SAE INTERNATIONAL

SURFACE VEHICLE RECOMMENDED PRACTICE

J2790™ AUG2021

Issued 2007-06
Revised 2021-08

Superseding J2790 FEB2010

Test Method for Evaluating the Electrical Resistance of Coolant System Hose Covers

RATIONALE

Minor revisions.

1. SCOPE

This test method provides a standardized procedure for evaluating the electrical resistance of automotive coolant hose covers. It is known that an electrical potential exists between the engine and the radiator. Coolant hose cover conductivity has been determined to be a factor to reduce hose clamp life when vehicle build variations allow possible contact of the hose or the clamp to metal components on the radiator and engine thus completing an electrical circuit. The ensuing electrical current can undercut the clamp protective coating, leaving it vulnerable to the corrosive effects of road salts, moisture, and other environmental contaminants. SAE Recommended Practice J1684 addresses the electrochemical resistance of the tube portion of the coolant hose.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1684 Test Method for Evaluating the Electrochemical Resistance of Coolant System Hoses and Materials

2.1.2 ISO Publications

Copies these documents are available online at http://webstore.ansi.org/.

ISO 17025 General Requirements for the Competence of Testing and Calibration Laboratories

2.1.3 Unified Numbering System (UNS)

Information on UNS S4300 can be found on website http://www.ssina.com/publications/primer.html.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/J2790_202108

2.1.4 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E177 Standard Practice for Use of the Terms Precision and Bias in ASTM Test Methods.

3. TERMINOLOGY AND ACRONYMS

DC	Direct current
ISO	International Standards Organization
UNS	Unified Numbering System
Voltage Sense	Measurement of a voltage drop between two electrodes
Current Source	A power supply that provides constant current to the test set-up
Source/Measurement Device	A combination power source and measurement device (in this document, it relates to sourcing current and measuring a voltage drop across a designated distance)

4. SAFETY

The foregoing test procedure involves use of potentially dangerous DC electrical voltage. The user of this procedure shall consult the manual for the test equipment being used, its manufacturer, and/or other pertinent documents as to the safe handling of electrical equipment used to conduct this test procedure. The user of this test procedure shall be solely responsible for understanding and following all safety guidelines of this test procedure and those of the manufacturers of the electrical equipment.

It is recommended the users of this test procedure electrically insulate the test hose set-up, such as by constructing a clear plastic box to house the test hose set-up. This box should have grounded interlocks in the event that access doors/panels are opened for any reason.

SAE, and members of the Non-Hydraulic Hose Committee, shall not be held liable for any accidents causing injuries or death due to inappropriate or improper manipulation of electrical generating/discharge equipment, or failure to follow the procedures set forth in this test method and the safety guidelines of the equipment manufactures whose equipment was used.

5. METHOD

5.1 Materials and Equipment

5.1.1 Source/measurement device[1] with the following capabilities: Voltage range 200 mV to 200 VDC, current range 1 µA to 1 A, and resistance measurement of 0.2 Ω to 200 MΩ. Tolerance ranges shall be as specified by the literature of the equipment referenced in footnote 1.

5.1.2 Two 9 mm wide non-perforated stainless steel screw clamps[2] and two 0.57 mm copper or brass blades for contact sensing with a weight (pressure).

5.1.3 Two sets (two wires per set) of leads with shrouded banana jacks on each end, and four alligator clips.

5.1.4 Hand torque wrench suitable for the torque being applied to the clamps in 5.3.

5.1.5 Plugs per SAE J1684, sized to fit snug in ends of test hose.

---

[1] Keithley Model 2400 source meter, Yojogawa GS610 source measure unit, or equivalent.
[2] Stainless steel per UNS S43000.

5.1.6 130 mm straight hose sample(s).

5.1.7 Non-conductive test surface large enough to support the test sample, plastic containment box, and the source/measuring device.

5.2 Hose Pre-Conditioning

5.2.1 Sample Cleaning

Samples shall be cleaned by rubbing with aluminum magnesium silicate (“Fuller’s earth”) and water. The surface shall be flushed thoroughly with distilled/deionized water. The surfaces should not be abraded or buffed.

5.2.2 Drying and Equilibration

Sample shall be placed in a hot air oven at 70 °C for 2 hours, then allowed to equilibrate at 23 °C ± 2 °C and 50% ± 10% relative humidity for at least 16 hours.

5.3 Procedure - Source Current

5.3.1 Insert plug in each end of the test hose.

5.3.2 Attach the two outboard clamps 12 mm ± 6 mm (approximately) from each end of the hose. Torque outboard clamps to 3 N·m.

5.3.3 Locate source blades 27.5 mm ± 6 mm from the outboard edge of each clamp and 50 mm from each other. (The 50 mm between the blades is a critical dimension and it is recommended to mount blades on non-conductive plastic base to maintain this spacing.) Place a 600 g weight on hose to provide a consistent firm contact with the hose. Weight shall not come in contact with clamps or brass electrodes.

5.3.4 Place hose/clamp assembly into plastic interlock box.

5.3.5 Set the source/measurement device to read ohms.

5.3.6 Set the source/measurement device to four-wire.

5.3.7 Note: See Figure 1 to verify proper attachments. For clarity, Figure 1 has generic labels. Current source HI and Current source LO in the figure represent input/output HI and input/output LO labels for the instrument referenced in footnote 1. For clarity, Figure 1 is also labeled voltage sense HI and voltage sense LO, which represent sense HI and sense LO labels for the instruments referenced in footnote 1.