



Failure Analysis of a Glass Filled Threaded Valve

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Executive Summary

A valve failed on the molding weld-line because of hoop stress from the threaded connection. The lack of glass fiber reinforcement across the weld-line due to orientation results in a weak location for the failure to occur. The tee failed on the molding weld-line, because of hoop stress from a fitting that was threaded in until bottom contact (over tightened). The lack of glass fiber reinforcement across the weld-line due to orientation, and poor adhesion of the fiber to the Nylon resin resulted in a weak location for the failure to occur. The quality of the melt fusing at the weld-line is questionable. In general, inside tapered pipe threads are a poor choice for thermoplastic materials as the joint relies on a tight fit between the threads to create a seal. The result is a significant amount of hoop stress on the fitting from tightening the male thread. Straight threads with a gasket seal or external threads are the better choice. If inside pipe threads are necessary, increases in wall thickness or metal reinforcement bands are potential remedies to consider.

Experimental

Specimen Preparation

The valve and tee samples were prepared for examination by cutting the affected areas with a band saw to enable access to the fracture surfaces. Optical examination was done without further preparation. Areas of interest from the fracture surfaces of the valve and tee were cut