

Anchor chain swivels

BY DAVE MCCAMPBELL

Recently, there has been a good deal of interest in swivels placed between one's anchor and chain. Besides the obvious question of whether one is necessary or not, there are at least three issues worth careful consideration before purchasing a swivel. They are: 1) size and strength, 2) design characteristics and 3) construction material and mixed metals.

There are at least three reasons to use swivels. First, they make the attachment between the anchor and chain; second, they minimize dangerous chain twist, especially in the chain locker; third, they allow rotation of a large anchor hanging below the anchor roller tray in order to facilitate smooth retrieval over the roller. Both of these latter reasons assume that the swivel moves easily under load, which is not true for most galvanized swivels. For those of us with a big anchor, the roller issue is the major reason to use a swivel.

Modern scoop, plow and claw anchors do much better coming over a roller if the tip of their blade is pointed aft rather than forward. For anchors on the bow heavier than about 60 pounds, turning the anchor over is near impossible without a swivel. Leaving an anchor to turn itself over during retrieval is asking for trouble from the shock loading it puts on all the ground tackle.

Size and strength

When it comes to sizing an anchor swivel, bigger and stronger are usually better, within reason. The primary consideration is to ensure that it has at least similar safe working load (SWL) and ultimate breaking strength (UBS) as the chain so that it does not become the weak link. That also goes for the connecting shackles. See the accompanying table indi-

cating, for example, that G4 3/8-inch chain needs at least a 5/8-inch galvanized swivel and a 7/16-inch G4 or 5/8-inch mild steel or stainless-steel shackle in order to match the chain strength. BBB or proof coil 3/8-inch galvanized chain has about half that working strength — 2,650 pounds — so smaller sizes could be used.

Another issue here is making sure the shackle pin will fit through the chain end link. A 7/16-inch shackle pin is the largest that will fit standard 3/8-inch chain. If your chain is a different size, determine whether it is BBB/G3 or high-test (HT)/G4, then check the strengths and fit of your associated hardware carefully. One good source for strengths is the West Marine catalog online.

It goes without saying that cheap

A selection of swivel types, both stainless and galvanized. Some swivels can be taken apart, aiding with inspection for corrosion.



swivels and shackles, especially some unrated Southeast Asian brands, are far riskier than the more expensive and rated swivels made by reputable companies. The recent loss of a boat on a mooring in St. Croix with an inexpensive but properly sized galvanized swivel is further proof to exercise caution here.

Design

Some swivels are designed specifically for marine use and others for construction. For example, Crosby says its common bail-to-bail G-402 swivels are “positioning devices and are not intended to rotate under load.” Wichard says its forged 316 stainless-steel mooring swivel is designed for “permanent immersion.”

Quality swivels will have a rated SWL stamped on them. Others, including some from Southeast Asia, may also have the same stamp but are a risk. If there is no stamp, then consider them disposable and probably not approved by your insurance company.

One important design characteristic for any swivel is its ability to be taken apart in order to inspect every square millimeter. There are 645 square millimeters in a square inch of surface area, so for us more elderly cruisers it is probably best to use a magnifying glass. Stress corrosion cracking almost always starts with very small surface cracks that can be evident from rust stains and detected by several methods, including X-ray and dye penetrant testing. The stainless-steel Mantus and Kong are two swivels designed to be completely disassembled for inspection and cleaning. Many other swivels cannot be fully disassembled, including most galvanized swivels.

Another feature to look at closely is a swivel’s connecting devices, including the pins between the two halves of the swivel and those that connect the anchor and chain. Are they properly sized for the rated load? Threading and welding — especially if in line with the load, as on most galvanized and some stainless-steel swivels — have caused failures. Machined parts are better. The stainless-steel Mantus swivel has oval pins that increase the strength along the load axis, and the connection on the anchor end is designed to orient a shackle so there is no side loading. The Ultra Flip, Wasi Powerball and a few others use a strong, machined

ball-and-socket arrangement between the two swivel halves.

Side loading is a significant problem. Crosby degrades the strength of their shackles for offline pulls as follows: 0 to 10 degrees = 100 percent SWL; 45 degrees = 70 percent SWL; and 90 degrees = 50 percent SWL. The strength degradation in Crosby swivel SWLs will be similar.

Kong says their swivel will lose up to two-thirds of its strength if loaded at 90 degrees to a straight-line pull, so always use a full-strength shackle between the anchor and swivel. Mount it so that the rounded bail is through the anchor shank to prevent dangerous side loading.

Construction

An important decision to be made here is what metals are *not* suitable for use in swivels and other ground tackle. For those that prefer galvanized steels, the choices are G7 high test, G4 high tensile or G3 mild steel.

But, only hot-dip galvanizing should be considered — not hot flame or cold galvanizing spray, or cadmium plating. We tried having our chain regalvanized using hot flame sprayed with zinc by a firm in Fiji; it lasted less than a year.

G4 metals have a much greater strength but do not stretch as much as G3 metals before failure. Both can be regalvanized without significant loss of strength. G7 metals are only somewhat stronger than G4, much more expensive and cannot be regalvanized. I believe that of the three, G4 has the best combination of desirable characteristics.

Common stainless-steel metals come in a variety of types. The 200

Finding ground tackle weak links

Chain (3/8")		SWL (pounds)
– BBB/G3	\$5	2,650
– HT/G4	\$5	5,400
– HT/G7	\$10	6,600
Shackles		
– 3/8" MS/SS		2,000
– 7/16" MS/SS		3,000
– 1/2" MS/SS		4,000
– 7/16" G4	\$12	5,300
– 5/8" MS/SS		6,500
Swivels		
– 1/2" MS	\$39	3,600
– 5/8" MS	\$58	5,200
– Kong 1/2" SS	\$240	6,600

series of stainless steel is a bit stronger than the 300 series but not very resistant to corrosion. Within the 300 series, 316 is the most corrosion resistant but about 10 percent weaker than 304. Forging and heat treating improve strength, longevity and reliability. Machining is better than welding. Almost all standing rigging and most deck fittings, for good reason, are made these days of 316 stainless steel. Most stainless-steel swivels claim to be made of 316, but as evidenced in the online PDF below, that is not always true.

See this link for an informative look at a failed swivel's metallurgy and failure analysis: [fsc.com.au/wp-](http://fsc.com.au/wp-content/uploads/2016/07/Anchor-20Swivel20Report.pdf)

[content/uploads/2016/07/Anchor-20Swivel20Report.pdf](http://fsc.com.au/wp-content/uploads/2016/07/Anchor-20Swivel20Report.pdf).

Flawed metallurgy is certainly a possible cause of swivel failures. So if purchasing a swivel, it is best to stick with a reputable, major brand.

Despite claims from others, I have found little evidence of failures from electrolysis. My own experience includes 15 years of cruising with a big stainless-steel Kong swivel that still shows no sign of deterioration. It gets taken apart, greased and carefully inspected at least once a year. Spade claims more than 10 years with no breaks and no returns for their stainless-steel Wasi Powerball. Other quality stainless-steel swivels include

the Ultra Flip and Mantus; both are well designed with quality material but have a relatively short use history. Crosby (who also makes stainless-steel swivels) and ACCO/Peerless both make forged, galvanized, bail-to-bail "positioning device" swivels, and have a good reputation.

A swivel, like other parts of your ground tackle, is not necessarily a weak link unless you make it so. ■

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