

Technical Bulletin 8: Fiber-on-Fiber Abrasion Testing

Internal friction between the fibers inside a sling can begin to wear at each other over time. The wearing of the fibers over time and use, has led some high performance roundslings to be limited by the number of cycles you can use them for. Slingmax developed K-Spec® core yarn, a unique blend of fibers, to ensure it was the longest lasting fiber in extreme conditions.

In order to compare the internal abrasion performance of various load-bearing fibers for use in roundslings, Slingmax developed a fiber-on-fiber abrasion test. This test consists of forming a loop of the material under test and mounting it to a sturdy structure. Another sample of the same material is then passed through the loop and a weight is suspended from one end of the sample. The other end of the sample is then attached to an eccentric crank on the end of a roundsling machine roller, so that when the machine is run, the material sample is raised and lowered through the fiber loop. The test setup is shown in Figure 1 below. This is a very severe test and it is highly unlikely that similar conditions would ever be present in actual use of the products. It does serve as a simple way to compare the internal abrasion performance of two candidate fibers or fiber blends.

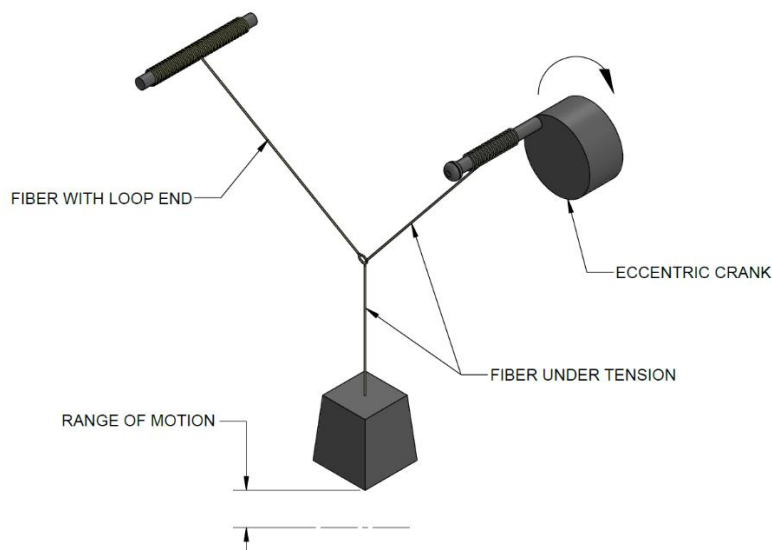


Figure 1 - Fiber-on-Fiber Tester

Initial Testing:

In 1996, K-Spec® high performance core yarn was compared with polyester core yarn using this fiber-on-fiber abrasion test. The K-Spec and polyester fiber samples each had a weight equal to 2.7% of their breaking strength suspended from them to provide tension during the test. The results are reported in Table 1. It can be seen from the results that K-Spec high performance core yarn outperformed polyester by a factor of 5.5x.

Table 1 - 1996 Test Results

Material	K-Spec®	Polyester
Cycles to failure	8,672	1,574
Time to failure	2 hours 31 minutes	21 minutes

Updated Testing:

By 2004, new fibers had been introduced to the market, and as better fibers became available, the K-Spec core yarn formula was constantly improved to stay at the forefront of fiber technology. Testing was repeated to evaluate K-Spec as well as other fibers used in roundslings; Technora, polyester, and Kevlar. The results of the second round of tests are shown in Table 2. In this round of testing, not only did K-Spec outperform every other fiber by at least 22x, it also outperformed the older version of K-Spec by over 2x.

Table 2 - 2004 Test Results

Material	K-Spec®	Technora	Polyester	Kevlar
Cycles to Failure	18,582	821	731	340
Time to Failure	358 minutes	16 minutes	14 minutes	7 minutes

Twin-Path® Roundslings made with K-Spec core yarn have proven to be the longest lasting sling available. In fact, Twin-Path Roundslings sustained over 50,000 cycles at 1.5 times capacity with negligible loss in strength. See Technical Bulletin 9a.