



SURFACE VEHICLE INFORMATION REPORT

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Hydraulic Hose Pin Hole Sleeve Testing Information Toward Development of a Test Method

RATIONALE

This SAE Information Report, Project No. C2-J343-11-02, was initiated to evaluate the development of an SAE Test Method for the evaluation of Hydraulic Hose Pin Hole Protection Sleeves.

FOREWORD

In fluid power systems, power is transmitted in high-pressure hydraulic hoses via a fluid under pressure within an enclosed circuit. In the event of a hose failure (pin hole or burst), a hose protection sleeve must be designed to meet these requirements under varying conditions. Testing of sleeves to meet performance requirements provides users a basis of assurance for determining design application and for checking compliance with their stated requirements. This information report documents the work that was done to evaluate functional requirements of new sleeve configurations as well as those already in the marketplace.

WARNING: Some of the tests described in this document are considered hazardous; it is therefore essential that, in conducting these tests, all appropriate safety precautions are strictly adhered to. Attention is drawn to the dangerous fine jets, which can penetrate the skin, and energy release of expanding gases. To reduce the hazard to energy release, bleed air out of test specimens prior to pressure testing. Tests shall be set up and performed by properly trained personnel.

1. SCOPE

This SAE Information Report documents efforts toward developing a test method for the evaluation of hose protection sleeves used in hydraulic fluid power applications.

These sleeves are intended for general application and hydraulic systems on industrial equipment and commercial products. These sleeves shall be capable of providing protection to pin hole failures in hydraulic systems operating to working pressures specified by the manufacturer. Hose assembly burst containment is not in the scope of this document.

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.

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

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Documents



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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 J343 Test and Test Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies

SAE J2020 Accelerated Exposure of Automotive Exterior Materials Using a Fluorescent UV and Condensation Apparatus

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D6770 Standard Test Method for Abrasion Resistance of Textile Webbing (Hex Bar Method)

2.1.3 Code of Federal Regulations (CFR) Publications

Available from United States Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-1800, www.gpo.gov.

30 CFR Part 18 Electric Motor-Driven Mine Equipment and Accessories

2.1.4 ISO Publications

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

ISO 5598 Fluid power systems and components - Vocabulary

ISO 8031 Rubber and plastics hoses and hose assemblies - Determination of electrical resistance and conductivity

ISO 23529 Rubber - General procedures for preparing and conditioning test pieces for physical test methods

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 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 J516 Hydraulic Hose Fittings

SAE J517 Hydraulic Hose

SAE J1176 External Leakage Classifications for Hydraulic Systems

SAE J1273 Recommended Practices for Hydraulic Hose Assemblies

SAE J1405 Optional Test Procedures for Hydraulic Hose Assemblies

2.2.2 ISO Publications

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

ISO 3457 Earth-moving machinery - Guards - Definitions and Requirements

2.2.3 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

FED-STD 191 Test Method 5309 for Abrasion

3. DEFINITIONS

For the purpose of this document, the definitions given in ISO 5598 shall apply.

4. GENERAL REQUIREMENTS

4.1 Test Pressures

Hose sleeves vary by design between manufacturers and, as a result, so do maximum working pressures. Contact the manufacturer for applicable test pressures.

4.2 Test Samples

All components were tested in the final form (as the customer receives the part). Unless otherwise specified, test samples shall be comprised of a hose sleeve either by itself or installed on a hydraulic hose.

4.3 Assembly Procedures

Consult the manufacturer for applicable assembly instructions.

4.4 Test Fluids

Test fluid is to be water for the pin hole test. The burst test shall be oil or water.

4.5 Test Temperatures

The test shall be conducted at a standard laboratory temperature and humidity in accordance with ISO 23529.

4.6 Test Frequency

Qualification testing shall be required when there is a change in design, material, or manufacturing process. Otherwise, the test frequency shall be decided between the user and the manufacturer.

5. TEST METHODS (AS AGREED BETWEEN THE MANUFACTURER AND USER)

Each test requires the use of new samples and should not be reused or returned to stock after completion of the test.

5.1 Pin Hole Test

This test evaluates the sleeve's ability to contain a pin hole failure in the hose.

A test piece shall be cut from a sleeve so as to provide a sample of size of 200 mm in length and 60 mm in width.

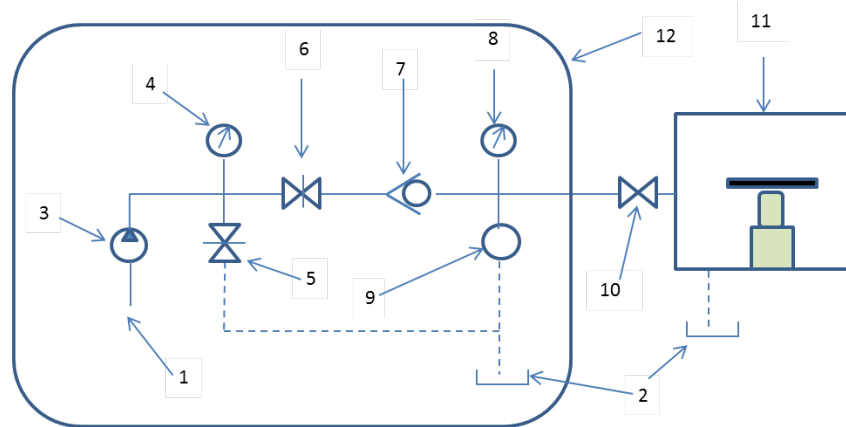
The test cabinet and test fluid pressure circuit is shown in Figure 1. The pump shall be capable of supplying water at a pressure at or above the rated pressure of the sleeve and a flow rate commensurate of the orifice size.

The orifice size shall be selected from 0.380mm, 0.762mm, or 1.143mm.

The sleeve test piece shall be mounted on the sample fixture as shown in Figure 2. The water test system shall be able to vary the pressure depending on the sleeve ratings. The system shall be capable of producing the required flow rate based on the test pressure and orifice size.

The sleeve shall contain the stream for the duration as specified in the product specification. The sleeve shall contain the stream without failure or allowing a visible stream to penetrate the sleeve. Seepage of the fluid though the sleeve is acceptable.

Test pressure is to be as agreed upon between the customer and the manufacturer.



Key

Indication, measurement, recording, and control

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|------------------------------------|--|
| 1 Water Supply Inlet | 7 Check Valve |
| 2 Water Drain | 8 Test pressure gage |
| 3 Pump for pressure test | 9 Pressure dump valve |
| 4 Pump pressure gage | 10 Manual shut off ball valve |
| 5 Pressure regulating needle valve | 11 Test Cabinet – See Figure 2 for details |
| 6 Isolation needle valve | 12 Water pump system enclosure |

Figure 1 - Diagram of test bench