

## Anchor rodes

### The Ideal

If you were starting from scratch to create the ideal anchor rode, what properties would it have? We'd suggest the following.

1. It would be strong, to hold your boat securely in place.
2. It would be elastic, to reduce the load on your boat's cleats.
3. It would be lightweight, so it wouldn't affect the boat's performance or be difficult to weigh.
4. It would pull horizontally on the anchor shank, to ensure maximum holding power.
5. It would be compatible with mechanical hoisting systems like windlasses, as well as being self-stowing.
6. It would be abrasion resistant, to withstand rough bottoms like coral.
7. It would be affordable.

### The Reality

Not surprisingly, there is no one combination of all seven attributes that does the job for all boaters. Each anchor rode is a compromise of qualities, that need to be chosen for the type of boating you do. Inland boaters will have dramatically different needs from coastal and offshore boaters.

#### Scope

Scope is defined as the ratio of water depth (plus freeboard) to anchor line paid out. Most anchoring texts and anchor manufacturers agree that a scope of 7:1 achieves the anchor's designed holding power, and more scope is better than less.

In theory, 7:1 scope is great, but at a crowded anchorage most cruisers scoff at the idea of paying out more than 3:1 or 4:1 —there just isn't much space in which their boats can swing. Any reduction in scope, of course, must be made up for by using larger anchors and/or larger chain.

#### Mixed rode

A compromise solution to anchor rode ideals is to use a short length of chain (6-30') connected to the anchor, with a long length of three strand nylon line connected to the chain. This combination satisfies nearly all the requirements above, except that it is not abrasion resistant over its entire length and long scope must be used to keep the pull on the anchor shank horizontal. Nylon is used because it is naturally elastic. Its stretch reduces peak loads on the anchor and your boat.



One myth we'd like to dispel is that a boat length of chain will keep the pull on an anchor shank parallel to the bottom. This is unfortunately not the case, since even a 15 knot wind will lift short lengths of chain clear off the bottom. Yes, it is better to use chain but, no, it isn't effective as windspeeds increase. Its primary mission is to handle the chafe from rough bottoms that would otherwise abrade the soft nylon line.

#### All Chain Rode

Larger boats with windlasses generally use all-chain rode. This reduces the need for long scope (except in shallow water) because the chain is heavy and lies on the bottom until severe conditions are encountered, when more scope may have to be let out. Since chain has very little elasticity, care should be taken to not allow the chain to become "bar tight" in high winds by using a snubber made of nylon line.

The penalty for using all-chain rode is weight, expense, and the necessity of using a windlass. A windlass and all-chain rode may add 300-600 pounds in the bow and can adversely affect the performance of your boat. Modern lightweight cruising boats will probably not be willing to suffer the reduction in speed and increase in pitching that this weight entails.

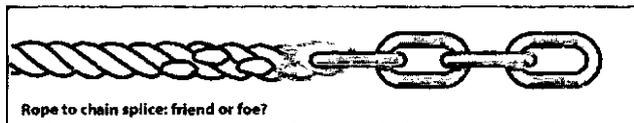
Chain works well with windlasses, since its links engage the pockets of the chainwheel. Mixed rodes are more difficult to use in a windlass, since the rope does not self-tail like chain does.

A lightweight, yet abrasion-resistant solution

A promising solution is to use a windlass with a rope/chain wildcat and moderate lengths of chain. This has been used successfully by many cruisers who want to have both security and reduced weight. On a typical 20,000 pound boat, you might use 60' to 100' of 5/16" HT chain, spliced to 250' of 5/8" 3-strand nylon anchor line. This can be weighed by a windlass equipped with a rope-chain gypsy from Lewmar, Simpson-Lawrence, or Maxwell.

Greater lengths of chain will be needed where coral is found. A special rode might be used, or you can use a double clevis link to connect two lengths of chain together without sacrificing strength.

This is a connecting link for chain which is compact enough to pass through the deck pipe into the anchor locker.



But is a rope-chain splice safe?

For several years, we have tried to find reliable information on the security of the rope-chain splice. In general, vendors who did not have a rope-chain gypsy told us that it was no good, and ran contrary to all cordage industry guidelines. Simpson Lawrence, on the other hand, said that they knew of no failures resulting from the splice. Sensing a marketing rather than an engineering debate, we elected to test the strength of the splice ourselves. Using New England Ropes' 3-strand nylon line, and ACCO proof coil chain, we created 15 short samples of anchor rode. These were sent to New England Ropes for destructive pull testing. The results, while based on new rope and chain and a small sample size, gave us great confidence in the security of this method of joining rope to chain. When splicing 5/8" line to 5/16" chain, 87.7% of the breaking strength of the line alone was retained (an average of 10,695 lbs.). When using 1/2" line and 1/4" chain, 79.2% of the strength of the line was retained (5,937 lbs.). While we would have preferred to have 100% of the strength of the original line, we think that the strength reduction which we observed was reasonable. We also noticed that each link of chain and each shackle in the assemblies was stretched and distorted, indicating that each was near failure.

What size do I need?

As a general guide, for winds up to 30 knots, we recommend the following anchor line and chain diameters, using three-strand, high quality line. This table assumes an 8:1 working load ratio.

Boat LOA:	3 Strand:	Chain:
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Up to 25'	3/8"	3/16" PC
27-31'	7/16"	1/4" PC
32-36'	1/2"	1/4" PC
37-44'	9/16"	5/16"PC/BBB
45-50'	5/8"	5/16"PC/BBB
51-62'	3/4"	3/8" PC/BBB
63-76'	7/8"	3/8" HT
77-90'	1"	1/2" HT

### Conclusion

In inland, coastal, and performance cruising applications, boaters should use a combination of nylon line and galvanized chain. For serious cruisers, all-chain rode is a better solution. The tradeoff is one of weight vs. abrasion resistance.

## Marine Chain

### What It Does

Chain has several applications on boats, the most common being a component in anchor rode. Because it is supple, abrasion resistant, strong, and relatively inexpensive, it is used in almost all anchoring and mooring systems. It is also used as an abrasion-resistant link in permanent dock lines, placed between the eye splice and cleat or ring at the dock.

### How It Works

Chain is made from a variety of steel alloys, and is galvanized for corrosion resistance in the wet and salty marine environment. It has a number of properties that make it handy in boating applications.

1. It is flexible, like line or wire, so it can be stored compactly and it conforms to contours.
2. It is relatively strong, so it can withstand lots of tension before breaking.
3. It is highly abrasion resistant since it is made from steel.
5. It is heavy, which helps anchor holding power by pulling the anchors parallel to the bottom.

### What to Look For

Chain is made to a standard, so its strength, size, and properties are very similar within a given grade and size. But there are differences, and you should examine the following criteria:

#### Country of origin:

We have found that domestic chain is manufactured more consistently and has better galvanizing than imported chain. We sell ACCO chain, which is consistently high quality and hot-dip galvanized, which is best.

#### Matching your gypsy or chainwheel:

The one time that chain must be precise in its dimensions is when you haul it with a gypsy. Chain varies in dimension between grades (High Test is smaller than Proof Coil), and even between manufacturers. If you are not using a gypsy, then the exact dimensions of the chain are not critical. Many windlass manufacturers specify the chain compatibility using ACCO chain, which is another reason that we sell it.

#### Chain Grade:

Grade refers to the strength of the steel, and shape of the links of chain. The most common grade of chain in boating is Proof Coil galvanized chain. Proof Coil chain is made from low carbon steel and has relatively long links compared to other grades. It is also known as Grade 28 or Grade 30. Its ultimate strength is four times the working load limit. Probably 90% of our customers use Proof Coil chain since it is strong and affordable.

BBB chain is made from the same steel as Proof

Coil, but has a shorter link dimension and works better in windlasses. Another way of saying this is that BBB chain has more links per foot of chain. Cruisers who use all-chain rode and powerboat skippers who want to use a dual-direction windlass will often specify BBB chain.

High Test chain is made from high carbon steel and has greater strength and abrasion resistance than proof coil or BBB. It is also known as Grade 40 or 43 chain. Its ultimate strength is three times the working load limit. For those boaters who want to reduce the weight in the bow, High Test chain will allow you to reduce the chain size by at least one size with no loss of strength and a 30% weight savings.

While stronger grades are available, they are infrequently used in boating, and are much more expensive than these three.

#### Glossary

Working Load Limit (WLL) of a chain is the maximum load in pounds that the chain should be subjected to in normal use.

The proof test strength is the load which the chain is subjected to as part of its quality control process. For Proof Coil chain, the load amounts to twice the working load limit. The ultimate strength is how many pounds it takes to break the chain. It is commonly 3 to 4 times the working load limit.

#### What They Do

Anchor rollers provide a rolling surface which makes it easier to drop and weigh anchor without banging up your topsides. Anchor roller/mounts allow you to stow your anchor conveniently after you weigh it.

#### How They Work

Although they won't exactly haul the anchor line for you, anchor rollers make it easier for you to weigh anchor by hand since you can place your body where you can pull more efficiently. They also create a fair lead for the anchor rode so that it does not chafe against your stem fitting or chocks. The rolling action reduces chafe as the nylon line stretches.

Anchor mounts cradle the anchor on the bow of the boat so that it is always ready for deployment (a basic tenet of good seamanship). They are practically required when your boat is equipped with a windlass, since they guide the anchor rode to the windlass gypsy, and keep chain from gouging your hull and deck, while securing the anchor.

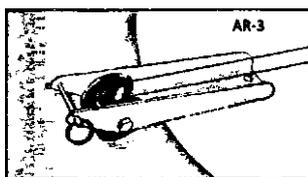
Powerboats will commonly be able to place anchor mounts on their centerline, since they have no headstay to deal with. Sailboats, however, have to deal with stem fittings, head stays, furling drums, bow pulpits, etc. This forces the mounts to be placed 4-8" to the right (or left) of the head-stay, and may require some wooden blocks to raise the mount above the toe rail. It should be parallel to the centerline of the boat, however, and aligned with the windlass gypsy.

#### What to Look For

The following tips will make it easier to select the model best for you:

##### Anchor Rollers/Chocks:

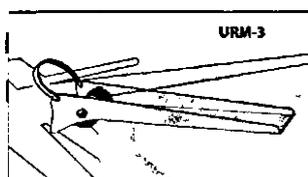
Since these devices don't store anchors, they can be used with almost any combination of anchors, nylon rode and chain. All of them can handle line up to 1" in diameter, and chain up to 3/8". Model AR-2 (#146340) and AR-3 (#153593) are generally mounted on the bow and have 2 1/2" Marithane rollers. For leading anchor rodes from the stern. Model DR-1 (#161133) allows the boat to swing through a large arc without chafe. With the bail open you can drop in one or more lines, yet your lines will be captive when closed. Although more of a mooring chock, we really like Windline's LC-1 Locking Chock (#190785) because it is attractive, holds



the line securely, and looks like you could haul your boat off a reef by passing a line through it.

##### Anchor Rollers/Mounts:

If you have a Bruce anchor. Model BRM-2 (our #317107) will handle sizes from 2.2 to 16.5 lbs, while Model BRM-3 (our #155143) will take anchors from 22 to 66 lbs. Model BRM-4 is a special roller designed for the Bruce 22, which it holds perfectly. As the anchor is weighed, it lodges securely against the self-adjusting roller and the stainless steel frame. The



smaller model is for boats up to about 27'; the BRM-4 is for boats to 33', while the large model would work on any boat that might use a Bruce 66.

Owners of fluke-type and Fortress | anchors can select from a wide variety of roller/mounts. Small anchors (up to 13 lbs. steel, Fortress to FX-23) fit on the URM-2 (#469742), which is 16" long to get the sharp flukes away from the hull and has a 2 1/2" wheel. Anchors in the next size range (to 28 lbs. steel, or Fortress FX-23) should use the URM-4 (#314880). It's 19" long for additional hull clearance, and has a 3" wheel. Large anchors (steel to 60 lbs. and Fortress to FX-55) can use the URM-3 (#171470) which is 26" long and has a 3" wheel. All three models have a bail over the roller to keep the line from jumping off the roller.

Our favorite roller is the URM-1 (#161125) which has a sliding roller like the Bruce models. This allows it to adjust and hold anchors from CQR (25-45 lbs.), Delta (14-35 lbs.) and fluke-type anchors (13-60 lbs.). It also features a ball-loc pin which can be removed to allow anchor rode removal. CQR and Delta anchor owners can use the URM-1, but some Delta owners may find the URM-3 or 4 works better for their boat type. Make sure that the roller/mount can support the anchor far enough away from the hull to allow the point of the plow to clear the hull.

