



Stitch-free Sail Repair

We tested five products for the ability to quickly repair holes and torn seams in sails, such as this blown-out spinnaker.

Dr. Sails excels, but there are other options at 1/10 the cost.

Sail repairs are a fact of life for the sailor. A stray cotter pin can shred a spinnaker. Perhaps the mainsail luff could use some chafe protection, or the genoa sun cover is flapping. Often, a trip to the sailmaker isn't justified for these repairs. The sail is too old to take stitching without further weakening the material, or you simply want to delay that repair until the end of the season. Perhaps you're on a cruise and would rather wait. A sewn repair is generally the gold standard, but some tears better-fixed with a patch.

Several sailmakers we spoke with agreed that tapes and glues play a key role in sail repair and maintenance. They shared long tales of repairs in which the cloth was too old to take stitching, where a sewn repair would require too much disassembly and reassembly for the labor to make sense, or where tapes and adhesives were used as adjuncts to sewn repairs. We've repaired shredded chutes, patched luff tapes, replaced tell-tales, and repaired race damage, all in field conditions, but we were never sure what could have been better or just how strong a given repair really was. Time for some numbers.

WHAT WE TESTED

We tested tapes and adhesives, including sail repair tapes and a specialized sail repair adhesive, Dr. Sails. We tested all materials on lightly used 6-ounce weight polyester sail cloth, which we laundered and scrubbed with TSP prior to testing to remove any surface contamination or treatments.

HOW WE TESTED

First, we tested several control samples containing sewn seams. Then we made up 2-inch wide cloth coupons and created a seam for pull testing. For tapes we used a butt joint with tape on both sides. The tape was firmly smoothed with a seam rubber and the samples allowed to rest overnight (some tapes take a little time to develop full strength). For adhesives we allowed a 1-inch overlap (more overlap would generally mean more strength) and allowed the adhesives to cure for 1-week in hot humid conditions (more time would be required in winter or dry conditions). These samples were slowly pulled to failure.

We then made up 6-inch x 8-inch flags from each material, with a seam

running horizontally. These were aged by leaving them in the sun for three months and running them through the laundry a dozen cycles, including three hours of tumbling dry with no heat and tennis balls added to increase impact and flexing.

OBSERVATIONS

Because sailcloth does not wick adhesive away from the joint and because the surface is smooth, much less glue is needed to make a strong joint. We had our best result, in terms of flexibility and strength, when we went over the seam lightly with a seam rubber, removing most of the surplus adhesive (leave a little extra if crossing existing seams). We masked and used wax paper above and below to prevent a mess.

Because sail cloth is less stretchy than Sunbrella (see *PS Fixing Tears in Sunbrella Boat Canvas*), the slightly stiffer West Systems G-Flex did an acceptable job.

All of the adhesives, with the exception of Aileen's, could be peeled from the fabric—albeit with great difficulty—should a sewn repair be desired later. This includes materials that were

MAINTENANCE

AS VALUE GUIDE TAPES AND ADHESIVES FOR SAIL REPAIR						
MANUFACTURER	MODEL	CREEP	*FAIL (70F)	PRICE	QUANTITY	COST PER FOOT REPAIR
TAPES						
SAIL RITE ✓	Polyester Repair Tape	8 pounds	82 pounds	\$5.95	45 feet	13 cents
SAIL RITE \$	Nylon Repair Tape	8 pounds	64 pounds	\$8.95	75 feet	12 cents
TEAR AID	Type B	10 pounds	14 pounds	\$4.95	1 feet	\$ 4.95
ADHESIVE SEALANTS/GLUES						
3M ✓	5200	None	>150 pounds	\$16.99	10 oz.	68 cents
LOCTITE ✓	Marine Sealant	None	>150 pounds	\$12.95	10 oz.	52 cents
LOCTITE \$	PL S40	None	>150 pounds	\$5.85	10 oz.	23 cents
SIKA ✓	Sikaflex 291	None	>150 pounds	\$13.99	10 oz.	56 cents
WELDWOOD	Contact Cement	25 pounds	55 pounds	\$4.97	89 ml.	34 cents
ALEENE'S	Multi-surface Adhesive	None	80 pounds	\$3.95	29 ml.	79 cents
EPOXIES						
WEST SYSTEMS	G 5 Epoxy	None	60	\$24.50	946 ml.	16 cents
WEST SYSTEMS ✓	G-Flex	None	>150	\$25.99	236 ml	22 cents
SAILING TECH ★	Dr. Sails	None	>150	\$38.50	25 ml.	\$9.24

★ Best Choice ✓ Recommended \$ Budget Buy *Stitched seam and fabric began tearing at 150 pounds.

stronger than the cloth when used with 1-inch overlap. A clean disassembly might be impossible with old porous sailcloth, since many of these products tore old Sunbrella before releasing.

Even though we could peel the panels apart with our hands, none of them came apart in our rigorous laundering and drying test, suggesting they'd survive just fine in the field. In most cases, a sewn repair will better resist peeling, but glued patches are often preferable for areas where threads would chafe.

The details of application? Our testing was all at 1-inch overlap, but we would increase this to 1.5 inches in actual use. All patches should be rounded to about a 1-inch radius, including tape patches. This prevents the patches from peeling, and prevents it from puckering.

Sewn patches, on the other hand, generally have square edges because of difficulties hemming curves.

Secure the torn fabric in position by taping it from the backside with sail repair tape or even masking tape. Slather up the patch area and the patch (remember to mask and work over a

non-stick area, like wax paper), place the patch, rub down, and wait to cure. Then repeat on the other side (remove any tape adhesive by scrubbing). It will be stronger than the fabric and probably outlast the sail.

TAPES

The tapes in our test adhered reliably if rubbed down firmly; a seam rubber is your friend. In fact, we used old sun-rotted rip-stop reachers for years with yards of tape, feeling there was little point in real repairs for such an old sail. Occasionally a corner lifted, but it took only moments to peel back to good cloth, slap a few feet on each side, and hoist away. Polyester repair tape, on the other hand, felt sturdy enough that we would be comfortable using it as a part of a permanent repair if the perimeter were stitched down.

SAILRITE NYLON RIP-STOP SAIL REPAIR TAPE

We've used rolls of sail repair tape over the years, patching chutes with minor snags from sharp bits and long rips

from age. Although it is not a permanent repair, it always did better than expected, often lasting through years of sporadic use.

We've used this tape to rebuild chafed luff tapes, where nothing thicker would fit up the luff groove and the extreme flexibility helped it conform to sharp bends. On the other hand, we would not recommend it for a repair near an edge where high loads are carried; it is very light and will creep under sustained load. If you apply it to both sides and then sewn, it can be very durable.

Bottom line: Recommended for repairs to light sails and chafe/cover repairs on working sails.

SAILRITE POLYESTER SAIL REPAIR TAPE

Like the nylon tape, this tape readily creeps in hot weather. However, if you apply it to both sides and then sew it in place, it can be a permanent repair to working sails, rather like a strip of cloth with built-in seam tape. The adhesive will make the sewing needle drag a bit, but not too bad.

Bottom Line: Recommended for

Test Compares Strength and Durability

As in our previous testing, each sample was pulled to failure. The control sample with no repairs failed at 150 pounds. Several repairs held beyond that.

1. Dr. Sails created a formidable bond in the in the Dacron sail. The sail material failed before the bond.
2. The Loctite PL S40 forms a tenacious bond, although it failed before the material. When the webbing failed on a sun-baked Lifesling, we cut and glued a patch using
3. The control failed at the clamp screws before it failed at the triple-stitched seam. To avoid this metal-to-cloth mismatch, some sailmakers still prefer manually stitched finish work over rivets and hydraulically pressed eyes.
4. The 3m 5200 glue had started to peel, but the joint still held beyond the longer than the sail material.
5. The West System G5 was too stiff and did not bond as well as Dr. Sails, another two-component product.
6. The sail samples were set out for three months in the weather and then run through a brutal wash and dry cycle.



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Photos by Drew Fyfe

repairs to woven polyester working sails and chafe/cover repairs on working sails.

TEAREPAIR TEAR-AID A

The problem with this Tear-Aid A is that it is so darn stretchy and soft. In hot weather it began to stretch at only one pound/inch of seam. It cannot be sewn (and it wouldn't help). Bottom line: Not for sail repair, and too expensive anyway.

GLUED PATCHES

Cruisers have been using 3M 5200 successfully for sail and canvas repair for many years, and the sail makers we spoke with agreed it could be a useful tool. We added several additional sealants to our testing panel that out-performed 3M 5200 when bonding plastics. We were curious if that versatility would cross over into fabric adhesion. A sail specific product, Dr. Sails, held promise, and epoxies seemed worth in-

vestigating, since we always have them around.

DR. SAILS

Dr. Sails has a lickety-split 8-minute working time. Make certain that all of the parts and tools are laid out before you begin, including paper towels and several plastic scrapers to spread the epoxy and press the layers together.

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The DIY Sail Repair Kit

If you're going to sail you'll be doing some stitching. No two ways about it. Don't jump into the \$100 do-everything kit. Start with a modest kit, adding tools and materials only as your skills grow and projects require them. You already have most of what you need in your other supply lockers or tool boxes. Study a good book on sail and canvas repair, concoct a few small projects for practice.

Work Surface - A wooden cutting board is perfect for small projects, much better than plastic.

Sailmaker's palm - Get one that fits. Left-handed palms are available. A Dremel can smooth out the sharp edges, so your palm is as soft as a true sailmaker's palm.

Needles - Get an assortment, size 12-18. Smaller numbers are larger needles. A number 16 is a good match for #4 whipping twine, your workhorse thread.

Waxed whipping twine - You can wax as you go, but pre-waxed is handier. Robline #4 is our favorite. It is heavier than machine thread, so it will last longer. And it's strong enough that if you double it, you don't need to back-fill in each zig-zag stitch. Heavier twines are used for webbing and around eyes, but for field repairs you can just use more strands of #4. Get a few spools; white is good for sails, dark colors are handy for marking lines.

Safety Pins and Straight Pins - You'll want these for holding fabric. Double-stick seam tape helps, but if you're working in the wind or in tight spaces, pins seem to work better.

Awl or icepick - Essential for forcing holes through material too stiff for palm or even stitching awl alone.

Stitching awl - These tools are handy when you can't reach to both sides, but most jobs are more easily fixed with a needle and palm.

Pliers - Sometimes the needle requires a little encouragement. The one in your toolbox is fine.

Lighter or Soldering Iron for Sealing Edges - If you can't turn a seam under soldering the edges prevents fraying.

Cutting Tools - Although a knife, razor, and seam ripper all have their place, start with scissors.



A herringbone stitch on a small tear requires no glue or patch, but taping over it will surely prolong the life of the repair.

Materials - Some scraps of sailcloth and canvas are useful, but webbing, soft leather or elk hide, Sunbrella, and sail repair tape are just as essential.

Fids - Handy for loosening knots and splicing, get a standard fid before you start coveting all of the fine implements for splicing double braid. ("A Fistful of Fids," *PS* July 2006).

Wool Yarn - Tell tales are perhaps the most common item, and though other materials fly more easily, wool seems to dry fastest and not get stuck to the sail. Some attach them with sail tape. You can also thread them through the tiniest possible hole with a knot on each side. Instead of struggling to thread fat yarn through a small needle (hint, push the needle onto the thread), thread a double strand of light thread through the needle, "lasso" the thick thread and bring it back through.

Household needles and thread - Include an assortment of smaller needles and thread for repairs to upholstery and clothing. White and several colors in heavier weights.

Fasteners - Once you head offshore it's good to have a few grommets and a grommet kit, as well as some spare fasteners.

Now practice - If you can find nothing that needs fixing, splice and stitch a loop at each end of a short piece of old double braid—about a foot will do—you'll find plenty of uses for it.

Photos courtesy of Mahina Expeditions, www.mahinatare.com



Staggering the stitches on a clew repair avoids creating a perforated line that can create a rip-on-the-dotted line effect under load.

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The in-line mixer on the syringe does require a firm hand; large jobs can be a hand-cramper, but the rate is about right for smaller projects. The 25 milliliter kits come with two in-line mixers, allowing two repair jobs if put away carefully. The repair was considerably more flexible than the G-Flex repair, and the cure time far less. We liked that the glue did not show through the fabric, making for a neat job if we masked the work area. Because it is an epoxy, clean-up is with vinegar (stops the curing) followed by soap and water. We wonder what other uses we may find for this unique material.

Bottom Line: Pricey, but our Best Choice for sail repair.

G/5 EPOXY, WEST SYSTEMS

A 5-minute epoxy, it is easy to work with and fast. However, because the epoxy is very stiff compared to the fabric, it does not distribute force evenly as the cloth stretches, resulting in a weak bond. Add to that its stiffness, and it did not advance to fatigue testing.

Bottom Line: Not for sails or canvas.

WEST SYSTEMS G-FLEX EPOXY

Much like Dr. Sails, but with slightly less flexibility and an overnight curing time. **Bottom Line:** Recommended for working sail repair.

3M 5200

We have used 5200 for years to stiffen areas where grommets were to be installed. It has never let us down, and dependable test results support that experience. We would be comfortable using this if sewing was not a viable option. A little stiffer than other materials in the test.

Bottom Line: Our Best Choice for fixing canvas works as well on sails.

LOCTITE PL S40

This is useful around the boat and the house, performing right up there with marine sealants at a fraction of the price.

Bottom Line: Our Budget Buy for sail repair



Stitching is usually the first to fail on old sails as ultra-violet (UV) rays take their toll.

MARINE SEALANT, LOCTITE

This product is a lot like Loctite PL S40, but polyether and with a quicker setting time.

Bottom Line: Recommended for sail repair.

SIKA CORPORATION SIKAFLEX 291

This is another well-respected polyurethane sealant popular for marine use. It does not disappoint.

Bottom Line: Recommended for Sunbrella repair.

WELDWOOD CONTACT CEMENT

While this worked very well for sail repair, we found the results on canvass were extremely variable, somehow related to the condition of the cloth and whether we could rub it down hard. Easy to work with and very fast, but UV resistance is also a concern.

Bottom line: This option deserves further investigation.

AILEEN'S

This was suggested to us by a cruiser who had used it successfully for both sail and dodger repairs. Sure enough, when applied carefully on a flat work surface in the lab, we got respectable results. However, when we tried it in the field to repair a number of holes in a dodger it was a complete failure. When used on sails we were alarmed by the sudden failure at relatively low load.

Bottom Line: Leave it in the craft department.

CONCLUSIONS

A needle and thread will always be king for canvas and conventional sail repair. However, there are times and places where adhesive and tapes can have considerable advantages in labor and even quality, if properly applied.

We like sail repair tape for speed and versatility; you can slap it on as a quick expedient (always rubbed down well), use it for chafe protection, or add a few stitches and make it permanent. We like the quick-cure of Dr. Sails, our best choice. It was a close call, however, with excellent performances by 3M 5200 and other sealants, all producing flexible repairs that were stronger than the fabric.

It comes down to practice and proper application of the tools. ▲

CONTACTS

3M, www.3m.com

ALEENE'S, www.aleenes.com

DAP, www.dap.com

LOCTITE, www.loctiteproducts.com

SAIL-RITE, www.sail-rite.com

TEAR-AID, www.tear-aid.com

WEST SYSTEM, www.westsystem.com

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