INTERNATIONAL STANDARD

ISO 12151-4

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Connections for hydraulic fluid power and general use — Hose fittings —

Part 4: Hose fittings with ISO 6149 metric stud ends

Raccordements pour transmissions hydrauliques et applications générales — Flexibles de raccordement —

Partie 4: Flexibles avec éléments mâles métriques conformes à l'ISO 6149

Reference number
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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 12151-4 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components*.

ISO 12151 consists of the following parts, under the general title *Connections for hydraulic fluid power and general use — Hose fittings*:

— *Part 1: Hose fittings with ISO 8434-3 O-ring face seal ends*

— *Part 2: Hose fittings with ISO 8434-1 and 8434-4 24° cone connector ends with O-rings*

— *Part 3: Hose fittings with ISO 6162-1 or ISO 6162-2 flange ends*

— *Part 4: Hose fittings with ISO 6149 metric stud ends*

— *Part 5: Hose fittings with ISO 8434-2 37° flared ends*

— *Part 6: Hose fittings with ISO 8434-6 60° cone ends*

Introduction

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

Components are connected through their ports by stud ends on fluid conductor connectors to tubes and pipes or to hose fittings and hoses.

Connections for hydraulic fluid power and general use — Hose fittings —

Part 4: Hose fittings with ISO 6149 metric stud ends

1 Scope

This part of ISO 12151 specifies the general and dimensional requirements for the design and performance of ISO 6149 metric stud-end hose fittings made of carbon steel, for nominal hose inside diameters of 6,3 mm through 38 mm inclusive, in accordance with ISO 4397.

NOTE 1 Other materials can be supplied as agreed between the manufacturer and user.

NOTE 2 Method of attachment of fitting to hose is optional, for example, permanent, field-attachable, push-on, beaded, etc. Also included is a 90° elbow hose fitting suitable for hose connections made with or without hose clamps in relatively low-pressure applications.

NOTE 3 See ISO 4038 and ISO 4039 for hose fittings used in hydraulic and pneumatic braking systems on road vehicles (as defined in the scope of ISO/TC 22).

These hose fittings (see Figure 1 for a typical example) are for use in hydraulic fluid power systems with hose that meets the requirements of the respective hose standards and in general applications with suitable hoses.

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

ISO 4397, *Fluid power systems and components — Connectors and associated components — Nominal outside diameters of tubes and nominal inside diameters of hoses*

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

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

ISO 6149-2, *Connections for hydraulic 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 6149-3, *Connections for hydraulic fluid power and general use — Ports and stud ends with ISO 261 metric threads and O-ring sealing — Part 3: Dimensions, design, test methods and requirements for light-duty (L series) stud ends*

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

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

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

3 Terms and definitions

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

4 Performance requirements

Hose assemblies shall meet the performance requirements specified in the appropriate hose specification without leakage or failure when tested in accordance with ISO 6605.

The working pressure of the hose assembly shall be the lower of the pressures for that size given in ISO 6149-2 or ISO 6149-3 for the end connection or in the relevant hose specification.

The working pressure of the hose fitting shall be verified through testing conducted in accordance with ISO 19879, but the entire hose assembly shall be tested in accordance with ISO 6605. During the cyclic endurance test, the hose fitting shall be subjected to the number of cycles specified in the relevant hose specification.

5 Designation of hose fittings

5.1 Hose fittings shall be designated by an alphanumeric code to facilitate ordering. They shall be designated by the words “Hose fitting”, followed by “ISO 12151-4”, followed by a spaced hyphen, then the connection-end type and shape letter symbols, followed by another spaced hyphen and the stud-end series letter, and the stud-end thread size in accordance with ISO 6149-2 or ISO 6149-3 and the hose size (nominal hose inside diameter in accordance with ISO 4397), each separated by a multiplication symbol (×).

EXAMPLE A 90° elbow hose fitting with a M18 × 1,5 mm thread stud end in accordance with ISO 6149-3 and 12,5 mm nominal ID hose is designated as follows:

Hose fitting ISO 12151-4 - SDE - LM18 × 12,5

5.2 The following letter symbols shall be used:

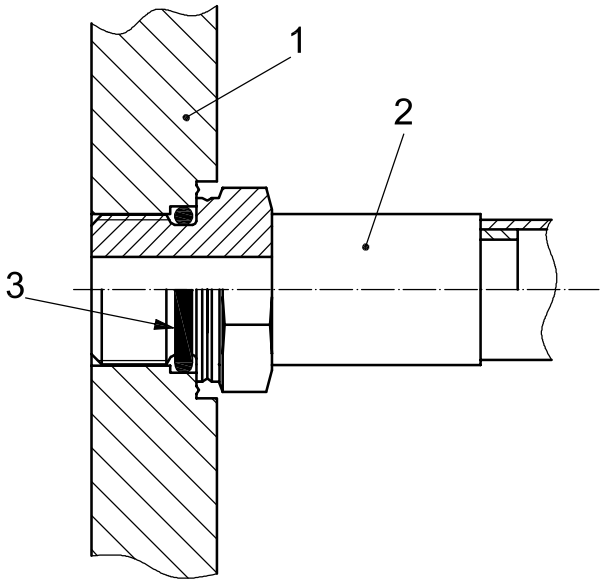
Connection- end type	Symbol
Stud	SD

Shape	Symbol
Straight	S
90° elbow	E

Series	Symbol
ISO 6149-2	S
ISO 6149-3	L

6 Design

6.1 Figure 1 shows a typical example of a hose fitting with ISO 6149-2 and ISO 6149-3 metric stud end.



Key

1 ISO 6149-1 port
2 Hose fitting
3 Stud end with O-ring seal in accordance with ISO 6149-2 or ISO 6149-3

Figure 1 — Typical example of hose fitting connection with metric stud end

6.2 Hose fitting dimensions shown in Figures 2 and 3 shall conform to those given in Tables 1 and 2 and to the relevant dimensions given in ISO 6149-2 or ISO 6149-3.

6.3 Hex tolerances across flats shall be in accordance with ISO 4759-1:2000, product grade C.

6.4 The angular tolerance on axis of ends of elbows shall be ± 3° for all sizes.

6.5 Details of contour shall be as chosen by the manufacturer, provided the dimensions given in Tables 1 and 2 are maintained.

6.6 The screw threads on the connection stud ends of the hose fittings shall be metric screw threads in accordance with ISO 261.

7 Manufacture

7.1 Construction

Hose fittings may be forged, cold-formed, machined from barstock or manufactured from multiple components.

7.2 Workmanship

Workmanship shall conform to the best commercial practice to produce high quality hose fittings. Hose fittings shall be free from visual contaminants, all hanging burrs, loose scale and slivers that can be dislodged in use and any other defects that might affect the function of the parts. All machined surfaces shall have a surface roughness value, $Ramax$, of 6,3 µm, except where otherwise specified.

7.3 Finish

The external surface and threads of all carbon steel parts shall be plated or coated with a suitable material that passes a 72 h neutral salt spray test in accordance with ISO 9227, unless otherwise agreed upon by the manufacturer and the user. Any appearance of red rust during the salt spray test on any area, except those noted below, shall render that part a failure:

— all internal fluid passages;

— edges, such as hex points, serrations and crests of threads where there can be mechanical deformation of the plating or coating typical of mass-produced parts or shipping effects;

— areas where there is mechanical deformation of the plating or coating caused by crimping, flaring, bending and other post-plate metal forming operations;

— areas where the parts are suspended or affixed in the test chamber where condensate can accumulate.

Internal fluid passages shall be protected from corrosion during storage.

NOTE Cadmium plating is not preferred due to environmental concerns. Changes in plating can affect assembly torques and require requalification, when applicable.

7.4 Protection

By a method agreed upon between manufacturer and purchaser, the face of the hose fittings shall be protected by the manufacturer from nicks and scratches that would be detrimental to the function of the hose fitting. Passages shall be securely covered to prevent contamination by dirt or other polluants.

8 Procurement information

The following information should be supplied by the purchaser when making an inquiry or placing an order:

— description of hose fitting (using designation in accordance with Clause 5);

— material of hose fitting (if other than carbon steel);

— hose type and size;

— fluid to be conveyed;

— working pressure;

— working temperatures (both ambient and fluid).

9 Marking

Hose fittings shall be permanently marked with the manufacturer's name or trademark.

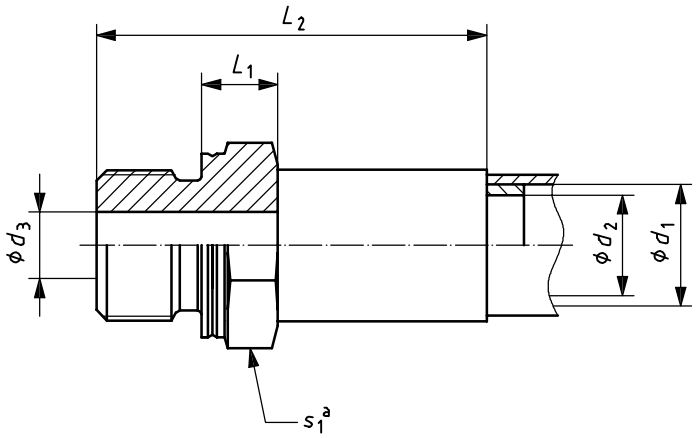
10 Assembly

Annex A provides guidance on the assembly of hose fittings that conform to this part of ISO 12151.

11 Identification statement (reference to this part of ISO 12151)

It is strongly recommended to manufacturers who have chosen to conform to this part of ISO 12151 that the following statement be used in test reports, catalogues and sales literature:

"Metric stud-end hose fittings produced in accordance with ISO 12151-4:2007, *Connections for hydraulic fluid power and general use — Hose fittings — Part 4: Hose fittings with ISO 6149 metric stud ends*."



NOTE 1 Connection details in accordance with ISO 6149-2 or ISO 6149-3.

NOTE 2 Method of attachment of fitting to hose is optional.

[a] Across flats.

Figure 2 — Straight stud hose fitting (SDS)

Table 1 — Dimensions of straight stud hose fittings (SDS)

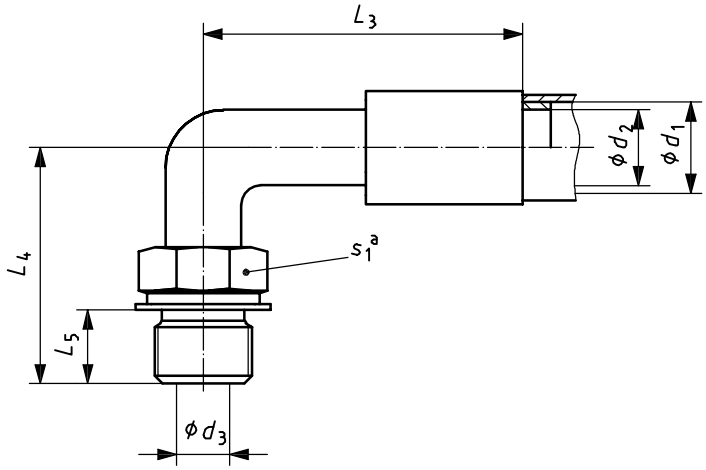
Dimensions in millimetres

Hose fitting size	Thread	Hose size d_1	d_2 [a] min.	d_3 [b] max.		L_1 min.	L_2 [c] max.	s_1 hex
				S series	L series			
M12 × 6,3	M12 × 1,5	6,3	3	4,18	6,18	9	61,5	17
M14 × 8	M14 × 1,5	8	5	6,18	7,68	10	67,5	19
M16 × 10	M16 × 1,5	10	6	7,22	9,22	11	73	22
M18 × 12,5	M18 × 1,5	12,5	8	9,22	11,22	12	82,5	24
M22 × 16	M22 × 1,5	16	11	12,27	14,27	13	90	27
M27 × 19	M27 × 2	19	14	15,27	18,27	15	98,5	32
M33 × 25	M33 × 2	25	19	20,33	23,33	18	106	41
M42 × 31,5	M42 × 2	31,5	25	26,33	30,33	20	128,5	50
M48 × 38	M48 × 2	38	31	32,39	36,39	21	161	55

[a] Minimum diameter at any point through the hose fitting prior to assembly to the hose. The diameter after assembly shall not be less than $0{,}9d_2$.

[b] Dimension d_3 is in accordance with ISO 6149-2 or ISO 6149-3, except the minimum diameter for d_3 shall not be less than d_2. Transition between diameters d_2 (hose nipple through diameter) and d_3 (through diameter of the stud end) shall be located to minimize stress concentration.

[c] Dimension L_2 is measured after assembly.



NOTE 1 Connection details in accordance with ISO 6149-3.

NOTE 2 Method of attachment of fitting to hose is optional.

NOTE 3 Only suitable for applications where the hose can be attached after the hose fitting is installed.

[a] Across flats.

Figure 3 — Adjustable 90° stud elbow (SDE)

Table 2 — Dimensions of 90° adjustable stud elbow hose fittings (SDE)

Dimensions in millimetres

Hose fitting size	**Thread**	**Hose size** d_1	d_2 [a] min.	d_3 [b] L series max.	L_3 [c] max.	L_4 ref.	L_5 ± 1	s_1 hex
M12 × 6,3	M12 × 1,5	6,3	3	6,18	41	30,5	11,1	17
M14 × 8	M14 × 1,5	8	5	7,68	43	33,5	11,1	19
M16 × 10	M16 × 1,5	10	6	9,22	43	38	11,6	22
M18 × 12,5	M18 × 1,5	12,5	8	11,22	45	40	12,6	24
M22 × 16	M22 × 1,5	16	11	14,27	57	42,5	12,8	27
M27 × 19	M27 × 2	19	14	18,27	60	51	15,8	32
M33 × 25	M33 × 2	25	19	23,33	65	53	15,8	41
M42 × 31,5	M42 × 2	31,5	25	30,33	70	58	15,8	50
M48 × 38	M48 × 2	38	31	36,39	77	63,5	17,3	55

[a] Minimum diameter at any point through the hose fitting prior to bending and/or assembly to the hose. The diameter after bending and/or assembly should not be less than $0{,}9d_2$.

[b] Dimension d_3 is in accordance with ISO 6149-2 or ISO 6149-3, except the minimum diameter for d_3 shall not be less than d_2.

[c] Dimension L_3 is measured after assembly.

Annex A
(informative)

Instructions for assembling hose fittings in ISO 6149-1 straight thread O-ring port

A.1 To protect the sealing surfaces and prevent contamination of the system by dirt or other polluants, do not remove the protective caps and/or plugs until it is time to assemble the components.

A.2 Prior to assembly, remove protective caps and/or plugs and inspect the connector and the port to ensure both mating parts are free of burrs, nicks, scratches or any foreign material.

A.3 If O-ring is not present, install O-ring on the port end of the connector using a proper O-ring installation tool, taking care not to cut or nick the O-ring.

A.4 Lubricate the O-ring with a light coat of system fluid or compatible oil.

A.5 **Position 1** (see Figure A.1) — The O-ring should be located in the groove adjacent to the face of the back-up washer. The washer and O-ring should be positioned at the extreme top end of the groove as shown.

A.6 **Position 2** (see Figure A.1) — Position the locknut to just touch the back-up washer as shown. The locknut in this position eliminates potential damage to the back-up washer during the next step.

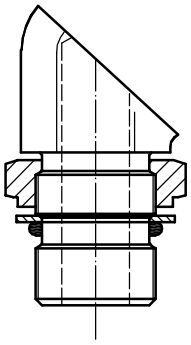
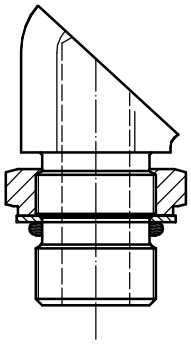
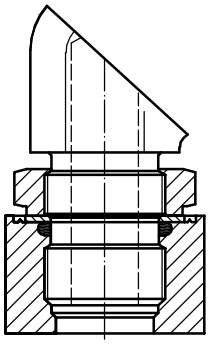
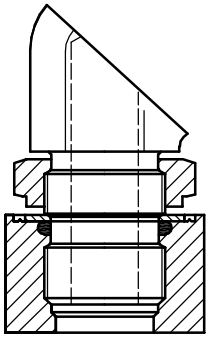
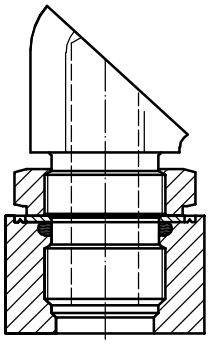
A.7 **Position 3** (see Figure A.1) — Install the connector into the port until the back-up washer contacts the face of the port as shown.

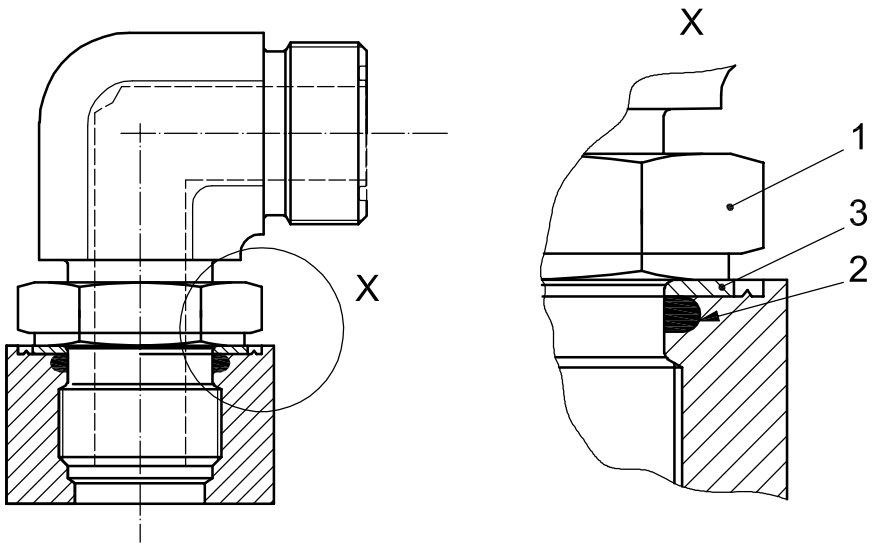
CAUTION — Overtightening beyond contact can cause damage to the back-up washer if the washer is not supported by the locknut.

A.8 **Position 4** (see Figure A.1) — Adjust the connector to the proper position by turning counter clockwise up to a maximum of one turn as shown to provide proper alignment with the mating connector, tube assembly or hose assembly.

A.9 **Position 5** (see Figure A.1) — Using two wrenches, use the backup wrench to hold the connector in the desired position and then use the torque wrench to the tighten the locknut to the appropriate torque level given by the manufacturer.

A.10 Visually inspect, where possible, the joint to ensure the O-ring is not pinched or bulging out from under the washer and that the backup washer is properly seated flat against the face of the port. See Figure A.1 for an illustration of a correct final assembly.

				
Position 1 — Locknut and washer backed off with O-ring in position	**Position 2 —** Locknut in position to protect the back-up washer from damage during installation into the port	**Position 3 —** Hand tightened into port until back-up washer contacts port face	**Position 4 —** Connector backed off for alignment to mating connector, tube assembly or hose assembly	**Position 5 —** Connector tightened to final position



Key

1 locknut
2 O-ring
3 back-up washer

Figure A.1 — Illustrations of positions 1 through 5 or a correct final assembly of adjustable stud end

Bibliography

[1] ISO 1436-1, *Rubber hoses and hose assemblies — Wire-braid-reinforced hydraulic types — Specification — Part 1: Oil-based fluid applications*

[2] ISO 3862-1, *Rubber hoses and hose assemblies — Rubber-covered spiral-wire-reinforced hydraulic types — Specification — Part 1: Oil-based fluid applications*

[3] ISO 3949, *Plastics hoses and hose assemblies — Textile-reinforced types for hydraulic applications — Specification*

[4] ISO 4038, *Road vehicles — Hydraulic braking systems — Simple flare pipes, tapped holes, male fittings and hose end fittings*

[5] ISO 4039-1, *Road vehicles — Pneumatic braking systems — Part 1: Pipes, male fittings and tapped holes with facial sealing surface*

[6] ISO 4039-2, *Road vehicles — Pneumatic braking systems — Part 2: Pipes, male fittings and holes with conical sealing surface*

[7] ISO 4079-1, *Rubber hoses and hose assemblies — Textile-reinforced hydraulic types — Specification — Part 1: Oil-based fluid applications*

[8] ISO 6149-1, *Connections for hydraulic 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*

[9] ISO 11237-1, *Rubber hoses and hose assemblies — Wire-braid-reinforced compact types for hydraulic applications — Specification — Part 1: Oil-based fluid applications*

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