Plastic Failure LABS

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Failure Analysis of PEX Pipe

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Introduction

PEX piping is preferred by plumbers for potable water in new home construction due to its ease of installation. PEX is a highly ductile material and the piping is ductile/flexible so that it can be installed with gradual radius/bend. However, all polyolefin materials, including PEX, are susceptible to oxidative degradation and therefore PEX must be chemically stabilized in order for it to remain ductile for several decades of use. PEX should be manufactured to meet ASTM F876 and F877 which requires that the piping be resistant to oxidative degradation upon exposure to chlorinated water as determined following ASTM F2023. For PEX to meet ASTM F876 and 877, the PEX material must be stabilized by the addition of additives to counteract the degrading effects of chlorinated water on the material. Failure to stabilize PEX will allow the chlorinated water to chemically degrade the PEX material causing the normally ductile material to turn brittle.

Results of Failure Analysis

A sample of failed blue PEX pipe was submitted for forensic failure analysis to determine the root cause of failure. The sample of pipe had a visible crack on the outside surface on the convex side of a bent pipe (Figure 1). The leak location is shown in Figure 2.

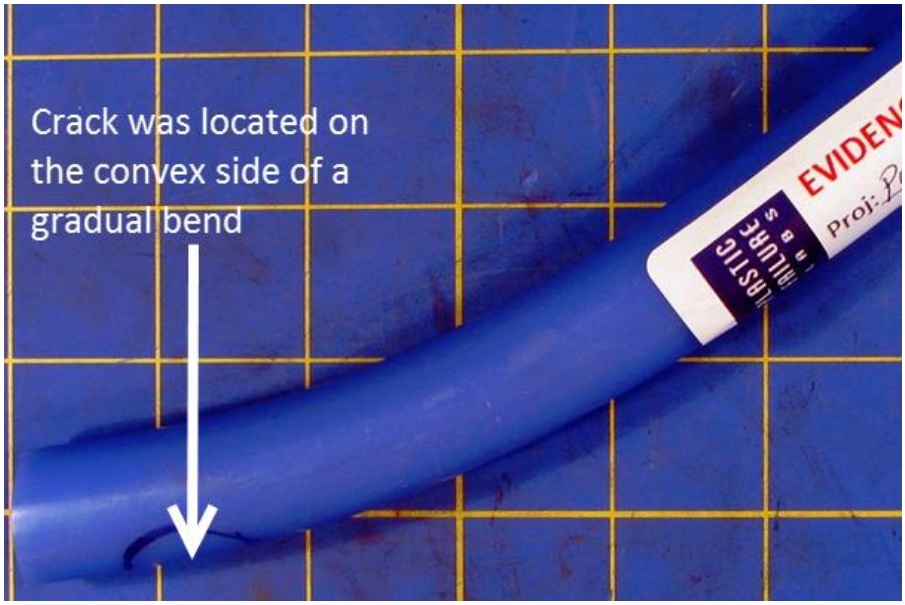

Figure 1. The pipe sample in its as received condition. Yellow grid is 1".

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