SAE INTERNATIONAL

SURFACE VEHICLE RECOMMENDED PRACTICE

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Superseding J1235 SEP2015

Measuring and Reporting the Internal Leakage of a Hydraulic Fluid Power Valve

RATIONALE

Update 7.2 with three-digit contamination code and remove all references to temperature in degrees Fahrenheit.

1. SCOPE

This procedure applies to directional control valves or other valves which in various positions direct or block fluid flow as applied to Off-Road Self-Propelled Work Machines as referenced in SAE J1116.

1.1 Purpose

To provide a uniform laboratory procedure for measuring and reporting the fluid flow (leakage) across a restricted flow path in a hydraulic fluid power valve.

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.

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 +1 724-776-4970 (outside USA), www.sae.org.

SAE J1116 Categories of Off-Road Self-Propelled Work Machines

SAE J1276 Standardized Fluid for Hydraulic Component Tests

2.1.2 ISO Publications

Copies of these documents are available online at https://webstore.ansi.org/.

ISO 4406 Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles

ISO 5598 Fluid power systems and components - Vocabulary

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3. DEFINITIONS

For definitions of terms not herein defined, refer to ISO 5598.

3.1 TEST PRESSURE

The differential pressure between input and output ports at which leakage will be determined.

3.2 INPUT PORT

Any port into which flow is directed or pressure is applied for purposes of this test.

3.3 OUTPUT PORT

Any port from which flow exits for purposes of this test.

3.4 CONTROL

Any adjustable feature integral with the test valve that determines the restricted flow path.

3.5 SPECIFIED DATA

That basic information furnished in the request for the test as indicated in Section 6.

4. UNITS

4.1 The International System of Units (SI) is used herein in accordance with SAE TSB 003.

5. SUMMARY OF SPECIFIED DATA

5.1 Specify the following information on all requests for this test:

5.1.1 A description of valve.

5.1.2 A description of fluid (if different from 10.1).

5.1.3 The fluid temperature (if different from the standardized value in 10.2).

5.1.4 Test pressure.

5.1.5 The input ports.

5.1.6 The output ports.

5.1.7 The control position and flow paths.

6. GENERAL PROCEDURE

6.1 Conduct the test in accordance with the fixed values specified by the test request (see Section 9).

6.2 Use only standardized values, shown in Section 11, for catalog information and sales literature.

NOTE: For close coordination between testing laboratories, similar equipment, fluid, and procedures are recommended.

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7. TEST CONDITIONS

7.1 Accuracy

Maintain equipment accuracy within the limits shown in Table 1:

Table 1 - Test equipment accuracy

Test Condition	Maintain Within ±
Flow	2%
Pressure	2%
Temperature	0.6 °C
Time	2%

7.2 Contamination Level

Oil cleanliness code in accordance with ISO 4406 of 19/16/13 (maximum).

8. TEST PROCEDURE

8.1 Install the test valve in the test circuit using the input ports and output ports indicated in the test request.

8.2 Actuate or set the control for the flow paths indicated on the test request.

8.3 Ensure that valve body temperature has stabilized to within 3 °C of the temperature of the oil or the external temperature rise rate of the valve body is less than 3 °C per minute.

8.4 Establish and maintain the specified test pressure.

8.5 Cycle the input control at least three times within 1 minute and return to the specified control position.

8.6 Start the measurement of leakage rate after it has stabilized or between 15 and 60 seconds after completion of 8.5.

8.7 Finish measurement of leakage rate between 15 and 60 seconds after start of measurement.

8.8 Perform 8.2 through 8.7 three times.

8.9 Record and report all readings (see Figure 1).

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DATE TESTED:_____ TEST LABORATORY:_____

VALVE DESCRIPTION:_____ FLUID:_____

COMMENTS:_____

_____

_____

_____

CONTROL POS.	INPUT PORT(S)	OUTPUT PORT(S)	TEST PRESSURE	FLUID TEMP.	BODY TEMP.	TEST NO.	LEAKAGE RATE
						1	
						2	
						3	

Figure 1 - Example test data summary

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9. DATA PRESENTATION

Include the following information with the data presentation:

9.1 Leakage rate (three readings) and type of measurement method used (beaker versus flowmeter).

9.2 Fluid temperature.

9.3 Valve body temperature.

9.4 Valve description.

9.5 Test pressure.

9.6 Control position and leak paths.

9.7 Input ports.

9.8 Output ports.

9.9 Date of test.

9.10 Test agency.

9.11 Description of fluid.

10. STANDARDIZED VALUES

10.1 All tests shall use fluid in accordance with SAE J1276 unless explicitly stated otherwise. If fluid other than SAE J1276 is used, each test document shall minimally include fluid type, ISO viscosity grade, VI index, and viscosity at 40 °C and at 100 °C of the fluid used in the test.

10.2 Fluid temperature shall be 50 °C + 3 °C unless explicitly stated otherwise.