SafeMark™ Information Sheet

Laboratory Testing of SafeMark™ Pipemarkers

Strategic Corrosion Management supply semi-flexible pipe markers to be wrapped around pipes for identification purposes. The markers, called **SafeMark™**, are made from a transparent UPVC material, colour coded by the addition of high-grade printing inks, generally carrying a legend appropriate to the contents of the pipe printed onto the inner surface of the marker. Additional safety information is also sometimes printed onto the marker.

Laboratory tests have also been performed to investigate the performance characteristics of the materials used. All laboratory testing has been performed and/or supervised by an independent test laboratory.

Temperature & Humidity Tests

Tests were performed at 55ºC and in saturation humidity to determine whether crevice corrosion was likely when **SafeMark™** products were fitted to stainless steel pipes. At the conclusion of the test period, silver nitrate was used to test for the presence of chlorides in the moisture located under the leading edges of the strips of pipemarker. In all cases, no chlorides were found to be present.

Stability in Exposure to Ultra-Violet light

Tests were performed to compare accelerated testing results with field experience, and to establish likely performance criteria for the UPVC materials. In extended, simulated weathering tests, the UPVC materials had not deteriorated in any way after exposure equivalent to 3 years. In specific Ultra-Violet testing, using a total radiation intensity of 1010 micro-watts per square centimetre, no deterioration was observed after 10 weeks of exposure (1680 hours).

Immersion Testing

Immersion testing was performed to investigate whether chloride ions might leach from either the UPVC base material or the printing inks used. Pieces cut from pipe markers were placed into separate flasks with analytical grade water, sealed to prevent evaporation, and then submerged in a water bath and maintained at a temperature of 55ºC for 28 days. A slight pH change was observed in the analytical water, but no detectable level or chloride ions was observed.

During immersion testing, it was noted that the **SafeMark™** UPVC material developed some opacity. The effect appeared to be permanent, and did not disappear when the samples were allowed to dry. The effect was limited to a milky, cloudy appearance, and coloured samples could still be easily distinguished, and printed legends could easily be read. The same effect could be created by immersing the material into hot water (80ºC) for a few seconds, but once again the colours and legends were easily distinguished.

Flammability

Comparative tests were performed to examine the behaviour of the **SafeMark™** material (and some alternative marking materials) when exposed to a naked flame. Self-adhesive materials, once ignited, continued to burn aggressively until destroyed. Some black smoke and fumes were released during the burning process. **SafeMark™** UPVC material charred and generated some smoke and fumes, but did not support combustion when the source of ignition was removed.

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Conclusions

Based on Laboratory Test results, the following conclusions can be made;

1. Crevice Corrosion of austenitic stainless steel could not be induced by simulated testing. It is our opinion that crevice corrosion will not be induced by the fitting of **SafeMark™** markers to austenitic stainless steel pipes

2. The risk of localised corrosion occurring when pipe markers (or any other wrapping material) are used on uncoated austenitic stainless pipes, at least up to the 316 grade, cannot be totally ignored. Corrosion is unlikely, however, to derive from the influence of the SafeMark material. The application of **SafeMark™** pipemarkers to stainless steel pipe is not likely to create or significantly increase the risk of corrosion.

3. Under warm humid conditions, some opacity may develop in the pipe marker materials, and the change may be permanent. In all testing, however, the legends and colours could still be discerned without difficulty.

4. The stability of the pipe marker materials in continuous ultra-violet radiation appears to be good.

5. Pipe marker materials may absorb small amounts of water in immersion or high humidity environments, without apparent detriment to functionality.

6. Pipe marker materials and/or printing inks may induce small changes in the measured pH of the immediate environment; the resulting pH change is likely to be less that one point on the pH scale, and within the range 6 to 8, and are unlikely to produce significant corrosion effects.

7. Specific testing for chloride ions within the pipe marker materials or printing inks has determined that no detectable quantity of chloride ions is released during hot water immersion testing. It can be concluded that exposure at normal ambient temperatures will not lead to any detectable chloride contamination.

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