Engineers are quick to point out the downside of bending a tensioned line over a hard point—which is exactly what happens at every cleat, chock, and anchor roller on a moored boat. The result is a cluster of compromises that make line failure at the point of contact much more likely. These rope-degrading factors are all directly linked to the point load and pressure induced by the contact.

For example, rope fibers are more stressed in the outer part of the bend radius than at the inward most point, but this often becomes a moot issue because of the even more damaging internal filament friction and line abrasion. This friction and abrasion are linked to heat build-up and physical damage to the surface in contact with the metal cleat, chock, or rail.

Padding can help prevent or at least minimize rope damage caused by hard edges. At the heart of a good chafe-protection plan is a sacrificial layer placed between the hard surface and the softer nylon, polyester, or other type rope. Such a boundary layer shifts the chafing action to the material wrapped around the line, sacrificing its integrity rather than that of the line. However, this padding can also act as a thermal insulator, increasing the heat generated by internal stretch. In our cordage tests at New England Ropes (PS, December 2007), we found that intra-strand filament friction linked to rope stretch caused heat buildup that resulted in filament melting.

A corollary to this work is relevant when it comes to approaches to chafe protection. And the bottom line is the importance of avoiding the use of chafe gear that “bottles up” rope-generated heat. It’s important to maintain thermal transfer and allow heat created by a working dock line, mooring pendant, or anchor rode to dissipate into the surrounding structures and the atmosphere. Failure to do so is the very reason why a spate of mooring-pendant breakages in the 1980s led to the end of the once-common practice of using PVC tubing as a chafe protection. The tubing-sleeved rope was placed at key points such as chocks, bow rollers, hawseholes and in mooring thimbles. As the nylon rope worked, filament stretch created heat, and it was unable to escape because of the tube’s insulating effect. The resulting line rupture occurred at lower tension due to the effect of higher internal temperature.

So when shopping for—or making your own—anti-chafe gear, there are a few key things you should keep in mind. First, make sure that the material will fit your chocks and will extend far enough to prevent rails and other

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The trademark Marine Fome inside Fiorentino’s LineRap is a mixed, low-density, open-cell foam. The soft foam soaks up water, which may help dissipate heat, but it also can create moisture and mold concerns.
**Aye, There’s the Rub . . .**

In addition to the handling and fit observations mentioned above, testers devised a jig to test accelerated wear on the chafe protectors. The goal was to be able to abrade each product in an identical fashion and compare how the material coped with extreme point loading.

In normal duty, line pressures vary greatly and the fatigue cycle is measured in months, even years, rather than seconds. But the prime objective remains the same: provide a durable sacrificial cover that resists abrasion and other environmental deterioration. Believing that abrasion resistance was the most important factor, we tested each product on our abrasion accelerator.

After some hardware fine tuning, we ended up using an angle belt sander and a constant load, cantilevered jig that allowed us to do one minute-long, low-RPM runs on each product. Using a sensitive digital scale, we center-trimmed the lever to compensate for varying product weights and repeated runs five times to insure valid, reliable results.

1. Our abrasion-testing machine was designed to apply a consistent amount of pressure on each test product for the same set amount of time at a consistent RPM. This ensured that all test products faced the same abrasion risk.

2. The rubber Taylor Made Chafe Guard came close to chafing all the way through during bench tests.

3. Fjord’s Chafe-Pro was the only test product to earn an Excellent rating for chafe protection.

4. The polyester Taylor Made guard offered the least chafe protection, burning all the way through to the rope during tests.

5. The Davis Secure burned through, but its Velcro liner kept the chafe from getting to the rope being protected.

6. The Fiorentino LineRap was in the middle of the pack during abrasion tests, showing some chafe holes, but it did not burn through.
We ranked the five over-the-counter chafe protectors we tested for this report as light, medium, and heavy duty. The tougher the chafe problem, the more heavy-duty the solution and the bulkier the products tend to be. The Davis and Taylor Made single-skin webbing products were convenient and easy to use but not as abrasion resistant as the other three test products.

Fiorentino’s LineRap had a tough Dacron double-layer design, and Taylor’s traditional rubber chafe protector fell into our medium-duty designation, showing more resistance to chafe than the light-duty alternatives but doing so with two very different materials. We pegged the Fjord Chafe-Pro as the heavy-duty entry, and it lived up to expectations as the most abrasion resistant. For details on the testing protocol and rating criteria, see “How We Tested.”

**DAVIS SECURE**

This simple-to-use chafe guard is comprised of nylon webbing with Velcro sewn to the other side. Installing the Davis Secure (No. 395) involves rolling the line up in the webbing, which proved to be a quick and easy way to get chafe protection in place with the least possible fuss. The hooked Velcro surface locks into the fibers of the three-strand or braided line, and there was no need to follow up with any tieoffs or other locking effort to keep the chafe gear where it belonged.

The moderate weight of the nylon webbing affords fair abrasion resistance, but testing did reveal that durability directly correlates to the weight, layering, and surface coating of the materials used. The abrasion test cut through the webbing and was abrading the Velcro hook layer that backs the webbing, but it had not yet holed it.

This would be a handy piece of anti-chafe protection to put on roller-furling genoa sheets when the boat is left for a week or more. Just roll the Davis Secure chafe guard at the point where the sheet presses against a shroud and prevent costly premature sheet replacement. This would also keep users from hardware from becoming a secondary source of abrasion. We also found that there needs to be a rugged means of preventing the gear from sliding away from where the action happens to be. Some people duct tape their anti-chafe gear in place, a temporary, in-a-pinch solution. Some products come with Velcro hooks on the inside to anchor the chafe guard to the rope itself. Others use hook-and-loop technology only to close the two halves of the chafe gear around a line. When the chafe protection is left on the line permanently, it makes sense to lash or sew the ends in place.

**WHAT WE TESTED**

For this test, we evaluated five commercially made products marketed for chafe protection on and around boats. The anti-chafe gear included products from marine accessories-maker Davis Instruments, Para-Anchor manufacturer Fiorentino, the North Carolina-based Fjord Inc., and Taylor Made.

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releasing the sheets and moving them forward, clear of the shrouds—a bad habit that could result in the sail unfurling and being destroyed in a storm.

Bottom line: An easy-to-use anti-chafe system, the Davis Secure gets PS’s Budget Buy pick for light duty.

FIorentino LineRap
A manufacturer of sea anchors and rode, Fiorentino has first-hand experience with line-chafe issues, and the company has adapted its RodeRap design developed for sea anchors into a shorter version dubbed the “LineRap.”

The trademarked Sun Protector Dacron sleeve is a supple chafe guard with open-cell foam padding. The sleeve’s Velcro seam makes attachment quick and easy, though the relatively short length and large-diameter opening make the product seem more appropriate for larger diameter lines and single-point chafe concerns. However, the designer intentionally provided this more open approach to increase line cooling—a definite plus, but there are other factors to consider.

Testing has shown us that during rough weather, chafe gear on dock lines, mooring pendants, and anchor rode tends to bunch and move along the rode, often working its way out of a chock or hawsehole. LineRap has a single, sewn-in webbing eye at one end of the chafe guard that allows a lashing to secure the product to the line being protected or to a fixed point on the boat. Lashing ability at both ends would be of more value, in our opinion.

Our abrasion test showed that the double layer of Dacron was tough, and although the aggressive test gear did cut through one layer, the equally thick back layer was completely intact. What testers found disappointing, however, was how easily the guard’s open-cell-foam guts sheared. According to Fiorentino, the company uses open-cell—rather than closed-cell—foam because it provides more cushioning, is more flexible, and bends easier. “Flexibility is important when placing the chafe guard in chocks and fairleads and allows the guard to shape itself around a sharply bent rope,” Fiorentino researcher Zack Smith explained. “We believe our foam does the...
Old Salt’s Anti-chafe Solution

Being a team of diehard do-it-yourselfers, we decided to try our own hand at devising a workable solution to defeating line chafe. After fiddling with canvas, old fire hose, and even messing around with some Kevlar, we settled on leather—an old rigger’s standby. It proved to be rugged and remained unholed after a ride on the belt sander. (See “How We Tested.”) The fabrication process was kids craft 101, and there was something quite seafaring about the result.

Our approach was straight out of the old-salt column. Using a sharp knife and metal straight edge, we lopped off the size patch we needed. Holes were punched opposite each other at ¾-inch intervals, and for temporary use, we zigzagged small cord the length of the leather. For a more permanent installation, we handstitched the leather in place, tucking locking stitches into the rope at each end. Holes were made with a pliers-like hole punch, and we fashioned our chafe strips to be long enough to cover the hard points, adding an additional 25 percent to the length to handle stretch and any minor slippage.

Whether laced on for short-term use or stitched more permanently in place, the leather rode smoothly in chocks and prevented the hard edge of an alloy rail from damaging rope fibers. Care needs to be taken to keep the more fragile stitched seam from facing the action and becoming the surface that handles the abrasion. But the same holds true for commercial products the rely on hook-and-loop fabric closures.

All in all, we concluded that if you have the time and enjoy the tradition of handworking a seafaring solution, definitely go find some leather. If you would rather spend the time sailing, purchase one of the tested over-the-counter solutions. But above all, be ready to add anti-chafe gear to your lines when the good weather turns bad; a good outcome is all about staying put.

Bottom line: Testers like the Fiorentino LineRap's design and it had Good abrasion resistance, but it fell short of topping the Chafe-Pro.

**Fjord Chafe-Pro**
The Fjord Chafe-Pro (08-HB-02)—a patented, heavy-duty nylon webbing and Velcro system—has gained wide acceptance among professional mariners, and as we found out in testing, it lives up to its name. Fjord’s commercial product has been scaled down to yacht dimensions but retains its rugged reputation, and according to our team of evaluators, it “offers the kind of chafe protection you want when the chips are down.”

The longer-length, heavier-weight, quadruple-stitched webbing and double-locking Velcro end point make this product a cut above the competition, in our opinion. Despite its bulkier appearance, the Chafe-Pro was easy to install, took an angle change in stride, and fit into chocks with ease.

Nearly defying the bite of the 50-grit belt sander, Chafe-Pro’s urethane-coated, black ballistic nylon went away from our hungry test machine with all layers intact. In fact, at the point where the abrasion was focused, there was only a slightly scuffed surface.

**Bottom line:** The Chafe-Pro combines rugged protection with a user-friendly design that’s easy to install and lock in place. With prices in the recreational line starting at $20 per pair for the smaller guards, the Chafe-Pro gets the nod for PS Best Choice.

**Taylor Made Chafe Guard RCG1.14**
The Taylor Made Chafe Guard (RCG1.14) is a 16- by-4.75-inch length of single-skin polyester webbing with strips of Velcro along each side. Each end has two holes and short stuff is supplied to lash the nylon Chafe Guard in place. This system does not incorporate Velcro on the inner surface as a means of locking the line to the webbing.

In testing, we noted that the line did slide inside the chafe guard, and the webbing also slid against the chock. The former can be minimized by following Tay-

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**Tools & Techniques**

**Cordage**

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In testing, we noted that the line did slide inside the chafe guard, and the webbing also slid against the chock. The former can be minimized by following Tay-
Testers looked at the different ways the chafe gear could be lashed in place. The Taylor Made products feature small ties that can be woven into the ropes’ strands to immobilize the chafe gear. The maker recommends weaving the tie through the rope and then doing a final tie around the chafe guard. (We tied off around the rope to better show the weaving process here.) We suggest using two rolling hitches as the final tie or one of the other top gripping hitches discussed in the August 2009 issue. The Fiorentino LineRap comes with a webbing loop for a single-point attachment, which we’ve found often allows the gear to bunch up with each surge of the line—unless the chafe gear is rigid.

Taylor Made’s recommended means of attachment: lacing the line through rope strands or braid and also lashing around the webbing itself. Being able to keep anti-chafe material from working its way out of contact with the offending hardware is as important as the material’s toughness.

The abrasive test took its toll on the Chafe Guard, wearing a hole through the material faster than any other test product. We recognized the brutal surface destructiveness of our equipment, but the fact that overall results ranged from complete to minor damage validated that some products were more resistant to heavy abrasion than others.

**Bottom line:** The polyester Taylor Chafe Guard is vulnerable to heavy point loading, but it’s easy to install, and from our perspective, it still has merit in situations where very light-duty chafe protection is desired.

**TAYLOR MADE CHAFE GUARD 96013**

Taylor Made has long provided rubber-boot type Chafe Guards that have been marina favorites for decades. Their longitudinally split, overlapping attachment design allows them to be easily slipped over docklines, and a hole is placed at one end for the lashing line that is provided. Because of the rigid nature of the product, there’s no tendency to bunch up, and a single-point attachment takes care of the bidirectional line movement. However, one drawback to rigid chafe protectors is that heat buildup can become an issue.

Rubber dust flew as the 96013 Chafe Guard rested on the spinning 50-grit sanding belt. Thanks to the substantial wall thickness of the material, the product remained intact, and no penetration occurred.

**Bottom line:** The rubber chafe guard is worth considering if you prefer rigid protection, but it was not testers’ favorite in this group.

**CONCLUSION**

The best type of chafe gear to rely on in a storm is the one that has high resistance to abrasion, doesn’t act as thermal insulation causing heat build up in the line to increase filament failure, and can be easily installed—even when the line has already been deployed.

Just as important is the anti-chafe gear’s ability to remain in place, regardless of how vigorously lines tense and relax as they pass through or over a piece of hardware. Boats left on moorings or tied to floats and docks are usually unattended when the worst weather strikes. Time and again, lines fail because perfectly good chafe protection worked its way up or down the line and the abrasion buffer was lost. This is why our evaluation stressed the importance of locking the chafe guard in place.

All five of the products tested provided useful abrasion protection, but when it came to our Best Choice selection, the hands-down winner was the Fjord Chafe-Pro—a commercial product that holds just as much validity for the recreational sailor. In addition to shrugging off the belt sander’s assault, it easily attached to three-strand and braided lines, and the inside strip of Velcro hooks locked it tightly in place. We liked the 2-foot length and felt the heavy-duty chafe protection it offered was just right for those who must set up a boat to ride out a serious blow on a mooring or on a rope anchor rode. We felt the higher price was in keeping with the quality of the product purchased—another case of getting what you pay for.

The Budget Buy award went to the Davis Secure (No. 395), a handy, quick to setup, and streamlined piece of chafe gear. It’s even compact enough to wrap into the first turn around a good-sized cleat and still have enough extension to protect against track chafe.

This round of testing looked at abrasion, construction quality, and design. We have set up a long-term test to see how these products handle UV exposure and atmospheric deposition of chemical pollutants. Stay tuned for the results of the long-term test in a future issue. 📌

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