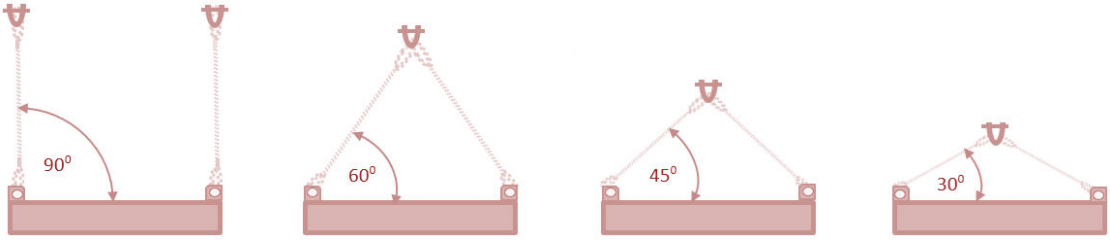
**OSHA Training Toolbox Talk:** Material Handling and Storage – How Sling Angles Affect Capacity

*[Reference: 1910.184 / 1926.251]*

When using two or more slings to lift a load, there is one primary factor that can alter the rated capacity of the slings; and that is the angle between the sling legs and the horizontal plane across the top of the load. All other things being equal, the flatter, or more severe, the sling angle, the lower the lifting capacity of the sling. Conversely, the greater or less severe the angle, the greater the capacity of the sling.

Sling capacities for various leg angles are typically included on the sling manufacturer's sling capacity reduction charts, or on the tag attached to a sling *(See handout for samples. Data for reference only, not for use in actual field conditions)*. Refer to the figures below for general examples of how the capacity of slings rated to lift 1,000-pounds apiece in a straight pull decrease as the sling angles change.




*1,000# capacity per sling* | *866# capacity per sling* | *707# capacity per sling* | *500# capacity per sling*

The figures above reveal that as the sling angles decrease, the tension in the sling legs increases, resulting in a greater load on each leg of the sling – and that reduces lifting capacity. Conversely, as the sling angle increases, the tension in the sling legs decreases, resulting in a lower load on each leg of the sling – and that increases capacity. In general, the recommended best practice is to try for a sling angle of 60 degrees or more from the horizontal plane of the load, to help minimize the risk of over-loading the slings.

The angle effect is also important to remember when a sling is attached to a load using a basket hitch *(see handout for examples)*. The negative effect is most pronounced when using a short sling, because doing so decreases the angle of the sling relative to the load, significantly lowering the sling's lifting capacity. The angle effect also reduces sling capacity when using a choker hitch to lift a load (*covered in previous toolbox talk*).

This is why a qualified person competent in rigging must oversee lifting operations. And the sling manufacturer's data and instructions must be followed to ensure that at the angles used, the sling has adequate strength to lift the weight of the load. Likewise, it is important for others assisting with the lift to be cognizant about how changing the angle of a sling leg, even slightly, can affect a sling's capacity.

In review; the angle that a sling is positioned relative to the horizontal place of a load can significantly affect its ultimate lifting capacity. It is important to follow instructions for proper rigging techniques as specified by a qualified person and the sling manufacturer's data. This includes making sure the angle of the sling legs relative to the load is adequate so the load can be lifted safely.

Does anyone have anything to add to today's discussion on how sling leg angle relative to the load can significantly affect the sling's lifting capacity? Please sign the training certification form to ensure you get credit for attending today's OSHA toolbox training session.

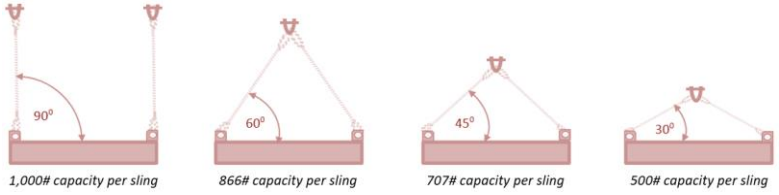
# HOW SLING LEG ANGLE AFFECTS LIFTING CAPACITY

| SLING LEG ANGLE (*in degrees from horizontal*) | SLING CAPACITY REDUCTION FACTORS* |
|---|---|
| 90° | 1 |
| 85° | .996 |
| 80° | .985 |
| 75° | .966 |
| 70° | .940 |
| 65° | .906 |
| 60° | .866 |
| 55° | .819 |
| 50° | .766 |
| 45° | .707 |
| 40° | .643 |
| 35° | .574 |
| 30° | .5 |

** General info for demonstration purposes only. A qualified person must refer to sling manufacturer's data for actual capacity reduction factors*

## Example of Effects of Sling Angles on 1,000 Pound Sling Capacity in a Straight Pull*

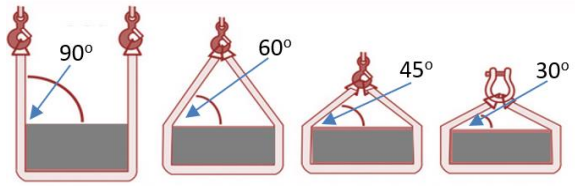
** General info for demonstration purposes only. A qualified person must refer to sling manufacturer's data for actual capacity reduction factors*




*1,000# capacity per sling* | *866# capacity per sling* | *707# capacity per sling* | *500# capacity per sling*

## Example of Effects of Sling Angles on 1,000 Pound Sling Capacity Using a Basket Hitch*

** General info for demonstration purposes only. A qualified person must refer to sling manufacturer's data for actual capacity reduction factors*




*1,000# capacity* | *866# capacity* | *707# capacity* | *500# capacity*

**TWO-LEGGED CHAIN SLING CAPACITY TAG**

*(Example only - not for use in actual lifting applications)*

**OSHA SAFETY TRAINING CERTIFICATION FORM**

Toolbox Topic Covered: Material Handling and Storage – How Sling Angles Affect Capacity

Company Name: _____ Date: _____

Training led by: _____

| PRINT NAME | SIGNATURE |
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