Horsepower

Horsepower equals 33,000 foot-pounds per minute or 550 foot-pounds per second. In terms of chain load and speed use the following:

HP = (Working Load x Ft/min) / 33,000
or
HP = Working Load x T x P x RPM / 396,000

Where:
T = Number of sprocket teeth
P = Chain pitches (in.)

Ratio

Ratio = N/n or R/r

Where:
N = Number of teeth in large sprocket
n = Number of teeth in small sprocket
R = RPM of large sprocket
r = RPM of small sprocket

Feet Per Minute (FPM)

FPM = (n x P x r) / 12

Where:
n = Number of teeth in small sprocket
P = Pitch
r = RPM of small sprocket

Chain Working Load

When the input horsepower is known and the chain working load is desired, this can be calculated as follows:

Working Load = (HP x 33,000) / FPM
or
Working Load = (HP x 396,000) / (T x P x R)

Factor of Safety (FS)

Factor of safety is determined from the following:

FS = Chain ATS / Chain WL

Where:
ATS = Average tensile strength
WL = Working load

Centrifugal Pull or Tension

Centrifugal pull or tension caused by the weight and velocity of the chain may be calculated from the following:

Centrifugal Pull = [Wt. Per Foot of Chain x $(FPM)^2$] / 115,900

Total Chain Tension

Total Chain Tension = Working Load + Centrifugal Pull

Chain Bearing Pressure

Chain Bearing Pressure = (Working Load) / (L x D)

Where:
L = Bushing length
D = Pin diameter

Torque and Horsepower (HP)

HP = [Torque (inch-pounds) x RPM] / 63,000
or
HP = [Torque (foot-pounds) x RPM] / 5,250

Kilowatts to Horsepower

1 KW = 1.333 HP (approx.)
or
HP = KW / [.746 x Efficiency]

Where:
Efficiency = .90 for generators
= .87 for motors