Wire Rope Data

Note: (d_w : wire diameter, d : rope diameter, D: drum diameter)

Table 1: Wire Rope Data

Rope[1]	Mass Kg/100m	Min. Diam. Sheave	Size range d	Wire Diam d_w	Strength Coef. A	Elast. Mod. E, GPa	Uses
6 x 7 FC	$0.35d^2$	$42d$	6.5-38	$d/9$	0.608	80.6	Mines, haulage Tramways.
6 x 7 IWRC	$0.39d^2$	$42d$	6.5-38		0.656	68.6	
6 x 19 FC	$0.39d^2$	$34d$	6.5-70		0.643	74.7	Hoisting rope standard. Car pulleys, cargo cranes, mine hoist. Derricks, dredges elevators, tramways well drilling.
6 x 19 IWRC	$0.43d^2$	$34d$	6.5-70	$d/16$	0.688	93.0	
6 x 19 IWRC*	$0.43d^2$	$34d$	6.5-70		0.798	93.0	
6 x 37 FC§	$0.39d^2$	$23d$	6.5-83		0.643	68.2	Cranes, high speed elevators, and small shears.
6 x 37 IWRC§	$0.43d^2$	$23d$	6.5-103	$d/22$	0.688	86.8	
6 x 37 IWRC*§	$0.43d^2$	$23d$	6.5-103		0.798	86.8	
8 x 19 FC	$0.37d^2$	$27d$	6.5-38		0.520	55.8	Extra flexible hoisting rope.
8 x 19 IWRC	$0.42d^2$	$27d$	13-29	$d/19$	0.579		
8 x 19 IWRC*	$0.42d^2$	$27d$	13-29		0.668		

[1] Material is improved plow steel except as noted
[*] Material is extra-improved plow steel
[§] Equation (1) may not be valid for sizes greater than 70 mm

Table 2: Preferred Millimeter Sizes of Wire Rope

6.5, 8, 9.5, 11.5, 13, 14.5, 16, 19, 22, 26, 29, 32, 35, 38, 42, 45, 48, 51, 54, 57, 61, 64, 67, 70, 74, 77, 80, 83, 86, 90, 96, 103

Table 3: Minimum Allowable Bearing Pressures of Ropes on Sheaves (MPa)

Rope	Material				
	Wood*	Cast Iron[1]	Cast Steel[2]	Chilled Cast Iron[3]	Manganese Steel[4]
Regular lay:					
6 x 7	1.03	2.07	3.79	4.48	10.1
6 x 19	1.70	3.30	6.20	7.58	16.5
6 x 37	2.07	4.03	7.41	9.13	20.7
8 x 19	2.41	4.69	8.68	10.7	24.1
Lang lay:					
6 x 7	1.14	2.41	4.13	4.93	11.4
6 x 19	1.89	3.79	6.89	8.34	18.9
6 x 37	2.27	4.54	8.13	9.99	22.7

[*] On end grain of beech, hickory, or gum.
[1] For HB(min.) = 125
[2] 30-40 carbon; HB(min.) = 160
[3] Use only with uniform surface hardness
[4] For high speeds with balanced sheaves having ground surfaces

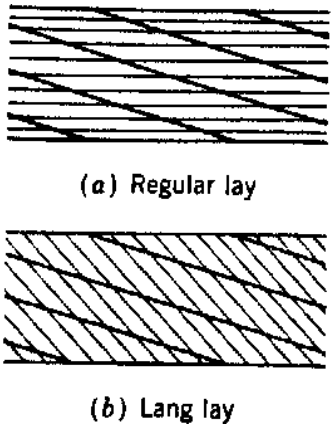

Figure 1: Types of Wire Rope
(6 x 7 = No. of Stands x No. of wire in each stand)

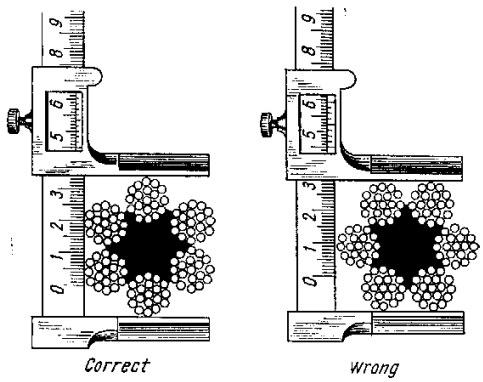

Figure 2: Measuring of Rope Diameter (*d*)

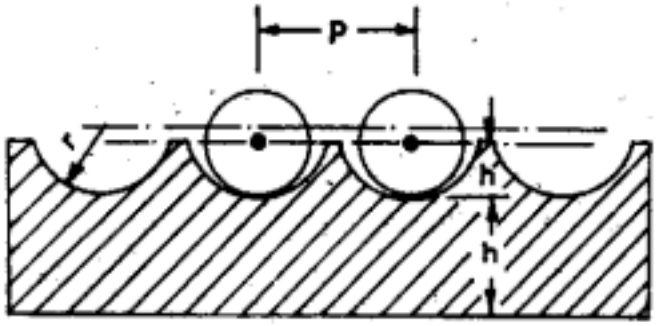

Figure 3: Dimensions of Wire Rope Drum
(p = 1.15d, r = 0.53d, h_1 = 0.25d, h = d, D = 800 to 1000 d_w)
Note: Length of the drum must be large enough to hold the entire length of rope in one layer plus two or three holding turns.

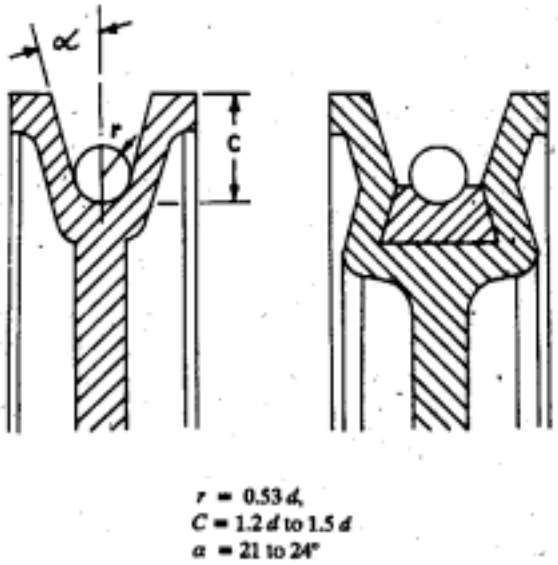

Figure 4: Dimensions of Wire Rope Sheave (Pulley)

Table 4: Wire Ropes Material

No.	Material	Ultimate Strength (MPa)
1	Improved plow steel	1400
2	Plow steel	1225
3	Extra strong cast steel	1120
4	Cast steel	980
5	Iron	455

Nominal Tensile Strength (T_u):

$$T_u = Ad^{1.95} \quad (1)$$

Where T_u = Nominal Tensile Strength (kN),
A = Strength Coefficient (Table 1)
d = Rope size (mm).