

S. G. CHRISTENSEN.

CRANKSHAFTS.

PRELIMINARY
CALCULATIONS FOR 12x13 IN. CRANKSHAFTS
L. R. RULES.

CALCULATIONS FOR ALLOWABLE HP

$$H_0 = \frac{K_2 N E}{5730 C K_1} \left[\frac{d^3 Z (\sigma_u + 16)}{7000} - \frac{A K_2 P (Z - 2p)}{100000} \right]$$

$$N = 1$$

$$P_2 = 450$$

$$E = 0.55$$

$$C = 5.2$$

$$A = 0.37$$

$$d_p = 12 \times 25.4 = 304.8$$

$$d_s = 13 \times 25.4 = 330.2$$

$$r = 0.75 \times 25.4 = 19.05$$

$$d_s > d_p \therefore Z = 304.8 \quad Z = 1$$

$$u = 12 + 13 - 21 = 4$$

$$p = 1800 = 126.58$$

$$126.5529$$

$$K_1 = 0.5 + \frac{4}{3 \times 12} + 0.243 \sqrt{\frac{12}{0.75}} = 1.8831$$

$$\frac{450 \times 1 \times 0.55}{5730 \times 5.2 \times 1.8831} = 0.028231$$

$$UTS \quad 695 \text{ N/mm}^2 = 70.87 \text{ Kg/mm}^2 = \sigma_u$$

$$\frac{304.8^3 \times 1.0 \times 70.87}{7000} = 351412.0641$$

K₂ To Find

$$\frac{4}{12} = 0.3333$$

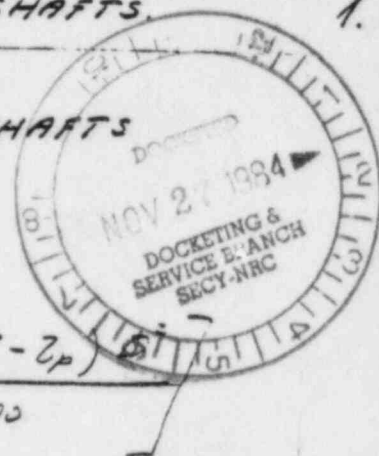
$$\frac{0.6875 \times 0.75}{144} = 0.003581 \quad Q = 1215$$

$$\frac{2.1}{12} = 1.75 \quad F = 1.15$$

$$\frac{4.5}{12} = 0.375 \quad G = 1.44$$

$$K_2 = 1215 \times 1.15 \times 1.44 \times \sqrt{\frac{12}{0.75}} = 8.048$$

$$\frac{0.37 \times 8.048 \times 126.58 (460.629 - 177.8) \times 31.5^2}{100000} = 198.7668692$$



$$\text{ALLOWABLE HP} = 0.028231 (351\,412 - 198\,767)$$

$$= \underline{4309.32} \text{ HP metric}$$

$$= 4250.28 \text{ U.S. HP}$$

TEMP Max μ FREQ 1500 to 2000

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λ	K_g / cm^2	μ
1500	105.4629	5173.775
1600	112.4938	4866.377
1700	119.5247	4558.979
1800	126.5556	4251.581
1900	133.5864	3944.183
2000	140.6173	3636.785
2100	147.6482	3329.387
2200	154.6791	3021.989
2300	161.7100	2714.591
2400	168.7409	2407.193
2500	175.7718	2100.795
2600	182.8027	1793.397
2700	189.8336	1485.999
2800	196.8645	1178.601
2900	203.8954	871.203
3000	210.9263	563.805
3100	217.9572	256.407
3200	224.9881	-71.009
3300	232.0190	-368.611
3400	239.0499	-676.213
3500	246.0808	-983.815
3600	253.1117	-1291.417
3700	260.1426	-1599.019
3800	267.1735	-1906.621
3900	274.2044	-2214.223
4000	281.2353	-2521.825
4100	288.2662	-2829.427
4200	295.2971	-3137.029
4300	302.3280	-3444.631
4400	309.3589	-3752.233
4500	316.3898	-4059.835
4600	323.4207	-4367.437
4700	330.4516	-4675.039
4800	337.4825	-4982.641
4900	344.5134	-5290.243
5000	351.5443	-5597.845

42	306	300	500	1.05	5	500	4.00
43	302	100	500	1.05	5	500	4.00
44	300	200	500	1.05	5	500	4.00

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