

Chain

Table 17-19 → ANSI-100 → P = 1.250 in

$$V = \frac{N P n}{12} = \frac{17 \times 1.250 \times 700}{12} = 1240 \text{ ft/min}$$

$$H_1 = 0.004 N_1^{1.08} n_1^{0.9} P^{(3-0.07P)} = 0.004 (17)^{1.08} \times 700^{0.9} \times (1.250)^{(3-0.07 \times 1.25)}$$

$$\rightarrow H_1 = 59.4 \text{ hp}$$

$$H_2 = \frac{1000 K_r N_1^{1.5} P^{0.8}}{n_1^{1.5}}$$

K<sub>r</sub> = 17 (for chain No. 100)

$$\rightarrow H_2 = \frac{1000 \times 17 \times (17)^{1.5} \times (1.250)^{0.8}}{(700)^{1.5}} = 76.9 \text{ hp}$$

Table 17-20 → Type B / ANSI-100 / n = 700 rpm → H<sub>tab</sub> = 59.4 hp

Table 17-22 → N<sub>1</sub> = 17 → K<sub>1</sub> = 1

Table 17-23 → 2-Strand → K<sub>2</sub> = 1.7

$$H_a = K_1 K_2 H_{tab} = 1 \times 1.7 \times 59.4 = 100.98 \text{ hp}$$

$$H_d = H_{nom} K_s n_d = H_a, \quad H_{nom} = 50 \text{ hp} \quad (K_s = 1 \text{ صددرصدتوان})$$

$$\rightarrow 100.98 = 50 \times 1 \times n_d \rightarrow n_d = 2.02 \quad (\text{صحت ندارد})$$

$$H_d = H_{nom} K_s n_d = H_1$$

$$\rightarrow 59.4 = 50 \times 1 \times n_d \rightarrow n_d = 1.2 \quad (\text{صحت ندارد})$$

$$H_d = H_{nom} K_s n_d = H_2$$

$$\rightarrow 76.9 = 50 \times 1 \times n_d \rightarrow n_d = 1.5 \quad (\text{صحت ندارد})$$

$$\frac{L}{P} \approx \frac{2c}{P} + \frac{N_1 + N_2}{2} + \frac{(N_2 - N_1)^2}{4\pi^2 c / P}$$

نسبت 1:3  $\rightarrow \frac{N_2}{N_1} = 3 \rightarrow N_2 = 3 \times 17 = 51$

$$\rightarrow \frac{L}{P} \approx \frac{50}{1.250} + \frac{17+51}{2} + \frac{(51-17)^2}{4\pi^2 \times 50 / 1.250} = 74.7 \text{ inch}$$

نسبت درز خنجر معمولاً برابر با نسبت کشش است. اما برای مواد  $H_1, H_2$  با نسبت  $H_1 = 1$

or  $H_1/H_2 = 1000 \left[ K_r \left( \frac{N_1}{n_1} \right)^{1.5} P^{0.8} \left( \frac{L_P}{100} \right)^{0.4} \left( \frac{15000}{h} \right)^{0.4} \right]$

or  $H_1/H_2 = 1000 \left[ 17 \left( \frac{17}{700} \right)^{1.5} \times (1.25)^{0.8} \times \left( \frac{74.7}{100} \right)^{0.4} \times \left( \frac{15000}{h} \right)^{0.4} \right]$

$$H_1 \rightarrow h = 21377.35 \text{ hr}$$

$$H_2 \rightarrow h = 11209.96 \text{ hr}$$

$$H_a \rightarrow h = 5673.25 \text{ hr}$$

با سطح نهایی برابر نسبی

$$n_d = 1.2$$

$$h = 5673.25 \text{ hr}$$

### V-Belt

$$\theta_d = \pi - 2 \sin^{-1} \frac{D-d}{2c}$$

$$\theta_D = \pi + 2 \sin^{-1} \frac{D-d}{2c}$$

$$L = \sqrt{4c^2 - (D-d)^2} + \frac{1}{2} (D\theta_D + d\theta_d)$$

نسبت 1:3  $\rightarrow \frac{D}{d} = 3 \rightarrow D = 15 \times 3 = 45 \text{ in}$

$$\theta_d = \pi - 2 \sin^{-1} \frac{45-15}{2 \times 50} = \pi - 2 \sin^{-1} (0.3) = \pi - 2 \times \frac{2\pi}{360} \times 17^\circ = 0.8\pi$$

$$\theta_D = \pi + 2 \sin^{-1} \frac{45-15}{2 \times 50} = \pi + 2 \sin^{-1} (0.3) = \pi + 2 \times \frac{2\pi}{360} \times 17^\circ = 1.2\pi$$

$$L = \sqrt{4(50)^2 - (45-15)^2} + \frac{1}{2} (45 \times 1.2\pi + 15 \times 0.8\pi) = 199 \text{ inch}$$

Table 17-11  $\rightarrow$  type D  $\rightarrow L_{\text{correction}} = 3.3 \rightarrow L_{\text{final}} = 199 + 3.3 = 202.3 \text{ inch}$

3

$$L_p = 2C + \frac{\pi}{2}(D+d) + \frac{(D-d)^2}{4C}$$

$$L_p = 2 \times 50 + \frac{\pi}{2}(45+15) + \frac{(45-15)^2}{4 \times 50} = 198.7 \text{ inch}$$

Table 17-11 → type D → L correction = 3.3 → L<sub>final</sub> = 198.7 + 3.3 = 202 inch

مورد طول تویا ب در هشتاد و پنج اینچ است

$$H_a = K_1 K_2 H_{tab}$$

Table 17-12 → type D → ?

$$v = \frac{\pi d n}{12} = \frac{\pi \times 15 \times 700}{12} = 2748 \text{ ft/min}$$

Table 17-12 → p = 30 in (17.0 and up)

|      |      |
|------|------|
| 2000 | 3000 |
| 13.9 | 18.1 |

$$\text{Interpolation} = \frac{3000 - 2000}{18.1 - 13.9} = \frac{2748 - 2000}{H_{tab} - 13.9}$$

$$\Rightarrow H_{tab} = 17.0 \text{ hp}$$

Table 17-13 →  $\frac{D-d}{c} = \frac{45-15}{50} = 0.6 \rightarrow K_1 = 0.83$  (V-Flat)

Table 17-14 → type D →  $173 < L < 210 \rightarrow K_2 = 0.95$

Table 17-15 →  $K_5 = 1$

$$H_{nom} = 50 \text{ hp}$$

$$H_a = H_{nom} K_5 n_d$$

$$n_b \geq \frac{H_d}{H_a} \rightarrow H_d = n_b H_a$$

$$\rightarrow 5 \times 0.83 \times 0.95 \times 17.0 = 50 \times 1 \times n_d \Rightarrow n_d = 1.3$$

①

$$\frac{F_1 - F_c}{F_2 - F_c} = \exp(0.5123\phi)$$

$$\phi = \theta_d = 0.8\pi \rightarrow \frac{F_1 - F_c}{F_2 - F_c} = \exp(0.5123 \times 0.8\pi) = 3.6$$

$$F_c = K_c \left(\frac{V}{1000}\right)^2$$

Table 17-16  $\rightarrow$  type D  $\rightarrow K_c = 3.498, K_b = 5680$

$$\rightarrow F_c = 3.498 (2748/1000)^2 = 26.4 \text{ lb}$$

$$\Delta F = \frac{63025 H_d / N_b}{n(d/2)} = \frac{63025 \times 50 \times 1 \times 1.3 / 5}{700 \times 15/2} = 156.1 \text{ lb}$$

$$F_1 = F_c + \frac{\Delta F \exp(0.5123\phi)}{\exp(0.5123\phi) - 1} = 26.4 + \frac{156.1 \times 3.6}{3.6 - 1} = 242.5 \text{ lb}$$

$$F_2 = F_1 - \Delta F = 242.5 - 156.1 = 86.4 \text{ lb}$$

$$F_i = \frac{F_1 + F_2}{2} - F_c = \frac{242.5 + 86.4}{2} - 26.4 = 138.1 \text{ lb}$$

$$T_1 = F_1 + \frac{K_b}{d} = 242.5 + \frac{5680}{15} = 621.2 \text{ lb}$$

$$T_2 = F_1 + \frac{K_b}{D} = 242.5 + \frac{5680}{45} = 368.8 \text{ lb}$$

$$N_p = \left[ \left(\frac{K}{T_1}\right)^{-b} + \left(\frac{K}{T_2}\right)^{-b} \right]^{-1}$$

Table 17-17  $\rightarrow$  type D  $\rightarrow K = 4208, b = 11.105$

$$N_p = \left[ \left(\frac{4208}{621.2}\right)^{-11.105} + \left(\frac{4208}{368.8}\right)^{-11.105} \right]^{-1} = 1.7 \times 10^9 \text{ cycles}$$

$$t = \frac{N_p L_p}{720 V} = \frac{1.7 \times 10^9 \times 202}{720 \times 2748} = 171460.4 \text{ hrs}$$

$$N_d = 1.3$$

$$t = 171460.4 \text{ hrs}$$

میانگین زمان است

هم فدریک اسیان هم عمر تمام بسترزنجیر است همین اندک سواران کشته دریا

Table 17-8 → Inconel

$$S_y = 160 \text{ kpsi} / E = 30 \text{ Mpsi} / \nu = 0.284$$

$$S_f = \frac{S_y}{3} \quad (\text{others})$$

$$\rightarrow S_f = \frac{160}{3} = 53.3 \text{ kpsi}$$

$$(F_1)_a = \left[ S_f - \frac{Et}{(1-\nu^2)D} \right] tb = ab = \left[ 53.3 \times 10^3 - \frac{30 \times 10^6 \times t}{(1-0.284^2) \times 4} \right] \times t \times 1$$

$$\Delta F = \frac{2T}{D} = \frac{2 \times 50}{4} = 25 \text{ lb}$$

$$F_2 = (F_1)_a - \Delta F = \left[ 53.3 \times 10^3 - 8.2 \times 10^6 t \right] t - 25$$

$$F_1 = \frac{(F_1)_a + F_2}{2} = (F_1)_a - \frac{\Delta F}{2} = \left[ 53.3 \times 10^3 - 8.2 \times 10^6 t \right] t - 12.5$$

$$b_{\min} = \frac{\Delta F}{a} \frac{\exp(f\phi)}{\exp(f\phi) - 1}$$

$$\theta_d = \pi - 2 \sin^{-1} \frac{D-d}{2c} = \pi - 2 \sin^{-1} \frac{(8-4)}{10} = \pi - 2 \sin^{-1}(0.4) = \pi - 2 \times \frac{2\pi}{360} \times 23$$

$$\rightarrow \theta_d = 0.7\pi$$

$$\rightarrow \exp(f\phi) = \exp(f\theta_d) = \exp(0.3 \times 0.7\pi) = 2.02$$

$$\Rightarrow b_{\min} = \frac{25}{a} \times \frac{2.02}{2.02 - 1} = 1 \Rightarrow a = 0.02 \rightarrow t = 0.006 \text{ جزیب قابل قبول}$$

Table 17-7 → بادادہ صاف تو زیادہ درست ہے!

$$f' = \frac{1}{\phi} \ln \frac{(F_1)_a}{F_2} = \frac{1}{0.7\pi} \ln \frac{0.02}{0.02 - 25} \rightarrow \text{قابل مقایسہ ہے!!!}$$

6

Table 17-8  $\rightarrow$  BeCu

$$S_y = 170 \text{ kpsi} / E = 17 \text{ Mpsi} / \nu = 0.220$$

$$S_f = \frac{170}{3} = 56.7 \text{ kpsi}$$

$$(F_1)_a = \left[ 56.7 \times 10^3 - \frac{17 \times 10^6 \times t}{(1 - 0.220^2) \times 4} \right] \times t \times 1 = [56.7 \times 10^3 - 4.5 \times 10^6 t] t$$

$$\Delta F = 25 \text{ lb}$$

$$F_2 = [56.7 \times 10^3 - 4.5 \times 10^6 t] t - 25$$

$$F_i = [56.7 \times 10^3 - 4.5 \times 10^6 t] t - 12.5$$

$$b_{\min} = \frac{25}{a} \times \frac{2.02}{2.02 - 1} = 1 \Rightarrow a = 0.02 \rightarrow t = 0.01 \text{ حجاب قابل قبول}$$

Table 17-7  $\rightarrow$  بارده ها همخوانی ندارند!