

**Overview** Samson recognizes the importance of accurate rope measurement. ISO and the Cordage Institute (CI) offer guidelines to achieve accuracy and consistency in measurements, and this bulletin provides additional guidance to maintaining quality standards and best practices in rope handling.

## Rope Measurement Recommendations

**These recommendations should be used when a cut length of rope is needed:**

- > If a reliable rope length counter is available, it should be used as indicated by the manufacturer's instructions, while adding back-tension of approximately 10 lbs.
- > In the absence of a length counter, the recommended methods are identified in ISO standards 2307:2005 and CI 1500:2006. These recommendations state that the rope sample should be laid out straight on a flat surface with slight hand force or lightly tensioned by hand to measure the length. The rope should not be curved or twisted at any point along its length.

## Length Tolerance at Samson

In order to meet Samson quality standards and practices, all high-performance products made in whole or in part from high-modulus fibers such as HMPE, aramid, liquid crystal polymer (LCP), etc., are measured with a length tolerance of +5%/-0%. Other ropes made with olefin, nylon, or polyester fibers are measured with a length tolerance of +/-5%. These are determined during the reeling process, as described at right.

## Length Measurement Accuracy

The length counters are checked for accuracy weekly using a reference standard. The standard used is a predetermined rope sample with a firm shape and very low stretch that is run through the counters to verify the length readout.

## How Long is a Piece of Rope?

Several standards are available as references for measured lengths of testing samples, but do not include a method for determining a length for storing or shipping:

- > CI 1500-02, International Standard: Test Methods for Fiber Rope
- > ISO 2307:2005, Fiber Ropes: Determination of Certain Physical and Mechanical Properties
- > ASTM 4268, Standard Test Methods for Testing Fiber Ropes



*Do not allow the length of rope being measured to be curved or twisted.*



A rope is run over an elevated roller, or through two horizontal breaker bars that add back-tension to control the rope as it is pulled through the reeling system. The rope is then looped around a number of capstans that are controlled to a tension of 10 lb. The rope finally passes through a length counter as it is wound on to the final reel and cut at the required length. The back-tension on the rope as it moves through the counter assists in providing a consistent length measurement and a solidly wound reel.

These standards refer to measuring length under a low load or reference tension when measuring rope length for test calculations. However, CI-1500 states that "Because of the soft, flexible nature of fiber rope, reproducible measurements of diameter, circumference, and length cannot be made on the untensioned rope."

**The following is a list of the common difficulties of rope length determination in the field:**

- > Availability of a flat surface to lay the rope straight for measuring
- > The ability to tension the rope
- > The material is flexible and soft, which may cause variation
- > No standardized method for measuring rope length
- > Using an inadequate and/or inconsistent type of measuring device
- > The availability of a measuring device
- > The position of the measuring device at the starting and ending points of the rope
- > The method by which the measuring device is used
- > The rope's length may change as it is used

## The Difference in Measuring Length on Tensioned and Untensioned Rope

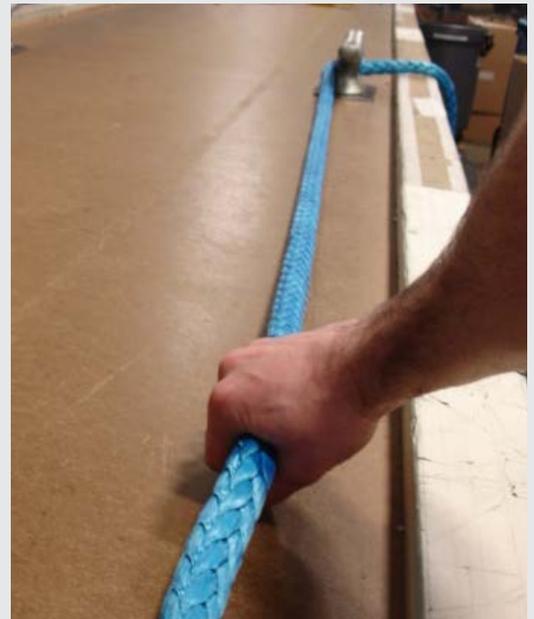
The greatest difference can be seen in the length of the measured rope when comparing it at a tensioned and untensioned state. Tests have shown an approximate 2% difference in length is found with 12-strand *AmSteel®Blue* when tension is used during measurement compared to an untensioned rope. Greater variability was seen with untensioned measurements, with as much as 2% of the same rope's length but when tensioned that difference dropped to 0.5%. The amount of variation seen between tensioned and untensioned ropes will also be affected by the material and construction of each rope.

### Necessary Rope Measuring Procedures:

- > Supply constant, even tension (no more than 10 lb is needed) to all diameter ropes.
- > Tension can be added simply by winding the rope in an S shape around two horizontal or vertical bars that will create the needed tension.
- > A controlled tensioning system can also be used as described on page one of this technical bulletin.
- > When no tensioning device is available, laying the rope to the complete required length on a flat surface, and tensioning it with hand force while measuring the full length will reduce the variability and difference in length.



*Controlled tensioning system.*



*Tension rope with hand force and measure to reduce the variability in length.*



For additional information and other available Technical Bulletins, please contact your Samson representative or visit our website: [SamsonRope.com](http://SamsonRope.com)