



Tire Sealant Performance Test with Object Removed from Tire

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. To validate that the Tire Sealant Compressor Kit (TSCK) can seal a specified tire puncture with the puncturing object removed from the tire, and maintain its seal for a defined time while exposed to the operational temperature range.

1.2 Applicability. This test applies to all vehicles with TSCK.

1.3 Remarks.

1.3.1 Test written as a full vehicle level test but may be modified into a lab test upon written authorization from GM Product Engineering or Validation Engineering (Design Responsible Engineer (DRE) or equivalent).

1.3.2 May have to be performed as a road test since the objects removed from the tire may damage the dynamometer.

1.3.3 Sealant Performance Test may be performed immediately following GMW15771 or as a standalone test.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15771

3 Resources

3.1 Facilities. Entire test shall be performed in climate controlled chamber with a dynamometer at specified temperature.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Stopwatch.

3.2.2 Certified Pressure Gauge.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Vehicle. Any vehicle from the associated program/platform is acceptable to use.

3.3.2 Test Piece.

3.3.2.1 In the event of multiple tire size releases, the largest tire relative to width and radius shall be selected for testing.

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3.3.2.2 In the event of multiple tire types, the worst case shall be selected for testing by GM Product Engineering and Validation Engineering.

3.3.2.3 Production Tire Performance Criteria (TPC) specification tires from the production manufacturer shall be tested (or written authorization from GM Product Engineering, DRE or equivalent if unavailable).

3.3.2.4 Outside tread area (e.g., high, mid, low, etc.)

3.3.2.5 Production Tire Pressure Monitor (TPM) sensor/valve stem.

3.3.2.6 Wheel must be approved by Tire and Rim Association (T&RA) or the European Tire and Rim Technical Organization (ETRTO), rim contour for the production size tire.

3.3.2.7 Production tire inner liner materials shall be used.

3.3.2.8 Current production sealant.

3.3.2.9 Artificial Aging.

Full life (5 years) = 55 days exposure at 70 °C.

Half life (5 years) = 27.5 days exposure at 70 °C.

3.4 Test Time.

Calendar time: 4 d

Test time: 72 h

Coordination time: 24 h

3.5 Test Required Information. See Data Sheet A1, Appendix A. The supplier shall work with the GM Lead Engineer to comprehend these requirements.

3.6 Personnel/Skills. Personnel familiar with climate controlled chamber, dynamometer and TSCK operation is required.

4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions.

4.2.1 Environmental Conditions. Testing shall be performed at -30 °C, 23 °C, and 70 °C.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Preconditioning Applies only if performing as a standalone test and not subsequent to the Compressor Performance Test.

4.3.1.1 Soak the test tires and TSCK at specified test temperature for minimum of 4 h in a climate controlled chamber.

4.3.1.2 Remove test tire from climate controlled chamber.

4.3.1.3 Adjust test tires to placard pressure.

4.3.1.4 Puncture the outboard circumferential groove of the tread area of the tire with a 6 mm diameter spike at ambient temperature. Puncture shall be positioned at 12 o'clock. The valve stem shall be positioned at 6 o'clock.

4.3.1.5 Puncturing object shall be removed from the tire for testing.

4.3.1.6 Record puncture air loss from placard pressure to 0 kPa (0 psi) (pressure vs. time) in 20 s increments using a stop watch and calibrated pressure gauge.

4.3.1.7 Mark the puncture on the tire sidewall with a paint pen for later reference.

4.3.1.8 Mark each tire with an identification number for tracking and report purposes, enabling a plot of pressure vs. time that can be matched to its corresponding tire.

4.3.1.9 Conduct test per 4.3.2

4.3.1.10 Repeat preceding steps for each test tire (six (6) tires per temperature).

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Documents
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4.3.1.11 Submit air loss rates, plots of pressure vs. time (P, t), and raw data for each tire with test report. See Appendix B, Figure B1 for sample graph.

4.3.2 Procedure.

4.3.2.1 Standalone Test (not subsequent to the Compressor Performance Test GMW15771).

4.3.2.1.1 Mount test tire onto vehicle.

4.3.2.1.2 Position tire valve stem at the 6 o'clock (puncture should be at 12 o'clock).

4.3.2.1.3 Record test tire and TSCK identification numbers.

4.3.2.1.4 Start the vehicle.

4.3.2.1.5 Unwrap the sealant hose, air hose, and electrical cord and evaluate for flexibility.

4.3.2.1.6 Connect the sealant hose to the tire valve stem and the power plug to the vehicle's auxiliary power outlet.

4.3.2.1.7 Inflate the test tire to placard pressure.

4.3.2.1.8 Turn off compressor when the TSCK pressure gage reads placard pressure and allow the gage to settle to the static pressure.

4.3.2.1.9 Repeat the previous two (2) steps until the static TSCK gage reading is at placard pressure.

4.3.2.1.10 Record tire pressure with a certified gage.

4.3.2.2 Start Sealant Performance Test at this point if immediately following GMW15771 (or continue from previous steps if test was run as standalone).

4.3.2.2.1 Drive the vehicle for 8 km (5 mi) at 40 km/h (25 mph).

4.3.2.2.2 Stop the vehicle.

4.3.2.2.3 Record the tire pressure using a certified pressure gage.

4.3.2.2.4 Connect the TSCK air only hose to the tire valve and record the tire pressure.

4.3.2.2.5 If the tire pressure has fallen below placard pressure, then use the TSCK to inflate the tire to placard pressure (static TSCK pressure gage reading shall read placard pressure).

If the tire pressure has risen above placard pressure, then proceed to the next step.

4.3.2.2.6 Apply leak detector solution (water and soap solution can be used as a replacement) to punctured area of the tire and record observation

4.3.2.2.7 Record whether there is an audible air leak from the puncture.

4.3.2.2.8 Dismount test tire from the vehicle.

4.3.2.2.9 Store tire in vehicle position with the puncture positioned at 12 o'clock off to the side in the climate controlled chamber.

4.3.2.2.10 Soak in the climate controlled chamber for 24 h.

4.3.2.2.11 Record final tire pressure using certified pressure gage.

4.3.2.2.12 Apply leak detector solution (water and soap solution can be used as a replacement) to punctured area of the tire and record observation

4.3.2.2.13 Record whether there is an audible air leak from the puncture.

5 Data

5.1 Calculations. Not applicable

5.2 Interpretation of Results.

5.2.1 Tire puncture shall seal within the specified pressure loss requirement.

5.2.2 Tire shall not lose more than the specified pressure over allotted time.

5.2.3 Tire puncture shall seal at specified speed and distance.

5.3 Test Documentation.

5.3.1 See Appendix A, Data Sheet A1.

5.3.2 Plot of air loss (see Appendix B, Figure B1).

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