

# Frequently asked Questions

**When pulling on a wireline, is there more tension at the top sheave than is shown on the weight indicator?**

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The answer to the question is no. The tension placed on a wireline cable is incremental starting with the tool weight at the rope socket and gradually increasing to maximum tension at the wireline unit's winch drum. The tension at the drum is equal to the tool weight, line weight, drag and friction on the wireline at a given time. The greatest amount of tension placed on a wireline cable can be recorded at the drum. Although wireline tension is not increased at the top sheave, the weight on the top sheave's attachment cable is increased.

In a block (sheave) and tackle system two types of blocks can be used:

1. A moving block (Traveling Block on a Drill Rig) is a movable pulley that is hooked to the object you are lifting. As you pull, the object and the block move together. This block does not change the direction of the effort, but it does multiply the effort.
2. A fixed block is a fixed pulley that is attached to at a support point (top sheave on a wireline setup). The fixed block helps make work easier by changing the direction of the effort but does not multiply the effort.

Because of the depth required to reach the bottom of an oil well when performing wireline services, wireline operations are limited to using a fixed block system. The fixed block (top sheave) does not decrease the effort (tension) needed to pull the wireline, it simply changes the direction of the effort. However, as seen in Figure 1, the downward force experienced on the sling that supports the top sheave is double that of the wireline tension. This doubling of tension can affect how wireline tension is measured.

Two methods of measuring tension are usually employed by wireline service companies. Tension is measured either by placing a load cell at the horse's head or at the support sling of the top sheave. If the load cell is at the horse's head (at the wireline drum) then the weight indicator should display tension with a 1:1 ratio. For every pound the load cell senses, the indicator dial should read 1 pound. When the load cell is placed at the top sheave, then the ratio is 2:1. For every 2 pounds the load cell senses the indicator dial should read 1 pound.

This can sometimes cause confusion when discussing the weight experienced at the top sheave of a wireline setup vs. the weight indicated on the wireline cable. As shown in Figure 1, the tension experienced by the load cell at the top sheave is actually 200 pounds but the tension on the wireline cable is still only 100 pounds. This is because the weight experienced by the sheave's support is the sum of the tension on either side of the wireline it is supporting. This phenomenon is sometimes mistaken by operators to mean that the tension on the wireline doubles after passing over a 180° bend at the top sheave but this is not the case.

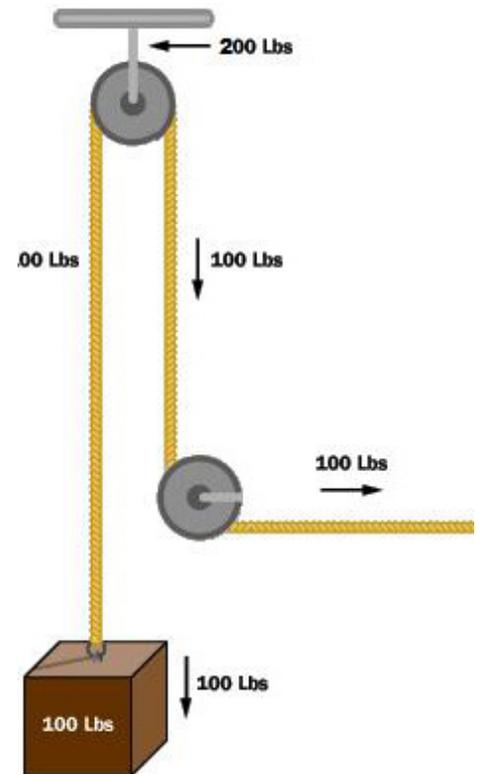


Figure 1

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