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Case Summaries

Water Heater Connector Failures: An Engineering Assessment of Cause

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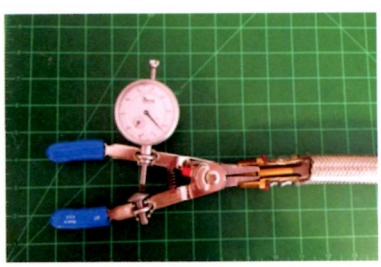
U.S. Forensic engineers undertook a project to investigate a large number of braided stainless steel water heater connector failures for one of the largest property carriers in the country.

The evaluation and testing occurred at the U.S. Forensic engineering and testing laboratory where engineers utilized a customized durometer to test the hardness of the internal plastic tubing of the connectors and an articulating borescope to photograph any interior damage of the failed lines. Michael DeHarde, P.E. and Brian Darr, P.E. worked on the project to determine the cause of the leaks associated with the braided stainless steel brand water heater connectors commonly sold at the major big box hardware centers.

Photograph 1 shows the custom made durometer and cross sectioned exemplar connector.



The process involved testing the internal hardness of the connectors using the customized durometer. The device was first tested in an exemplar connector. Then, the interior and exterior of each hose was visually inspected and photographed to document what was present in and on the hose upon receipt. Next, each connector was tested to confirm a leak existed in the connector. The location and cause of the leak was observed and then photographed internally using a high end articulating borescope to document the failure region.

After analyzing multiple connectors of differing sizes, the findings were consistent. Various opinions abound on-line theorizing that the cause of the leak of this particular manufacturer's water heater connector was associated with a poor connection associated with the fittings. However, U.S. Forensic, through their testing, revealed that the leaks were present within the

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inner plastic tubes and were the result of the inner plastic tubes prematurely decomposing and flaking apart. This material defect led to a breach of the internal wall which caused the water release and the resultant damages at the various properties across the country. Additional information regarding the materials used and the manufacturing process received will provide insight as to the chemical process involved in the decomposing process and the root cause of the defective product.

Photograph 2: Exterior view of braided stainless steel water heater connector.

Photograph 3: Internal borescope image revealing the decomposition of the interior plastic tubing.