SAE INTERNATIONAL

SURFACE VEHICLE RECOMMENDED PRACTICE

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

RATIONALE

This standard is being revised to update references, fluid specifications and test equipment accuracy.

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 Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

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

SAE J1276 Standard Fluid for Hydraulic Component Tests

2.1.2 ISO Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.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

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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3. DEFINITIONS

(For definitions of terms not herein defined, see 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.

4.2 Approximate conversions to U.S. Customary units are given for information purposes. These appear in parentheses after their SI counterpart.

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 paragraph 10.1).

5.1.3 The fluid temperature (if different from the standardized value in paragraph 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. (Reference 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.

7. TEST CONDITIONS

7.1 Accuracy

Maintain equipment accuracy within the limits shown in the following table:

Table 1 - Test equipment accuracy

Test Condition	Maintain Within ±
Flow	2%
Pressure	2%
Temperature	0.6 °C (1 °F)
Time	2%

7.2 Contamination Level

Oil cleanliness code in accordance with ISO 4406 of -/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 (5 °F) of the temperature of the oil or the external temperature rise rate of the valve body is less than 3 °C (5 °F) per minute.

8.4 Establish and maintain the specified test pressure.

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

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

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

8.8 Perform paragraphs 8.2 through 8.7 three times.

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

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

9. DATA PRESENTATION

Include the following information with the data presentation:

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

9.2 Fluid temperature.

9.3 Valve body temperature.

9.4 Valve description.