The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
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SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1333

ISSUED MAR90

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HYDRAULIC CYLINDER ROD CORROSION TEST

***Foreword*—**This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. ***Scope*—**Applies to hydraulic cylinders which are components of self-propelled work machines defined in SAE J1116.

1.1 **Purpose—**To provide a laboratory method for determining the capacity of a hydraulic cylinder rod to resist corrosion, and the other cylinder components to withstand that corrosion.

2. ***References***

2.1 **Applicable Publications—**The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the lastest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1116—Categories of Off-Road Self-Propelled Work Machines
SAE J1165—Reporting Cleanliness Levels of Hydraulic Fluids, Solid Contaminant, Code 19/16
SAE J1276—Standardized Fluid for Hydraulic Component Tests
SAE J1336—Hydraulic Cylinder Leakage Test

2.1.2 ASTM DOCUMENTS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 117—Method of Salt Spray (Fog) Testing
ASTM B 368—Method for Copper-Accelerated Acetic Acid-Salt Spray (Fog) Tesing (CASS Test)

3. ***Definitions***

3.1 **Average Cylinder Rod Velocity—**The sum of twice the stroke length divided by the sum of the movement time for the rod to extend and retract.

3.2 **Cycle—**One extension and retraction of the cylinder rod for a specified stroke length.

3.3 **Cycle Rate—**The number of cycles per unit of time.

3.4 **Rated Pressure—**The continuous duty operating pressure specified by the manufacturer.

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3.5 **Side Load—**A continuous force which is in a direction, unless otherwise specified, perpendicular to the axial loading or the cylinder to simulate loading due to external forces on the cylinder as defined by the user.

3.6 **Stroke Length—**The total distance traveled by the piston in completing one-half cycle.

4. Testing Conditions

4.1 **Accuracy of Measurement—**The accuracy of measurement unless otherwise stated shall be as follows:

a. Temperature ±3 °C (±5 °F)
b. Pressure ±2%
c. Leakage ±2%
d. Time ±2%
e. Length ±2%

4.2 **Test Fluids—**The test fluid shall be SAE J1276 unless otherwise specified.

4.3 **Fluid Test Temperature—**The fluid test temperature, measured in the supply line, shall be 50 °C (122 °F) or 110 °C (230 °F) or as agreed between user and supplier.

4.4 **Test Pressure—**Operational test pressure shall be the manufacturer's rated pressure and measured at the cylinder work ports. A 10% transient overshoot is permissible unless another amount is agreed upon by the user.

4.5 **Pressure Rise Rate—**The pressure rise rate shall be a minimum of 150 000 kPa (21 755 psi) per second:

4.6 **Contamination Level—**Test system shall have a contamination level not to exceed SAE J1165 solid contaminant code 19/16.

4.7 **Stroke Length—**The length of stroke for the operational test shall be equal to at least 15% of the maximum stroke length of the hydraulic cylinder.

4.8 **Cycle Rate—**The cycle rate shall be as specified by the manufacturer.

5. Test Equipment

5.1 **Salt-Fog Chamber—**Use a salt-fog chamber having an atomizer and air circulating system.

5.2 **Test Fixture—**Use a suitable test fixture, for example, an oscillating beam type, a conventional in-line beam type, or similar fixture, in which the test cylinder can be loaded and driven in either direction under both static and dynamic conditions with a side load.

6. Test Procedure

6.1 Connect test cylinder to a fluid power source and cycle at maximum stroke a minimum of 20 cycles to displace the trapped air and install it in the cycle test stand.

6.2 Cycle the cylinder against the external load for 1000 cycles and perform a 1000 cycle rod seal dynamic leakage test per SAE J1336.

6.3 Remove the cylinder from the test fixture. In a fully extended position, prepare the rod surface as defined in ASTM B 117 or B 368. Subject the fully extended rod to a salt-fog environment per the selected test for 8 h minimum, unless otherwise specified. Define the rod surface condition at completion of exposure per the selected test method. Use photographs as required.

6.4 Following exposure test, reinstall cylinder (do not clean rod) in same fixture used for 6.2.

6.5 Cycle the cylinder against an external load at rated conditions for 10 000 full stroke cycles.

6.6 Perform a rod seal dynamic leakage test per SAE J1336 during the final 1000 cycles.

6.7 Record the test used, exposure duration, and rod seal dynamic leakage coefficients per SAE J1336.

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HYDRAULIC FLUID POWER SYSTEMS AND COMPONENTS
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