Choosing the Best Line for the Job

Assess your sailing, determine the loads, select the best rope for the task

So many different ropes — need a little help choosing?

Samson offers 20 different ropes specifically for use as running rigging. Each is engineered to perform superbly under a particular set of circumstances. The choice may seem intimidating. Armed with a little knowledge, an accurate assessment of your sailing needs, and what you expect from your lines, the choice becomes clear.

Accurately assess your working load

The selection guide on Samson's Recreational Marine webpage or in their catalog can help you identify potential ropes for sailing applications, but it all begins with an accurate assessment of the loads they'll encounter.
Formulas for sheet loads are available in the Samson catalog, but consider the following:

Halyard loads are best determined by your rigger.

For sheets, halyards, or control lines, anticipated loads are considered working loads. The standard working load for any Samson rope is 20% of the rated break strength.

For example, the total load for an end-of-boom mainsheet going through a four-purchase sheave system may be calculated at 900 lb. Factoring in a 20% working load, the rope's break strength needs to be five times the working load, or 4,500 lb for this application.

Synthetic fibers: What are the differences?

Nylon was the first synthetic fiber widely used in ropes. Reasonably strong (much stronger than the natural fibers it replaced), nylon is still used in dock and anchor lines where its excellent elasticity allows it to absorb shock loads. But for many sailing applications, elasticity is not a desirable trait.

The introduction of **polyester** fiber allowed rope manufacturers to build ropes that were as strong as nylon, but with much less stretch and wet-strength loss. Because polyester has excellent grip, it works well on winches and in rope clutches.
Polyester ropes, particularly polyester double braids, became the standard against which all ropes were measured. Polyester is still regarded as an excellent fiber for many marine applications and is widely used for covers on high-performance, or high-modulus double braids.

High-Performance/High-Modulus fibers: Which one, for what, and why?

There are several modern high-modulus fibers, each with a unique set of characteristics. The challenge of the rope designer is to match these characteristics with the unique performance requirements of the application for which they are designing.

Dyneema® is a high modulus polyethylene (HMPE) fiber with a particularly well balanced set of characteristics that allow it to be used in a variety of applications. Extremely lightweight (less than 15% the weight of steel) with ultra-high strength (at least as strong as steel wire of the same size), very low stretch, and excellent abrasion, cut, and UV resistance, it is well-suited for use in halyards, control lines, and sheets.
Within the Dyneema® family of HMPE fibers are several grades (SK78, SK90, etc.), each possessing different characteristics that include increasing levels of tenacity, durability, and resistance to creep. Samson uses Dyneema® fiber or Dyneema®-fiber blends in more than half of the lines that comprise their competition-grade running rigging.

Other high-modulus fibers include:

Technora®, an aramid fiber that blends very high strength, low stretch, and abrasion resistance with extreme heat resistance.
Vectran®, a liquid crystal polymer (LCP) fiber featuring very high strength, extremely low stretch, and negligible creep under high static loads.
Zylon®, or PBO fiber, offers the highest strength of all the high-modulus fibers. Zylon®, however, must be protected from UV light.
Technora®, Vectran®, and Zylon® are all exceptionally low-creep fibers.

In some cases, Samson blends fibers to take advantage of the relative properties of each of the components.
Lightning Rope is a good example: the lightweight characteristic of Dyneema® fiber is blended with the strength and exceptionally low creep characteristics of Vectran® fiber.
The result is a rope that is lighter than Validator-12 (an all Vectran® 12-strand) while sacrificing only 5% of the strength of AmSteel®-Blue (an all Dyneema®-fiber 12-strand line).

Class I and Class II ropes: What are they?

Samson ropes are classified into two main categories based on fiber type:
Ropes manufactured using the traditional fibers of nylon, polyester, and olefin are categorized as **Class I**.
Those ropes made in whole or in part with any of the high-modulus fibers such as Dyneema®, Technora®, or Vectran® are categorized as **Class II**.

Double braids and single braids: What's the difference?

Samson invented the **double braid** in the late 1950s, when nylon was still the king of synthetic fibers.
This construction incorporates a braided core within a braided cover, each carrying an equal percentage of the total load.
This type of construction is common to lines that use the more traditional synthetic fibers like polyester, olefin, and nylon. In addition to carrying up to one-half of the load, the cover serves to protect the core from abrasion or ultraviolet degradation, to provide grip on winches or in clutches and stoppers, and to provide protection from friction-generated heat.

For applications that require higher strength and lighter weight than traditional Class I fibers provide, you need to look at core-dependant double braids.
In this construction, the core is made from Class II fibers, which serves as the strength member, while the cover is typically made of Class I fibers.

Single braids are ropes designed without a separate core. Samson manufactures a wide variety of single braids. For sailing applications, the most common single braid is a 12-strand line.
Where necessary or desired, covers can be added to single braids to protect them from exposure to heat, abrasion, or cutting while in use. Samson manufactures Smooth Ice and Flavored Ice for this specific purpose. These are specialty covers where Dyneema®, Vectran®, Technora®, polyester, or Zylon® fibers are blended to provide enhanced heat and abrasion resistance.

Alternately, a sailor may opt to strip the cover from a double braid in order to save additional weight aloft for halyard applications. The cover remains intact on sections of the rope where the rope is cleated or winched.

Splicing techniques: Why is knowing the class of my line important?

Splicing techniques are different between Class I and Class II ropes and reflect the differences in strengths and grip between the two groups. It is absolutely critical to use the correct splice for the class of rope being used. The Samson catalog and website designate the class and recommended splicing technique for each type of rope.