Firescale

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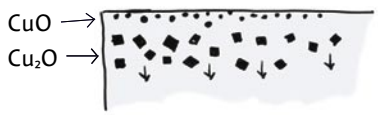
The Jeweler's Bane, firescale is an insidious deposit of cupric oxide that grows within the structure of some copper alloys such as sterling and low karat gold. It is also called Fire Coat, Fire Mark, Fire Stain, #*!!*!

What Happens

When copper-bearing alloys are heated in the presence of oxygen, oxides are quickly formed. Cuprous oxide (CuO) is a black surface layer that can usually be dissolved in pickle. Cupric oxide (Cu_2O) is a purplish compound that forms simultaneously within the metal. This is firescale.



Prevention

Strictly speaking, the only way to eliminate firescale is to heat the metal in an oxygen-free environment. This is the solution used in industry, but it is rarely appropriate for the craftsperson. By following these suggestions, however, it is possible to minimize the growth of firescale.

- Avoid prolonged heating—use a "hit and run" soldering technique.
- Use a big enough flame to get the job done efficiently. A small flame can cause rather than prevent firescale because it extends the soldering time.
- Use enough flux. Flux absorbs oxygen and prevents it from combining with copper. Flux will become saturated, so be sure you have enough.
- Do not overheat when soldering. There is no advantage to keeping the work hot after solder has flowed. Silver and gold alloys should never need to go above a medium red when soldering.

Bright Dipping

If firescale has formed, it can often be removed by dipping the work in a strong solution of nitric acid and water. After all soldering and rough finishing are done (but before stones are set), attach the piece to a wire and dunk it for only a few seconds into a 50/50 solution at room temperature. Firescale will turn dark gray. Rinse and scratchbrush. Repeat until the scale is gone, neutralize the piece in baking soda and water, then polish. Wear rubber gloves, protective clothing, and a respirator.

Depletion Gilding

A commercially popular solution is to electroplate a coating of oxide-free metal over an object to cover scale. This is especially good for work that is subject to little wear. In the studio, a process called depletion gilding can be used on sterling and karat golds to simulate this action without special equipment. Copper in the alloy is converted to copper oxide by heating, and this is then selectively removed in pickle. In essence, the alloys are broken apart, leaving a thin coating of pure silver or gold on the surface.

After all soldering and finishing is complete (but before patination or stonesetting) heat the work until a gray oxide forms and quench it in clean pickle. Repeat the procedure 3 to 5 times, rinsing in water and lightly scratchbrushing each time. Remember to protect yourself against splashing pickle.