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SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1137

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Hydraulic Valves for Motor Vehicle Brake Systems—Performance Requirements

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1. ***Scope***—This SAE Recommended Practice applies to valve assemblies that are used on passenger car and light truck braking systems utilizing motor vehicle hydraulic brake fluids. The procedure (SAE J1118) and these requirements (SAE J1137) were developed for brake fluids conforming to SAE J1703 and FMVSS 116 (DOT 3) requirements; however, it may be utilized for valves which use DOT 4 or DOT 5 brake fluid. These requirements are applicable to differential warning, metering hold off, bypass function, or proportioning type valves or any combination thereof.

1.1 **Purpose**—To specify the minimum performance, physical strength and durability requirements for hydraulic valves tested in accordance with SAE J1118.

2. ***References***

2.1 **Applicable Publications**—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, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1118—Hydraulic Valves for Motor Vehicle Brake Systems Test Procedure
SAE J1703—Motor Vehicle Brake Fluid

2.1.2 FEDERAL PUBLICATION—Available from The Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FMVSS 116

3. ***Requirements***—Valve assemblies when tested in accordance with SAE J1118 shall meet the following requirements:

3.1 **Performance Test Requirements are as follows:**

3.1.1 The holdoff metering pressure (point A, Figure 2, Reference 4.1.1.1 of SAE J1118) must be within 69 to 448 kPa (10 to 65 psi) output pressure. It is recommended that the manufacturer design specifications to provide a nominal value with a maximum tolerance range of 206 kPa (30 psi).

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3.1.2 The point where the metering pressure starts to increase again after the holdoff (point B, Figure 2, Reference 4.1.1.2 of SAE J1118) shall be between 434 to 1069 kPa (63 to 155 psi) inlet pressure. It is recommended that the manufacturer design specifications to provide the inlet/outlet pressure envelope requirements.

3.1.3 The blendback of metering pressure where the inlet and outlet pressures have returned to within 138 kPa (20 psi) shall occur between 1207 to 2102 kPa (175 to 305 psi) unless otherwise specified by the manufacturer. Reference 4.1.1.3 and point C, Figure 2 of SAE J1118.

3.1.4 The difference (hysteresis) between inlet and outlet metering pressure on apply and release at 6900 kPa (1000 psi) shall not exceed 138 kPa (20 psi). Reference 4.1.1.4 of SAE J1118.

3.1.5 The knee pressure and percent slope of the proportioner shall be according to the manufacturer's specifications and tolerance (Reference 4.1.1.5 and Section 6 of SAE J1118). The knee pressure to be within ±241 kPa (35 psi) of the nominal specified by the manufacturer.

3.1.6 PROPORTIONER LEAKUP CHECK—The final proportioner pressure reading shall be within 10% of the initial pressure reading after the 30 s check (Reference 4.1.2.1 of SAE J1118).

3.2 Differential Warning Requirements are as follows:

3.2.1 The pressures to activate the differential warning light to be between 483 kPa (70 psi) and 1551 kPa (225 psi) when tested per 4.2 and 4.2.6 of SAE J1118.

3.2.2 The rear outlet pressure to be within 138 kPa (20 psi) of the inlet pressure for 4.2.2 and 4.2.3 of SAE J1118 at 6900 kPa (1000 psi).

3.2.3 The pressure to recenter the differential piston to be 3103 kPa (450 psi) when tested per 4.2.5 and 4.2.6 of SAE J1118.

3.3 Reverse Flow Test Requirements are as follows:

3.3.1 The minimum flow rate obtained from the front ports (either direction) to be 1500 cc/min and from the rear ports (either direction) to be 1000 cc/min when tested per 4.3 (Reference 4.3.1, 4.3.2, and 4.3.3 of SAE J1118).

3.4 Pressure Leak and Physical Strength Requirements are as follows

3.4.1 The maximum leakage of one drop per exterior seal point or vent is permitted (Reference 4.4.1 and 4.4.2 of SAE J1118).

3.4.2 The maximum loss of pressure permitted shall be 21 kPa (3 psi) (Reference 4.4.1 and 4.4.2 of SAE J1118).

3.4.3 The performance of the valve after being tested for physical strength (Reference 4.4.3 of SAE J1118) shall provide readings within 15% of the initial reading when tested to the functional requirements of 4.1 and 4.2 of SAE J1118.

3.5 Vacuum Capability Requirements are:

3.5.1 The valve must be capable of being evacuated from atmospheric pressure to 2 mm Hg absolute pressure within 15 s (Reference 4.5.1 of SAE J1118).

3.5.2 With the vacuum source shut off, the pressure must not rise to more than 4 mm Hg absolute after 5 s (Reference 4.5.2 of SAE J1118).

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3.6 Ozone Resistance of External Elastomeric Boots and Seals Requirements are:

3.6.1 There shall be no cracking, checking, or tears of the boots and seals after exposure to the ozone test (Reference 4.6 of SAE J1118).

3.7 High Temperature Durability Requirements

3.7.1 The total leakage from the traps during the entire test (Reference 4.7 of SAE J1118) shall not exceed 10 cc.

3.7.2 The total seepage of fluid into the switch cavity shall not exceed 0.5 cc (Reference 4.7 of SAE J1118).

3.7.3 The performance (Reference 4.7.6) of the valve after test shall be within 15% of the original checks.

3.8 Cold Temperature Operation Requirements

3.8.1 Total leakage from the traps, seepage into the switch cavity, and performance shall be the same as the High Temperature Durability Test requirements as stated in 3.7 of this document (SAE J1137).

3.9 Inspection Requirements

3.9.1 After any of the previous tests, there shall be no evidence of imminent failure such as internal corrosion and/or detrimental galvanic action inboard of the external sealing points and vent seals.

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