

## ZX1 Copper corrosion test conducted at Sheffield University April 2010

Four samples of varying grades of copper were used to test the corrosive nature of Extralube ZX1. The specimens ultrasonically cleaned in 10% hydrochloric acid and then neutralised with sodium bicarbonate, followed by an ultrasonic cleaning process in acetone.



(a) (b) (c) (d)

The photographs above show the four copper components used after cleaning. (a) a ring from a copper pipe, (b) a section from a thicker copper pipe, (c) a thin section of copper wire and (d) the tip from a welding torch.

The specimen were weighed and then submersed in 100ml of Halfords 15W40 enhanced mineral motor oil for 5 hours at 100 deg C. The specimens were removed from the fluid, wiped dry, cleaned in acetone to remove all traces of oil, photographed and weighed again.



The test was then repeated using 95ml of Halfords 15W40 and 5ml of Extralube ZX1 using the same testing conditions. The specimens were then removed, dried, cleaned in acetone, photographed and re-weighed.



## Results

	Weight of component (g)			
	Ring	Pipe	Wire	Welding Tip
<b>Initial Weight</b>	4.48825	5.41948	3.28653	10.49776
<b>After heating in oil</b>	4.48831	5.42223	3.32062	10.51113
<b>After heating in oil and ZX1</b>	4.48837	5.42291	3.34642	10.51236

It can be seen that in every case, the heating of the copper in pure oil and in the ZX1-oil mixture leaves a deposit of the lubricant components on the surface of the copper resulting in a slight increase in mass. This natural reaction will have been accelerated as the copper had no oxide layer at the beginning of the test. The resulting copper components can be seen in the following images, note the lack of shine that was evident in the initial images. It can be seen that oxidation has taken place, but no reduction. It is therefore possible to state that ZX1 is non-corrosive under the prescribed conditions.

