

Rigging formulas & charts

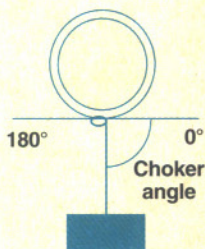
A contractor must understand basic rigging principles and be able to apply them to the situation at hand.

Rigging any load can be complicated and challenging; rigging heavy loads is often more difficult. A contractor must understand basic rigging principals, be able to apply them to the situation at hand and have the ability to decipher load tensions and balances. Here are the formulas and charts that will make it easier to decide how to proceed.

The following formulas and charts are excerpted from the ATM Fly-Ware *Riggermeister Production Rigging Guide*.

Choker hitch capacity

$$\text{Choker hitch capacity} = (\text{sling capacity})(\text{choker factor})(\text{choker angle adjustment})$$



Sling type	Choker factor
Wire rope	70% to 75%
Fiber strap	75% to 80%
Fiber rope	50%
Chain	75%

Choker angle	Adjustment
120°-180°	100%
90°-119°	87%
60°-89°	74%
30°-59°	62%
0°-29°	49%

Example

For a 1/2 inch, 7 x 19 galvanized aircraft cable with a choker angle of 90°:

$$\begin{aligned} \text{Choker hitch capacity} &= (*4,300)(.70)(.87) \\ \text{Choker hitch capacity} &= 2,618.7 \text{ pounds} \end{aligned}$$

*WLL of 1/2 inch, 7 x 19 GAC = 4,300 pounds

By Andrew T. Martin

Approximate wire rope strength when bent over a pin

(Formulas taken from MACWHITE catalog G-18 p. 174.)
For 6x19 independent wire rope core (6x19 IWRC):

$$D = \frac{\text{diameter of pin}}{\text{nominal diameter of wire rope}}$$

When $D \leq 6$, wire rope efficiency = $100 - \frac{50}{\sqrt{D}}$

When $D > 6$, wire rope efficiency = $100 - (76/D)^{0.73}$

Example

For a 1/2 inch, 6x19 IWRC wire rope wrapped over a 1/2 inch pin, $D = 0.5/0.5 = 1$. When $D \leq 6$, wire rope efficiency is:

$$100 - \frac{50}{\sqrt{1}} = 50$$

(1/2 inch, 6x19 IWRC) WLL = 4,400 pounds
Wire rope adjusted WLL = 4,400 pounds x 50% (or 0.5)
WLL = 2,200 pounds

Resultant turning force

$$\text{Resultant turning force} = (\text{tension})(\text{turning factor})$$

Load angle	Turning factor
180°	0%
150°	52%
120°	100%
90°	141%
60°	173%
30°	193%
0°	200%

Example

For a wire rope with 1,000 pounds of tension and a load angle of 90°:

$$\begin{aligned} \text{Resultant turning force} &= 1,000(141\% \text{ or } 1.41) \\ \text{Resultant turning force} &= 1,410 \text{ pounds} \end{aligned}$$