
**Connections for fluid power and general
use — Ports and stud ends with ISO 261
metric threads and O-ring sealing —**

Part 4:

**Dimensions, design, test methods and
requirements for external hex and
internal hex port plugs**

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*Raccordements pour transmissions hydrauliques et applications
générales — Orifices et éléments mâles à filetage métrique ISO 261 et
joint torique*

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*(Partie 4: Dimensions, conception, méthodes d'essai et exigences des
bouchons d'orifice à six pans externes et à six pans internes*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6149-4 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components*.

ISO 6149 consists of the following parts, under the general title *Connections for fluid power and general use — Ports and stud ends with ISO 261 metric threads and O-ring sealing*

- *Part 1: Ports with truncated housing for O-ring seal*
- *Part 2: Dimensions, design, test methods and requirements for heavy-duty (S series) stud ends*
- *Part 3: Dimensions, design, test methods and requirements for light-duty (L series) stud ends*
- *Part 4: Dimensions, design, test methods and requirements for external hex and internal hex port plugs*

Introduction

In fluid power systems, power is transmitted and controlled through a fluid (liquid or gas) under pressure within an enclosed circuit. In general applications, a fluid can be conveyed under pressure.

Components are connected through their threaded ports by stud ends on fluid conductor connectors to tubes and pipes or to hose fittings and hoses. Fluid ports are closed by inserting a plug in the port.

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Connections for fluid power and general use — Ports and stud ends with ISO 261 metric threads and O-ring sealing —

Part 4: Dimensions, design, test methods and requirements for external hex and internal hex port plugs

1 Scope

This part of ISO 6149 specifies dimensions and performance requirements for external hex and internal hex port plugs for use with ISO 6149-1 ports.

Port plugs in accordance with this part of ISO 6149 can be used at working pressures up to 63 MPa (630 bar¹). The permissible working pressure depends upon the plug end size, materials, design, working conditions, application, etc.

Conformance to the dimensional information in this part of ISO 6149 does not guarantee rated performance. It is necessary that each manufacturer perform testing according to the specification contained in this part of ISO 6149 to assure that components comply with the performance ratings.

2 Normative references

The following referenced documents are indispensable for the application 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, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IHRD)*

ISO 261:1998, *ISO general-purpose metric screw threads — General plan*

ISO 1629, *Rubber and latices — Nomenclature*

ISO 3601-3:2005, *Fluid power systems — O-rings — Part 3: Quality acceptance criteria*

ISO 4042, *Fasteners — Electroplated coatings*

ISO 4759-1:2000, *Tolerances for fasteners — Part 1: Bolts, screws, studs and nuts — Product grades A, B and C*

ISO 5598², *Fluid power systems and components — Vocabulary*

ISO 6149-1, *Connections for fluid power and general use — Ports and stud ends with ISO 261 metric threads and O-ring sealing — Part 1: Ports with truncated housing for O-ring seal*

1) 1 bar = 0,1 MPa = 10⁵ Pa; 1 MPa = 1 N/mm².

2) To be published. (Revision of ISO 5598:1985)

ISO 6149-2, *Connections for fluid power and general use — Ports and stud ends with ISO 261 metric threads and O-ring sealing — Part 2: Dimensions, design, test methods and requirements for heavy-duty (S series) stud ends*

ISO 7789, *Hydraulic fluid power — Two-, three- and four-port screw-in cartridge valves — Cavities*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

ISO 19879, *Metallic tube connections for fluid power and general use — Test methods for hydraulic fluid power connections*

3 Terms and definitions

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

3.1

plug

stud end with no through hole for fluid passage, used to contain hydraulic fluid.

4 Dimensions

4.1 Plug dimensions

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External hex and internal hex plugs shall conform to the dimensions shown in Figures 1 and 2 and given in Tables 1 and 2, respectively.

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4.2 Hex tolerances

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External hex tolerances across flats shall be in accordance with ISO 4759-1:2000, product grade C. Minimum across corner dimensions are 1,092 times the nominal width across flats. The minimum side flat is 0,43 times the nominal width across flats. Internal hex tolerances across flats shall be in accordance with ISO 4759-1:2000, product grade A. External hex corners shall be chamfered 10° to 30° to a diameter equal to the width across flats, with a tolerance of $\begin{matrix} 0 \\ -0,4 \end{matrix}$ mm.

4.3 Screw threads

The screw threads on the plug shall be metric screw threads conforming to ISO 261:1998, class 6g.

5 Requirements

5.1 Working pressures and working temperatures

External hex and internal hex plugs conforming to this part of ISO 6149 shall be suitable for use at the working pressures given in Table 3 when used at temperatures between –40 °C and +120 °C. For use at pressures and/or temperatures outside of this range, the manufacturer shall be consulted.

Plugs conforming to this part of ISO 6149 may contain elastomeric seals. Unless otherwise specified, plugs are made and delivered with elastomeric seals for use within the specified working temperature range with petroleum-based hydraulic fluids. The use of these plugs and elastomeric seals with other hydraulic fluids can result in a reduced working temperature range or can render the plugs unsuitable for the application. Manufacturers may supply, upon request, plugs with elastomeric seals for use with hydraulic fluids other than petroleum-based hydraulic fluids that meet the specified working temperature range of the plugs.

5.2 Performance

External hex and internal hex plugs conforming to this part of ISO 6149 shall meet the burst and impulse pressures given in Table 3, and shall be capable of withstanding a vacuum of 6,5 kPa (0,065 bar) absolute pressure when tested in accordance with Clause 7.

6 O-rings

Unless otherwise specified, for use at the pressure and temperature requirements in 5.1 and Table 3 and for testing, the O-rings shall

- be made of NBR (nitrile) with a hardness of (90 ± 5) IRHD, measured in accordance with ISO 48,
- conform to the dimensions shown in Figure 3 and given in Table 4, and
- meet or exceed the O-ring quality acceptance criteria for grade N of ISO 3601-3:2005.

Tolerances on O-ring dimensions shall be in accordance with ISO 6149-2.

7 Test methods

Port plug tests shall be conducted in accordance with ISO 19879 for burst, cyclic endurance (impulse) and vacuum. The qualification test torques given in Table 5 shall be used in testing. Test results shall be reported on the test data form in ISO 19879.

8 Designation of port plugs ISO 6149-4:2006

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Port plugs shall be designated by an alphanumeric code to facilitate ordering. They shall be designated by the word "Plug", then a space, followed by ISO 6149-4, then a hyphen, followed by the shape code PLEH for external hex or PLIH for internal hex, followed a hyphen, followed by the plug size, followed by the O-ring code NBR for plugs delivered with an O-ring that conforms to the requirements of Clause 6. If desired, the code may be supplemented by a hyphen followed by the plating code in accordance with ISO 4042 or ISO 10683, followed by hyphen, followed by the O-ring material code in accordance with ISO 1629.

EXAMPLE 1 Plug with an external hex for an ISO 6149-1 port size M12 × 1,5 shall be designated as follows:

Plug ISO 6149-4-PLEH-M12

EXAMPLE 2 Plug with an external hex for an ISO 6149-1 port size M12 × 1,5, ordered assembled with an O-ring that conforms to the requirements of Clause 6 shall be designated as follows:

Plug ISO 6149-4-PLEH-M12-NBR

EXAMPLE 3 Plug with an external hex for an ISO 6149-1 port size M12 × 1,5, ordered assembled with an O-ring that conforms to the requirements of Clause 6 but made of FKM instead of NBR shall be designated as follows:

Plug ISO 6149-4-PLEH-M12-FKM

EXAMPLE 4 Plug with an external hex for an ISO 6149-1 port size M12 × 1,5, ordered galvanized zinc coated in accordance with ISO 4042 and assembled with an O-ring that conforms to the requirements of Clause 6 but made of FKM instead of NBR shall be designated as follows:

Plug ISO 6149-4-PLEH-M12-A3C-FKM