

ENGINEERING FORMULA

Horsepower

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

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

or

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

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:

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

Factor of safety

Factor of Safety is determined as follows:

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

Chain speed

Chain Speed can be determined from the following formula:

$$\text{Chain Speed} = \frac{T \times \text{R.P.M.}}{K} \quad (\text{Ft. Per Min.})$$

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:

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

Theoretical weights of steel

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

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

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