

Sail Stretch Data

| Material | Weight | Primary 1% | Bias 1% | Primary Stretch at 40 lbs | Bias Stretch at 40 lbs |
|---------------------------|---------|------------|----------|---------------------------|------------------------|
| 6.62 HA Woven Polyester | 6.7 oz | 86 lbs | 21 lbs | 7.5 | 4.5 |
| CX 6 Polyester Composites | 6.29 oz | 105 lbs | 28.5 lbs | 6 | 2.4 |
| CXP 6 Pentex Composites | 7.2 | 170 lbs | 29 lbs | 4 | 24.5 |
| SX 10 Spectra Composites | 6.99 oz | 448 lbs | 46 lbs | 2.2 | 14.8 |
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| 7.62 HA Woven Polyester | 8.23 oz | 108 lbs | 23 lbs | 5 | 3.4 |
| CX 7 Polyester Composites | 8.78 oz | 122 lbs | 27 lbs | 5 | 2.5 |
| CXP 7 Pentex Composites | 8.7 oz | 194 lbs | 29 lbs | 3.5 | 2.2 |
| SX 15 Spectra Composites | 8.05 | 616 lbs | 53 lbs | 1.8 | 11.2 |
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| 9.62 HA Woven Polyester | 9.23 oz | 131 lbs | 16 lbs | 4 | 4.5 |
| CX 9 Polyester Composites | 9.97 oz | 172 lbs | 28.5 lbs | 3.8 | 2.5 |
| CXP 9 Pentex Composites | 9.8 oz | 266 lbs | 27.4 lbs | 2.3 | 24.8 |
| SX 25 Spectra Composites | 9.17 oz | 680 lbs | 42 lbs | 0.8 | 1.4 |

Primary 1%

Strength is reflected in a material's 1% elongation number. It is the amount of load (in pounds) needed to elongate a 2x16" strip of material 1% of its overall length. At this point, for practical purposes, a material has failed. It will not stretch back. The primary 1% is measured in the materials strongest direction (fill for wovens, warp for composites). The higher the number the stronger the material.

Bias %

Bias is the weakest direction, (off-threadline). Again, the higher the number, the stronger the material. Since even with the most complex panel layouts there is always load off the primary threadline, bias stretch is important, particularly in terms of long term shape holding. Bias stretch is a bigger problem in cross cut sails because the panel layout is less efficient in terms of aligning threadline to loadline.

Primary and Bias Stretch

Stretch is measured in units equal to one/hundredth of an inch in both the strongest and weakest direction. The table above gives the amount of stretch measured at 40lbs of pull, which is a typical of the loads seen in a sail. The lower the number, the less the stretch.