SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1410

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(R) Air Brake Valve—Performance Requirements

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:

a. Input - Output Performance
b. Leakage Characteristics
c. Low temperature performance
d. Elevated temperature performance
e. Corrosion resistance performance
f. Endurance testing
g. Structural integrity

1.1 Purpose

The document establishes uniform performance requirements for pneumatic valves designed to operate at 931 kPa (135 psi) nominal pressure in truck and bus air brake vehicles.

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 SAE J1409 are also applicable to this document.

4. Input-Output Performance

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 Chartacteristics

5.1 Pilot Operated and Mechanically Actuated Modulating Type Valve

5.1.1 LOW SUPPLY PRESSURE TEST (NO DELIVERY PRESSURE CONDITION)

When tested per test procedure 5.1.1 of SAE J1409, supply air leakage must not exceed 100 std. cm^3/m.

5.1.2 FULL SUPPLY PRESSURE TEST (NO DELIVERY PRESSURE CONDITION)

When tested per test procedure 5.1.2 of SAE J1409, supply air leakage must not exceed 100 std. cm^3/m.

5.1.3 FULL SUPPLY PRESSURE TEST (APPLIED CONDITION)

5.1.3.1 When tested per test procedure 5.1.3.1 of SAE J1409, total air leakage must not exceed 150 std. cm^3/m.

5.1.3.2 When tested per test procedure 5.1.3.2 of SAE J1409, total air leakage must not exceed 150 std. cm^3/m.

5.1.3.3 When tested per test procedure 5.1.3.3 of SAE J1409, total air leakage must not exceed 150 std. cm^3/m.

5.2 Pilot Operated and Mechanically Actuated Non-Modulating Type Valves

5.2.1 LOW SUPPLY PRESSURE TEST (NO DELIVERY PRESSURE CONDITION)

When tested per test procedure 5.2.1 of SAE J1409, supply air leakage must not exceed 100 std. cm^3/m

5.2.2 FULL SUPPLY PRESSURE TEST (NO DELIVERY PRESSURE CONDITION)

When tested per test procedure 5.2.2 of SAE J1409, supply air leakage must not exceed 100 std. cm^3/m.

5.2.3 FULL SUPPLY PRESSURE TEST (APPLIED CONDITION)

When tested per test procedure 5.2.3 of SAE J1409, total air leakage must not exceed 100 std. cm^3/m.

5.3 Through Valves

5.3.1 LOW PRESSURE TEST

When tested per test procedure 5.3.1 of SAE J1409, the total air leakage must not exceed 100 std. cm^3/m.

5.3.2 INTERMEDIATE PRESSURE TEST

When tested per test procedure 5.3.2 of SAE J1409, the total leakage must not exceed 100 std. cm^3/m.

5.3.3 FULL PRESSURE TEST

When tested per test procedure 5.3.3 of SAE J1409, the total leakage must not exceed 100 std. cm^3/m.

5.3.4 PRESSURE TEST (ONE WAY CHECK VALVES)

When tested per test procedure 5.3.4 of SAE J1409, the total leakage must not exceed 100 std. cm^3/m.

5.4 Automatic Pressure Actuating Valves

When tested per test procedure 5.4.1 of SAE J1409, the total air leakage must not exceed 100 std. cm^3/m.

When tested per test procedure 5.4.2 of SAE J1409, the total air leakage must not exceed 100 std. cm^3/m.

6. Structural Integrity

6.1 Over Pressurization

When tested per test procedure 6.1 of SAE J1409, the input-output characteristics and leakage must be within the limits specified in Sections 4 and 5.

6.2 Maximum Pressure Test

When tested per test procedure 6.2 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)

When tested per test procedure 7.1 of SAE J1409, the total air leakage must not exceed 2500 std.cm^3/m except for Pilot Operated and Mechanically Actuated Modulating Valves in the applied condition where the total air leakage must not exceed 4000 std.cm^3/m.

7.2 Low Temperature Function

When tested per test procedure of 7.2 of SAE J1409, 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)

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

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

When tested per test procedure 8.2 of SAE J1409, 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. cm^3/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

When tested per test procedure 9 of SAE J1409, , the valve must not show visible cracks, permanent deformation or exterior leakage.

10. Endurance Testing

After testing per test procedure 10.of SAE J1409 for the number of cycles listed as follows, leakage must not exceed 200 std. cm^3/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.