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Training Update March 2021

Corrosion in plumbing

Thanks to Allan Roukema for a suggested topic to discuss this month. He was particularly interested in pin holes but it would be wise to widen the scope somewhat as there are different types of corrosion that you might come across. The subject is extremely wide and therefore a simple 1 answer fits all issues is not possible.

We will take a very brief look at:

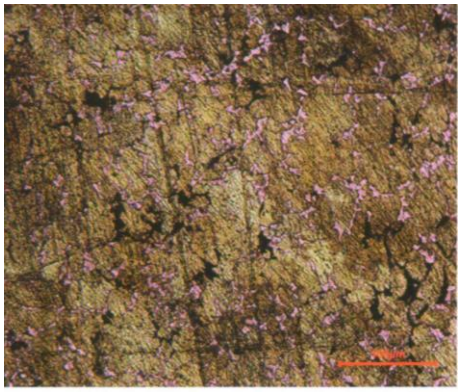
- Erosion corrosion
- Dezincification
- Pitting
- Under deposit corrosion

Figure 3 Erosion corrosion on hot water recirculating return pipe © P Munn

Erosion corrosion is caused by excessively high water velocity, turbulent flow results, especially where there are changes in direction or flow area. Small gas bubbles are created and as these collapse, the protective oxide layer on the metal is removed allowing corrosion. Particulate matter in the water will make this issue worse. Small shiny areas of copper are sometimes visible or horseshoe shaped depressions in the metal. If left unchecked, the metal can become paper thin and develop pinholes. This phenomenon can be avoided by ensuring water velocities are not excessive, below 2 m/sec is normally satisfactory unless the water is excessively soft or very hot.

Dezincification

Brass is essentially an alloy of copper and zinc, if a standard brass is used for plumbing fittings in water with a higher ion density the zinc will corrode out of the alloy. The highly enlarged image to the right shows the typical pink tell-tale sign of zinc corroding out of the alloy. In extreme cases, the metal becomes like meringue and can be crumbled in your hands – not ideal for a fixture holding pressurised water! G12 requires the use of dezincification resistant brass (DR) for all plumbing fittings. Apex use only DR brass in their plumbing products for this reason.



Pitting can be caused by the composition of hard water from certain sources. Type 1 pitting can result in pinhole leaks in either pipework or fittings. Any conditions that produce high levels of copper (I) chloride can lead to type 1 pitting

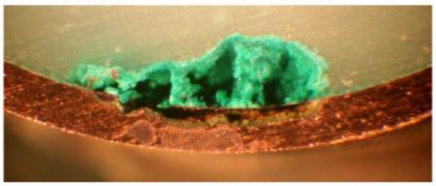


Figure 6 Cross-section through a Type 1 pit © P Munn

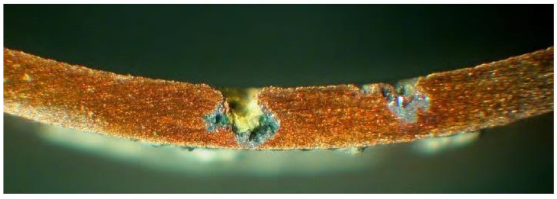


Figure 11 Cross-section through Type 2 pits © P Munn

For Type 2 pitting to occur, the water needs to be soft and over 60°C. The presence of Manganese increases the likelihood of the issue. The image to the left shows pitting that has corroded right through a copper pipe to form a pinhole.

Under deposit corrosion as the name implies occurs under a deposit. Under the deposit there is a difference in dissolved oxygen concentration and this sets up a local corrosion cell. Iron deposits can cause similar issues and we see this occasionally in relief valve bodies corroding a pit in the DR brass seat.