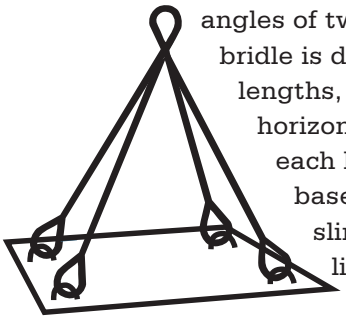
Calculating the load of basket hitches and bridles

When you're calculating the load of basket hitches and bridles, remember that as the horizontal angle of a sling decreases, the resultant load on each leg increases.

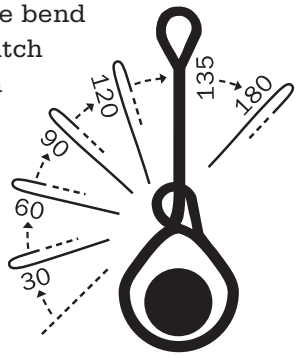
The horizontal angle of bridles with three or more legs is measured the same way as horizontal sling angles of two-legged hitches. If a bridle is designed with different leg lengths, it may result in different horizontal angles. The load on each leg must be calculated based on the position of the slings and the location of the lift's center of gravity.



ADJUSTING THE RATED CAPACITY OF A CHOKER HITCH

Due to the body of the sling being used in the choke, there is a reduction in rated capacity. This is reflected in the choker rated capacity tables. Another reduction that must be considered is due to the "angle" of the choke (not the angle of the leg of the sling).

If the load is hanging free, the normal choke angle is approximately 135 degrees. When lifting and turning a load using a choker hitch, it is not uncommon to have a severe bend at the choke. When a choker hitch is used at an angle of less than 120 degrees, you must reduce the hitch's rated capacity as shown in the chart at right. You always must adjust the rated capacity of the wire rope sling whenever you use a choker hitch to shift, turn or control a load, or when the pull is against the choke in a multi-leg lift.



As always, if more than one sling is used and the legs are not vertical, a further reduction in rated capacity must be made for the sling angle.

Warning: Choker hitches at angles greater than 135 degrees are not recommended since they are unstable. Extreme care should be taken to determine the angle of choke as accurately as possible.

THREE-STEP FORMULA FOR CALCULATING LOAD PER SLING LEG

These calculations assume that the center of gravity is equal distance from all of the lifting points, and the sling angles are the same. If not, more complicated engineering calculations are needed.

1. Divide the weight of your total load by the number of legs you are using. This gives you the load per leg if the lift were being made with all legs lifting vertically.
2. Measure the angle between the legs of the sling and the horizontal plane.
3. Multiply the load per leg that you calculated in step 1 by the load factor for the leg angle you are using. Use the Load factor guidelines table on the next page to determine the load factor.

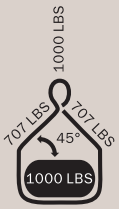
The result is the actual load on each leg of the sling for this lift and angle. The actual load must never exceed the sling's vertical rated capacity.

Warning: Slings shall not be used with horizontal angles less than 30°.

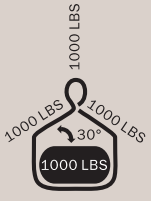
EXAMPLES OF HOW TO CALCULATE SLING LEG LOADS

1. Total load is 1,000 lbs. divided by two legs – 500 lbs. load per leg if vertical lift.
2. Horizontal sling angle is 60 degrees.
3. Multiply 500 lbs. by 1.154 load factor (from table) = 577 lbs. actual load per leg.

1. Total load is 1,000 lbs. divided by two legs – 500 lbs. load per leg if vertical lift.
2. Horizontal sling angle is 45 degrees.
3. Multiply 500 lbs. by 1.414 load factor (from table) = 707 lbs. actual load per leg.



1. Total load is 1,000 lbs. divided by two legs – 500 lbs. load per leg if vertical lift.
2. Horizontal sling angle is 30 degrees.
3. Multiply 500 lbs. by 2 load factor (from table) = 1000 lbs. actual load per leg.



Sound lifting practices

There are four primary factors to take into consideration when lifting a load.

They are: (1) the physical parameters of the load; (2) the number of legs and the angle they make with the horizontal; (3) the rated capacity of the sling; and (4) the condition of the sling.

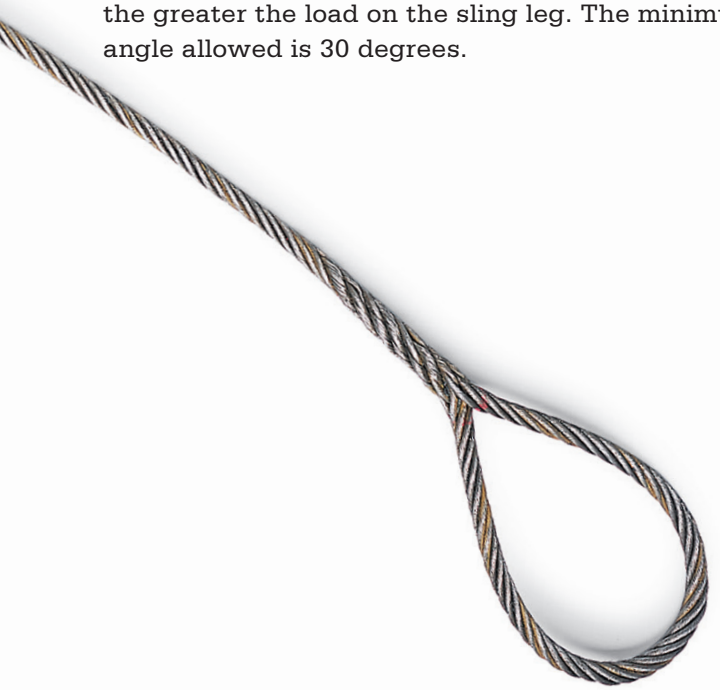
PHYSICAL PARAMETERS OF THE LOAD

The size of the object to be lifted, and particularly the location of lifting points, will affect sling selection. The weight of the lift, while a critical component, is only a part of the information. The location of the center of gravity is also necessary to determine sling loadings.

If the load has small diameter corners, protective blocking or "softeners" must be used so that sling capacity isn't reduced. Also, if lifting a painted object or an object with a finished surface, padding or softeners may be needed between the sling and the load to protect the load.

NUMBER OF LEGS AND ANGLE WITH THE HORIZONTAL

As the angle formed by the sling leg and the horizontal decreases, the rated capacity of the sling also decreases. In other words, the smaller the angle between the sling leg and the horizontal, the greater the load on the sling leg. The minimum angle allowed is 30 degrees.



RATED CAPACITY

The rated capacity of a sling must never be exceeded. The rated capacity is based both on sling fabrication components (minimum breaking force of rope used, splicing efficiency, number of parts of rope in sling and number of sling legs) and sling application components (angle of legs, type of hitch, D/d ratios, etc.).

If you are using one wire rope sling in a vertical hitch, you can utilize the full rated lifting capacity of the sling, but you must not exceed that lifting capacity.

If you are using two wire rope slings in a vertical hitch (called a 2-legged bridle hitch) in a straight lift, the load on each leg increases as the angle between the leg and the horizontal plane decreases.

Whenever you lift a load with the legs of a sling at an angle, you can calculate the actual load per leg by using the following three-step formula.

CONDITION OF SLING

Each sling must be inspected daily. If the sling does not pass inspection, do not use. (See Inspection and Removal Criteria in Wire Rope Sling Guide.)

LOAD FACTOR GUIDELINES

Leg angle	Load factor
90°	1.000
85°	1.003
80°	1.015
75°	1.035
70°	1.064
65°	1.103
60°	1.154
55°	1.220
50°	1.305
45°	1.414
40°	1.555
35°	1.743
30°	2.000

CAPACITY DECREASES WITH ANGLE

Angle of choke in degrees	Rated Capacity Percent*
Over 120	100%
90-120	87%
60-89	74%
30-59	62%
0-29	49%

*Percent of sling's rated capacity in a choker hitch.

Union®
A WireCo® WorldGroup Brand

Form No. 2029