

*A plough and an old fashioned 'fisherman's' anchor on the bow of a large cruising yacht. Fisherman's anchors are still the only anchors that can be used in areas of very high weed but their holding power is very low.*

Plough anchors work because they are heavy, and thus penetrate the seabed, and develop resistance – to dragging – by the compression of the seabed at the ends of the flukes.

However the flukes are 'streamlined' to allow the seabed to be shovelled aside and the shanks are usually thick (particularly drop-forged CQRs) and resist penetration. In tests the shank is seldom, or never, drawn below the seabed surface.

These anchors will work in a range of seabeds. They are often sufficiently strong that if caught in, say, coral they either break at the hinge or plough shank interface, or need to be abandoned.

The Delta is a good attempt at equalling the performance of the CQR but based on cheaper production methods. On a large number of tests conducted by completely unrelated testing panels, USA, UK, France, Germany, Holland, Australia, ploughs develop holding powers within the band of 26-60kgf per kg of anchor weight – crudely averaging, say 43kgf/kg. (This means that a 10kg CQR/Delta has a holding power of 430kg – a bit meaningless by itself but we are simply looking here at the relationship of holding power of each anchor grouping.)



*A typical Danforth copy, it looks like a Danforth but might differ, markedly, from the original design and has been sold with no specification. (Even \$10 T-shirts declare the raw materials from which they are made) Danforth anchors are seldom seen on bow rollers as they can catch stray ropes.*

Plate anchors can have phenomenal holding powers, particularly Fortress anchors but also some versions of the original Danforth, but unfortunately only work in softer seabeds, soft sands and muds.

These anchors perform because as the load is applied the anchors simply bury themselves (some people call them diving anchors), particularly if they have plate, as opposed to drop forged, shanks. They can continue to bury themselves to considerable depths, and can be difficult to extricate – say after a cyclone in a tropical muddy estuary.

In the right substrate holding powers of as high as 400kgf/kg have been recorded. These anchors can develop holding powers sufficiently high to only allow retrieval subsequent to deformation of the anchor. Ideally one might want to think of retrieval 'backwards' having buoyed the anchor in anticipation.

They tend not to be able to penetrate grassy or hard sands and shales and develop only poor holding power in areas of gravel and shell.

If you are wise and are carrying more than one anchor then a genuine Danforth or Fortress are a sensible choice as a second or third anchor, but do not buy one too small on the basis that its high holding power will compensate for low weight.

Scoops work by penetrating the seabed and compressing the seabed over the rear of the fluke.

The original Bruce had a relatively blunt toe and penetration could be problematic in harder seabeds and fluke strength was developed through weight of steel, so there was a tendency to have a low surface area to weight ratio.

The modern scoops, the Rocna and Manson Supreme are the most successful examples, have sharpened and strengthened toes and the roll bar ensures self righting and strength to the fluke plate. Unfortunately the roll bar resists penetration and the anchor never truly buries itself; in tests these anchors still leave their shanks visible. However, the design forces and compresses the seabed into the rear of the scoop and the anchor develops holding power through this 'developed' extra weight.



*A row of state-of-the-art yachts at the 2008 Sanctuary Cove Intl Boat Show boasting an anchor design developed from a 1933 model.*



*A very attractive stainless steel claw, Bruce type, anchor on a new motor launch. Low weight Claw/Bruce anchors will not set in some seabeds as they have blunt toes, and in this case too low a weight to penetrate.*

Holding powers from a number of unrelated tests (see the above country list) range from 62-91kgf/kg, again crudely averaging 77kgf/kg, almost twice the holding power of the ubiquitous ploughs! One downside to the mechanism of success for these anchors is that the compressed seabed does not fall off the anchor on retrieval and needs to be washed off, which is usually not a major problem (leave it hanging in the sea as you depart your anchorage). However, in weedy seabeds the compressed clod can become problematic and in the extreme can stop the anchor setting in the first place.



*The Rocna and Manson Supreme anchors are almost identical. The Supreme has a slot to ease retrieval but ROCNA have introduced the same device on some of their models.*

The Bruce had its limitations but the Rocna and Supreme work in a wider range of seabeds. Bruce anchors are no longer manufactured by Bruce and beware cheap copies. The Rocna and Supreme are too new to have 'enjoyed' being made by counterfeiters.

The outstanding performing anchors are the bent plates, the Spade is a weighted flattened scoop and the SARCA's weighted flattened ploughs.

The Spade and SARCA Excel have self-righting shanks and the Super SARCA a thin roll bar. These bent plates work by burying themselves (they are diving anchors), the thin roll bar of the Super SARCA does not overly retard penetration in the same way as the thicker roll bars of the scoops. The 'simple' bending of the plate allows the anchor manufacturer to develop the strength of the Delta and Rocna and the weighting of the sharpened toe and its strengthening allows rapid penetration.



*A Spade anchor on a Bulzen at the '07 Sydney Boat Show. The shank is bolted to the fluke which can be a weak point. These anchors have a very high reputation in Europe but are seldom seen in Australia.*

There is not the large range of testing of these anchors as for the previous anchors, certainly the newer SARCA's are too new, but independent UK testing is returning holding powers on the Spade 20% in excess of the Rocna and independent testing, witnessed by JL Robinsons (and ourselves), in Australia is returning crude averages after a multitude of tests in three different seabeds for the early model Super SARCA at 93kgf/kg and the, then developmental, SARCA Excel at 115kgf/kg. (In the same Australian tests, ploughs averaged 35kgf/kg and scoops 81kgf/kg – so in line with international testing and thus a reasonable basis for comparison.)



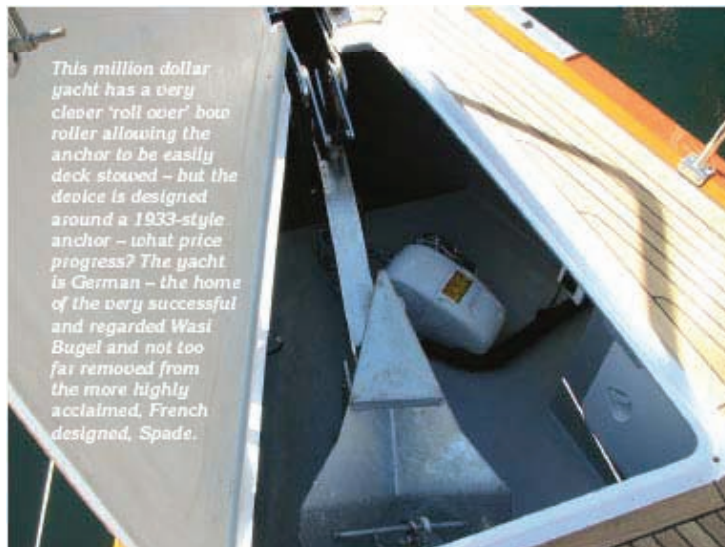
*SARCA anchors are used on some serious work vessels, so do not think your yacht is too big. These 2 x 145kg anchors on the Calypso Star have been a complete success reducing downtime through dragging and recommended for similar vessels working the Bass Strait oilfields.*

We understand these SARCA holding powers have now been exceeded by existing production models, again verified by independent testing. As these are diving anchors, and will drive deeper and deeper as long as the load is large enough, it might be necessary to buoy and retrieve backwards after use under storm or cyclone conditions. Again these anchors are too new to have enjoyed the attention of counterfeiters.



There is empirical evidence that the plates, scoops and bent plates can jam in some seabeds, eg corals, and that they can deform on retrieval.

Better a retrieved bent anchor than a lost one. You can beat a bent anchor into a semblance of the original form (desperation is the mother of improvisation) but having no anchor leaves you slightly vulnerable!



Recognising the loads that can be developed by these new anchors some manufacturers are using high strength bismuth steels in their construction – so check with your supplier as many anchors (and most copies) are simply cheap 'clog iron'.

The test data quoted is based on tests simulating pleasure boat anchoring conditions but there is no suggestion that an Excel is three times as good as a CQR – or that a 20kg Rocna is as good as a 40kg Delta. Frankly such a conclusion would be dangerous and nonsense.

However, there is no doubt from the test data and from our own, and other yachtsmen's experiences, that the newer anchors are much better – they set more quickly in a wider range of substrates and are more reliable and cost little in comparison to the asset and lives they secure.

There is also evidence that the newer anchors retain performance even with short scopes but I would still veer as much rode as possible, when required.

You can buy Asian copy anchors, and save a few hundred dollars, but ask for some performance/specification data before you part with your cash. There should be no question of buying a new yacht with a plough or Bruce type anchor again. In the fullness of time it might be possible to make better use of the test data, relating it to seabed type, yacht windage and expected wind strengths – in the meantime invest in the best anchor you can find.



*A stainless steel SARCA, they look very pretty and are said to set more quickly than the galvanised versions but cost a 'little' bit more. The SARCA has a slot to allow the anchor to be retrieved backwards.*

Refreshingly owners are demanding better anchors, so change might come from the grass roots (rather than industry who should have been providing leadership), and some builders are trialing the new anchors, for example Lightwave, Steber, Seawind and Riviera.

When buying one of these new anchors do not make the mistake of thinking higher holding power allows you to carry a really small anchor. The load your yacht can impose on a diving anchor can be such to drive a really small anchor well into the seabed making it difficult or impossible to retrieve. Equally an anchor too big might not allow the anchor to work to its full potential – the load might not be sufficient to allow it to dive. Recommended sizing takes all this into account.



A final note of caution, view with some scepticism some of the holding power data on anchor manufacturers or 'commercial' websites, if it is not underwritten by some form of independence it might be edited – after all they are selling anchors.

However, give them credit – they are at least trying. It is amazing that people are selling yachts with anchors that are based on a design over 70 years old and it is equally amazing that some anchor manufacturers sell their anchors (with glossy brochures – and at the boat shows, scantily clad young ladies – are we really that gullible?) with no performance data at all! Beware anchors, including shiny ones, for which there is no performance data – as maybe they have never been tested!

**\*Jonathan Neeves** *raced a 10m LDB but now sails Pittwater with his wife Josephine on board their Lightwave catamaran, Josepheline. Their cruising grounds were the Great Barrier Reef but for the last three years have found better sailing, and less crowds, in Tasmania. Jonathan previously wrote for Cruising Helmsman but now writes for the UK magazine*