

ENGINEERING FORMULA + HELPFUL TABLES

Horsepower

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

$$HP = \frac{\text{Working Load} \times \text{Ft. Per Min}}{33,000}$$

or

$$HP = \frac{\text{Working Load} \times T \times P \times \text{R.P.M.}}{396,000}$$

T = number of sprocket teeth; P = chain pitch

Chain working load

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

$$\text{Working Load} = \frac{HP \times 33,000}{\text{Ft. Per Min.}} \quad \text{or} \quad \text{Working Load} = \frac{HP \times 396,000}{T \times P \times \text{R.P.M.}}$$

Factor of safety

Factor of Safety is determined as follows:

$$F.S. = \frac{\text{Chain Ultimate Strength}}{\text{Chain Working Load}}$$

Chain speed

Chain Speed can be determined from the following formula:

$$\text{Chain Speed} = \frac{T \times \text{R.P.M.}}{K}$$

(Ft. Per Min.)

T = number of sprocket teeth; K = pitches of chain per foot

Chain lengths in pitches (approx)

$$\text{Chain Length} = \frac{S}{2} + 2C =$$

S = sum of teeth, both sprockets; C = center of distance in pitches

Chain approx workload

$$\text{Divide} = \frac{\text{Ultimate Strength in lbs.}}{6 \text{ (safety factor)}}$$

Example:

$$WR 132 = \frac{85,000\#}{6} = 14,167\#$$

Theoretical weights of steel

$$1) \frac{\text{cubic inches of steel}}{x 0.28334} = \text{Pounds} \quad 2) \frac{\text{cubic feet of steel}}{x 489.6} = \text{Pounds}$$

Approx. Weights of Wood in Lbs./Cu Ft.

species	green	airdry
Alder, red	46	28
Ash, black	52	34
Ash, commercial white	48	41
Ash, Oregon	46	38
Aspen	43	26
Basswood	42	26
Beech	54	45
Birch	57	44
Birch, paper	50	38
Cedar, Alaska	36	31
Cedar, eastern red	37	33
Cedar, northern white	28	22
Cedar, southern white	26	23
Cedar, western red	27	23
Cherry, black	45	35
Chestnut	55	30
Cottonwood, eastern	49	28
Cottonwood, northern black	46	24
Cypress, southern	41	32
Douglas Fir, coast region	38	34
Douglas Fir, Rocky Mtn. Region	35	30
Elm, American	54	35
Elm, rock	53	44
Elm, Slippery	56	37
Fir, balsam	45	25
Fir, commercial white	46	27
Gum, black	45	35
Gum, red	50	34
Hemlock, eastern	50	28
Hemlock, western	41	29
Hickory, pecan	62	45
Hickory, true	63	51
Honeylocust	61	..
Larch, western	48	36
Locust, black	58	48
Maple, bigleaf	47	34
Maple, black	54	40
Maple, red	50	38
Maple, silver	45	44
Maple, sugar	56	44
Oak, red	..	44
Oak, white	63	47
Pine, lodgepole	39	29
Pine, northern white	36	25
Pine, Norway	42	25
Pine, Ponderosa	45	34
Pines, southern yellow:		
Pine, loblolly	53	36
Pine, longleaf	55	41
Pine, shortleaf	52	36
Pine, sugar	52	25
Pine, western white	35	27
Poplar, yellow	38	28
Redwood	50	28

