

SPECIAL REPORT

YACHTING MONTHLY SEACOCK SAFETY CAMPAIGN

WHAT EVERY SAILOR NEEDS TO KNOW ABOUT SEACOCKS

Thousands of yachts, including new ones, are in danger of sinking, due to through-hull fittings made from brass rather than bronze. Yacht surveyor Paul Stevens, explains how confusion in some chandleries could put your boat at risk.

All boat builders used to fit high-quality bronze seacocks and skin fittings because cheaper brass fittings are known to fail, with potentially catastrophic results. Yet in recent years, some of the world's leading boat builders have been using ordinary brass fittings below the waterline. These typically consist of 40% zinc and are patently not suitable for use below the waterline. Equally worrying, many yachtsmen, due to lack of advice or good labelling, are buying replacement seacocks made of brass assuming they are buying bronze or DZR (dezincification resistant brass). As a yacht surveyor, I

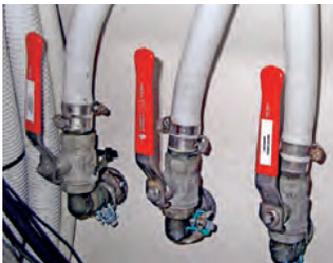
have seen hundreds of brass seacocks and associated fittings that are unfit for use in salt water, on a wide range of boats.

What's wrong with ordinary brass?

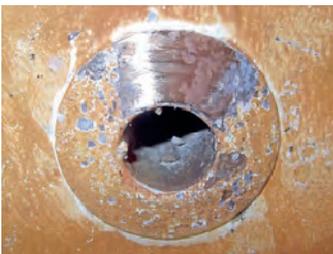
In salt water, brass – an alloy of copper and zinc – is prone to a form of corrosion called dezincification. Zinc is leached from the metal and the remaining copper shell becomes porous and fragile. The result is often referred to as the metal becoming 'carrot', due to its colour.

In the past, boat builders who used brass fittings were usually caught out and had to improve their specifications. But everything changed in 1998, when the European Community's Recreational Craft Directive (RCD) came into force. Where seacocks are concerned, it has made matters worse.

All boats must now conform to a wide range of compulsory ISO standards. The standard for metallic seacocks and through-hull fittings (ISO 9093-1) states: 'Materials used shall be corrosion-resistant...' But amazingly, the directive defines corrosion-resistant as: 'a material which, within a service time of five years, does not display any defect that will impair tightness, strength or function.'



1998 boat built to RCD with non-marine brass valves



2009 boat: through-hull already showing the pinkish spots of classic dezincification



Time to panic! So much electrolytic action that the plywood backing pad is disintegrating due to electrochemical decay

THE FOUR MAIN TYPES OF SEACOCK: PROS AND CONS

Traditional:

In common use for many years, this type has proved extremely reliable. It consists of a tapered, revolving hollow plug with an aperture in the side, located in a body with a matching taper. When the apertures are in line, the seacock is open. Manufactured by Blakes for decades, originally of bronze but of DZR in more recent years.

Pros:

- Instant visual indication of whether open or closed
- Only one moving part
- Supplied as an assembly, with fixing bolts made of material completely compatible with the seacock
- Very easy to dismantle for inspection and service

Cons:

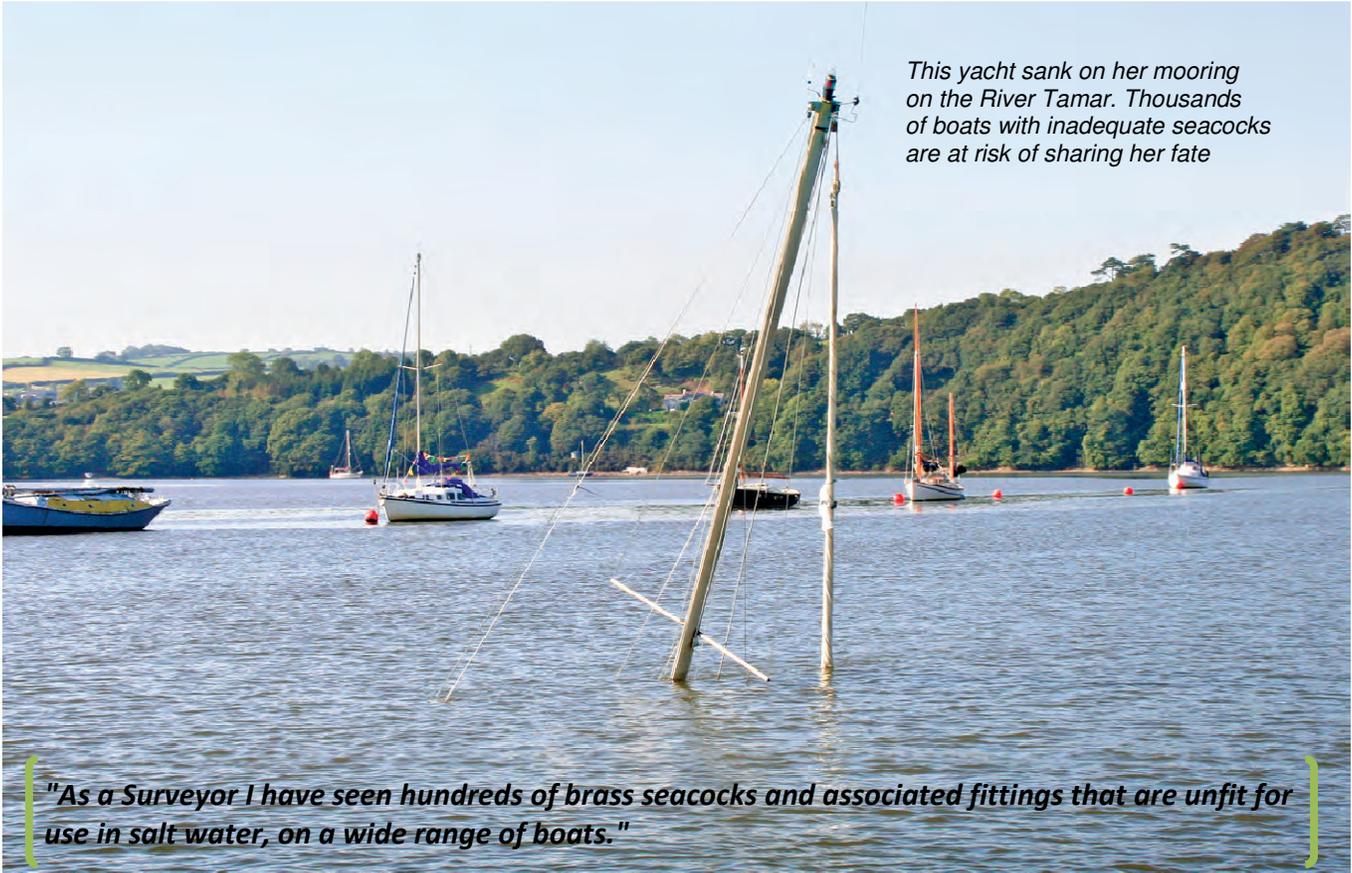
- More expensive than other types

Gate Valve Assembly:

This is a through-hull fitting with a gate valve and a hose tail fitting. They used to be quite widely used, but are no longer found on new boats. A gate valve is exactly what it says: a circular gate is screwed down into the body of the valve to close off the bore. Many older boats still have them. Provided good materials have been used, they will generally last well.



A decades-old bronze Blakes seacock: good for another 30 years or more



This yacht sank on her mooring on the River Tamar. Thousands of boats with inadequate seacocks are at risk of sharing her fate

"As a Surveyor I have seen hundreds of brass seacocks and associated fittings that are unfit for use in salt water, on a wide range of boats."



Many used boats have gate valves. This one is terminally corroded

Pros:

- None

Cons:

- Triple the risk of dodgy materials, because there are three separate components that are not usually supplied as an assembly
- Does not conform to the ISO standard, which requires a visual indicator as to whether the valve is open or closed
- More difficult to dismantle for inspection and servicing
- Prone to leaking, due to debris and scale building up in the bore and preventing full closure
- Gate valves have been made in their millions in ordinary brass and there is no mandatory marking scheme, so you may not be able to tell good ones from bad ones

Ball Valve Assembly:

Through-hull fitting with ball valve and hose tail fitting. This is in almost universal use in new boats. Ball valves have a rotating ball within the bore, with a hole right through it. When this is in line with the bore, the valve is open. Only a 45° turn is required to close it, which gives the required visual indication.

Pros:

- Easy and quick to operate, immediate visual indication
- Reliable and has a long life, provided that all the components in the assembly are made of corrosion-resistant materials such as bronze or DZR
- Less expensive than traditional seacocks, although the difference is not that significant when all three components are made of the appropriate materials

Cons:

- Requires quite a lot of space in the larger sizes as used for cockpit drains or heads discharge
- Millions made in ordinary brass
- No mandatory marking scheme, so you may not be able to tell good ones from bad ones

Prefer Plastic

Plastic seacocks are the choice of many long distance cruisers. The Marelon range made by Forespar, are glass reinforced DuPont Zytel.



Pros:

- Each assembly is sold as a unit
- Fittings made of the same material to cover every installation
- No galvanic or electrolytic corrosion – a big advantage
- Minimal maintenance
- High-quality, dedicated marine products

Cons:

- Not as fire-resistant as metal, thus not ideal for use in engine spaces and other areas with a fire risk
- More expensive than mass-produced, non-marine brass seacocks



Most modern boats have ball valves. This one needs replacing



Components are often sold loose. This chandler explains the difference



ABOVE: Packaging for ball valves, the DZR brass one is marked but the plain brass one is not

Five-year lifespan – or less!

Is a five-year service life acceptable for crucial below the-waterline fittings? If I were buying a yacht, whether new or second-hand, I would be very uncomfortable that such a vital fitting could fail and sink the boat after just five years. This is all the more unacceptable because we could be using other materials that are proven to have a life far in excess of five years. In 1980, a British Standards specification was issued for a new type of brass, designated CZ132, which was resistant to dezincification. This is now known as DZR (dezincification-resistant) brass and has the EN designation of CW602N. This material is proven to be the equal of bronze in a saltwater environment and is now in common use. Unfortunately, the other similarity it has with bronze is price. In the absence of any special circumstances, such as current leakage and associated electrolytic action, ordinary brass will probably last the prescribed five years. Brass is about a quarter the cost of bronze or DZR, so the decision to use it is being driven by cost.

Buyers face a lottery

The situation is even more difficult for yacht owners and yards replacing fittings as part of good preventative maintenance. The ball valve has become by far the most common type of seacock used and immediately the problem is multiplied, compared to traditional seacocks, because there are three components in the assembly: the through-hull fitting, the valve and the tailpipe to take the hose. These components may have been sourced from different suppliers and there is no mandatory requirement to mark them. Buying these can be a complete lottery. One well-stocked chandlery, Yachting Solutions, in Burnhamon-Crouch, Essex, sells the components loose, but the proprietor is knowledgeable and everything is properly marked. Bronze, DZR brass, and ordinary brass all have a natural gold colour and are virtually identical in appearance, so it's not surprising that there is confusion. Ball valves are sometimes plated and have a silver colour. I have not found any silver coloured valves that are claimed to be DZR or bronze.



An ordinary brass tailpipe found during the survey of a 10-year-old boat. It was so badly dezincified that the wall simply crumbled under a light tap. The tailpipe was on a cockpit drain always left open. Left like this,

Where these items are packaged, there is a tendency to clearly mark DZR and bronze items, but not to mark brass at all, with potentially disastrous consequences. I recently bought two tailpipes, as would be used on a typical heads discharge and presentation, apart from one little word – if it doesn't actually say 'bronze' or 'DZR', you must assume that it isn't.

'Tonval' spells danger

Brass is also marketed under the name Tonval. A few minutes searching the Internet will reveal mail-order chandlers describing this ordinary 60/40 brass as bronze. This is surprising, because recommendations were made to the industry as long ago as 2000 about this very subject in a Marine Accident Investigation Branch (MAIB) report on the flooding of a fishing boat, *Random Harvest*, due to the failure of Tonval brass fittings below the waterline.

The report should be essential reading for all yacht owners (see endnote). It is one of the best documents I have read concerning galvanic and electrolytic corrosion. It lists rates of corrosion for ordinary brass in seawater and, as a result, concludes that ordinary brass would not meet the RCD's five-year stipulation contained in ISO 9093-1, as I believe is being claimed in some quarters.

How to tell Good from bad

Buying the right skin fittings and tailpipes is absolutely essential, but what of the valves themselves?

The ball valve in the photo shown far left is a CW617N brass valve but it is not all it may seem.

The marking 'CW617N' is the European designation for ordinary brass with a high zinc content. Ball valves are made in their millions using this material, because they perform so well in freshwater plumbing and piping



Brass valve removed from packaging and turned over to show marking

systems but the material is not classed as dezincification-resistant and should not be used in salt water. To be fair, this ball valve has thick walls and may well last quite a few years if immersed in seawater. But experience suggests that if any electrolytic action is present – and with the proliferation of shore power supply, plus extensive onboard electrical systems, this is common – then the rate of dezincification is rapidly accelerated. That is exactly what nearly sunk *Random Harvest*, and it has also affected the brass ball valve pictured (inset right) The wall of the valve is badly dezincified and has just sheared off. Many boat owners believe the ball valves and associated components in their boats to be made of DZR or bronze, but, in fact, some are ordinary brass alloys – typically containing 40% zinc. The Copper Development Association has set up a UK scheme to mark genuine DZR valves with the designation 'CR' but this is not mandatory.

Inadequate labelling

Many suppliers' websites and packaging are clear in their description of materials but some are not. If you are replacing any of these vital below-the-waterline components, make absolutely sure you are getting the right ones. With such pressure on costs, the temptation to use cheaper components, which look identical, is strong. With underwater through-hull fittings, any risk should be avoided. Bronze or DZR should be the only choices for all metallic seacocks and associated components.

My colleague John Ross, of Malta Yacht Surveys, and I wrote to several major boat builders, asking how they could justify installing ordinary CW617N brass fittings in new boats. We received no response from the yacht builders, but a major motorboat builder, Sealine, offered the justification that they will last the five years prescribed in the RCD's ISO 9093-1 standard. But if you introduce other factors, such as electrolytic action, which accelerates the rate of dezincification, the weakening of brass fittings maybe very rapid indeed. The dezincification of brass alloys in salt water has been properly understood for some 90 years. So, in this enlightened age of advanced, mass-production boatbuilding, why on earth are we using an inferior material for such vital fittings below the waterline? If boat builders persist in fitting cheap brass ball valves and associated components, they should at least make the facts clear to their customers, who would then understand the importance of a regular inspection regime to avoid potential disaster.



What on earth are we doing using an inferior material for such vital fittings below the waterline?

The ISO standard is described as 'under review', so now may be the best chance for it to be improved. In the meantime, all yacht owners need proof of the materials used in their seacocks. Once installed, there is little or no chance of identifying the material.

Technical information

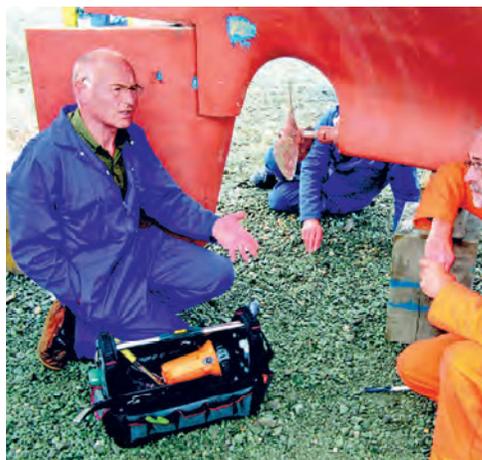
www.copperinfo.co.uk/alloys/brass/download/s/117/117-section-7-brasses-for-corrosionresistance.pdf

MAIB report

www.maib.gov.uk/publications/investigation_reports/2000/random_harvest.cfm



DZR brass ball valve with 'CR' (corrosion-resistant) marking



Paul Stevens

Paul, 58, is one of the UK's leading yacht surveyors and a lecturer at the world-renowned International Boatbuilding Training College at Lowestoft, Suffolk. A lifelong sailor, he has owned 24 yachts in the last three decades. His current boat is a Westerly 33 ketch.

LEFT: Paul Stevens (on left, in blue overalls) is a highly respected surveyor

