This calculator estimates the amount of elastic stretch experienced by 7x7 stranded wire rope constructed from 302/304 stainless steel that has been proof loaded to 60% of its breaking strength to remove constructional stretch. The values calculated are an approximation only.

Directions: Enter values into all cells in the Assumptions section and press **Calculate**.

ASSUMPTIONS

Load (Cable Tension)	lbf
Cable Length	inches
Cable Diameter 'SpaceAge Control generally uses two types of 7-by-7 stranded stainless steel cable: 0.018-inch (0.46-mm) dia. with 40-lb (177-N) min. breaking strength or 0.027 inch (0.6858 mm) dia. with 90-lb (400-N) min. breaking strength.'	inches

RESULTS

Elastic Cable Stretch	**0.004444 inches** **0.112889 mm** **0.074074% of cable length**

What Is Cable Stretch?

Two kinds of stretch occur in cable based on wire rope: constructional stretch and elastic stretch. This stretch is due to two different causes.

1. Constructional Stretch - When cable is made, the load at the closing head is light. Therefore, there are small clearances between the wires and strands, and between the strand and the core. The application of initial load causes wires and strands to seat properly and a slight overall elongation of the strand or cable accompanies this section. The amount of constructional stretch is not constant for all cables - it depends on such variables as type of construction, length of lay, and other factors, including the load applied.

2. Elastic Stretch - Elastic stretch is the actual elongation of the wires of a strand or a cable. This is caused by the application of a load up to the yield point of the metal. The stretch is approximately proportional to the load applied. When the load is released, cable subjected to elastic stretch returns to its approximate original length, providing the stretch has not reached the yield point of the metal.

When the elimination of as much stretch as possible is important, the cables or assemblies can be proof loaded to remove most of the constructional stretch. For assemblies, this process also verifies the holding power of the terminals. Proof loading is usually done by applying a 60% load to the cable or assemblies. This load is based on the minimum breaking strength of the cable or fittings, whichever is lower. Handling the cable as little as possible after prestretching helps eliminate putting constructional stretch back in.

How Does Elastic Cable Stretch Effect Position Transducer Accuracy?

Relative to other error sources, elastic cable stretch generally creates am extremely small error in cable-actuated postion transducers. For precision, low-cable-tension applications, the error is generally below 0.01% of the full scale range of the position transducer. This is because the rated cable strength of the cable is much greater than the load applied to the cable.

Determining the precise effect of elastic cable stretch on position transducer accuracy requires an application-by-application analysis of how much cable is involved, the amount of free cable at full retraction, the amount of prestretching performed, and the full-retraction cable tension versus full extraction cable tension. If you need assistance with this analysis, contact us. Testing a proof-loaded cable under the working load is the most accurate method to determine elastic stretch.

Other calculators:

- Thermal Effect
- Sinusoidal Motion
- Displacement Cable Sag (Catenary Curve)
- Position Transducer Linearity (Calibration)
- Sensor Total Cost of Ownership
- Cable (String) Fundamental Frequency
- Voltage Conditioner Zero-Span Calculator
- Potentiometer-Based Position Transducer Voltage Divider and Power Calculator

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