

FINAL
DRAFT

INTERNATIONAL
STANDARD

ISO/FDIS
19879

ISO/TC 131/SC 4

Secretariat: ANSI

Voting begins on:
2020-12-09

Voting terminates on:
2021-02-03

Metallic tube connections for fluid power and general use — Test methods for hydraulic fluid power connections

Raccords de tubes métalliques pour transmissions hydrauliques et pneumatiques et applications générales — Méthodes d'essai pour raccords pour transmissions hydrauliques

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Reference number
ISO/FDIS 19879:2020(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459/SC 10, *Steel tubes, and iron and steel fittings*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 19879:2010), which has been technically revised.

The main changes compared to the previous edition are as follows:

- clarification of the language used to describe the connector end, and of the proper method for selecting tubes for test assemblies;
- minor changes to [10.1](#), [10.2](#) (Table 7) and [12.2.2](#).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. It is suggested that components 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 conformance with the stated requirements.

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Metallic tube connections for fluid power and general use — Test methods for hydraulic fluid power connections

1 Scope

This document specifies uniform methods for the testing and performance evaluation of metallic tube connections, stud ends for ports and flange connections for use in hydraulic fluid power applications. This document does not apply to the testing of hydraulic quick-action couplings, which is covered by ISO 18869.

Tests outlined in this document are independent of each other and document the method to follow for each test. See the appropriate component International Standard for indications of which tests to conduct and for performance criteria.

For qualification of the connector, the minimum number of samples specified in this document is tested, unless otherwise specified in the relevant connector standard or as agreed upon by the manufacturer and the user.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 48-2, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 2: Hardness between 10 IRHD and 100 IRHD*

ISO 3448, *Industrial liquid lubricants — ISO viscosity classification*

ISO 3601-3, *Fluid power systems — O-rings — Part 3: Quality acceptance criteria*

ISO 5598, *Fluid power systems and components — Vocabulary*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 6605, *Hydraulic fluid power — Test methods for hoses and hose assemblies*

ISO 6743-4, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

ISO 10763, *Hydraulic fluid power — Plain-end, seamless and welded precision steel tubes — Dimensions and nominal working pressures*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 General requirements

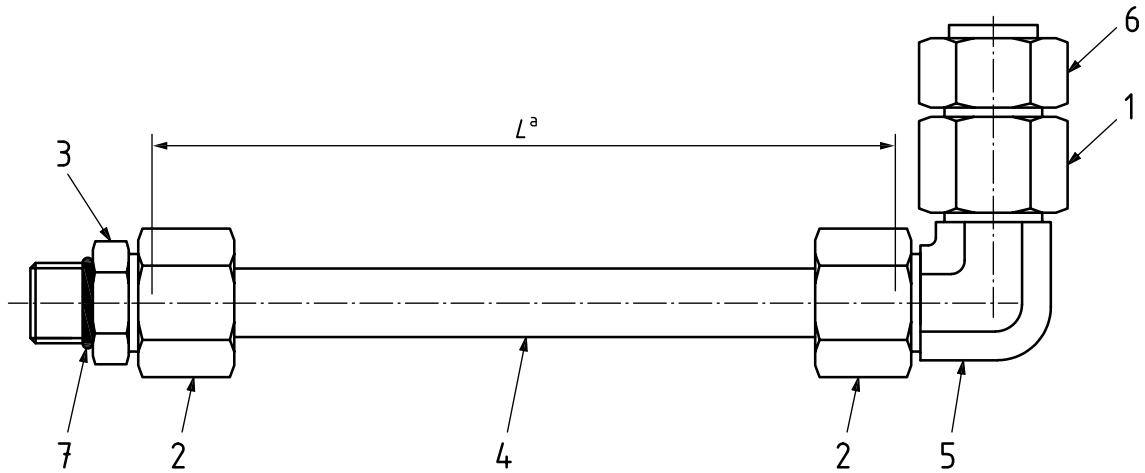
WARNING — Some of the tests described in this document are considered hazardous. It is, therefore, essential that, in conducting these tests, all appropriate safety precautions be strictly adhered to. Attention is drawn to the danger of burst, fine jets (which can penetrate the skin) and energy release 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, utilizing appropriate personal protective equipment (PPE).

4.1 Test assemblies

All components tested shall be in the final form, including annealed nuts, as required for brazed components. Unless otherwise specified in the respective connector standard, Type 1 test assemblies shall be as shown in [Figure 1](#) for tube connections, and Type 2 test assemblies shall be as shown in [Figure 2](#) for male stud ends. Alternatively, in order to test the connector to its full capability, use of the metallic tube may be omitted for burst and cyclic endurance tests, and different configurations with similar capability may be combined in a test assembly Type 3, as shown in [Figure 3](#). Type 4 test assemblies for flange connectors shall be as shown in [Figure 4](#). Test assemblies shall conform to the relevant requirements given in [Table 1](#).

Table 1 — Requirements for test assemblies

Part code	Part name	Description and further information
A	Straight stud connector	The type of stud end, tube-connector end and sealing method is optional but shall be recorded in the test report.
B	Metallic tube	The required tube wall thickness shall be selected according to the working pressure rating of the respective connector. The working pressure of the tube in accordance with ISO 10763 shall be equal to or slightly greater than the working pressure of the respective connector. The length of the tube shall be five times the tube outside diameter plus 50 mm.
C	Shaped connector, with swivel, if applicable	—
D	Blanking end (cap or plug)	—
E	Shaped connector with adjustable stud end	—
F	Flange connector	—
G	Sealing	e.g. O-ring.



Key

- 1 swivel nut
- 2 tube nut
- 3 straight stud connector
- 4 metallic tube
- 5 shaped connector
- 6 blanking end (cap or plug)
- 7 sealing, e.g. O-ring

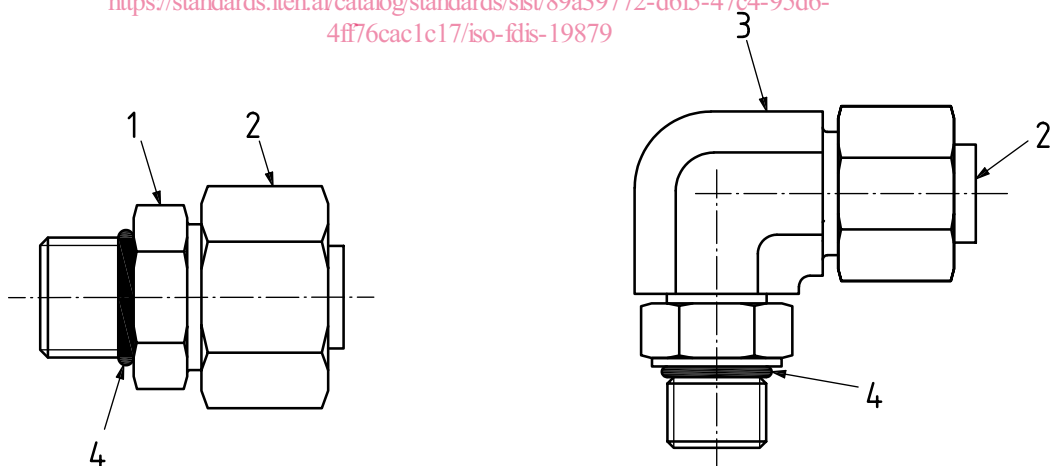
^a $L = 5 \times \text{the tube OD (in millimetres)} + 50 \text{ mm.}$

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Figure 1 — Typical test assembly for tube connection — Type 1

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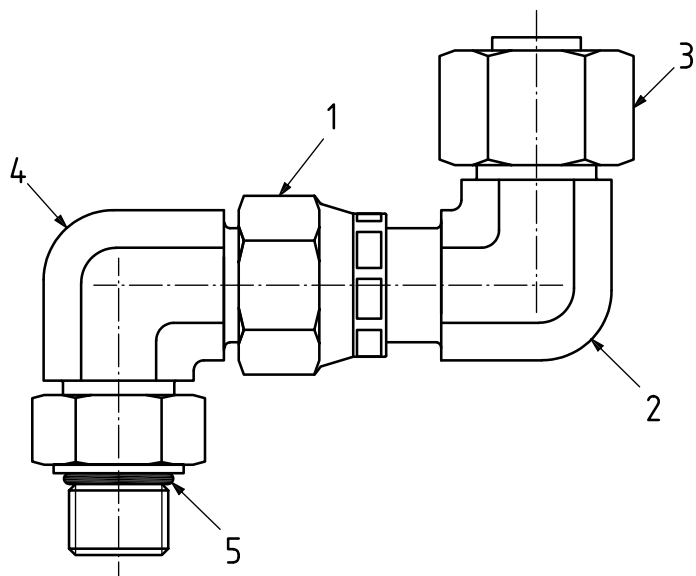
a) Non-adjustable stud end connection

b) Adjustable stud end connection, with shaped connector, if applicable

Key

- 1 straight stud connector
- 2 blanking end (cap or plug)
- 3 shaped connector with adjustable stud end
- 4 sealing, e.g. O-ring

Figure 2 — Typical test assembly for stud end — Type 2



Key

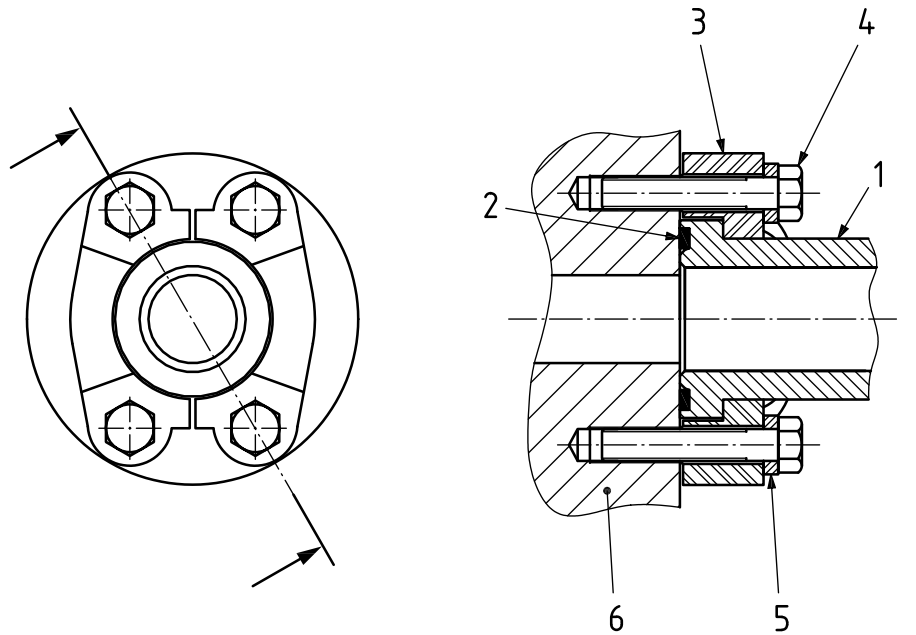
- 1 swivel nut
- 2 shaped connector with swivel
- 3 blanking end (cap or plug)
- 4 shaped connector with adjustable stud end
- 5 sealing, e.g. O-ring

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Figure 3 — Typical test assembly without tube — Type 3

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Key

- 1 flange connector
- 2 Sealing, e.g. O-ring
- 3 split-flange clamp
- 4 screw
- 5 washer
- 6 test block
- a This end capped or plugged.

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Figure 4 — Typical test assembly for flange connectors — Type 4

4.2 Test equipment

4.2.1 Test block

Test blocks shall be unplated and have a minimum hardness of 35 HRC in accordance with ISO 6508-1. For a test block with multiple ports, 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.

4.2.2 Test seals

For all tests, except for the overtightening test and unless otherwise specified, seals shall be nitrile (NBR) rubber with a hardness of (90 ± 5) IHRD when measured in accordance with ISO 48-2. 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.

4.3 Procedure

4.3.1 Thread lubrication

For all tests, on connectors made of carbon steel and for testing only, threads and contact surfaces shall be lubricated prior to application of torque using a hydraulic fluid with a viscosity of ISO VG 32 in