SAE International

SURFACE VEHICLE RECOMMENDED PRACTICE

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Superseding J1873 JUL2003

Moisture Transmission Test Procedure - Hydraulic Brake Hose Assemblies

RATIONALE

Sections 2.1.1 and 4 of this specification have been updated to create a reference to SAE J1703 and J1704 where previous revisions listed the referee brake fluid formulation for DOT 3 fluid only. The industry is trending towards use of both DOT 3 and DOT 4 for global applications, and the formulation of the referee fluids is changing more rapidly. A direct reference to the brake fluid specifications will provide more accurate information as these referee brake fluid formulations change.

1. SCOPE

This SAE Recommended Practice is intended for all vehicle hydraulic brake hoses. It is an accelerated test which is intended to provide the user with a method of comparing the ability of hydraulic brake hose designs to retard the ingress of moisture into brake fluid.

This document specifies a laboratory performance requirement. ASTM D 1364 interlaboratory reproducibility and correlation of data have not been defined, nor has correlation been established between field vehicle brake fluid moisture content and data obtained by this document.

1.1 Purpose

The purpose of this document is to simulate in the laboratory the transmission of moisture into a brake 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.

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

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 724-776-4970 (outside USA), www.sae.org.

SAE J1703 Motor Vehicle Brake Fluid

SAE J1704 Borate Ester Based Brake Fluids

2.1.1 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 D 1364 Test Method for Water in Volatile Solvents (Fischer Reagent Titration Method)

3. NOTE

This procedure is extremely sensitive and care must be taken to minimize the amount of unwanted moisture introduced into the system due to experimental error.

4. TEST APPARATUS

4.1 Brake Hose Assemblies

305 mm ± 5 mm (12.0 in ± 0.2 in) free length with female threaded fittings no longer than 40 mm (1-1/2 in) on each end.

4.2 Threaded end plugs tapered to match fitting eyelet.

4.3 Sample glass vials with appropriate caps to insure seal.

4.4 Glass water bath container.

4.5 Karl Fischer test apparatus (Reference ASTM D 1364).

4.6 Squeeze bottle with “J” tube.

4.7 Deionized or distilled water.

4.8 Desiccator.

4.9 Unopened can of brake fluid. Use the Compatibility Fluid as described in the latest revision of SAE J1703 or J1704.

4.10 Isopropyl Alcohol

4.11 Standard room environmental conditions of 23.0 °C ± 2.0 °C (73.4 °F ± 3.6 °F), 50% RH ± 5% RH.

5. TEST PREPARATION

5.1 Precondition all the brake hose assemblies at 100 °C ± 2 °C (212 °F ± 3.6 °F) for 24 h ± 2 h. Precondition all glass sample vials and the “J” tube squeeze bottle at 70 °C ± 2 °C (158 °F ± 3.6 °F) for a minimum of 1 h. This will assure that the hoses, vials, and bottle initially will be relatively dry.

5.2 After removing the previous items from the oven, place them in a desiccator at standard room environmental conditions for a minimum of 1 h or until the items reach room temperature. Keep these items in the desiccator until required to assure they stay in a dry state.

5.3 All phases of this test, where brake fluid is added to or removed from the brake hoses, shall be done at standard room environmental conditions as described in 4.11.

6. TEST PROCEDURE

6.1 Remove the preconditioned brake hose assemblies from the desiccator and start the fill procedure. Open an unopened can of brake fluid and fill the “J” tube squeeze bottle. Fill the appropriate vials and brake hoses described as follows within 1 h. This will assure that the test will be started with “dry” brake hoses and “unused” brake fluid, and keep the exposure to air and moisture at a minimum.

6.1.1 Fill one conditioned glass vial with brake fluid using the conditioned “J” tube squeeze bottle. The vial shall be totally filled to minimize air entrapment. Cap the vial securely within 30 s of filling to minimize exposure to air and moisture. This vial will be used as a control.

6.1.2 Fill three brake hose assemblies with brake fluid using the ”J” tube squeeze bottle, and then plug each end tightly within 30 s to minimize exposure to air and moisture. This is easily accomplished by bending the hose into a “U” shape with both ends level and injecting brake fluid into one of the ends. The “J” tube should be small enough to fit inside the brake hose fitting eyelet. Plug the ends of the hose with a threaded plug tapered at the tip to seal properly against the brake hose fitting eyelet. Make sure no air is entrapped inside the hose when the ends are plugged.

6.2 Place the brake hoses in a desiccator at standard room environmental conditions until ready to start the immersion test.

6.3 Remove the brake hoses from the desiccator and immerse them in a glass water bath container. Place the container and hoses in an oven maintained at 70 °C ± 2 °C (158 °F ± 3.6 °F) for 72 h ± 1 h.

6.3.1 The hose assemblies shall be held in a U-shape such that their centerlines are 76 mm ± 13 mm (3.0 in ± 0.5 in) apart. This can be accomplished by designing the walls of the glass bath container to accommodate this or by using a wire to tie the ends together. Position the hose assemblies in the glass water bath container so that they are totally immersed in the water and not contacting each other.

6.3.2 Use deionized or distilled water. Maintain the volume of water to a minimum of 490 mL (30 in^3) per hose. Keep the complete hose assembly below the water line at all times.

6.3.3 Refill the water bath as required to compensate for evaporation and assure compliance with the previous conditions. A lid for the water bath container will minimize evaporation and generally eliminate the need to add water during the test. If additional water is necessary, use water at 70 °C ± 5 °C (158 °F ± 9 °F).

6.4 After the required exposure interval, remove the three brake hose assemblies from the water bath and empty the brake fluid from each hose into separate conditioned glass vials.

6.4.1 Dry the outside of the brake hose thoroughly. Let cool to room temperature at standard room environmental conditions for a minimum of 30 min.

6.4.2 Wipe the hose assemblies just prior to cutting them using a cloth wetted with isopropyl alcohol.

6.4.3 Cut through the hose section within 13 mm (0.5 in) from one of the end fittings. While maintaining the longer hose section of the brake hose assembly in a vertical position with the end fitting up, cut the hose within 13 mm (0.5 in) from the remaining end fitting allowing the brake fluid to empty into a clean dry sample vial. Size the vial so that it will be totally filled. No attempt shall be made to recover or include the brake fluid remaining in either end fitting.