
**Metallic tube connections for fluid power
and general use —**

**Part 1:
24° cone connectors**

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

Partie 1: Raccords coniques à 24°

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Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	3
4 Materials	4
4.1 General.....	4
4.2 Connector bodies	5
4.3 Nuts	5
4.4 Cutting rings.....	5
4.5 O-rings	5
5 Pressure/temperature requirements.....	5
6 Designation of connectors	10
7 Requirements for tubes	12
8 Across-flats dimensions and tolerances	12
9 Design	12
9.1 Connectors	12
9.2 Dimensions.....	12
9.3 Passage tolerances	12
9.4 Angular tolerances	13
9.5 Contour details.....	13
9.6 Ports and stud ends	13
9.7 Stud end sealing	13
10 Screw threads	13
10.1 Cone ends and nuts.....	13
10.2 Stud ends (connection ends)	13
11 Manufacture.....	13
11.1 Construction.....	13
11.2 Workmanship	14
11.3 Finish	14
11.4 Corners	14
12 Assembly instruction	14
13 Procurement information	15
14 Marking of components	15
15 Performance and qualification test.....	15
15.1 General.....	15
15.2 Repeated assembly test.....	15
15.3 Proof test	15
15.4 Burst pressure test.....	15
15.5 Cyclic endurance (impulse) test.....	15
15.6 Vibration test	15
15.7 Leakage (gas) test.....	16
15.8 Overtightening test.....	16
16 Identification statement (reference to this part of ISO 8434)	16
Bibliography	46

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 8434-1 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components*.

This second edition of ISO 8434-1 cancels and replaces ISO 8434-1:1994 and ISO 8434-4:1995, of which it constitutes a technical revision.

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

- Part 1: 24° cone connectors
- Part 2: 37° flared connectors
- Part 3: O-ring face seal connectors
- Part 6: 60° cone connectors with or without O-ring

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 may be conveyed under pressure.

Components may be connected through their ports by connections (connectors) and conductors (tubes and hoses). Tubes are rigid conductors; hoses are flexible conductors.

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Metallic tube connections for fluid power and general use —

Part 1: 24° cone connectors

1 Scope

This part of ISO 8434 specifies the general and dimensional requirements for 24° cone connectors using cutting ring and O-ring seal cone (referred to as DKO) suitable for use with ferrous and non-ferrous tubes with outside diameters from 4 mm to 42 mm inclusive. These connectors are for use in fluid power and general applications within the limits of pressure and temperature specified in this part of ISO 8434.

They are intended for the connection of plain end tubes and hose fittings to ports in accordance with ISO 6149-1, ISO 1179-1 and ISO 9974-1. (See ISO 12151-2 for related hose fitting specification.)

These connectors provide full-flow connections in hydraulic systems operating to the working pressures shown in Table 1. Because many factors influence the pressure at which a system performs satisfactorily, these values are not to be understood as guaranteed minimums. For every application, sufficient testing will need to be conducted and reviewed by both the user and manufacturer to ensure that required performance levels are met.

NOTE 1 For new designs in hydraulic fluid power applications, see the requirements given in 9.6. Where the requirements of the application allow for the use of elastomeric seals, connector designs that conform to International Standards and incorporate elastomeric sealing are preferred.

NOTE 2 For use under conditions outside the pressure and/or temperature limits specified, see 5.4.

This part of ISO 8434 also specifies a performance and qualification test for these connectors.

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 IRHD)*

ISO 228-1:2000, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

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

ISO 965-1:1998, *ISO general-purpose metric screw threads — Tolerances — Part 1: Principles and basic data*

ISO 1127, *Stainless steel tubes — Dimensions, tolerances and conventional masses per unit length*

ISO 1179-1, *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports*

ISO 1179-2, *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)*

ISO 1179-4, *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)*

ISO 3304, *Plain end seamless precision steel tubes — Technical conditions for delivery*

ISO 3305, *Plain end welded precision steel tubes — Technical conditions for delivery*

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

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

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

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*

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 (5 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 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 9974-1, *Connections for general use and fluid power — Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports*

ISO 9974-2, *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)*

ISO 9974-3, *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)*

ISO 12151-2, *Connections for hydraulic fluid power and general use — Hose fittings — Part 2: Hose fittings with ISO 8434-1 and ISO 8434-4 24° cone connector ends with O-rings*

ISO 19879:2005, *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 and the following apply.

3.1

connector

connection

leak-proof device used to connect pipelines (conductors) to one another or to equipment

NOTE Adapted from ISO 5598:1985, definition 5.2.2.

3.2

fastening thread

terminal thread of a complete connector

3.3

run

two principal, axially aligned outlets of a tee or cross

3.4

branch

side outlet(s) of a tee or cross

3.5

chamfer

removal of a conical portion at the entrance of a thread, used to assist assembly and prevent damage to the start of the thread

3.6

face-to-face dimension

distance between the two parallel faces of axially aligned outlets of a connector

3.7

face-to-centre dimension

distance from the face of an outlet to the central axis of an angularly disposed outlet

3.8

assembly torque

torque to be applied in order to achieve a satisfactory final assembly

3.9

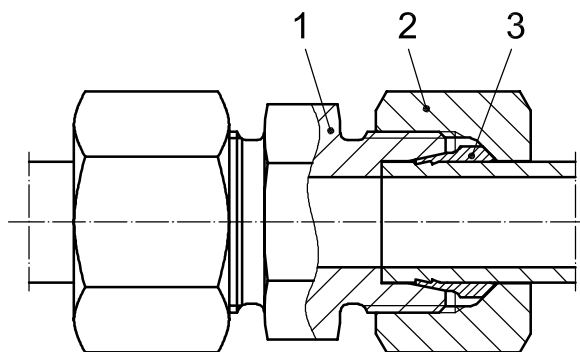
maximum working pressure

highest pressure at which the system or part of the system is intended to operate in steady-state conditions

4 Materials

4.1 General

Figures 1 and 2 show the cross-sections and component parts of typical 24° cone connectors.

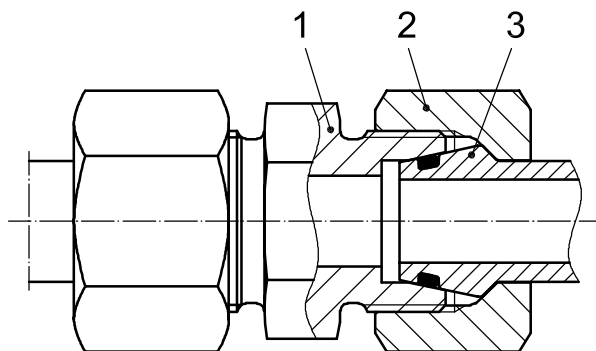


Key

- 1 body
- 2 nut
- 3 cutting ring

Figure 1 — Cross-section of typical 24° cone connector with cutting ring

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Key

- 1 body
- 2 nut
- 3 DKO-end (including O-ring)

Figure 2 — Cross-section of typical 24° cone connector with O-ring seal cone (DKO) end

4.2 Connector bodies

Bodies shall be manufactured from carbon steel that will provide the minimum pressure/temperature requirements specified in Clause 5. They shall have characteristics that make them suitable for use with the fluid to be conveyed and that will provide an effective joint. Weld connector types and weld-on nipples shall be made of materials classified as suitable for welding.

For bodies manufactured from stainless steel and copper alloys, the pressure/temperature ratings need to be defined by the manufacturer.

4.3 Nuts

Nuts to be used with carbon steel bodies shall be made of carbon steel, and those for use with stainless steel bodies shall be made of stainless steel, unless otherwise specified. Nuts to be used with copper alloy bodies shall be made of a material similar to the bodies.

4.4 Cutting rings

4.4.1 The ring material shall be compatible with the fluid to be conveyed and provide an effective joint.

4.4.2 Steel cutting rings are to be used in combination with other steel connector components and steel tubes.

4.4.3 Stainless steel cutting rings are to be used in combination with other stainless steel connector components and stainless steel tubes.

4.4.4 Brass cutting rings are to be used in combination with other brass connector components and copper tubes.

4.4.5 Other combinations of materials shall be agreed upon between the purchaser and supplier.

4.5 O-rings

Unless otherwise specified, for use with petroleum-based hydraulic fluids at the pressure and temperature requirements given in Clause 5 and Table 1, O-rings for use with connectors in accordance with this part of ISO 8434 shall be made of NBR (nitrile) with a hardness of (90 ± 5) IRHD, measured in accordance with ISO 48, and shall conform to the dimensions given in Table 5 and shall meet or exceed the O-ring quality acceptance criteria of ISO 3601-3:2005, grade N. In those cases where the pressure and temperature requirements of this part of ISO 8434 and/or the hydraulic fluid used in the system differ from those specified in Clause 5 and Table 1, the connector manufacturer shall be consulted to ensure that an appropriate O-ring material is selected.

5 Pressure/temperature requirements

5.1 Connectors in conformance with this part of ISO 8434 made of carbon steel shall meet or exceed without leakage the requirements from a vacuum of 6,5 kPa (0,065 bar) absolute pressure to the working pressures given in Tables 1 to 3 when used at temperatures between $-40\text{ }^{\circ}\text{C}$ and $+120\text{ }^{\circ}\text{C}$ with petroleum-based hydraulic fluids.

5.2 Connectors complying with this part of ISO 8434 may contain elastomeric seals. Unless otherwise specified, connectors are made and delivered with elastomeric parts giving their specified working temperature range with petroleum-based hydraulic fluids. The connectors may have a reduced working temperature range or may be completely unsuitable for applications with other fluids. Manufacturers may supply on request connectors with appropriate elastomeric seals meeting the required working temperature range for use with different hydraulic fluids.

5.3 The connector assembly shall meet or exceed all applicable performance requirements given in Clause 15. Testing shall be conducted at room temperature.

5.4 For applications under conditions other than the pressure and/or temperature limits given in Tables 1 to 3 and in 5.1 and 5.3, the manufacturer shall be consulted.

5.5 According to different applications and different pressure ratings, there are three series of connector, designated by

- LL, for extra light-duty,
- L, light-duty, and
- S, heavy-duty.

NOTE Ranges of the tube outside diameters and pressure requirements are shown in Tables 1 to 3.

Table 1 — Working pressures for 24° cone connectors for fluid power and general use

Series	Tube outside diameter (OD) mm	Cone and cutting ring connection		ISO 6149-2 or ISO 6149-3 stud end	
		Thread	Maximum working pressure ^a MPa (bar ^b)	Thread	Maximum working pressure ^a MPa (bar ^b)
LL	4	M8 × 1	10 (100)	—	—
	5	M10 × 1	10 (100)	—	—
	6	M10 × 1	10 (100)	—	—
	8	M12 × 1	10 (100)	—	—
L	6	M12 × 1,5	25 (250)	M10 × 1	25 (250)
	8	M14 × 1,5	25 (250)	M12 × 1,5	25 (250)
	10	M16 × 1,5	25 (250)	M14 × 1,5	25 (250)
	12	M18 × 1,5	25 (250)	M16 × 1,5	25 (250)
	15	M22 × 1,5	25 (250)	M18 × 1,5	25 (250)
	18	M26 × 1,5	16 (160)	M22 × 1,5	16 (160)
	22	M30 × 2	16 (160)	M27 × 2	16 (160)
	28	M36 × 2	10 (100)	M33 × 2	10 (100)
	35	M45 × 2	10 (100)	M42 × 2	10 (100)
	42	M52 × 2	10 (100)	M48 × 2	10 (100)
S	6	M14 × 1,5	63 (630)	M12 × 1,5	63 (630)
	8	M16 × 1,5	63 (630)	M14 × 1,5	63 (630)
	10	M18 × 1,5	63 (630)	M16 × 1,5	63 (630)
	12	M20 × 1,5	63 (630)	M18 × 1,5	63 (630)
	16	M24 × 1,5	40 (400)	M22 × 1,5	40 (400)
	20	M30 × 2	40 (400)	M27 × 2	40 (400)
	25	M36 × 2	40 (400)	M33 × 2	40 (400)
	30	M42 × 2	25 (250)	M42 × 2	25 (250)
	38	M52 × 2	25 (250)	M48 × 2	25 (250)
For higher pressure ratings and for dynamic conditions, the manufacturer shall be consulted.					
^a With a design factor of 4 to 1.					
^b 1 bar = 10 ⁵ N/m ² = 10 ⁵ Pa = 0,1 MPa.					

Table 2 — Working pressures for 24° cone connectors, for general use only

Series	Tube OD mm	Cone and cutting ring connection		ISO 9974 stud end			ISO 1179 stud end			
		Thread	Maximum working pressure ^a MPa (bar)	Thread	Maximum working pressure ^a		Thread	Maximum working pressure ^a		
					ISO 9974-2 (type E) ^b MPa (bar)	ISO 9974-3 (type B) ^c MPa (bar)		ISO 1179-2 (type E) ^b MPa (bar)	ISO 1179-4 (type B) ^c MPa (bar)	ISO 1179-4 (type B) ^c MPa (bar)
LL	4	M8 × 1	10 (100)	M8 × 1	—	10 (100)	G 1/8 A	—	10	(100)
	5	M10 × 1	10 (100)	M8 × 1	—	10 (100)	—	—	—	—
	6	M10 × 1	10 (100)	M10 × 1	—	10 (100)	—	—	—	—
	8	M12 × 1	10 (100)	M10 × 1	—	10 (100)	—	—	—	—
L	6	M12 × 1,5	25 (250)	M10 × 1	25 (250)	25 (250)	G 1/8 A	25 (250)	25	(250)
	8	M14 × 1,5	25 (250)	M12 × 1,5	25 (250)	25 (250)	G 1/4 A	25 (250)	25	(250)
	10	M16 × 1,5	25 (250)	M14 × 1,5	25 (250)	25 (250)	G 1/4 A	25 (250)	25	(250)
	12	M18 × 1,5	25 (250)	M16 × 1,5	25 (250)	25 (250)	G 3/8 A	25 (250)	25	(250)
	15	M22 × 1,5	25 (250)	M18 × 1,5	25 (250)	25 (250)	G 1/2 A	25 (250)	25	(250)
	18	M26 × 1,5	16 (160)	M22 × 1,5	16 (160)	16 (160)	G 1/2 A	16 (160)	16	(160)
	22	M30 × 2	16 (160)	M26 × 1,5	16 (160)	16 (160)	G 3/4 A	16 (160)	16	(160)
	28	M36 × 2	10 (100)	M33 × 2	10 (100)	10 (100)	G 1 A	10 (100)	10	(100)
	35	M45 × 2	10 (100)	M42 × 2	10 (100)	10 (100)	G 1 1/4 A	10 (100)	10	(100)
	42	M52 × 2	10 (100)	M48 × 2	10 (100)	10 (100)	G 1 1/2 A	10 (100)	10	(100)

Table 2 (continued)

Series	Tube OD mm	Cone and cutting ring connection		ISO 9974 stud end			ISO 1179 stud end			
		Thread	Maximum working pressure ^a MPa (bar)	Thread	Maximum working pressure ^a		Thread	Maximum working pressure ^a		ISO 1179-4 (type B) ^c MPa (bar)
					ISO 9974-2 (type E) ^b MPa (bar)	ISO 9974-3 (type B) ^c MPa (bar)		ISO 1179-2 (type E) ^b MPa (bar)	ISO 1179-4 (type B) ^c MPa (bar)	
S	6	M14 × 1,5	63 (630)	M12 × 1,5	63 (630)	40 (400)	G 1/4 A	63 (630)	40 (400)	
	8	M16 × 1,5	63 (630)	M14 × 1,5	63 (630)	40 (400)	G 1/4 A	63 (630)	40 (400)	
	10	M18 × 1,5	63 (630)	M16 × 1,5	63 (630)	40 (400)	G 3/8 A	63 (630)	40 (400)	
	12	M20 × 1,5	63 (630)	M18 × 1,5	63 (630)	40 (400)	G 3/8 A	63 (630)	40 (400)	
	16	M24 × 1,5	40 (400)	M22 × 1,5	40 (400)	40 (400)	G 1/2 A	40 (400)	40 (400)	
	20	M30 × 2	40 (400)	M27 × 2	40 (400)	40 (400)	G 3/4 A	40 (400)	40 (400)	
	25	M36 × 2	40 (400)	M33 × 2	40 (400)	25 (250)	G 1 A	40 (400)	25 (250)	
	30	M42 × 2	25 (250)	M42 × 2	25 (250)	16 (160)	G 1 1/4 A	25 (250)	16 (160)	
	38	M52 × 2	25 (250)	M48 × 2	25 (250)	16 (160)	G 1 1/2 A	25 (250)	16 (160)	
For higher pressure ratings and for dynamic conditions, the manufacturer shall be consulted.										
^a With a design factor of 4 to 1.										
^b Type E with elastomeric sealing.										
^c Type B with metal-to-metal sealing.										

Table 3 — Working pressures for 24° cone weld-on nipples with various tube wall thicknesses

Dimensions in millimetres

Series	Tube OD	Maximum working pressure																							
		10 MPa (100 bar)		16 MPa (160 bar)		25 MPa (250 bar)		31,5 MPa (315 bar)		40 MPa (400 bar)		63 MPa (630 bar)													
		Tube ID	<i>T</i>	Tube ID	<i>T</i>	Tube ID	<i>T</i>	Tube ID	<i>T</i>	Tube ID	<i>T</i>	Tube ID	<i>T</i>												
L	6	3	1,5	3	1,5	3	1,5																		
	8	5	1,5	5	1,5	5	1,5																		
	10	7	1,5	7	1,5	7	1,5																		
	12	8	2	8	2	8	2																		
	15	10	2,5	10	2,5	10	2,5																		
	18	13	2,5	13	2,5																				
	22	17	2,5	17	2,5																				
	28	23	2,5																						
	35	29	3																						
	42	36	3																						
S	6	2,5	1,75	2,5	1,75	2,5	1,75	2,5	1,75	2,5	1,75	2,5	1,75												
	8	4	2	4	2	4	2	4	2	4	2	4	2												
	10	6	2	6	2	6	2	6	2	6	2	5	2,5												
	12	8	2	8	2	8	2	8	2	7	2,5	6	3												
	16	11	2,5	11	2,5	11	2,5	11	2,5	10	3														
	20	14	3	14	3	14	3	14	3	12	4														
	25	19	3	19	3	19	3	17	4	16	4,5														
	30	24	3	24	3	22	4																		
	38	32	3	32	3	28	5																		
For pressure and/or temperature applications outside those given in this part of ISO 8434, the manufacturer shall be consulted.																									
ID interior diameter																									
<i>T</i> tube wall thickness																									