

Air Brake Valve—Performance Requirements

Foreword—This Document has also changed to comply with the new SAE Technical Standards Board format. Scope has changed to Section 1, Purpose to 1.1, and References were added as Section 2.

1. **Scope**—This SAE Recommended Practice establishes minimum performance requirements for pneumatic valves when tested in accordance with the test procedure outlined in SAE J1409. The performance requirements will include:
 - 1.1 **Purpose**—The document establishes uniform performance requirements for pneumatic valves designed to operate at 862 kPa (125 psi) nominal pressure in commercial air brake vehicles.
 - a. Input - output performance
 - b. Leakage test
 - c. Low temperature performance
 - d. Elevated temperature performance
 - e. Corrosion resistance performance
 - f. Endurance testing
 - g. Structural integrity
2. **References**
 - 2.1 **Applicable Publication**—The following publication forms a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.
 - 2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1409—Air Brake Valves Test Procedure
3. **General Notes**
 - 3.1 The same general notes listed in J1409 are also applicable to this document.

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4. Input-Output Performance

4.1 The performance requirements for the input-output characteristics of the air valves shall be determined by the intended design and functions as agreed upon by the valve manufacturer and purchaser.

5. Leakage Test

5.1 Pilot Operated and Mechanically Actuated Modulating Type Valve

5.1.1 There are no performance requirements for test procedure 5.1.1 of SAE J1409, unless agreed upon by the valve manufacturer and purchaser; however, record data and note any comments before continuing test procedure 5.1.2.

5.1.2 When tested per test procedure 5.1.2 of SAE J1409, supply air leakage must not exceed 175 std. cm³/m.

5.1.3 When tested per test procedure 5.1.3.1, 5.1.3.2, and 5.1.3.3 of SAE J1409, total air leakage must not exceed 175 std. cm³/m.

5.2 Pilot Operated and Mechanically Actuated Non-Modulating Type Valves

5.2.1 There are no performance requirements for test procedure 5.2.1 of SAE J1409, unless agreed upon by the valve manufacturer and purchaser; however, record data and note any comments before continuing test procedure 5.2.2.

5.2.2 When tested per test procedure 5.2.2 and 5.2.3 of SAE J1409, supply air leakage must not exceed 175 std. cm³/m.

5.3 Through Valves

5.3.1 When tested per test procedures 5.3.1, 5.3.2, and 5.3.3 of SAE J1409, the total air leakage must not exceed 175 std. cm³/m.

5.3.2 When tested per test procedures 5.3.1, 5.3.2, and 5.3.3 of SAE J1409 except with the outlet port pressurized and inlet vented, the total leakage must not exceed 175 std. cm³/m.

NOTE—This test only applies to one way check valves.

5.4 Automatic Pressure Actuating Valves

5.4.1 When tested per test procedures 5.4.1 and 5.4.2 of SAE J1409, the total air leakage must not exceed 175 std. cm³/m.

6. Over Pressurization

6.1 Over Pressurization

6.1.1 When tested per test procedure 6.2.1 or 6.2.2 of SAE J1409, the input-output characteristics and leakage spec must be within the limits specified in Sections 4 and 5.

6.2 Maximum Pressure Test

6.2.1 When tested per test procedure 6.2.1 or 6.2.2 of SAE J1409, the valve must not show visible cracks, permanent deformation, or exterior leakage.

7. Low Temperature Test

7.1 Low Temperature Leakage (First Application)

7.1.1 PILOT OPERATED AND MECHANICALLY ACTUATED MODULATING TYPE VALVE

7.1.1.1 There are no performance requirements for test procedure 7.1 and 5.1.1 of SAE J1409, unless agreed upon by the valve manufacturer and purchaser; however, record data and note any comments before continuing test procedure 7.1.1.2.

7.1.1.2 When tested per test procedure 7.1 and 5.1.2 of SAE J1409, supply air leakage must not exceed 5000 std. cm³/m.

7.1.1.3 When tested per test procedure 7.1 and 5.1.3.1 and 5.1.3.2 of SAE J1409, total air leakage must not exceed 5000 std. cm³/m.

7.1.1.4 When tested per test procedure 7.1 and 5.1.3.3 of SAE J1409, total air leakage must not exceed 5000 std. cm³/m.

7.1.2 PILOT OPERATED AND MECHANICALLY ACTUATED NON-MODULATING TYPE VALVES

7.1.2.1 There are no performance requirements for test procedure 7.1 and 5.2.1 of SAE J1409, unless agreed upon by the valve manufacturer and purchaser; however, record data and note any comments before continuing test procedure 7.1.2.2.

7.1.2.2 When tested per test procedure 7.1 and 5.2.2 of SAE J1409, supply air leakage must not exceed 5000 std. cm³/m.

7.1.2.3 When tested per test procedure 7.1 and 5.2.3 of SAE J1409, total air leakage must not exceed 5000 std. cm³/m.

7.1.3 THROUGH VALVES

7.1.3.1 When tested per test procedures 7.1 and 5.3.1, 5.3.2, and 5.3.3 of SAE J1409, the total air leakage must not exceed 5000 std. cm³/m.

7.1.3.2 When tested per test procedures 7.1 and 5.3.1, 5.3.2, and 5.3.3 of SAE J1409 except with the outlet port pressurized, the total air leakage must not exceed 5000 std. cm³/m. On two-way check valves, one inlet port must be vented.

7.1.4 AUTOMATIC PRESSURE ACTUATING VALVES

7.1.4.1 When tested per test procedure 7.1 and 5.4.1 and 5.4.2 of SAE J1409, the total air leakage must not exceed 5000 std. cm³/m.

7.2 Low Temperature Function

7.2.1 The performance requirements for low temperature function of air valves shall be determined by the intended design and functions as agreed upon by the valve manufacturer and purchaser.

7.3 Room Temperature Test (Post Low Temperature Soak)

7.3.1 When tested per test procedure 7.3 of SAE J1409, the input-output characteristics and leakage must be within the limits specified in Sections 4 and 5.

8. Elevated Temperature Test

8.1 Elevated Temperature Leakage (First Application)

8.1.1 When tested per test procedure 8.1 of SAE J1409, the leakage specification must be within the limits specified in Section 5.

8.2 Elevated Temperature Function

8.2.1 The performance requirements for elevated temperature function on air valves shall be determined by the intended design and function as agreed upon by the valve manufacturer and purchaser.

8.3 Elevated Temperature Endurance

8.3.1 After testing per test procedure 8.3 of SAE J1409 for the number of cycles listed as follows, the leakage during test procedure 8.4 of SAE J1409 must not exceed 200 std. cm³/m and input-output characteristics must be as specified in Section 4.

- a. Service Brake System Valve—100 000 cycles
- b. Modulator Valve—5000 major cycles (in addition to any other applicable requirement if part of another system)
- c. Traction Control System Valve—10 000 cycles (in addition to any other applicable requirement if part of another system)
- d. All Other Valves— 20 000 cycles

9. Corrosion Resistance Evaluation

9.1 When tested per test procedure 9.1 of SAE J1409 for 96 h, inspection should not reveal any corrosion which may degrade valve performance.

10. Endurance Testing

10.1 After testing per test procedure 10.1, 10.2, and 10.3 of SAE J1409 for the number of cycles listed as follows, leakage must not exceed 200 std. cm³/m and input-output characteristics must be as specified in Section 4.

- a. Service Brake System Valve—1 000 000 cycles
- b. Modulator Valve—500 000 major cycles (in addition to any other applicable requirement if part of another system)
- c. Traction Control System Valve—100 000 cycles (in addition to any other applicable requirement if part of another system)
- d. All Other Valves— 200 000 cycles

A service brake valve is defined as any valve which operates in a normal service brake application and could include, but not limited to, such valves as foot valves, relay valves, quick release valves, front limit valves, one-way and two-way check valves.