a vent valve.)

⋈	仕切弁 GATE VALVE
⋈	玉形弁 GLOVE VALVE
⋈	ボール弁 BALL VALVE
⋈	逃し弁 RELIEF VALVE
⋈	自動閉鎖弁 SELF CLOSEING VALVE
Ⓢ ⋈	電磁弁 SOLENOID VALVE
—◇—	コック COCK
⊙	ストレーナ STRAINER
∿	フレキシブルチューブ FLEXIBLE TUBE
FS	フロートスイッチ FLOAT SWITCH
Ⓟ	圧力計 PRESSURE GAUGE
Ⓒ	連成計 COMPOUND GAUGE
Ⓣ	温度計 THERMOMETER
DPS	差圧スイッチ DIFF. PRESS. SWITCH
TIC	制御用温度検出端 THERMO-DETECTOR
TI	温度検出端 THERMO-DETECTOR
LS	リミットスイッチ LIMIT SWITCH
⊳	ポンプ PUMP
—┼—	フランジ継手 FLANGED JOINT
—▷—	レジューサ REDUCER
—┫	盲フランジ BLANK FLANGE
—‖—	めがねフランジ SPECTACLE FLANGE

REMARKS

1) The air vent for the expansion tank must be blinded after venting and draining for a trial run.

2) Install the expansion tank at a level 1.5 m higher than the top level line of thermal oil.

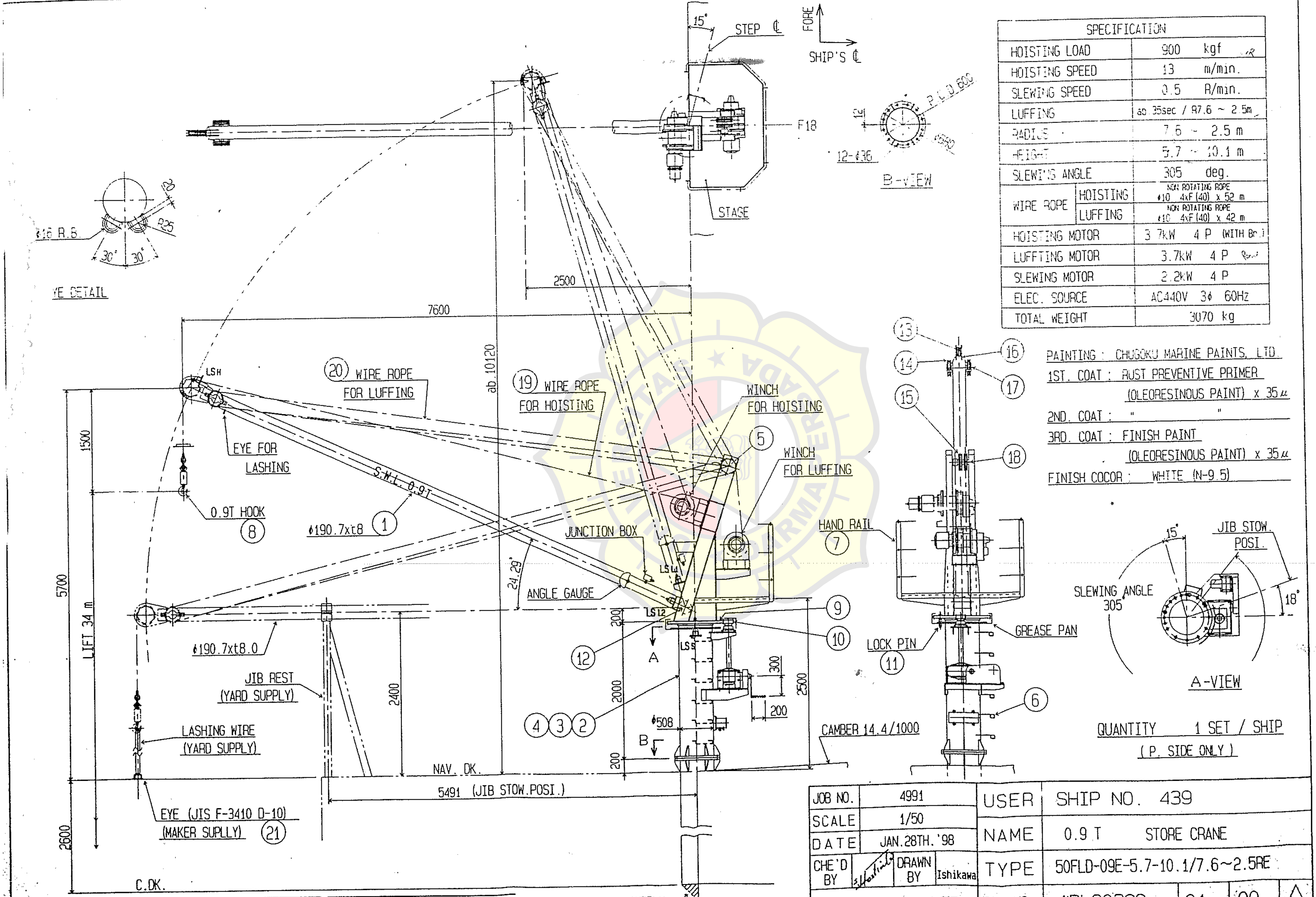
3) Thermal oil content in the expansion tank shall be about one fourth of the tank capacity.

4) Install an "internal partition plate" in the storage tank to shut off the external atmosphere.

5) The storage tank shall be located at the lowest part of the thermal oil line and shall be constracted so as to prevent water from entering.

Drawn by	Designed by	Review I (Chief. Eng'r)	Review I (Chief. Eng'r)	Apprv'd (Mgr. Eng'r)	縮尺 Scale	型式 Type
	[illegible]	[illegible]		[illegible]	—	HTB-80H KTH-S

三浦工業株式会社 MIURA CO., LTD.	図名 Title	配管系統図 PIPING DIAGRAM
Unless otherwise specified dimension are in mm.	図番 Dwg. No.	53-2800-00
		Rev. No.



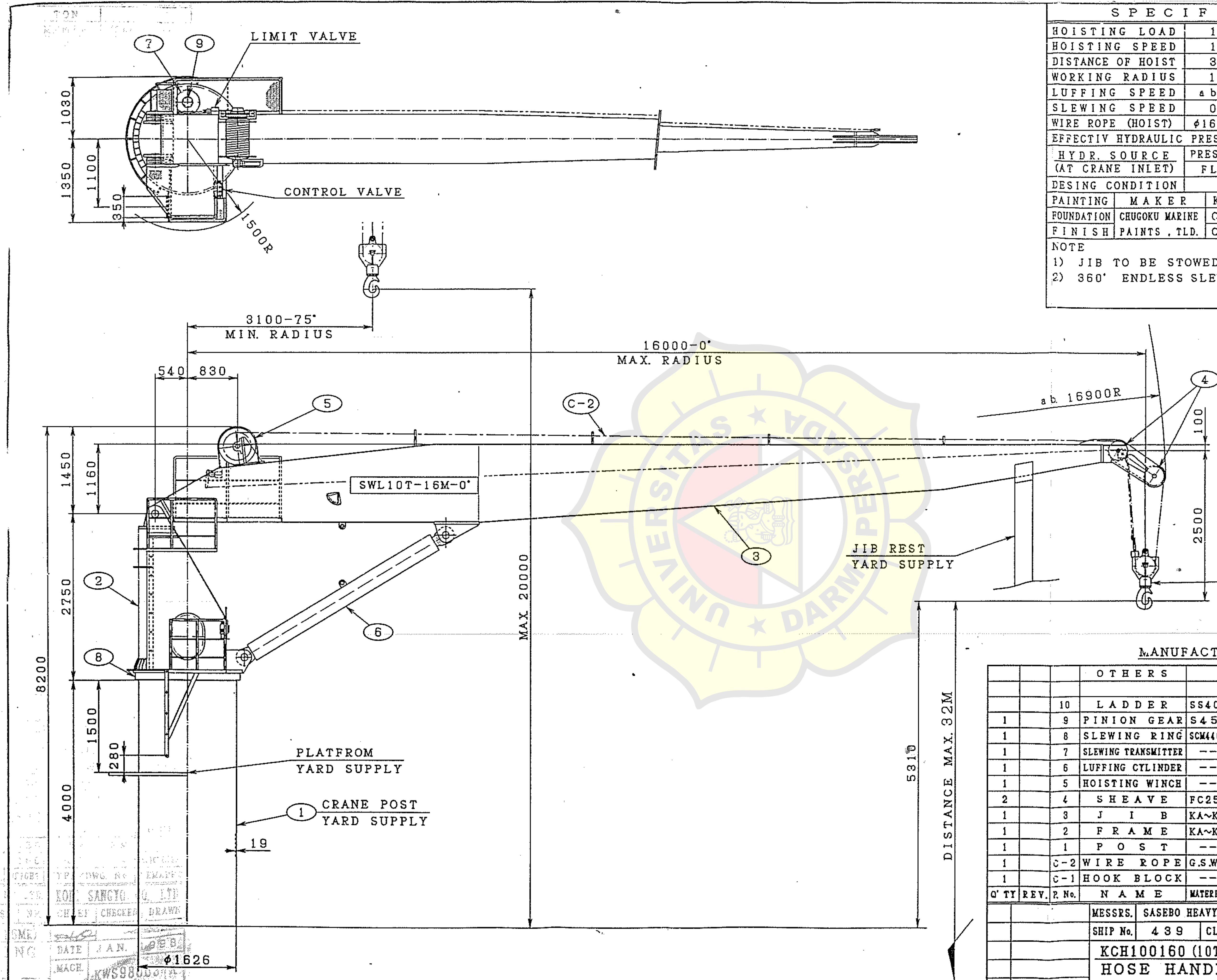
SPECIFICATION		
HOISTING LOAD		900 kgf
HOISTING SPEED		13 m/min.
SLEWING SPEED		0.5 R/min.
LUFFING		ab 35sec / R7.6 ~ 2.5m
RADIUS		7.6 ~ 2.5 m
HEIGHT		5.7 ~ 10.1 m
SLEWING ANGLE		305 deg.
WIRE ROPE	HOISTING	NON ROTATING ROPE ϕ10 4xF(40) x 52 m
	LUFFING	NON ROTATING ROPE ϕ10 4xF(40) x 42 m
HOISTING MOTOR		3.7kW 4 P (WITH Br.)
LUFFTING MOTOR		3.7kW 4 P
SLEWING MOTOR		2.2kW 4 P
ELEC. SOURCE		AC440V 3ϕ 60Hz
TOTAL WEIGHT		3070 kg

PAINTING : CHUGOKU MARINE PAINTS, LTD.
1ST. COAT : RUST PREVENTIVE PRIMER
(OLEORESINOUS PAINT) x 35μ
2ND. COAT : " "
3RD. COAT : FINISH PAINT
(OLEORESINOUS PAINT) x 35μ
FINISH COCOR : WHITE (N-9.5)

QUANTITY 1 SET / SHIP
(P. SIDE ONLY)

JOB NO.	4991	USER	SHIP NO. 439		
SCALE	1/50	NAME	0.9 T STORE CRANE		
DATE	JAN.28TH.'98	TYPE	50FLD-09E-5.7-10.1/7.6~2.5RE		
CHE'D BY	DRAWN BY Ishikawa				
FUJIKI CO., LTD.		DWG.NO.	ADLG0329	01	00

図面来歴	SSK S.NO.433 用に調整. SSK S.NO.439 用に修正流用.



SPECIFICATIONS

HOISTING LOAD	10 TON	
HOISTING SPEED	10 M/min	(2nd layer)
DISTANCE OF HOIST	32 M	
WORKING RADIUS	16~3.1 M	(0~75°)
LUFFING SPEED	ab. 100 Sec	(0~75°)
SLEWING SPEED	0.4 R/min	
WIRE ROPE (HOIST)	ϕ16 4×F(40)-B/O	ANTI-TWIST TYPE
EFFECTIV HYDRAULIC PRESSURE		170 Kg/㎠
HYDR. SOURCE (AT CRANE INLET)	PRESSURE	210- Kg/㎠
	FLOW	ab. 180 ℓ/min
DESING CONDITION	HEEL 3° - TRIM 2°	

PAINTING	MAKER	KIND	COLOR	NOTE
FOUNDATION	CHUGOKU MARINE PAINTS , TLD.	CR-R/P	BROWN	35μ×2
FINISH		CR-F/P	WHITE N-95	35μ×1

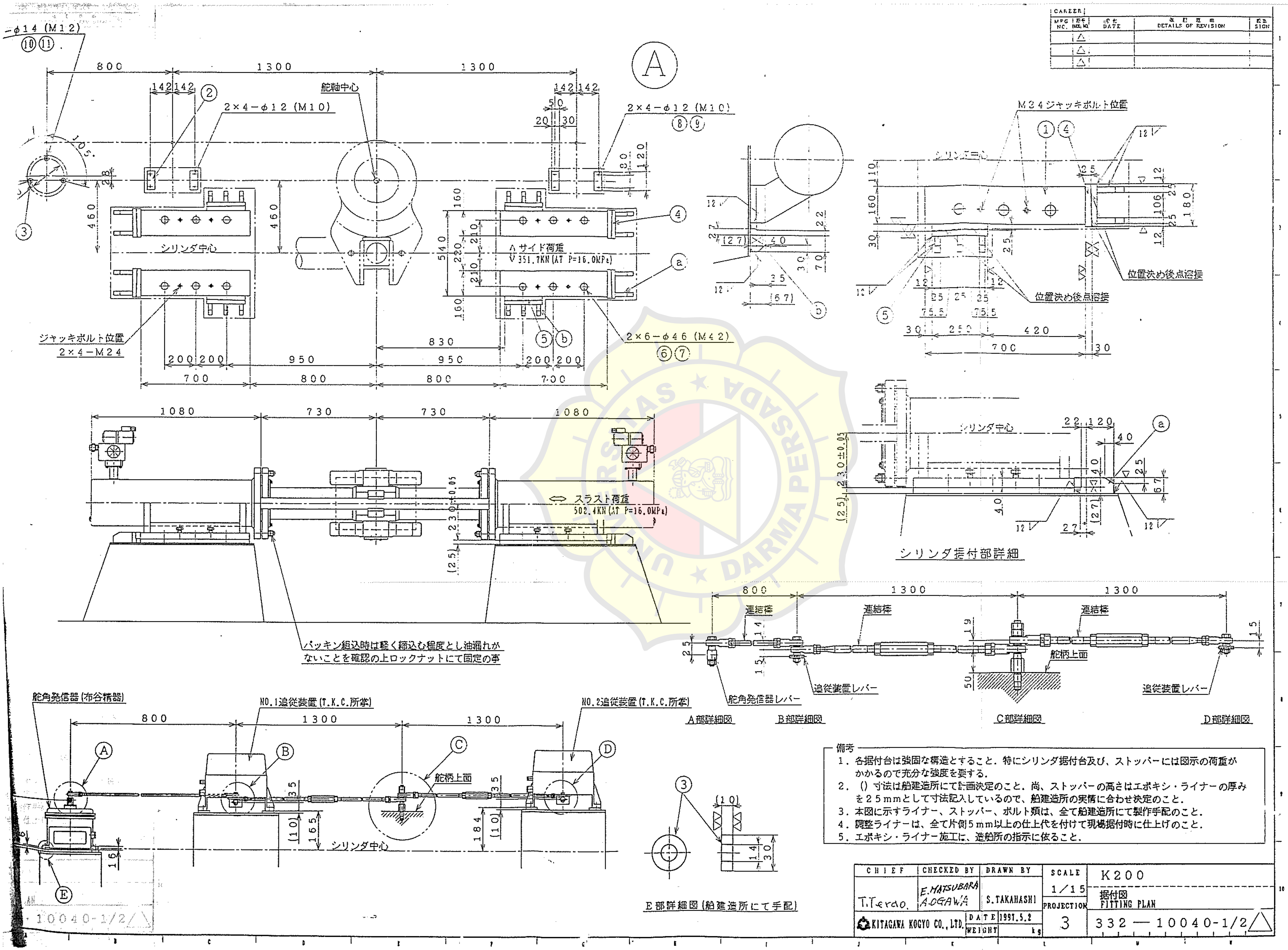
NOTE
1) JIB TO BE STOWED HORIZONTALLY.
2) 360° ENDLESS SLEWING.

MANUFACT ····· 1-SET

Q' TY	REV.	P. No.	NAME	MATERIAL	WEIGHT	TYPE/DWG. No.	REMARKS
			OTHERS		250		
		10	LADDER	SS400			
1		9	PINION GEAR	S45C	13	CR0051	M10×13T
1		8	SLEWING RING	SCM440V	833	KSR160P-370	M12×117T
1		7	SLEWING TRANSMITTER	--	210	ET3250-M(1/121.3)	
1		6	LUFFING CYLINDER	--	1550	KC250-3050-120A	
1		5	HOISTING WINCH	--	320	GMY17L-OB-54-92	WITH WIREDRUM
2		4	SHEAVE	FC250	24	CR0023	ϕ320
1		3	JIB	KA~KD	4950	CS7027A	
1		2	FRAME	KA~KE	2460	CS7026A	
1		1	POST	--	--		YARD SUPPLY
1		C-2	WIRE ROPE	G.S.W.R	150	ϕ16×142M	
1		C-1	HOOK BLOCK	--	160	CA1014	SWL10T(TL20T)

MESSRS.	SASEBO HEAVY IND' LTD.			KOEI SANGYO CO., LTD.		
SHIP No.	439	CLASS	NK	CHIEF	CHECKED	DRAWN
KCH100160 (10T×16MR) HOSE HANDLING CRANE				DATE	JAN. 1998	
				MACH. No.	KWS98063	A
SCALE	N·S	WEIGHT	ab. 10920Kg			

No.	REVISION

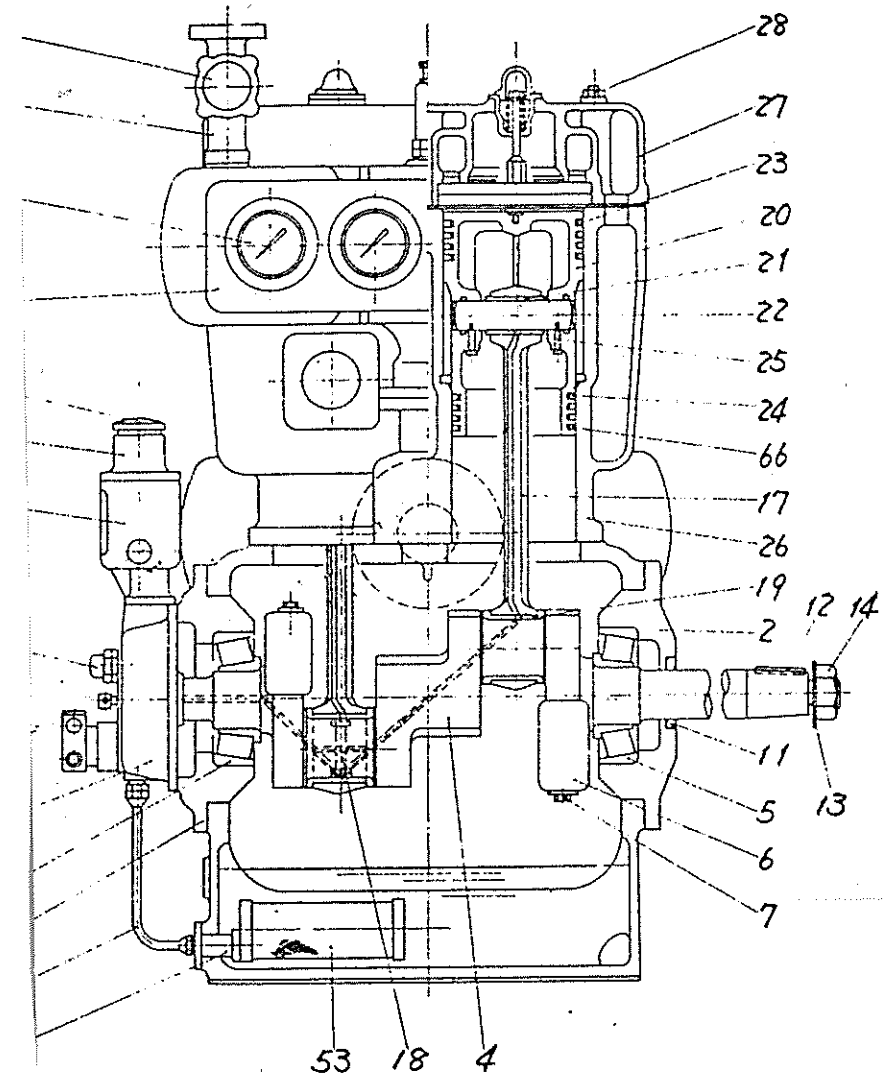


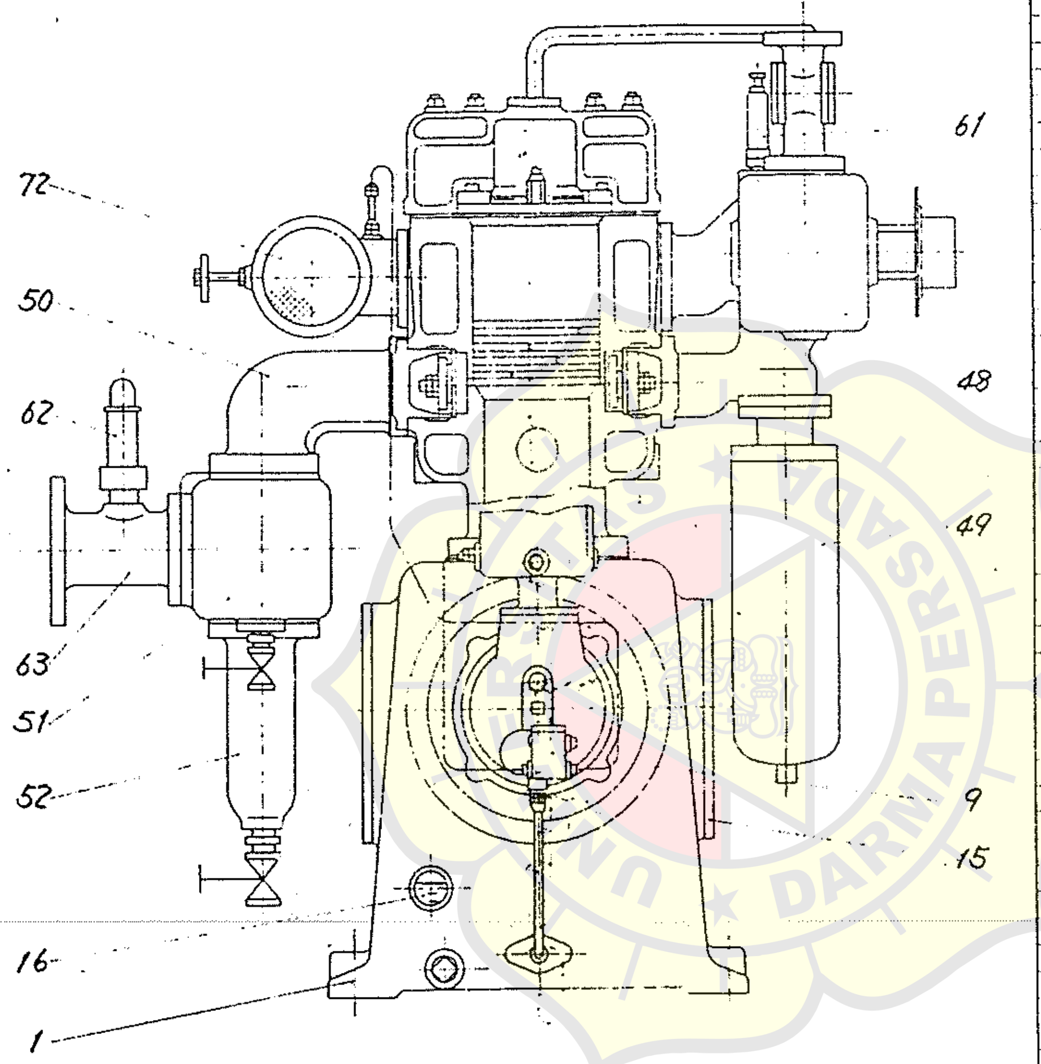
備考

1．各据付台は強固な構造とすること．特にシリンダ据付台及び、ストッパーには図示の荷重がかかるので充分な強度を要する．
2．() 寸法は船建造所にて計画決定のこと．尚、ストッパーの高さはエポキシ・ライナーの厚みを２５ｍｍとして寸法記入しているので、船建造所の実情に合わせ決定のこと．
3．本図に示すライナー、ストッパー、ボルト類は、全て船建造所にて製作手配のこと．
4．調整ライナーは、全て片側5ｍｍ以上の仕上代を付けて現場据付時に仕上げのこと．
5．エポキシ・ライナー施工に、造船所の指示に依ること．

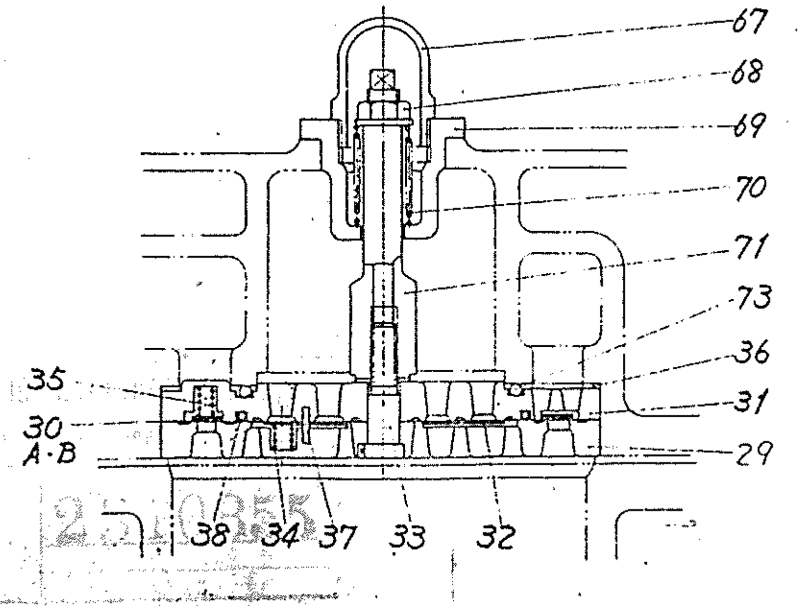
CHIEF	CHECKED BY	DRAWN BY	SCALE	K200
T.Terao.	E.MATSUBARA A.OGAWA	S.TAKAHASHI	1／15	据付図 FITTING PLAN
KITAGAWA KOGYO CO., LTD.	DATE 1997.5.2 WEIGHT kg		PROJECTION 3	332 — 10040-1/2 △

3

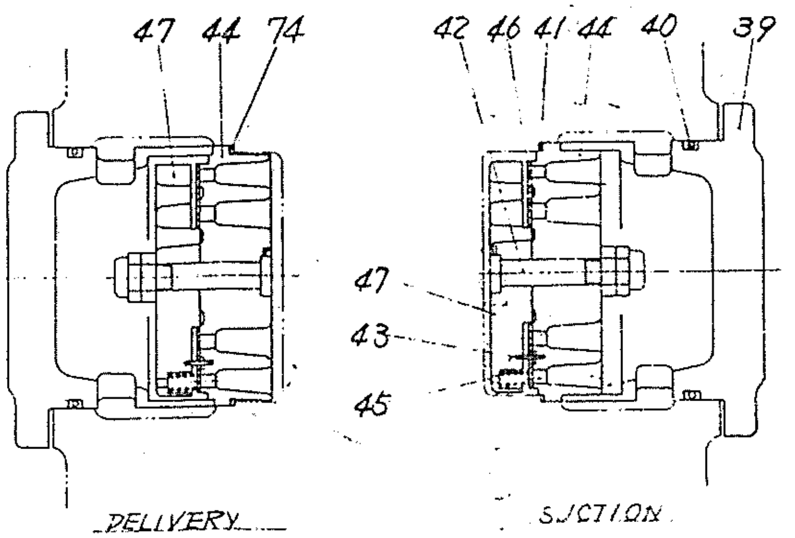




REF NO	NAME OF PARTS	MATERIAL		STANDING QUANTITY	REMARKS
1	CRANK CASE	CAST IRON	FC 20	1	
2	BEARING COVER (FRONT)	CAST IRON	FC 20	1	
3	BEARING COVER (REAR)	CAST IRON	FC 20	1	
4	CRANK SHAFT	FORGED STEEL	SF 60	1	
5	MAIN BEARING	HIGH CARBON Cr STEEL	SUJ 2	2	No-32313
6	BALANCE WEIGHT	CAST IRON	FC 20	2	
7	BALANCE WEIGHT BOLT	Ni-Cr STEEL	SNC 2	4	
8	GEAR PUMP COVER	CAST IRON	FC 20	1	
9	MECHANICAL LUBRICATOR ASSY	ALUMINUM CASTING	AC	1 Set	
10	OIL RELEASE VALVE ASSY	LEAD BRASS	Bs BME	1 Set	
11	OIL SEAL	STEEL & RUBBER		1	SB-578012
12	CRANK KEY	CARBON STEEL	S50C	1	
13	CRANK WASHER	CARBON STEEL	SPC	1	
14	CRANK NUT	CARBON STEEL	S30C	1	
15	SIDE COVER	CAST IRON	FC 20	2	
16	OIL LEVEL GAUGE	PLASTIC		1 Set	
17	CONNECTING ROD	FORGED STEEL	SF 50	2	
18	CONN. ROD BOLT & NUT	Ni-Cr STEEL CARBON STEEL	SNC 2 S15C-P	4 Sets	
19	CONN. ROD BEARING	BRONZE CAST. WHITE METAL	BC 2 WJ 2	2	
20	PISTON	CAST IRON	FC 20	2	
21	PISTON PIN BUSHING	[illegible] BRONZE	PBC 2A	2	
22	PISTON PIN	CARBON STEEL	S15C-K	2	
23	PISTON RING (L.P)	SPECIAL CAST IRON		8	
24	PISTON RING (H.P)	SPECIAL CAST IRON		6	
25	PISTON PIN SET SCREW	CARBON STEEL	S15C-P	4	
26	CYLINDER	CAST IRON	FC 25	1	
27	CYLINDER HEAD	CAST IRON	FC 25	1	
28	CYLINDER HEAD BOLT & NUT	CARBON STEEL Ni-Cr STEEL	S15C-D SNC 2	12 Sets	
29	L.P DELIVERY VALVE SEAT	DUCTILE CAST IRON	FCD 55	2	
30A	L.P DELIVERY VALVE PLATE	Ni-Cr-Mo STEEL	SNCM2	EACH 2	
31	L.P SUCTION VALVE SEAT	DUCTILE CAST IRON	FCD 55	2	
32	L.P SUCTION VALVE PLATE	VALVE STEEL		4	(ASSAB)
33	L.P VALVE CLAMPING BOLT	CARBON STEEL	S30C	2	
34	L.P SUCTION VALVE SPRING	STAINLESS STEEL	17-7PH	6	
35	L.P DELIVERY VALVE SPRING	STAINLESS STEEL	17-7PH	8	
36	L.P DELIVERY VALVE SEAT GASKET	COPPER	DCuP1-O	2	
37	KNOCK PIN	CARBON STEEL	SK-5	2	
38	L.P VALVE SET "O" RING	VITON		2	2G 100
39	H.P VALVE FLANGE	CAST IRON	FC 20	4	
40	H.P VALVE COVER "O" RING	VITON		4	2G 15
41	H.P VALVE SEAT GASKET (SUCTION)	COPPER	DCuP2-O	2	
42	H.P VALVE CLAMPING BOLT & NUT	STEEL	S45C	4 Sets	
43	KNOCK PIN	STEEL	SK 5	4	
44	H.P VALVE SEAT (SUCTION & DELIVERY)	DUCTILE CAST IRON	FCD 60	EACH 2	
45	H.P VALVE SPRING	PIANO WIRE	SWPA	12	
46	H.P VALVE PLATE	Ni-Cr-Mo STEEL	SNCM 2	4	
47	H.P VALVE GUARD (SUCTION & DELIVERY)	DUCTILE CAST IRON	FCD 60	EACH 2	
48	INTER COOLER ASSY	CAST IRON COPPER TUBE	FC 20 TCuT1-O	1 Set	
49	H.P DRAIN CHAMBER ASSY	CARBON STEEL	SS41 SGP	1 Set	
50	H.P OUTLET ELBOW	MALLEABLE	FCMB32	1	
51	AFTER COOLER ASSY	CAST IRON COPPER TUBE	FC 20 TCuT1-O	1 Set	
52	L.P DRAIN CHAMBER	MALLEABLE CAST IRON	FCMB 32	1	
53	OIL SCREEN SCREEN	BRASS WIRE	Bs W	1	
54	OIL SCREEN SUPPORT	CAST IRON	FC 20	1	
55	OIL PIPE WITH JOINT	COPPER TUBE, BRASS	TCuT, BsBM	1	
56	OIL BOX	CAST IRON	FC 20	1	
57	BREATHER FOOT	CAST IRON	FC 20	1	
58	BREATHER CAP ASSY	PLASTIC		1 Set	
59	GAUGE BOARD	CARBON STEEL	SPC	1	
60	PRESSURE GAUGE (OIL, WATER / L.P, H.P)	LEAD BRASS	Bs BME	EACH 1 Set	
61	L.P SAFETY VALVE ASSY	LEAD BRASS	Bs BME	1 Set	
62	H.P SAFETY VALVE ASSY	LEAD BRASS	Bs BME	1 Set	
63	DELIVERY PIPE	MALLEABLE CAST IRON	FCMB 32	1	
64	WATER CHECKER	CAST IRON	FC 20	1	
65	WATER CHECKER GLASS	PLASTIC		2	
66	OIL SCRAPER RING	SPECIAL CAST IRON		2	
67	SPRING RETAINER CAP FOR VALVE SET	ALUMINUM CASTING	AC2A-F	2	
68	VALVE SET NUT	CARBON STEEL	S15C-D	2	
69	VALVE SET SPRING RETAINER	CAST IRON	FC 15	2	
70	VALVE SET SPRING	SPRING STEEL	SUP 6	2	
71	VALVE CLAMPING NUT	CARBON STEEL	S15C-D	2	
72	SUCTION STRAINER ASSY	CARBON STEEL CAST IRON	S45C FC 15	1 Set	
73	L.P VALVE SEAT "O" RING	VITON		2	2G 95
74	H.P VALVE SEAT GASKET (DELIVERY)	COPPER	DCuP2-O	2	



L.P SUCTION & DELIVERY VALVE



H.P VALVE (PLATE VALVE)

	DATE	NAME
DRAWN BY		
TRACED BY		
CHECKED BY		

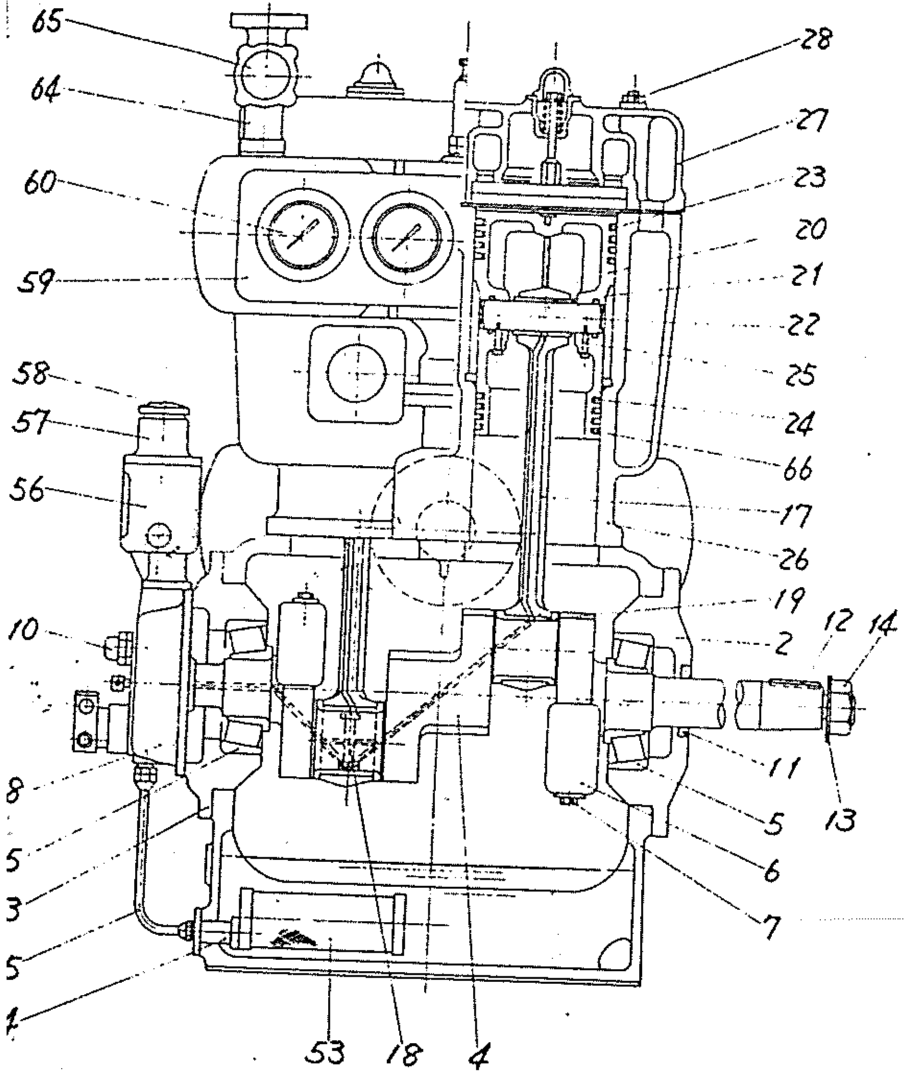
TANABE PNEUMATIC MACHINERY CO.,LTD.
SENRIOKA OSAKA JAPAN

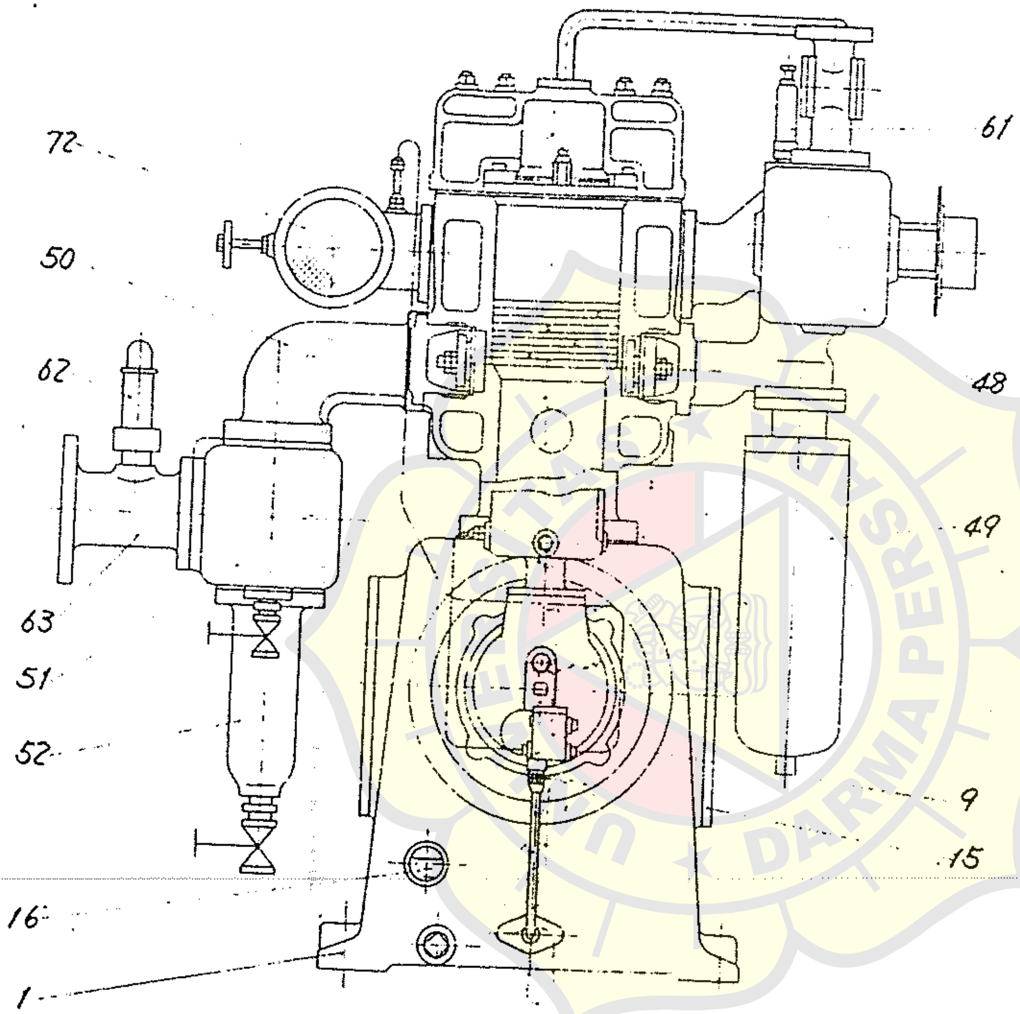
HC-264A
SECTIONAL VIEW OF
AIR COMPRESSOR

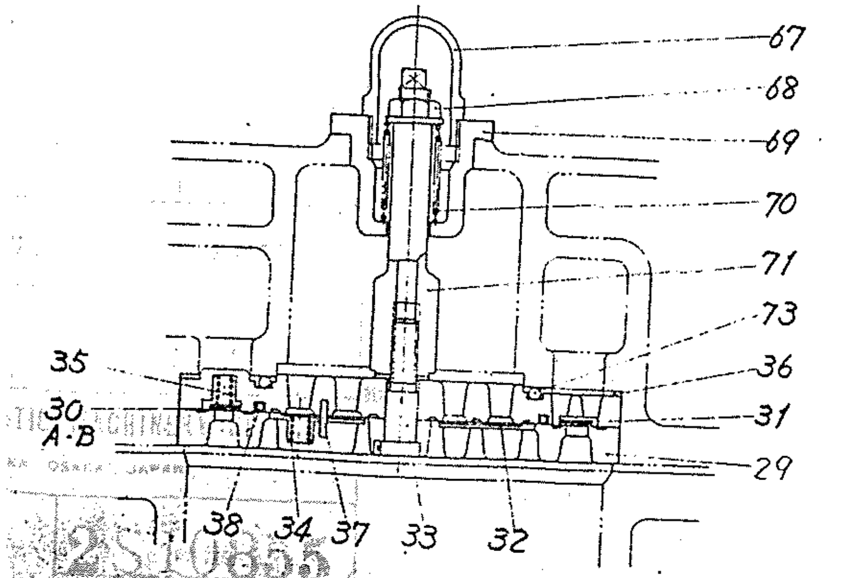
2S10855

3

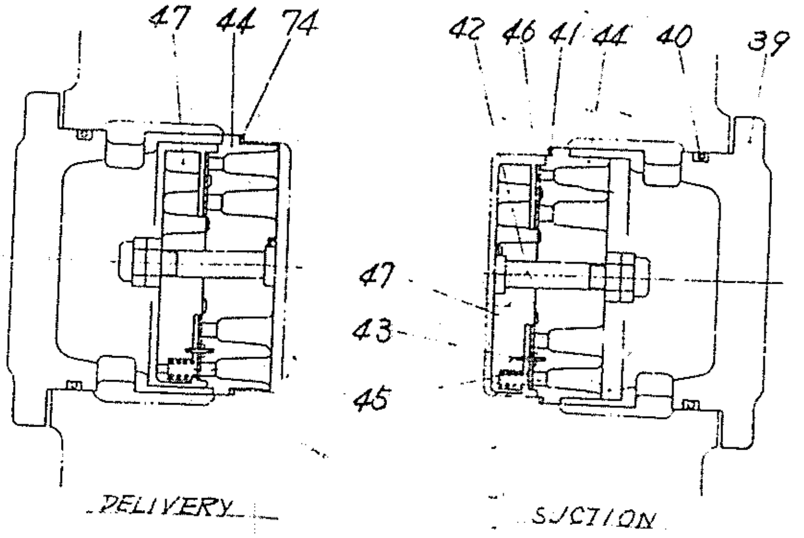
64	WATER CHECKER	CAST IRON	FC 20	1	
65	WATER CHECKER GLASS	PLASTIC		2	
66	OIL SCRAPER RING	SPECIAL CAST IRON		2	
67	SPRING RETAINER CAP FOR VALVE SET	ALUMINIUM CASTING	AC4A-F	2	
68	VALVE SET NUT	CARBON STEEL	S15C-D	2	
69	VALVE SET SPRING RETAINER	CAST IRON	FC 15	2	
70	VALVE SET SPRING	SPRING STEEL	SUP 6	2	
71	VALVE CLAMPING NUT	CARBON STEEL	S15C-D	2	
72	SUCTION STRAINER ASSY	CARBON STEEL CAST IRON	S15C FC 15	1 Set	
73	L.P VALVE SEAT 'O' RING	VITON		2	25.95
74	H.P VALVE SEAT GASKET (DELIVERY)	COPPER	DC-P2-O	2	







L.P SUCTION & DELIVERY VALVE



H.P VALVE (PLATE VALVE)

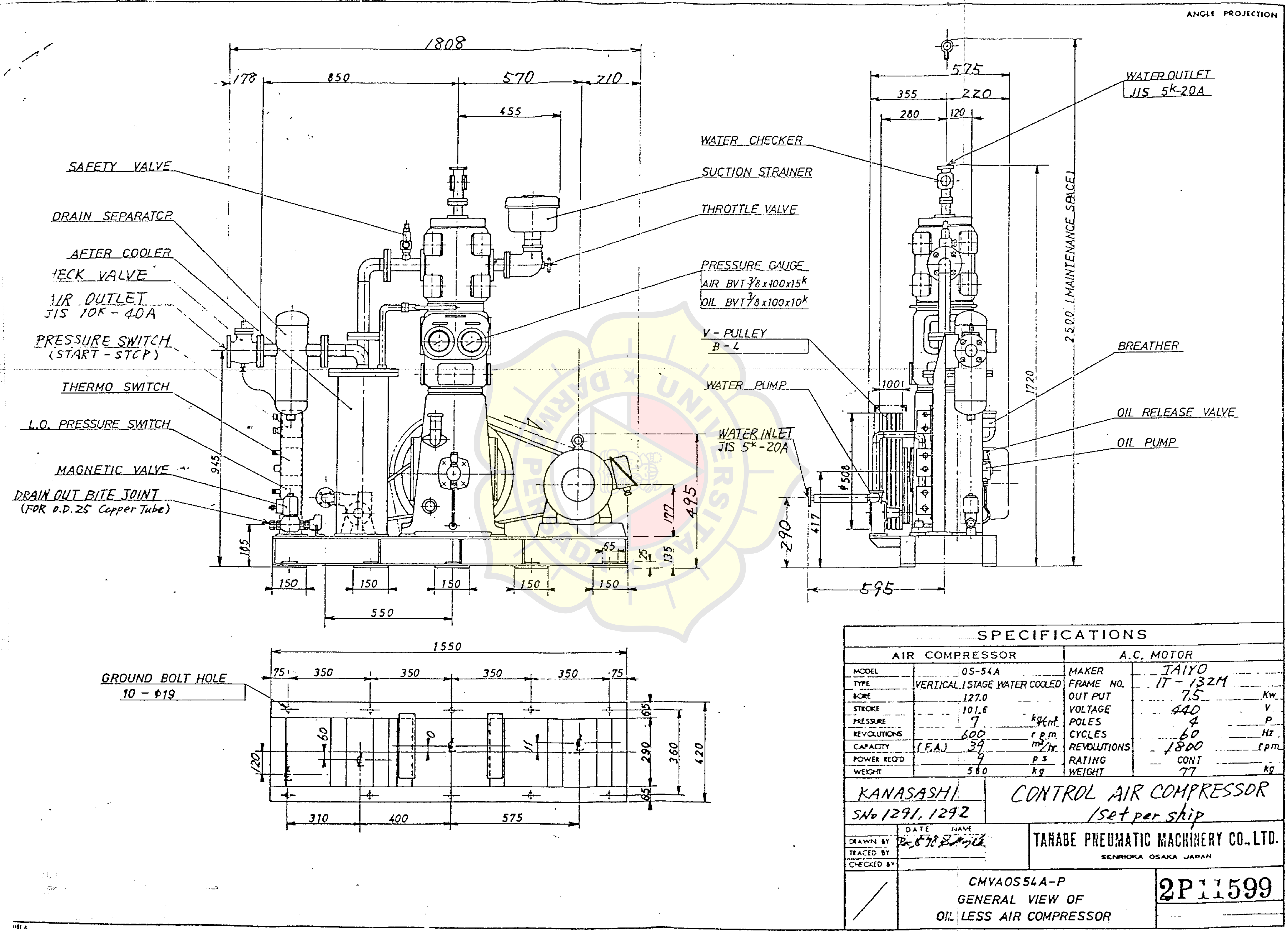
REF NO	NAME OF PARTS.	MATERIAL		STANDING QUANTITY	REMARKS
63	DELIVERY PIPE	MALLEABLE CAST IRON	FCMB32	1	
62	H.P SAFETY VALVE ASSY	LEAD BRASS	Bs BME	1 Set	
61	L.P SAFETY VALVE ASSY	LEAD BRASS	Bs BME	1 Set	
60	PRESSURE GAUGE (OIL, WATER / L.P, H.P)	LEAD BRASS	Bs BME	EACH 1 Set	
59	GAUGE BOARD	CARBON STEEL	SPC	1	
58	BREATHER CAP ASSY	PLASTIC		1 Set	
57	BREATHER FOOT	CAST IRON	FC 20	1	
56	OIL BOX	CAST IRON	FC 20	1	
55	OIL PIPE WITH JOINT	COPPER TUBE BRASS	TCuT BsBM	1	
54	OIL SCREEN SUPPORT	CAST IRON	FC 20	1	
53	OIL SCREEN SCREEN	BRASS WIRE	Bs W	1	
52	H.P DRAIN CHAMBER	MALLEABLE CAST IRON	FCMB 32	1	
51	AFTER COOLER ASSY	CAST IRON COPPER TUBE	FC 20 TCuT1-O	1 Set	
50	H.P OUTLET ELBOW	MALLEABLE	FCMB32	1	
49	L.P DRAIN CHAMBER ASSY	CARBON STEEL	SS41 SGP	1 Set	
48	INTER COOLER ASSY	CAST IRON COPPER TUBE	FC 20 TCuT1-O	1 Set	
47	H.P VALVE GUARD (SUCTION & DELIVERY)	DUCTILE CAST IRON	FCD 60	EACH 2	
46	H.P VALVE PLATE	Ni-Cr-Mo STEEL	SNCM 2	4	
45	H.P VALVE SPRING	PIANO WIRE	SWPA	12	
44	H.P VALVE SEAT (SUCTION & DELIVERY)	DUCTILE CAST IRON	FCD 60	EACH 2	
43	KNOCK PIN	STEEL	SK 5	4	
42	H.P VALVE CLAMPING BOLT & NUT	STEEL	S45C	4 Sets	
41	H.P VALVE SEAT GASKET (SUCTION)	COPPER	DCuP2-O	2	
40	H.P VALVE COVER 'O' RING	VITON		4	ZG 15
39	H.P VALVE FLANGE	CAST IRON	FC 20	4	
38	L.P VALVE SET 'O' RING	VITON		2	ZG 100
37	KNOCK PIN	CARBON STEEL	SK-5	2	
36	L.P DELIVERY VALVE SEAT GASKET	COPPER	DCuP1-O	2	
35	L.P DELIVERY VALVE SPRING	STAINLESS STEEL	17-7PH	8	
34	L.P SUCTION VALVE SPRING	STAINLESS STEEL	17-7PH	6	
33	L.P VALVE CLAMPING BOLT	CARBON STEEL	S35C	2	
32	L.P SUCTION VALVE PLATE	VALVE STEEL		4	(ASSAB)
31	L.P SUCTION VALVE SEAT	DUCTILE CAST IRON	FCD 55	2	
30 A·B	L.P DELIVERY VALVE PLATE	Ni-Cr-Mo STEEL	SNCM2	EACH 2	
29	L.P DELIVERY VALVE SEAT	DUCTILE CAST IRON	FCD 55	2	
28	CYLINDER HEAD BOLT & NUT	CARBON STEEL Ni-Cr STEEL	S15C-D SNC 2	12 Sets	
27	CYLINDER HEAD	CAST IRON	FC 25	1	
26	CYLINDER	CAST IRON	FC 25	1	
25	PISTON PIN SET SCREW	CARBON STEEL	S15C-D	4	
24	PISTON RING (H.P)	SPECIAL CAST IRON		6	
23	PISTON RING (L.P)	SPECIAL CAST IRON		8	
22	PISTON PIN	CARBON STEEL	S15C-K	2	
21	PISTON PIN BUSHING	PHOS. BRONZE	PBC 2A	2	
20	PISTON	CAST IRON	FC 20	2	
19	CONN. ROD BEARING	BRONZE CAST. WHITE METAL	BC 2 WJ 2	2	
18	CONN. ROD BOLT & NUT	Ni-Cr STEEL CARBON STEEL	SNC 2 S15C-D	4 Sets	
17	CONNECTING ROD	FORGED STEEL	SF 50	2	
16	OIL LEVEL GAUGE	PLASTIC		1 Set	
15	SIDE COVER	CAST IRON	FC 20	2	
14	CRANK NUT	CARBON STEEL	S30C	1	
13	CRANK WASHER	CARBON STEEL	SPC	1	
12	CRANK KEY	CARBON STEEL	S50C	1	
11	OIL SEAL	STEEL & RUBBER		1	SB-578012
10	OIL RELEASE VALVE ASSY	LEAD BRASS	Bs BME	1 Set	
9	MECHANICAL LUBRICATOR ASSY	ALUMINIUM CASTING	AC	1 Set	
8	GEAR PUMP COVER	CAST IRON	FC 20	1	
7	BALANCE WEIGHT BOLT	Ni-Cr STEEL	SNC 2	4	
6	BALANCE WEIGHT	CAST IRON	FC 20	2	
5	MAIN BEARING	HIGH CARBON Cr STEEL	SUJ 2	2	NU-32313
4	CRANK SHAFT	FORGED STEEL	SF 60	1	
3	BEARING COVER (REAR)	CAST IRON	FC 20	1	
2	BEARING COVER (FRONT)	CAST IRON	FC 20	1	
1	CRANK CASE	CAST IRON	FC 20	1	

	DATE	NAME
DRAWN BY	[illegible]	[illegible]
TRACED BY		
CHECKED BY		

TANABE PNEUMATIC MACHINERY CO.,LTD.
SENRIOKA OSAKA JAPAN

HC-264A
SECTIONAL VIEW OF

2S10855



SPECIFICATIONS

AIR COMPRESSOR			A.C. MOTOR		
MODEL	05-54A		MAKER	TAIYO	
TYPE	VERTICAL 1STAGE WATER COOLED		FRAME NO.	IT - 132M	
BORE	127.0		OUT PUT	7.5	Kw
STROKE	101.6		VOLTAGE	440	V
PRESSURE	7	kg/cm²	POLES	4	P
REVOLUTIONS	600	r.p.m.	CYCLES	60	Hz
CAPACITY	(F.A.) 39	m³/hr	REVOLUTIONS	1800	rpm
POWER REQ'D	9	p.s	RATING	CONT	
WEIGHT	580	kg	WEIGHT	77	kg

KANASASHI
SNo 1291, 1292

CONTROL AIR COMPRESSOR
1set per ship

	DATE	NAME
DRAWN BY	Dec 6 78	
TRACED BY		
CHECKED BY		

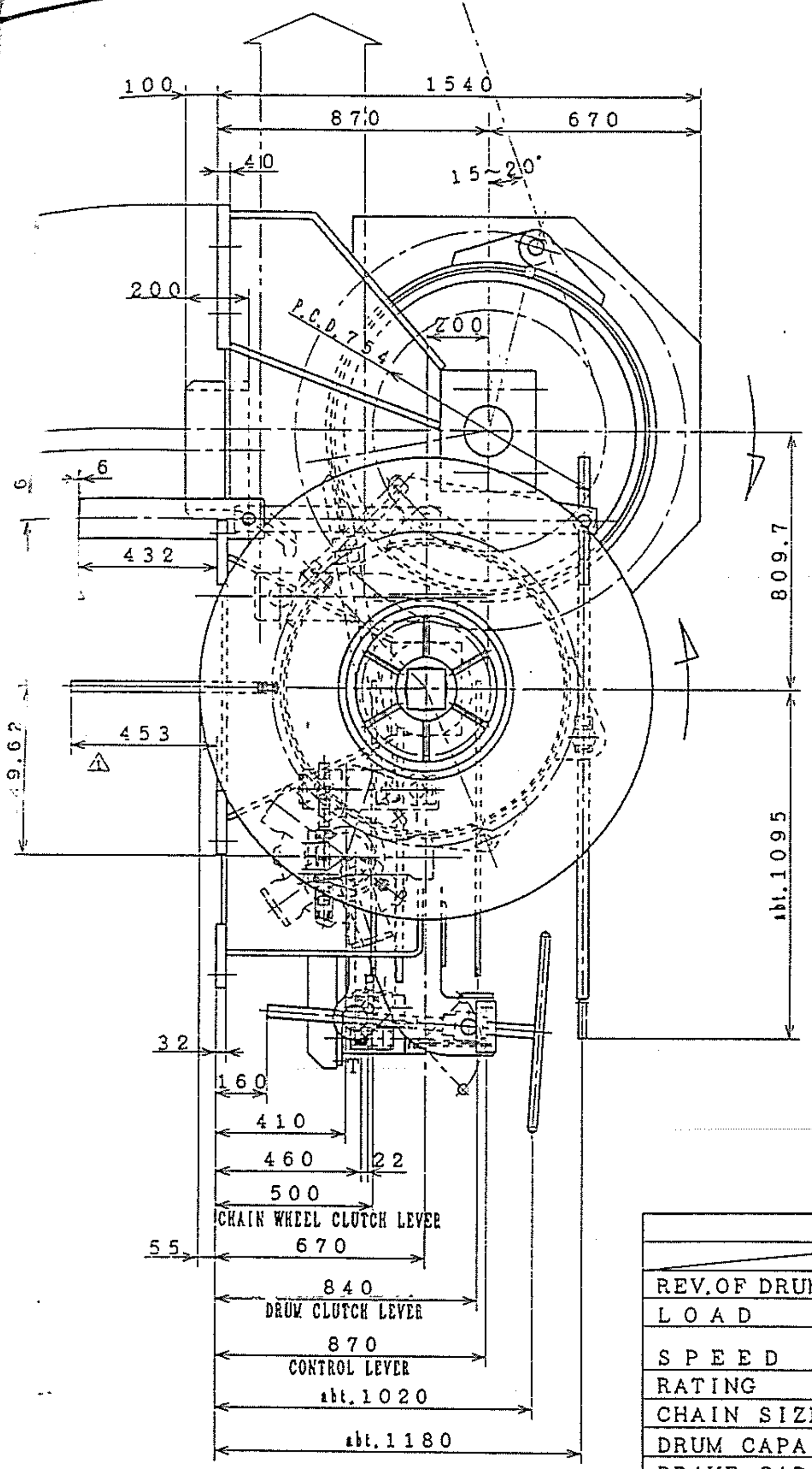
TANABE PNEUMATIC MACHINERY CO., LTD.
SENRIOKA OSAKA JAPAN

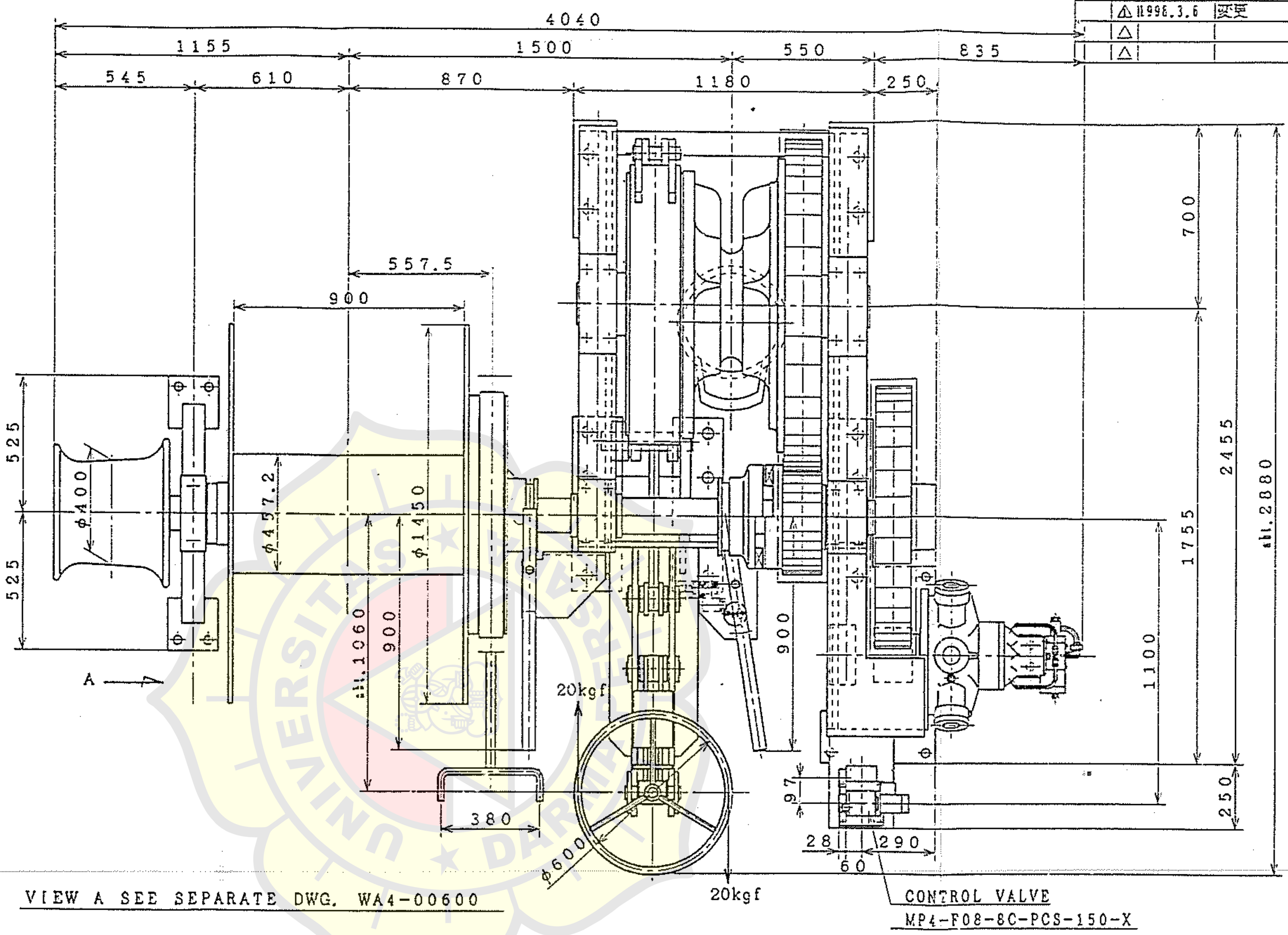
CMVAOS54A-P
GENERAL VIEW OF
OIL LESS AIR COMPRESSOR

2P11599

KITAKO

変更経歴 CAREER	4-A-G			
MFG NO.	符号 MARK	日付 DATE	改正要項 DETAILS OF REVISION	検印 SIGN
	△	1998.3.6	変更	YM
	△			
	△			





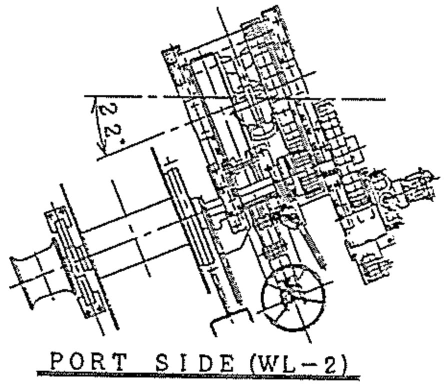
VIEW A SEE SEPARATE DWG. WA4-00600

CONTROL VALVE
MP4-F08-8C-PCS-150-X

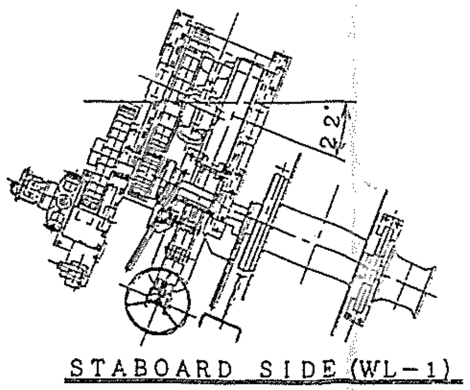
SPECIFICATION			
		CHAIN	DRUM
REV.OF DRUM	r.p.m	3.9	9.1 (27.2)
LOAD	ton	16.3	10
SPEED	m/min	9	NO LOAD 15 (45)
RATING	mm	754	527.2 (1st)
CHAIN SIZE	mm	58 (G3)	
DRUM CAPA	φ×m	NYLON ROPE 70×190	
BRAKE CAPA	ton	119.3	26.51 (1st)
GEAR RATIO		1/15.48	1/5.21

SPECIFICATION OF HYD. MOTOR			
		CHAIN	DRUM
TYPE		MRHV-2200-9-TPNSV+VPC-W4	
REVOLUTION	r.p.m	60	47.4 (142)
DESPLACEMENT	cc/rev	2195~(732)	
OUT PUT	kgf-m	496	562
DESIGNED PRESS	kgf/cm²	152	172
QUANTITY	ℓ/min	142	112 (116)
OIL		ISO VG32	

PARTS LIST			
NAME	MATERIAL	NO.S	REMARKS.
MAIN SHAFT	SCM435	1	
CHAIN WHEEL	SC480	1	φ58×5TH
DRUM	SS400	1	
DRUM SHAFT	SCM435	1	
WARPING DRUM	FC200	1	
CLAW CLUTCH	SC480	2	
GEAR	SCMn2A	1	12M-104T
	SC480	1	10M-99T
PINION	S45C	1 1	12M-35T 10M-19T
BED	SS400	1	
FRAME	SS400	1	
BEALING METAL	BC3	3	
BRAKE BAND SUPPORT (BOLT AND NUT)	SUS304	2	



PORT SIDE (WL-2)



STABOARD SIDE (WL-1)

CHIEF	CHECKED BY	DRAWN BY	SCALE	HWL-16-GHW-0-TT
	AOGAWA Y. MATSUMOTO	Y. TAKAHASHI	1/15	HYD. WINDLASS
KI AGAWA KOGYO CO., LTD.	DATE 1998.1.26 WEIGHT kg		PROJECTION 3	WA2 — 08211 △1