

INTERNATIONAL STANDARD

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Metallic tube connections for fluid power and general use —

Part 5:

Test methods for threaded hydraulic fluid
power connections

*Raccords de tubes métalliques pour transmissions hydrauliques et
pneumatiques et applications générales —*

*Partie 5: Méthodes d'essai pour raccords filetés pour transmissions
hydrauliques*



Reference number
ISO 8434-5:1995(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8434-5 was prepared jointly by Technical Committees ISO/TC 5, *Ferrous metal pipes and metallic fittings* and ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components*.

These test methods have been included in several International Standards, but because of their generic application to ports, studs and tube connections for both metric and inch connections, it was agreed that a separate standard should be established. Additional tests are being considered.

ISO 8434 consists of the following parts, under the general title *Metallic tube connections for fluid power and general use*:

- *Part 1: 24 degree compression fittings*
- *Part 2: 37 degree flared fittings*
- *Part 3: O-ring face seal fittings*
- *Part 4: 24 degree cone connectors with O-ring weld-on nipples*
- *Part 5: Test methods for threaded hydraulic fluid power connections*

Annex A forms an integral part of this part of ISO 8434. Annexes B and C are for information only.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Components must be designed to meet these requirements under varying conditions. Testing of components to meet performance requirements provides a basis of assurance for determining design application and for checking component compliance with the stated requirements.

Metallic tube connections for fluid power and general use —

Part 5:

Test methods for threaded hydraulic fluid power connections

1 Scope

This part of ISO 8434 specifies uniform methods for the testing and performance evaluation of threaded metallic tube connections and stud ends of ports for hydraulic fluid power.

Tests outlined in this part of ISO 8434 are independent of each other and document the method to follow for each test; see the appropriate component International Standard for the test requirements and performance criteria.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8434. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8434 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 48:1994, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*.

ISO 3448:1975, *Industrial liquid lubricants — ISO viscosity classification — First edition*.

ISO 3601-3:1987, *Fluid systems — Sealing devices — O-rings — Part 3: Quality acceptance criteria*.

ISO 5598:1985, *Fluid power systems and components — Vocabulary*.

ISO 6508:1986, *Metallic materials — Hardness test — Rockwell test (scales A - B - C - D - E - F - G - H - K)*.

ISO 6803:1994, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing*.

3 Definitions

For the purposes of this part of ISO 8434, the definitions given in ISO 5598 apply.

4 General requirements

4.1 Test samples

All components tested shall be tested in the final form (as the customer receives the part), including annealing as required for brazing.

4.2 Test temperature

Test temperature (ambient and liquid) shall be 15 °C to 35 °C, unless otherwise specified in the controlling International Standard.

4.3 Test report

Test results and test conditions shall be reported on the test data form given in annex A.

CAUTION: Some of the tests described in this part of ISO 8434 are considered hazardous. It is therefore essential that, in conducting these tests, all appro-

ropriate safety precautions are strictly adhered to. Attention is drawn to the danger of burst, fine jets (which can penetrate the skin) and energy release of expanding gases. To reduce the hazard of energy release, bleed air out of test specimens prior to pressure testing. Tests shall be set up and performed by properly trained personnel.

5 Proof pressure test

5.1 Principle

Testing of three samples to confirm that the specified connection(s) meet(s) or exceed(s) a ratio of 2:1 between the proof and working pressure for 60 s minimum at proof pressure without any visual signs of leakage.

5.2 Test equipment

5.2.1 Test block

Test blocks shall be unplated and hardened to 45 HRC to 55 HRC in accordance with ISO 6508. The distance between the centrelines of test ports shall be a minimum of 1,5 times the port diameter. The distance between the port centreline and the edge of the test block shall be a minimum of 1 times the port diameter.

5.2.2 Test seals (if applicable)

Unless otherwise specified, seals shall be nitrile (NBR) rubber with a hardness of (90 ± 5) IHRD when measured in accordance with ISO 48. Seals shall conform to their respective dimensional requirements, and O-rings shall meet or exceed the quality requirements for grade N (general purpose) of ISO 3601-3, if applicable.

5.3 Procedure

5.3.1 Thread lubrication

For testing only, threads and contact surfaces shall be lubricated with hydraulic oil with a viscosity of VG 32 in accordance with ISO 3448 prior to application of torque.

5.3.2 Torque

Tube connections and stud ends shall be tested at the required minimum torques of the respective connector standard, if specified. Otherwise test at the minimum torque values supplied by the manufacturer. Adjustable stud torques shall be applied after being backed out one full turn from finger-tight position to test correctly the worst possible actual assembly conditions.

1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm²

5.3.3 Pressure rise rate

During the proof test, the rate of pressure rise shall not exceed 138 MPa/min (1 380 bar¹⁾/min).

5.4 Re-use of components

Parts that pass this test may be used for other tests or in production.

6 Failure pressure test (Burst)

6.1 Principle

Testing of three samples to confirm that the specified connection(s) is (are) capable of withstanding a minimum of four times the working pressure without failure.

6.2 Test equipment

Use the same equipment as in 5.2.

6.3 Procedures

Use the same procedures as in 5.3, except that the rate of pressure rise shall be constant and be chosen to reach the final pressure within 30 s to 60 s.

6.4 Re-use of components

Parts that pass this test shall not be tested further, used or returned to stock.

7 Cyclic endurance test

7.1 Principle

Testing of six samples at their respective impulse pressure to confirm that they pass a cyclic endurance test for 1 000 000 cycles without leakage or component failure.

7.2 Test equipment

Use the same equipment as in 5.2.

7.3 Procedures

7.3.1 Thread lubrication

Use the lubricant specified in 5.3.1.

7.3.2 Torques

Apply torque as specified in 5.3.2.

7.3.3 Cycle rate

The cycle rate shall be uniform at 0,5 Hz to 1,3 Hz and shall conform to the wave pattern shown in ISO 6803.

7.4 Re-use of components

Parts that pass this test shall not be tested further, used or returned to stock.

8 Vacuum test

8.1 Principle

Testing of two samples to confirm that they are capable of withstanding a vacuum of 6,5 kPa (0,065 bar) absolute pressure for 5 min without leakage.

8.2 Test equipment

Use the same equipment as specified in 5.2.

8.3 Procedure

8.3.1 Thread lubrication

Use the lubricant specified in 5.3.1.

8.3.2 Torque

Apply torque as specified in 5.3.2.

8.4 Re-use of components

Parts that pass this test may be used for other tests or in production.

9 Overtorque test

9.1 Principle

Testing of six samples to confirm that they are capable of withstanding the overtorque qualification test when tested to the overtorque values shown in their respective standards.

9.2 Test equipment

An unplated threaded steel mandrel hardened to 40 HRC to 45 HRC in accordance with ISO 6508 shall be used.

9.3 Procedure

9.3.1 Thread lubrication

Use the lubricant specified in 5.3.1.

9.3.2 Wrenching requirements

Connections shall be restrained during the test and the wrench shall be located at the threaded end of the nut hex.

9.4 Re-use of components

Parts that pass this test shall not be tested further, used or returned to stock.

10 Identification statement (Reference to this part of ISO 8434)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 8434:

"Test methods for metallic tube connections conform to ISO 8434-5:1995, Metallic tube connections for fluid power and general use — Part 5: Test methods for threaded hydraulic fluid power connections."

Annex A
(normative)

Test data form

Specifications for connection being tested: ISO standard Material type.....
 Manufacturer Test facility
 Stud end type Size.....

Proof pressure test results: min. number of samples tested = 3 Test pressure..... MPa

Sample No.	Hardness	Torque	Pressure at failure	Type of failure
1	..... HRB	..... N·m	..... MPa	.....
2	..... HRB	..... N·m	..... MPa	.....
3	..... HRB	..... N·m	..... MPa	.....

Failure test (Burst) results: min. number of samples tested = 3 Test pressure..... MPa

Sample No.	Hardness	Torque	Pressure at failure	Type of failure
1	..... HRB	..... N·m	..... MPa	.....
2	..... HRB	..... N·m	..... MPa	.....
3	..... HRB	..... N·m	..... MPa	.....

Cyclic endurance test results: min. number of samples tested = 6 Test pressure..... MPa

Sample No.	Hardness	Torque	Cycles at failure	Type of failure
1	..... HRB	..... N·m	.....	.....
2	..... HRB	..... N·m	.....	.....
3	..... HRB	..... N·m	.....	.....
4	..... HRB	..... N·m	.....	.....
5	..... HRB	..... N·m	.....	.....
6	..... HRB	..... N·m	.....	.....

Vacuum test results: min. number of samples tested = 2 Test pressure..... kPa abs.

Sample No.	Hardness	Torque	Pressure absolute	Type of failure
1	..... HRB	..... N·m	..... kPa	.....
2	..... HRB	..... N·m	..... kPa	.....

Overtorque test results: min. number of samples tested = 6 Test torque N·m

Sample No.	Nut hardness	Torque at failure	Type of failure
1	..... HRB	..... N·m	.....
2	..... HRB	..... N·m	.....
3	..... HRB	..... N·m	.....
4	..... HRB	..... N·m	.....
5	..... HRB	..... N·m	.....
6	..... HRB	..... N·m	.....

Conclusions: Pass/fail with reason for failure

.....

Dimensions (list any exceptions):.....

.....

Name (printed/typed) and signature of person certifying report:

..... Date:

Annex B
(informative)

Applicable tests for various fitting and stud end standards

Fitting and stud end standards ¹⁾	Tests per ISO 8434-5				
	Proof pressure	Failure pressure (Burst)	Cyclic endurance	Vacuum	Overtorque
Fittings					
ISO 8434-1	✓	✓			
ISO 8434-2	✓	✓			
ISO 8434-3	✓	✓	✓	✓	✓
ISO 8434-4	✓	✓			
Stud ends					
ISO 1179-2		✓	✓		
ISO 1179-3		✓	✓		
ISO 1179-4		✓	✓		
ISO 6149-2 ²⁾		✓	✓		
ISO 6149-3 ²⁾		✓	✓		
ISO 9974-2		✓	✓		
ISO 9974-3		✓	✓		
ISO 11926-2		✓	✓		
ISO 11926-3		✓	✓		
1) See annex C. 2) Preferred for new designs in hydraulic fluid power applications.					

Annex C (informative)

Bibliography

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| <p>[1] ISO 1179-2:—²⁾, <i>Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 2: Heavy-duty (S series) and light-duty (L series) stud ends with elastomeric sealing (type E).</i></p> <p>[2] ISO 1179-3:—²⁾, <i>Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 3: Light-duty (L series) stud ends with sealing by O-ring with retaining ring (types G and H).</i></p> <p>[3] ISO 1179-4:—²⁾, <i>Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 4: Stud ends for general use only with metal-to-metal sealing (type B).</i></p> <p>[4] ISO 6149-2:1993, <i>Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 2: Heavy-duty (S series) stud ends — Dimensions, design, test methods and requirements.</i></p> <p>[5] ISO 6149-3:1993, <i>Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 3: Light-duty (L series) stud ends — Dimensions, design, test methods and requirements.</i></p> <p>[6] ISO 8434-1:1994, <i>Metallic tube connections for fluid power and general use — Part 1: 24 degree compression fittings.</i></p> | <p>[7] ISO 8434-2:1994, <i>Metallic tube connections for fluid power and general use — Part 2: 37 degree flared fittings.</i></p> <p>[8] ISO 8434-3:1995, <i>Metallic tube connections for fluid power and general use — Part 3: O-ring face seal fittings.</i></p> <p>[9] ISO 8434-4:1995, <i>Metallic tube connections for fluid power and general use — Part 4: 24 degree cone connectors with O-ring weld-on nipples.</i></p> <p>[10] ISO 9974-2:—²⁾, <i>Connections for general use and fluid power — Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal sealing — Part 2: Stud ends with elastomeric sealing (type E).</i></p> <p>[11] ISO 9974-3:—²⁾, <i>Connections for general use and fluid power — Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal sealing — Part 3: Stud ends with metal-to-metal sealing (type B).</i></p> <p>[12] ISO 11926-2:1995, <i>Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing — Part 2: Heavy-duty (S series) stud ends.</i></p> <p>[13] ISO 11926-3:1995, <i>Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing — Part 3: Light duty (L series) stud ends.</i></p> |
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²⁾ To be published.

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