

APPLICATION FORMULAS

Strokes Per Minute

$$SPM = \frac{RPM}{R} \times \frac{d}{D}$$

Example:

RPM = 1170 Revolutions per minute of prime mover
 R = 30.28 (912D Gear Reducer)
 d = 12" Pitch Diameter of Prime Mover Sheave
 D = 50" Pitch Diameter of Gear Reducer Sheave

$$SPM = \frac{1170}{30.28} \times \frac{12}{50} = 9.3$$

Prime Mover Sheave Diameter

$$d = \frac{SPM \times R \times D}{RPM}$$

SPM = 7 Strokes Per Minute
 R = 30.28 Ratio (912D Gear Reducer)
 D = 50" Pitch Diameter of Gear Reducer Sheave
 RPM = 1170 Revolutions Per Minute of Prime Mover

$$d = \frac{7 \times 30.28 \times 50}{1170} = 9 \text{ Inches}$$

Use nearest size available depending upon belt section and number of grooves in sheave.

Center Distance

$$CD = \sqrt{\left(S + \frac{T}{2}\right)^2 + (I - b)^2}$$

$$CD = \sqrt{\left(SS + \frac{TT}{2}\right)^2 + (II - b)^2}$$

Example:

Assume Hi-Prime Electric Motor
 Driven C228D-213-120 Conventional Unit
 SS = 27.5 (See General Dimensions)
 TT = 34.25 (See General Dimensions)
 II = 52.75 (See General Dimensions)
 b = 8 (Assume 25 HR Frame 324T Motor)

$$CD = \sqrt{\left(27.5 + \frac{34.25}{2}\right)^2 + (52.75 - 8)^2}$$

CD = 63.2 Inches

Belt Length

$$PL = 2 CD + 1.57 (D + d) + \frac{(D - d)^2}{4 \times CD}$$

Example:

CD = 65.5 Inch Center Distance of Shafts
 D = 46 Inch Pitch Diameter of Gear Reducer Sheave
 d = 14 Inch Pitch Diameter of Prime Mover Sheave

$$PL = 2 \times 65.5 + 1.57 (46 + 14) + \frac{(46 - 14)^2}{4 \times 65.5}$$

PL = 229.1 Inches
 Use C225 Belts.

Horsepower of Prime Mover

For High Slip Electric Motors and Slow Speed Engines

$$HP = \frac{BPM \times \text{Depth}}{56000}$$

For Normal Slip Electric Motors and Multi-cylinder Engines

$$HP = \frac{BPM \times \text{Depth}}{45000}$$

Example:

BPD = 250 @ 100% pump efficiency
 Depth = 5000 Feet pump depth
 Assume High Slip (Nema D) Motor

$$HP = \frac{250 \times 5000}{56000} = 22.32, \text{ use 25 HP Motor}$$

Maximum Strokes Per Minute Based on the Free Fall Speed of the Rod

$$SPM = .7 \sqrt{\frac{60000}{L}}$$

Example:

Assume C-228-213-120 Unit

$$SPM = .7 \sqrt{\frac{60000}{L}} = 15.65 \text{ SPM Maximum}$$

SYMBOL DEFINITION

SPM = Strokes Per Minute
 RPM = Revolutions Per Minute of Prime Mover
 R = Gear Reducer Ratio
 D = Gear Reducer Sheave Pitch Diameter, Inches
 d = Prime Mover Sheave Pitch Diameter, Inches
 PL = Belt Pitch; Inches
 CD = Shaft Center Distance, Inches
 S = See General Dimensions
 T = See General Dimensions

I = See General Dimensions
 SS = See General Dimensions
 TT = See General Dimensions
 II = See General Dimensions
 b = Prime Mover Backing (Vertical Distance from Mounting Feet to Center to Shaft), Inc.
 HP = Horsepower
 BPD = Barrels Per Day at 100% Pump Efficiency
 Depth = Pump Setting, Feet
 L = Stroke Length, Inches