



Cold Testing of Wheel Brake Cylinders

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. The purpose of this procedure is to test the operation of wheel brake cylinders when subjected to cold ambient temperature.

1.2 Applicability. The procedure is applicable for all hydraulic wheel brake cylinders.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- CG190
- Global Document Management (GDM) System (<https://documents.gm.com/gdm3/component/main>) (ID)
- Subsystem Technical Specifications (SSTS)

ID = This website is limited to internal use within General Motors and shall not be used outside this company. Contact the GM Lead Engineer for further instructions.

3 Resources

3.1 Facilities.

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.

3.1.3 Climate Chamber. Capable of obtaining and maintaining a temperature of -40 °C.

3.1.4 Actuation Equipment. Brake fluid actuation system capable of actuating the brake cylinders to 7 MPa.

3.2 Equipment.

3.2.1 Pressure Transducers. Two (2) pressure transducers (0 MPa to 10 MPa); one per braking circuit.

3.2.2 Fixtures. Fixtures shall be provided to mount the brake hardware under test. Reaction devices shall be provided to assure the brake piston does not travel beyond the intended normal operation.

3.2.3 Switches. Four (4) end switches per wheel brake cylinder should be used in order to monitor piston travel and stop the test machine when the wheel brake cylinder piston surpasses the end positions.

3.3 Test Vehicle/Test Piece. At least three (3) wheel brake cylinders shall be tested. If requested, pretreated/used wheel brake cylinders may also be tested.

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3.4 Test Time.

Calendar time: 5 days to 7 days
Test hours: 120 hours
Coordination hours: 8 hours to 16 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Technician or engineer trained to perform the instruction in Section 4.

4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions.

4.2.1 Environmental Conditions. Climatic chamber required.

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 Test Setup.

4.3.1.1 Connect wheel brake cylinders to the brake actuation equipment. No more than four wheel brake cylinders, maximum of two per brake circuit, shall be connected to the brake actuation equipment.

4.3.1.2 Fill brakes with brake fluid and bleed system. Check performance of the braking equipment and wheel brake cylinders by cycling 7 MPa and returning to 0 MPa. Check that wheel brake cylinders return to original position. If not, consult design engineer and/or discard sample and install another wheel brake cylinder.

4.3.2 Cold Test.

4.3.2.1 Place wheel brake cylinders and, if necessary, brake actuation equipment, in the climatic chamber.

4.3.2.2 Set climatic chamber for a cold test temperature of $-40\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$. Test time zero (0) shall be set when the climatic chamber reaches the cold test temperature.

4.3.2.3 After 72 h, 96 h, and 120 h at the cold test temperature, the wheel brake cylinders shall be evaluated for performance as in 4.3.2.3.1 through 4.3.2.3.4. Data Sheet A1, Appendix A, shows example data sheet.

4.3.2.3.1 Make sure that the position of the cylinder piston is marked. This original position is the zero (0) position.

4.3.2.3.2 Pressurize the wheel brake cylinders with six (6) actuations each to 4 MPa and 7 MPa. The time interval between actuations shall be 1 minute.

4.3.2.3.3 The position of the wheel brake cylinder shall be recorded for each actuation. Observe if the inner and/or outer end position is reached on pressure buildup and/or release.

4.3.2.3.4 Visually inspect the wheel brake cylinders for leaks, cracks, and wear condition.

4.3.2.4 Following the final actuation cycle, the chilling system of the climatic chamber shall be deactivated. Remove the wheel brake cylinders from the chamber for inspection. Inspect the cylinders for leaks, cracks, or rips.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results.

5.2.1 Compare the piston travel performance of each wheel brake cylinder to the applicable Subsystem Technical Specifications (SSTS) or to the performance of the other samples.

5.2.2 The wheel brake cylinders shall be free from leaks following the cold test. Also, the sleeves shall not be cracked or ripped.

5.3 Test Documentation. Publish test results using the Evaluation Report Template (CG190) and Engineering Global Document Management (GDM) system.

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