

Metal Deactivation Study

Latest research shows Metal Deactivation (MD) additives improve PEX tubing properties for potable water applications.

In PEX tubing systems, contact with brass or copper alloy fittings is a concern, as the use of these fittings is standard for the installation of PEX plumbing systems.

In the presence of metal such as copper and brass, there is a chemical reaction that takes place that results in the degradation of the physical properties of unprotected PEX tubing.

Metal deactivators bond available metal ions to prevent the catalysation of oxidative degradation.

Test Procedures:

Samples were extruded and exposed to 115°C (239°F) potable water from 0 to 28 days and then exposed to air at 150°C (302°F).

Test Samples	Description
Sample 1	TA 1108 HD + TA 2125 HD (natural, includes MD)
Sample 2	TA 1108 HD + TA 2125 HD (natural, includes MD) + 0.05% copper powder
Sample 3	TA 1108 HD + TA 2125 HD (natural, without MD)
Sample 4	TA 1108 HD + TA 2125 HD (natural, without MD) + 0.05% copper powder

Test Results:

Colour changes of the test samples after 14 days in hot water at 115 °C (239°F) are most pronounced with samples 3 and 4, which do not contain any MD in the formulation, this being most severe with the presence of copper powder in the material.

Oxidation induction period (OIP) values decrease exponentially with the time exposed to hot water. The most severe decrease was found in the case of sample 4, containing copper and no MD. A severe decrease was also found with the corresponding sample 3 without copper, showing that drinking water itself may exert some catalytic degradation effects, which must be eliminated by the action of metal deactivator.

OIP testing at 150°C (302°F) demonstrated that sample 4 containing copper and no MD has most quickly lost the oxidation stability both in hot air as well as in hot water contact. Positive effects of MD in comparison with this sample was again confirmed.

Different MD additives were also tested and the generated data reveals significant variations in the effectiveness of the additives.

Source: Polymer Institute Brno (PIB), November, 2005. The complete report is available upon request.

Oxidation induction period (OIP) at 150°C after hot water exposure at 115°C

