APPLIED TECHNICAL SERVICES, INCORPORATED ISO 9001

1190 Atlanta Industrial Drive, Marietta, Georgia 30066 • (770) 423-1400 Fax (770) 424-6415

EVALUATION OF TAPE REPAIR OF AN AUTOMOTIVE COOLING HOSE

ATS JOB # D55612

PURCHASE ORDER # TBA

Prepared for

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MATERIALS TEST REPORT

Purchase Order TBA

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Subject

Determining the ability to field repair an automotive cooling hose using customer provided tape.

Material

1 inch wide plastic tape

Objective and Background

To situate a section of automotive cooling hose in a manner that simulates a failure under operating conditions and to then repair the failure with the customer provided tape and to test the repair.

Test Procedure and Results

A section of automotive cooling hose was obtained from a local parts store. The hose was plugged at one end and the opposite end was fitted to allow the addition of coolant and to enable pressure adjustment and monitoring (Figure 1). This assembly was filled with a 50% water-antifreeze mixture. A utility hose was connected and the entire assembly was placed in an environmental chamber where the temperature was raised to 299.5° F (148.6° C). After reaching the desired temperature a hole was cut into the hose to simulate a typical failure (Figure 2).

A repair was made on the hole using the provided tape by the following application method: A 66 inch long section of the tape was stretched to 5/8 inch width and applied in 3 layers over a 3 inch run centered on the leak. Each lap was applied in half width (5/16 inch) overlaps. An 18 inch section was then stretched to 7/8 inch width and applied in 1 layer over the total 3 inch area. This final layer was also applied in half width (7/16 inch) overlaps (Figure 3).

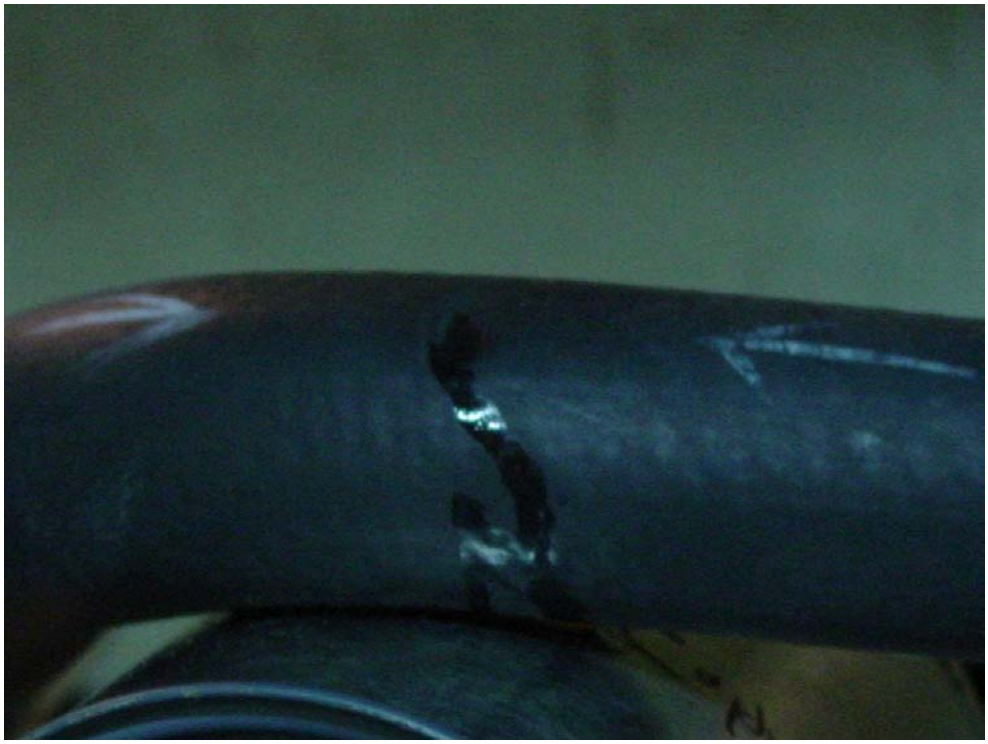
The environmental chamber was then closed, and the temperature raised to 299.5° F (148.6° C) (Figures 4 through 6). The test article was then subjected to the following pressures as prescribed by the customer:

- 10 psi for 5 minutes
- 20 psi for 7 minutes
- 28 psi for 49 minutes
- 32 psi for 11 minutes
- 40 psi for 2 minutes
- 50 psi for 2 minutes
- 60 psi for 2 minutes
- 70 psi for 2 minutes
- 80 psi for 2 minutes

This marked the end of the test.

Discussion and Conclusions

As 80 psi was approached the hose began to expand greatly while the repair remained virtually unchanged. The tape performed satisfactorily under pressures and temperatures well beyond that which is encountered in automotive cooling systems.



Close up showing hole in rad hose.

“Failure” repaired by tape under test.

Tape wrapped over hose as seen through the test chamber.

Test Chamber and test setup showing positive displacement pump and pressure gauge. Note: tape seal can be vaguely seen wrapped over hose.

Chamber Temperature (◦C)

Chamber Pressure (PSI) for first hour of test