Small Anchor Reset Tests

The most controlled aspect of the anchor testing took place on a sand and clay bottom near Sydney, Australia. The comparison featured traditional designs, and a variety of newer "convex" fluke designs (foreground) and "concave" designs (background).

Bruce, CQR types fall behind newer designs in 180-degree pulls.

Practical Sailor has carried out dozens of anchor tests over the years. The majority of these tests have compared the ability of various anchor types to set and hold in specific bottoms—sand, clay, soft mud, etc. Our most recent in-depth anchor report was a series of tests to calculate wind loads imposed on a typical cruising boat while at anchor (*PS*, May 2012). This month, we set out to compare anchor performance when the boat position changes under the forces of wind or tide, a shift that often causes the anchor to move and reset itself. We have carried out this type of veer-reset test before, but the last one was in January 2001, before many of today's anchors had been introduced or made available in the U.S.

For this test, we include some newer fixed-shank anchors—such as the Rocna and the Manson Supreme—with concave fluke designs very similar to the Spade, one of the strongest performers in our 2001 veer test.

WHAT WE TESTED

In order to simplify the testing, we used relatively small anchors, less than 20 pounds, suitable for use on a 20- to 25-foot trailer-sailer. Size and weight will have an impact on an anchor's ability to reset, but comparing this test's results to those of the 2001 test—which featured 10- to 35-pound anchors—it appears that smaller anchors will perform similarly to their larger brethren in this kind of test. We'll be able to confirm our theory soon enough, as we plan to follow up with a veer test of heavier anchors later this year.

For this test, we included 12 different anchors: a 14-pound Ultra, a welded stainless-steel design made in Turkey and distributed in the U.S. by Quickline; a 12.5-pound Spade, a two-piece concave-fluke model made in Tunisia and distributed in the U.S. by Sea Tech and Fun; a 15-pound Super SARCA (Sand and Rock Combination Anchor), an Australian design with a prominent "roll bar;" an original, 20.7-pound CQR, a hinged plough design copied by several different makers (the original factory in Scotland has ceased production); a 9.4-pound Kobra, a plough-style anchor with a welded shaft and flukes; an 11-pound SARCA Excel, a design similar to the Kobra; a 10.1-pound Manson Supreme, a welded steel anchor with concave flukes made in New Zealand; a 13.2-pound Rocna, a Spade-like (concave fluke) design with the addition of a roll bar; a 16-pound Manson Ray, a claw-style anchor based on the original Bruce anchor; a Lewmar Claw 19.4-pound Bruce-style anchor; a 14.7-pound Delta, made by Lewmar; and finally, a 10.3-pound traditional fisherman anchor.

Our tester originally intended to

Photos by Jonathan Neeves

PS VALUE GUIDE SMALL ANCHOR RESET TESTS

ANCHOR	WEIGHT	HOLDING	SURFACE AREA/WEIGHT (cm^2/kg)	THROAT ANGLE	SAND/CLAY INITIAL SET (SHORE TESTING*)	SAND/CLAY 90˚/180˚ (SHORE TESTING*)	SAND INITIAL SET (BOAT TESTING**)	SAND 90˚/180˚ (BOAT TESTING**)
ULTRA (Recommended)	14 lbs.	Very good	64	35°	0.65 meters	0.4 / 1.5 meters	1.1 meters	0.8 meters /1.5 meters
SPADE ★	12.5 lbs.	Very good	79	40°	0.8 meters	0.5 / 1.3 meters	0.7 meters	1 /1.6 meters
SARCA	15 lbs.	Very good	92	38°	0.7 meters	1.4 / 3.7 meters	1.9 meters	1 /4.7 meters
CQR3	20.7 lbs.	Good	40	38°	N / A	N / A	Dragged	N / A
KOBRA $	9.4 lbs.	Very good	80	34°	1 meter	0.9 / 1.9 meters	1 meter	1.1 / 2.5 meters
SARCA EXCEL (Recommended)	11 lbs.	Very good	66	40°	0.95 meters	1.5 / 1.8 meters	1 meter	1.7 meters/ 2.1 meters
MANSON SUPREME*	10.1 lbs.	Very good	90	40°	0.8 meters	1.3 / 6.9 meters	1.5 meters	0.9 / 2 meters
ROCNA	13.2 lbs.	Very good	N / A	N / A	0.85 meters	1.7 / 7.5 meters	N / A	N / A
MANSON RAY	16 lbs.	Good	62	33°	N / A	N / A	1.5 meters	1.5 / 1.8 meters
LEWMAR CLAW	19.4 lbs.	Good	34	50°	N / A	N / A	1.9 meters	1.7 /2.1 meters
DELTA $	14.7 lbs.	Good	61	40°	2.1 meters	2.9 / 3.1 meters	2.7 meters	2.3 /3.2 meters
FISHERMAN	10.3 lbs.	Poor	16	57°	N / A	N / A	Dragged	N / A

★ Best Choice $ Budget Buy ✓ Recommended

*Used shackle hole (not shank slide) for reset tests
**4-5 pulls at 90 degrees and 2 pulls at 180 degrees

include Danforth-style anchors, but he was unable to find a good example in Australia, where they are rare. The Fortress FX-16, an alloy Danforth-style anchor, was the best lightweight anchor in the 2001 test, while the steel Danforth Deepset reset with less than 3 feet of dragging.

We recognize that this test did not include every anchor we have reviewed in prior tests, but, except for the missing Danforth, it is representative of the more popular styles found today on American cruising boats.

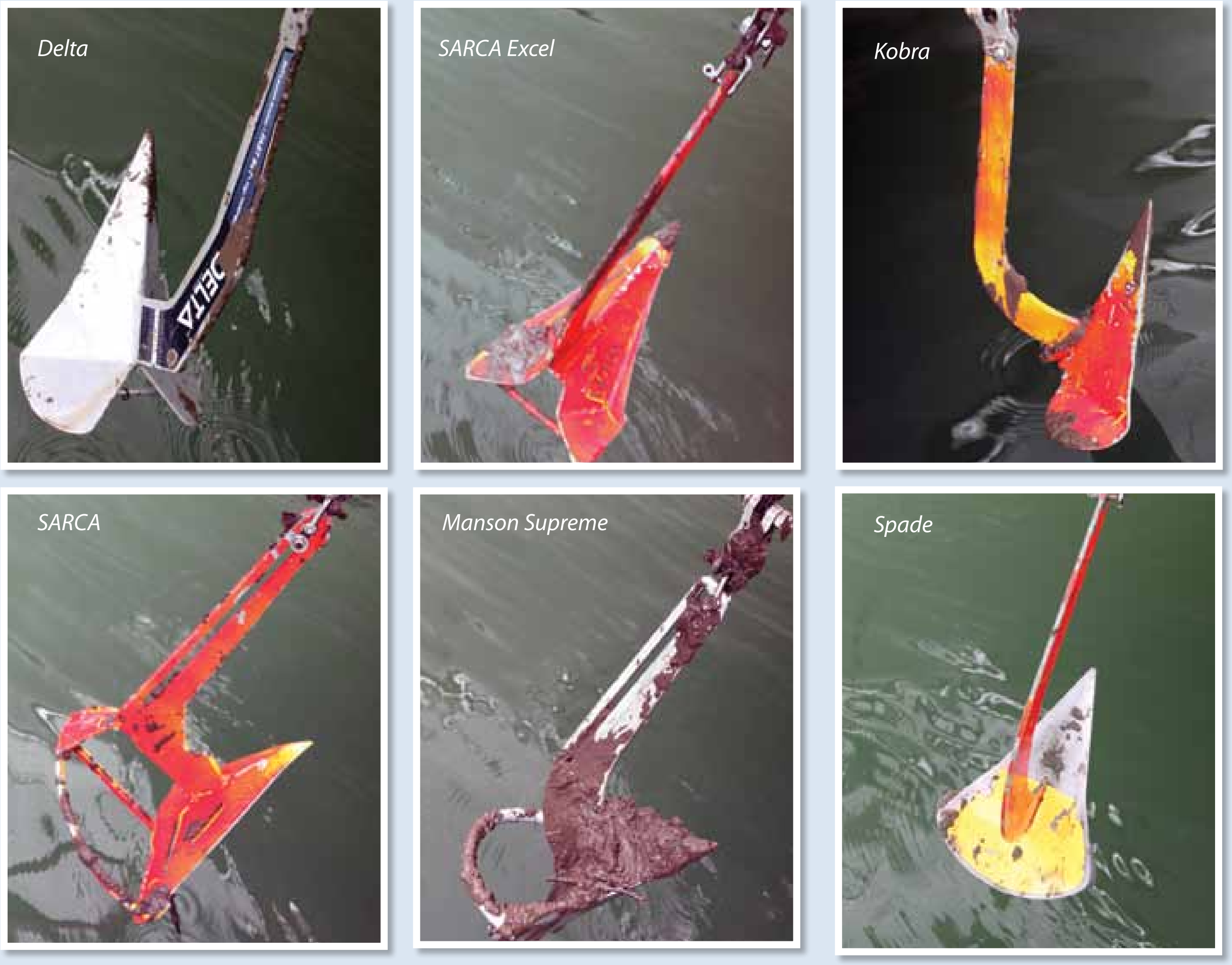
HOW WE TESTED

We focused on how the anchors performed when the direction of pull shifted 90-degrees and 180-degrees—as often happens when the wind or tide changes direction. We evaluated this several different ways. In the first test, we set the anchors underwater in the intertidal zone off a beach with a constant-speed, five-ton winch fixed to a small truck. For the first pull, we pulled in a straight line directly onto the winch. To change the directional pull, we set a large anchor with a heavy-duty snatch block positioned so that we could quickly re-load the test anchor at 90-degrees. The test anchors were set and initially tested using a 5:1 scope, but the 90-degree pull was applied at "infinite" scope—i.e. with the rode parallel to the holding ground. To effect the 180-degree change, we again relied upon a fixed winch for pulling, and the initial scope was 5:1. The load was directed through snatch blocks on well-set anchors about 100 meters apart on either side of the test anchor, so both of the directional test loads in the 180-degree pull test were applied with the rode effectively parallel to the holding ground.

It took two days and five people to test the anchors. The tests were all conducted in a compacted, sand-clay, hard seabed, and each anchor was tested at least three times to ensure the results were valid. This was our most controlled test.

The second series of tests was a variation of the first and took place on the water over a sand/clay seabed. All testing was carried out using a small runabout with a 60-horsepower outboard. We set anchors in a good sand seabed with a 10:1 scope and chain rode. The position where we dropped the anchor was marked with a buoy. We set the anchors to approximately a 220-pound load. We then re-positioned the runabout at 90 degrees to the set direction and pulled. We marked and measured the distance to the new set position. The test was repeated with only the angle of pull changed for the 180-degree test. Each of the pull tests was repeated multiple times. We discarded results that were widely outside the norm, leaving five 90-degree and a minimum of two 180-degree pulls for the average.

Finally, we carried out a third round of testing from a large sailing catamaran over a mud bottom. We set each anchor in about 15 feet of water using an all-chain road with a scope of 4.5:1. The



While ability to self clean isn't a high priority on anchors, some of our test anchors managed better than others. A tendency to scoop and hold mud and clay can also impede an anchor's ability to reset.

setting load for each anchor was 330 pounds, applied by steadily reversing at approximately 2,000 rpm on both engines (20-horsepower Volvos with three-bladed folding props).

We held the engines in reverse for about 30 seconds. Measuring the amount of drag during this test proved impossible due to the limited visibility, but we took photos of the anchors after testing, hoping to find some clues as to their performance in mud.

A few anchors were tested in weed bottoms, but the test was stopped because testers could not find a large enough area of undisturbed grass. Surface area (of flukes) is linked to holding capacity, so we have also included area-to-weight ratios in the Value Guide. We also took underwater images of each anchor, which we compared to existing "action shots" of larger versions of the same anchor.

FINDINGS

Not surprisingly, we found that anchors with some of the same features had similar performance characteristics. We would not regard any of these findings as definitive, but rather as another datapoint to consider when choosing an anchor.

CQR STYLE

The only articulated anchor we tested was a genuine CQR made in Scotland. We had previously found it difficult to set with a fixed scope of 5:1, and because we could not increase the scope with the winch and could not get it to set, we could not test it. The testers were able to set the CQR during on-the-water tests using a short scope, but it did not reset itself in any of the re-pull tests. In our 2001 tests, the 35-pound CQR also had trouble resetting, dragging 9 feet before digging in.

FISHERMEN TYPE

Testers tried a traditional fisherman's anchor. It only set in the sand and had a minimal holding capacity. Testers attributed this to its small size, though it was the same weight as the other test anchors. Although some claim that it holds well in weed bottoms, it did not set in our weed test bed. We presume it would need to be very heavy for this use, posing a stowage issue on smaller sailboats.

CONVEX WITHOUT ROLL BARS

We tested three convex anchors without roll bars: the Lewmar Delta, Anchor Right's Excel, and the Plastimo Kobra. All of these anchors are similar to the Canadian-made Kingston Quickset, which we previously tested. The Excel looks like the Delta but has a flatter profile and a much sharper toe (the leading edge of the fluke). Both the Delta and the Excel have flat soles (the bottom side of the flukes). All three have an upturned heel, which is the trailing edge of the fluke. The Kobra is similar to the Delta but has a protruding V-shaped sole and a curved shank.

All three anchors performed similarly, setting quickly. In the 90-degree veer tests, they swung but stayed mostly set and when loaded, they set further. The Kobra stood out in the 90-degree veer test: It remained well set throughout the turns.

During the 180-degree test, all of these anchors somersaulted and immediately reset. The Kobra set well and deeply. The downside to the Delta is that it does not dive or bury itself, and it has only half the holding capacity of a similarly sized Excel, according to other testing and manufacturer data.

All three anchors worked well in the sand, sand/clay, and mud seabeds. The Excel set the quickest. The Kobra set almost as fast, and the Delta was the slowest of the bunch, but it wasn't so slow as to be an issue. In the mud seabed test, all were easy to retrieve cleanly. Some mud collects where the heel bends, but this did not seem to impact performance. All three anchors were good all-around performers, consistent with the popularity of the convex design.

'SHALLOW' CONCAVE

We tested two shallow, concave anchors: the Spade and the Ultra. The latter is available only in stainless steel and is expensive. The two are uncannily similar in design: Both have protruding, v-shaped soles and a hollow shank, and they are only slightly concave with a heavily weighted toe.

Not surprisingly, their performances were also similar. Both set quickly and aggressively in the hard sand/clay seabed. Both turned without pulling out in the 90-degree veer tests, and both somersaulted in the 180-degree turn and immediately reset. They also have demonstrated high holding capacity, according to others' tests and manufacturer data.

There was a slight tendency for the Ultra to collect mud in the mud seabed. This seemed to indicate that there might be strong technical advantages to having a v-shaped sole, as those type of anchors tended to slide around in the 90-degree turn better than the others. This might be an effect of the sole profile shape or the fact that the center of gravity is so close to the toe.

Like the three convex anchors, the shallowly concave anchors were excellent all-around performers. They appeared to set slightly more quickly than the best of the convex, but it is unlikely an owner could tell the difference in real-world use.

BRUCE TYPE

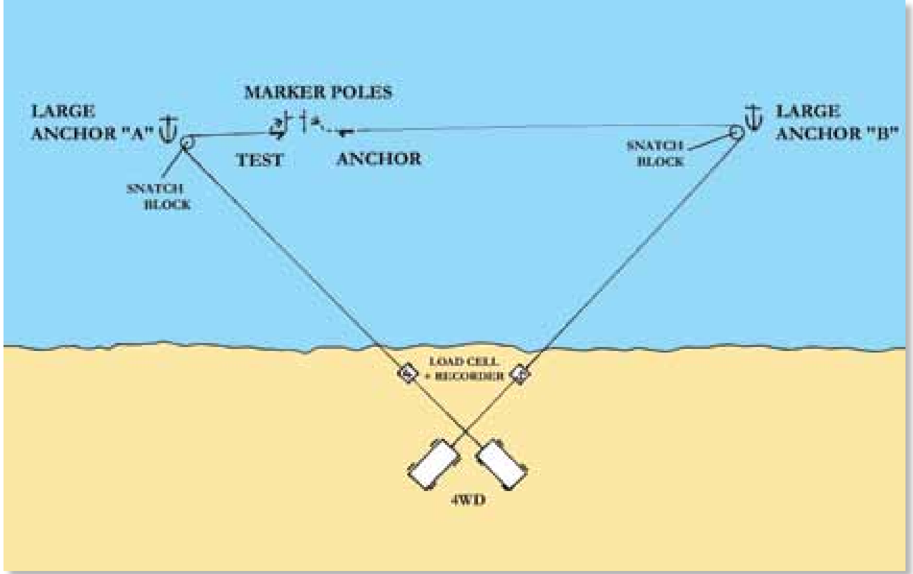
We tested two Bruce-type anchors: the Lewmar Claw and the Manson Ray. Both were defeated by the hard surface of the sand/clay seabed, as they simply skated over the surface without engaging. As we have reported in previous tests, seasoned users of this style of anchor say they work well in larger sizes (33 pounds or greater).

Testers were surprised by their success in the sand seabed. Both quickly set well and looked as if they would dive deeper. On one pull, the Claw pulled out and would not reset, but otherwise, both completed the 90-degree and 180-degree yaw tests satisfactorily. They tended to pull out and reset at 90 degrees, rather than slide around, but in the 180-degree test, they somersaulted and reset almost immediately.

In the mud seabed, both anchors scooped large amounts of mud, which might interfere with resetting in soft bottoms.

SLOTTED SHANK

We tested two slotted-shank anchors: Manson's Supreme and Anchor Right's SARCA. The slot is meant to make it easier to free a deep-diving anchor from the bottom. Neither slot engaged in the 90-degree turn, and both anchors performed as if they were unslotted. During the 180-degree turn tests, the slots worked perfectly: The anchors pulled out backward easily,



Blocks anchored offshore allowed testers to reverse the load direction from shore. A load cell was positioned between the shore winch and the turning blocks.

Testers Dig Deep and Get Wet

Anchors were tested three different ways in three different bottoms: from shore in hard sand/clay; from a boat in soft sand; and in a weed seabed, although the weed trials were stopped after only a few anchors were tested.

1. A 12.5-pound Spade digs into sand in 16 feet of water.
2. The CQR, shown here resting on its side, gave a lackluster performance.
3. The Lewmar Claw dug in quickly and reset quickly.
4. The SARCA set well, but testers found the slotted shank delayed resetting.
5. The Delta set and reset quickly, but did not dig in as deep as other anchors.
6. Bruce-like claws like the Manson Ray and the Lewmar Claw dragged during shoreside testing.
7. The Manson Supreme dug in quickly, even in weed.

but the distance taken for the shackle to re-engage at the shank end meant both anchors took much longer to reset than those that were not slotted.

The Supreme has both a shackle hole and a slot, so if you are anchoring in a tight anchorage and are expecting a wind shift, using the shackle hole may reduce the distance the anchor will drag before it resets. Anchor Right now supplies the SARCA with an optional Nyloc nut and bolt to close off the slot so that the shackle can be temporarily fixed in place.

During the 180-degree veer tests, we found that using the slot will cause an anchor to pull out before other anchors typically somersault or turn. In our tests of other anchors, a pull from an angle greater than 150 degrees from the centerline would cause the anchors to somersault, and—with a good anchor—reset. With a slotted shank anchor, any pull greater than 120 degrees will pull out, suggesting that the slot may help prevent a bent shank in extreme conditions.

When subjected to 150-degree loads, a well-set anchor will gradually slide around to the new direction; others tip over, pull out, and reset (though this sequence might be dependent on the rate of pull). In a tidal river with a moderate current, a normal anchor might remain set even though loaded "backward," but in both cases, a slotted anchor would more easily pull out before resetting. Unless you are setting in a bottom that might snag an anchor, the slotted shank feature seems less desirable in a veering scenario.

ROLL BAR

We tested three roll-bar anchors: Anchor Right's convex SARCA and two concave designs, a Rocna and Manson Supreme. We only tested the Rocna in the hard sand/clay seabed. All three anchors performed well in the 90-degree test, sliding around and moving a minimal distance.

In the sand seabed, all performed well in the 90-degree and 180-degree veer tests. The biggest surprise was in the 180-degree somersault in the sand/clay seabed. All anchors set well and quickly during the initial pull, but on somersaulting, both the Rocna and Supreme retained a clod of seabed in the fluke, dragged upside down, balanced on the embedded shank and the roll bar until the act of dragging dislodged the clod. Once cleaned, the anchor rolled over and engaged as normal.

The Supreme performed better than the Rocna. It's possible that the upturned heel of the Rocna allows greater compaction—and this slowed the "clean out." The Rocna and Supreme exhibited the worst resetting characteristics in the sand/clay seabed of any anchor tested, except the CQR. The anchors showed this tendency to scoop up and hold seabottom again in the mud seabed.

Another potential problem with these anchors is that if the anchor is dropped with the boat stationary, it is possible for the anchor to settle upright on its roll bar and fluke, allowing the chain to wrap around the vertical shank. When loaded, the anchor simply cannot set. This is likely a rare occurrence and easily avoided, but testers were able to snag one anchor this way.

OTHER OBSERVATIONS

Most anchors will turn or pull out, and slide around when the boat veers less than 150 degrees to the original set direction, even with a fairly sharp aggressive pull. However, beyond 150 degrees, they tend to somersault.

Well-set anchors need a fairly hefty pull to force them to move, even at 90 degrees. In such cases, a strong, sharp pull might result in a bent or broken shank before the anchor has time to move.

Even the best anchors can perform unpredictably. We have mentioned that on one occasion, the Lewmar Claw would not reset. We set a Spade in the sand/clay seabed, and when we pulled it 180 degrees, it dragged upside down for a considerable distance before resetting. We retested it two times in the sand/clay seabed, and it performed flawlessly; the unusual behavior never occurred again.

But was our testing realistic? Certainly, our anchors set and looked identical, when set, to real life. Our small Spade and Excel looked identical when set to our full-sized models that were set from the test catamaran. But did our testing—with fairly sharp pulls at 90 and 180 degrees—reproduce anything that nature throws at us?

Our experience in sitting at anchor in tidal rivers suggests that a sharp, sudden reverse in the direction of pull is much less likely than a gradual change in angle with a slowly increasing load. Still, it is highly likely that as load increases at 180 degrees, the anchor will eventually somersault and reset.

Moreover, we have sat in very tight anchorages under storm conditions and experienced very strong bullets, sufficient to lift water off the surface, coming from opposite directions to the prevailing wind. We have also sat as storm cells passed over and winds moved through 90 or 180 degrees with violent rapidity. Our test, therefore does replicate what we consider "real" scenarios.

However, we do believe that most vessels, when subjected to a normal frontal wind shift, will experience a slow change in wind direction, a few degrees at a time, and from our work, we think virtually all anchors in our test—except perhaps the CQR—will swivel, without pulling out, and simply re-orientate to the new wind direction.

CONCLUSIONS

The CQR has been a reliable performer, but evolving technology has brought better, cheaper, and more reliable anchors. A fisherman anchor might work well in weeds, but the size necessary for security does not seem to merit its usage. Pronounced concave anchors can carry mud in some seabeds (and presumably collect other detritus like rocks and seaweed), and this can seriously impact their performance—a problem that would be exacerbated in weedy seabeds.

Shaft tripping slots work well, but for normal use, they impose disadvantages as they take longer to reset when somersaulting. Unless the tripping slots will be needed for a quick exit or tricky bottom, it would be better to lock them off. The Bruce styles simply would not engage with our hard seabed but performed more than adequately in clean sand. They can carry substrate, though we were unable to test whether this would be disadvantageous to resetting. (They have no roll bar to compact anything they collect).

Anchors with v-shaped soles—the Spade, Ultra, and Kobra—performed best in the 90-degree veer tests. Whether it is the protruding sole or the fact that the center of gravity is closer to the toe is unresolved, but the protruding sole under these tests offers real technical advantages. Convex anchors are good all-around performers.

The fact that an anchor has high holding capacity is not indicative that it will perform well if subjected to a wind or tide change in all seabeds.

Finally, the fact that an anchor sets well and has the ability to cope with changes in wind and tide does not necessarily make that anchor a good anchor. We found that the higher holding-capacity anchors took greater loads to dislodge, as you might expect, and this means the shank is subjected to a load at an angle to its length (and it will be potentially vulnerable at 90 degrees). Ideally, a good anchor will set well and quickly, but also have the ability to reset quickly and be sufficiently robust to withstand any strain.

CONTACTS

SARCA, (03) 5968 5014,
www.anchorright.com.au

MANSON, +64 (0)9 835 0968,
www.manson-mainre.co.nz

LEWMAR, 203/458-6200
www.lewmar.com

NAVIMO USA, 941/360-1888,
www.navimousa.com

SPADE, 321/409-5714,
www.spadeanchorusa.com

KINGSTON, 613/549-2718,
www.kingstonanchors.com

ROCNA, 604/940-2010,
www.rocna.com

QUICKLINE, 604/940-2010**,**
www.quickline.us