Horsepower Rating

The horsepower rating in Table IV on page A-24 is based on the following conditions:

1) The chains are operated under ordinary conditions. The ambient temperature range must be between 15°F and 140°F. They should not be used in an atmosphere in which abrasive dust or corrosive gas is present or where the humidity is high.
2) The two transmission shafts are in a horizontal position, and the chains are properly installed.
3) The suggested lubrication system and oil are used.
4) The load does not change significantly during transmission. The "Service Factor" given in Table I should be taken into account when the chains are used under various operating conditions. The load conditions will affect the life of the chain.
5) The increase in the horsepower rating of multiple strand roller chain cannot be calculated simply by multiplying the horsepower rating of one strand by the number of strands, since the load on each strand is not exactly the same. In order to estimate the service life of a multiple strand chain, the "Multiple Strand Factor" given in Table II must be used. When the chain length is 100 pitches and the above conditions are met, a service life of approximately 15,000 hours can be expected.

Procedures for Selecting Roller Chain

1) The following factors must be considered when selecting roller chain.
   a. Source of power
   b. Driven machine
   c. Horsepower to be transmitted
   d. RPM of driving and driven shafts
   e. Diameter of driving and driven shafts
   f. Center distance of the shafts
2) Use Table I to obtain the "Service Factor."
3) Multiply the horsepower value by the service factor to obtain the design horsepower value.
4) Use Table IV on page A-24 and the horsepower ratings tables on pages A-6 to A-19 to obtain the appropriate chain number and the number of teeth for small sprockets. Refer to the number of revolutions of the high speed shaft (the driving shaft when the speed is reduced; the driven shaft when the speed is increased) and the design horsepower value. For smoother chain drive, a smaller pitch chain is suggested. If a single strand chain does not satisfy the transmission requirements, use a multiple strand chain. If there are space limitations, a multiple strand roller chain with a smaller pitch may be used.
5) After determining the number of teeth necessary for the small sprocket, refer to the Sprocket Dimension Table (pages A-79 to A-82) to check if the sprocket diameter satisfies the space limitations.
6) The number of teeth for the large sprocket is determined by multiplying the number of teeth for the small sprocket by the speed ratio. More than 15 teeth on the small sprocket is suggested. The number of teeth for the large sprocket should be less than 120. By reducing the number of teeth for the small sprocket, the number of teeth for the large sprocket can be reduced.
7) For temperatures below 15°F, see the Environmental Temperatures and Points of Concern Table on page B-38.

Basic Formula for Chain Drive

1) Chain speed: S

$$S = \frac{P \bullet N \bullet n}{12} \text{ (ft./min.)}$$

P : Chain pitch (inch)
N : Number of teeth of sprocket
n : Revolution per minute (rpm)

2) Chain tension: T

$$T = \frac{33{,}000 \bullet HP}{S} \text{ (lbs.)}$$

S : Chain Speed (ft./min.)
HP: Horsepower to be transmitted (hp)

3) Number of pitches of chain: L

$$^{*}L = \frac{N_1+N_2}{2} + 2C + \frac{\left(\frac{N_2-N_1}{6.28}\right)^2}{C}$$

N_1 : Number of teeth (small sprocket)
N_2 : Number of teeth (large sprocket)
C : Center distance in pitches
* Any fraction of L is counted as one pitch.

4) Center distance in pitches: C

$$C = \frac{1}{8}\left\{2L - N_1 - N_2 + \sqrt{(2L-N_1-N_2)^2 - \frac{8}{9.86}(N_2-N_1)^2}\right\}$$

Table II: Multiple Strand Factor

Number of Roller Chain Strands	Multiple Strand Factor
2	1.7
3	2.5
4	3.3
5	3.9
6	4.6

Table I: Service Factor

Type of Impact	Machines	Source of Power		
		Electric Motor or Turbine	Internal Combustion Engine	
			With hydraulic drive	Without hydraulic drive
Smooth	Belt conveyors with small load fluctuation, chain conveyors, centrifugal blowers, general textile machines, machines with small load fluctuation	1.0	1.0	1.2
Some impact	Centrifugal compressors, marine engines, conveyors with some load fluctuation, automatic furnaces, dryers, pulverizers, general machine tools, compressors, general work machines, general paper mills	1.3	1.2	1.4
Large impact	Press, construction or mining machines, vibration machines, oil well rigs, rubber mixers, rolls, general machines with reverse or large impact loads	1.5	1.4	1.7