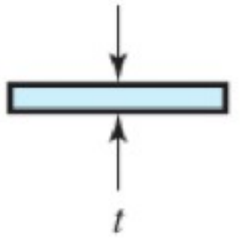
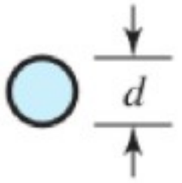
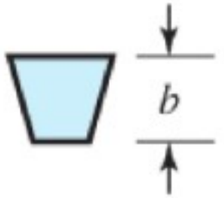
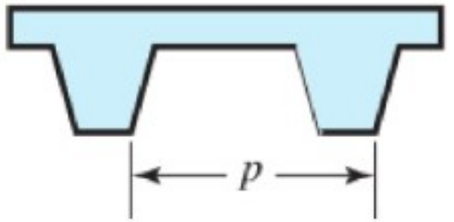
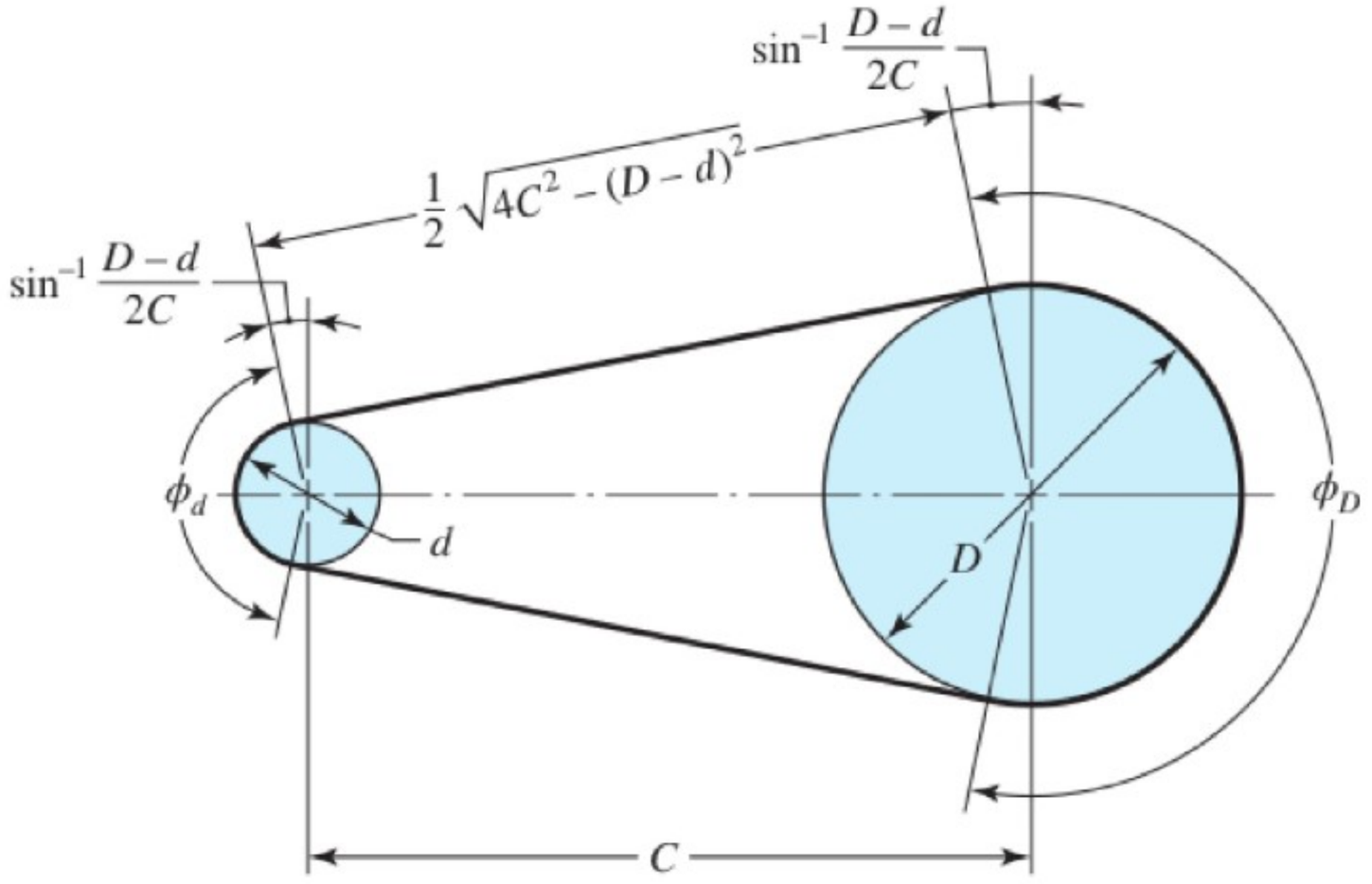
$$1\ \text{reyn} = 1\ \frac{\text{lb}\ \text{s}}{\text{in}^2}$$

Belts

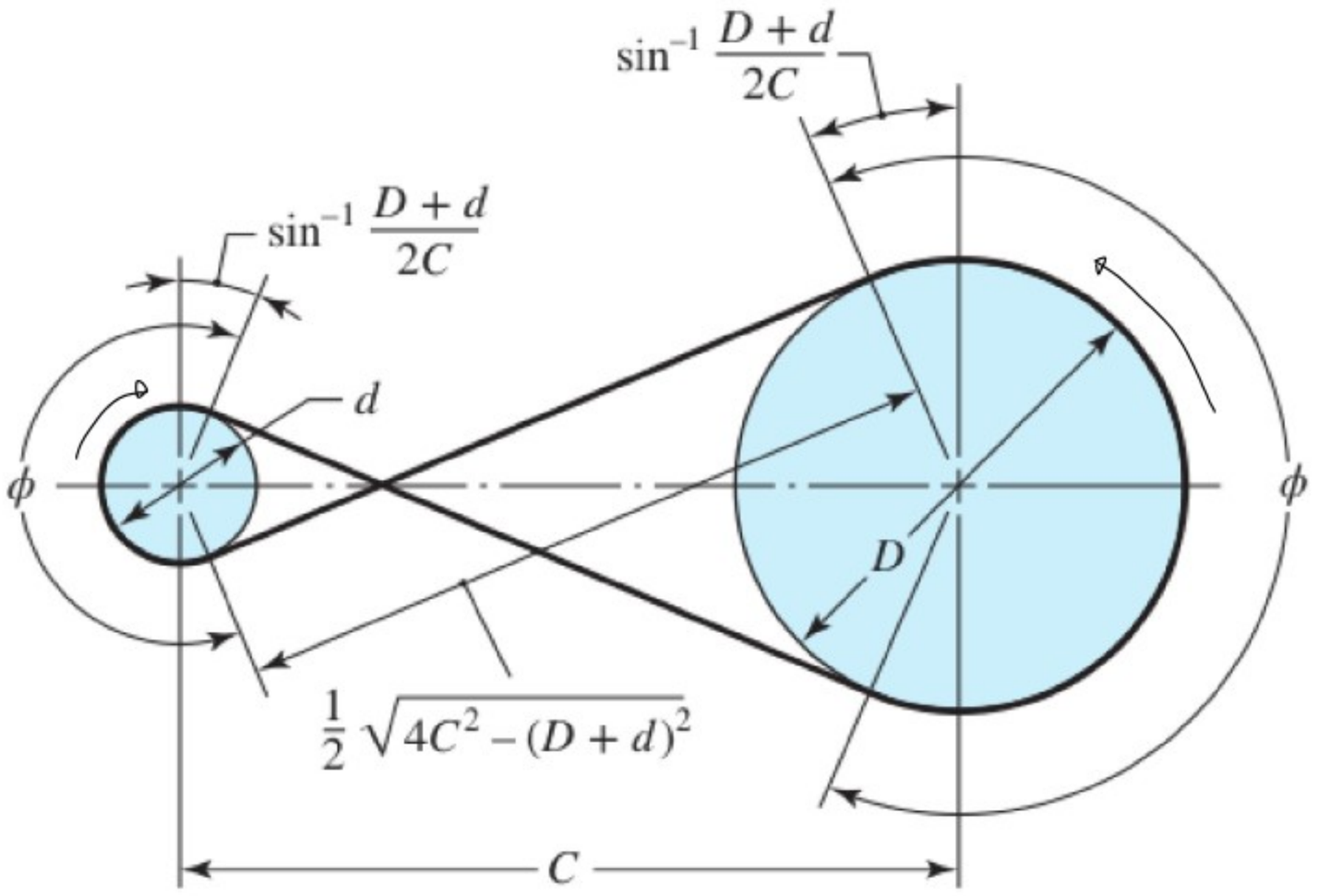
Belt Type	Figure	Joint	Size Range	Center Distance
Flat		Yes	$t = \begin{cases} 0.03 \text{ to } 0.20 \text{ in} \\ 0.75 \text{ to } 5 \text{ mm} \end{cases}$	No upper limit
Round		Yes	$d = \frac{1}{8}$ to $\frac{3}{4}$ in	No upper limit
V		None	$b = \begin{cases} 0.31 \text{ to } 0.91 \text{ in} \\ 8 \text{ to } 19 \text{ mm} \end{cases}$	Limited
Timing		None	$p = 2$ mm and up	Limited



$$\phi_d = \pi - 2\sin^{-1}\frac{D-d}{2C}$$

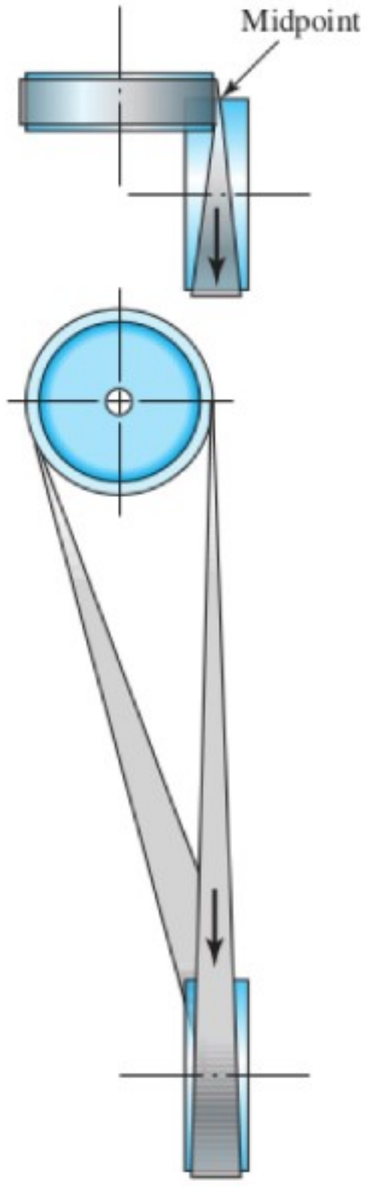
$$\phi_D = \pi + 2\sin^{-1}\frac{D-d}{2C}$$

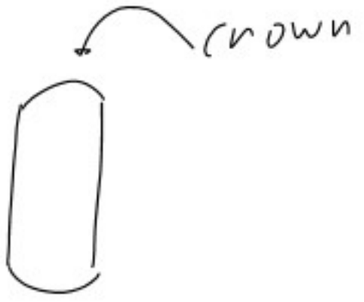
$$L = \sqrt{4C^2-(D-d)^2} + \tfrac{1}{2}(D\phi_D + d\phi_d)$$

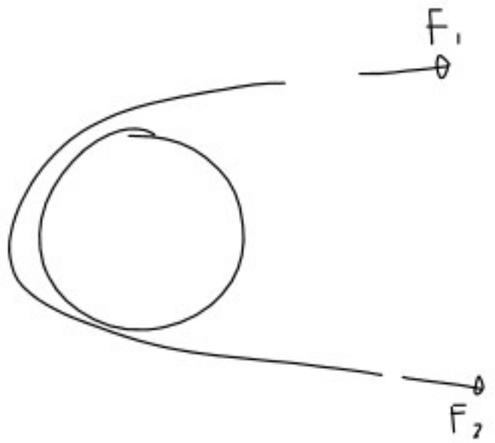


$$\phi = \pi + 2\sin^{-1}\frac{D+d}{2C}$$

$$L = \sqrt{4C^2-(D+d)^2} + \tfrac{1}{2}(D+d)\phi$$


Midpoint


crown



$$F_1 - F_2 = (F_1 - F_c)\,\frac{e^{f\theta} - 1}{e^{f\theta}}$$

$$F_c = \frac{w}{g} v^2$$

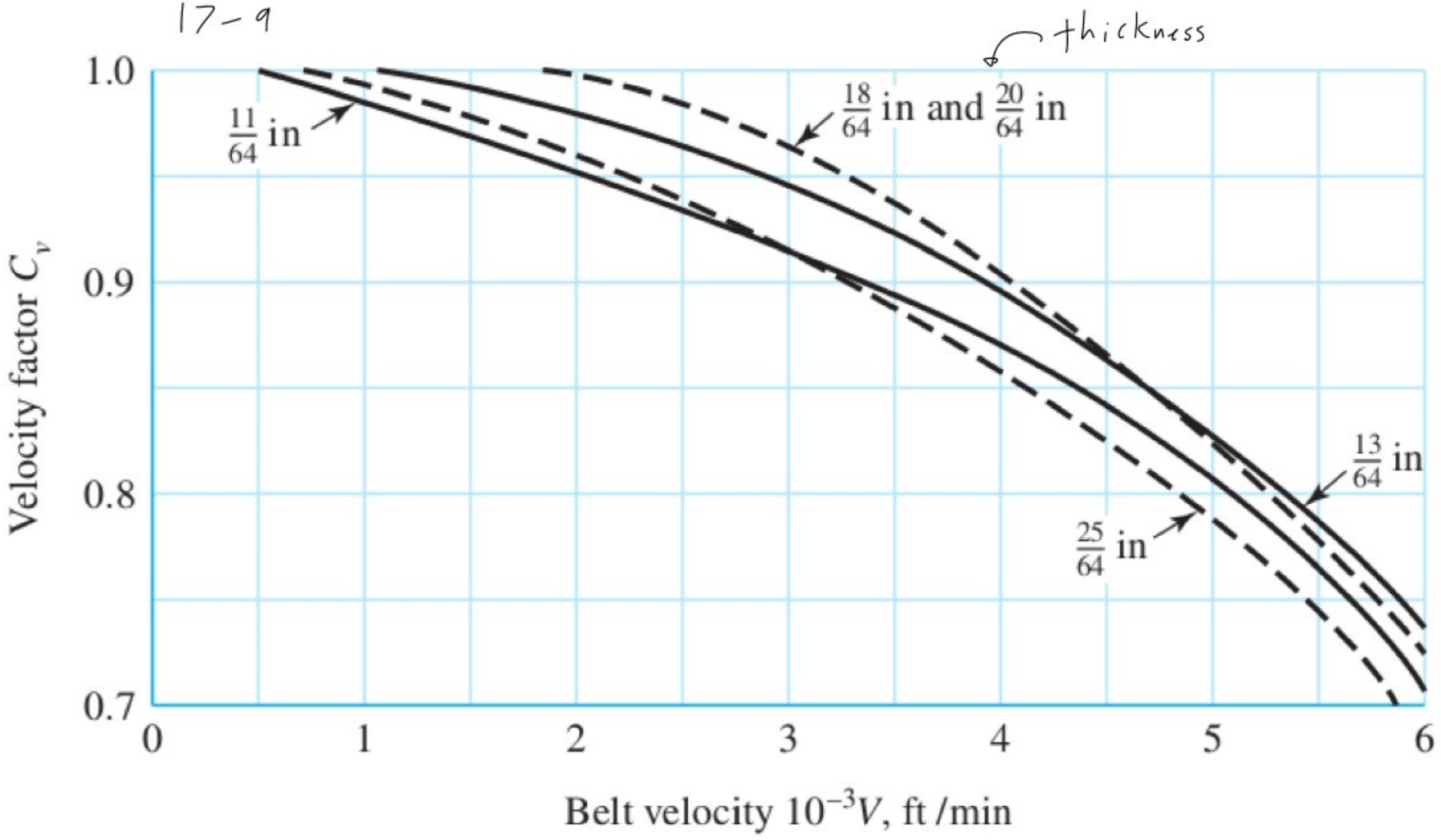
w weight per unit length

(centrifugal force)

$$F_{1a} = b F_a C_p C_v$$

F_{1a}	allowable force
F_a	manufacturers allowable force
b	belt width
C_p	Pully correction factor
C_v	velocity factor

17-9


thickness
1.0
0.9
0.8
0.7
Velocity factor C_v
$\frac{11}{64}$ in
$\frac{18}{64}$ in and $\frac{20}{64}$ in
$\frac{13}{64}$ in
$\frac{25}{64}$ in
0
1
2
3
4
5
6
Belt velocity $10^{-3}V$, ft /min

17-4 Pully correction factor

	Small-Pulley Diameter, in					
Material	**1.6 to 4**	**4.5 to 8**	**9 to 12.5**	**14, 16**	**18 to 31.5**	**Over 31.5**
Leather	0.5	0.6	0.7	0.8	0.9	1.0
Polyamide, F–0	0.95	1.0	1.0	1.0	1.0	1.0
F–1	0.70	0.92	0.95	1.0	1.0	1.0
F–2	0.73	0.86	0.96	1.0	1.0	1.0
A–2	0.73	0.86	0.96	1.0	1.0	1.0
A–3	—	0.70	0.87	0.94	0.96	1.0
A–4	—	—	0.71	0.80	0.85	0.92
A–5	—	—	—	0.72	0.77	0.91

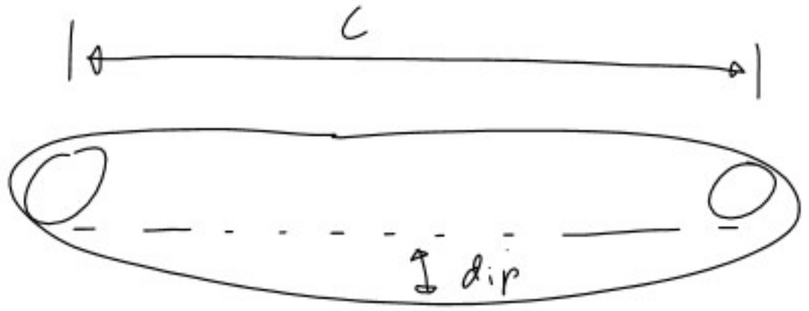
Minimum Pully Size 17-3 in inches

Belt Style	Belt Size, in	Ratio of Pulley Speed to Belt Length, rev/(ft · min)		
		Up to 250	250 to 499	500 to 1000
Flat	0.50 × 0.062	0.38	0.44	0.50
	0.75 × 0.078	0.50	0.63	0.75
	1.25 × 0.090	0.50	0.63	0.75
Round	$\frac{1}{4}$	1.50	1.75	2.00
	$\frac{3}{8}$	2.25	2.62	3.00
	$\frac{1}{2}$	3.00	3.50	4.00
	$\frac{3}{4}$	5.00	6.00	7.00

17-2

Material	Specification	Size, in	Minimum Pulley Diameter, in	Allowable Tension per Unit Width at 600 ft/min, lbf/in	Specific Weight, lbf/in^3	Coefficient of Friction
Leather	1 ply	$t = \frac{11}{64}$	3	30	0.035–0.045	0.4
		$t = \frac{13}{64}$	$3\frac{1}{2}$	33	0.035–0.045	0.4
	2 ply	$t = \frac{18}{64}$	$4\frac{1}{2}$	41	0.035–0.045	0.4
		$t = \frac{20}{64}$	6[a]	50	0.035–0.045	0.4
		$t = \frac{23}{64}$	9[a]	60	0.035–0.045	0.4
Polyamide[b]	F–0[c]	$t = 0.03$	0.60	10	0.035	0.5
	F–1[c]	$t = 0.05$	1.0	35	0.035	0.5
	F–2[c]	$t = 0.07$	2.4	60	0.051	0.5
	A–2[c]	$t = 0.11$	2.4	60	0.037	0.8
	A–3[c]	$t = 0.13$	4.3	100	0.042	0.8
	A–4[c]	$t = 0.20$	9.5	175	0.039	0.8
	A–5[c]	$t = 0.25$	13.5	275	0.039	0.8
Urethane[d]	$w = 0.50$ in	$t = 0.062$	See Table 17–3	5.2[e]	0.038–0.045	0.7
	$w = 0.75$ in	$t = 0.078$		9.8[e]	0.038–0.045	0.7
	$w = 1.25$ in	$t = 0.090$		18.9[e]	0.038–0.045	0.7
	Round	$d = \frac{1}{4}$	See Table 17–3	8.3[e]	0.038–0.045	0.7
		$d = \frac{3}{8}$		18.6[e]	0.038–0.045	0.7
		$d = \frac{1}{2}$		33.0[e]	0.038–0.045	0.7
		$d = \frac{3}{4}$		74.3[e]	0.038–0.045	0.7

Dip



F_i initial tension

$$d_{ip} = \frac{C^2 w}{96 F_i}$$

C	in	
w	lbf/ft	
F_i	lbf	