

Third edition
2018-07

Corrected version
2018-10

**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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Reference number
ISO 8434-1:2018(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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: 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*.

This third edition cancels and replaces the second edition (ISO 8434-1:2007), which has been technically revised.

A list of all the parts in the ISO 8434 series, can be found on the ISO website.

This corrected version of ISO 8434-1:2018 incorporates the following corrections:

- Table 4: missing data in the Thread column of Series L and S has been inserted.
- Table 21: missing data in the s_1 column of Series L and S has been inserted.

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 document 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 document.

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 a 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 intended to be understood as guaranteed minimums. For every application, sufficient testing is meant 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 document also specifies a performance and qualification test for these connectors.

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, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

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

ISO 724, *ISO general-purpose metric screw threads — Basic dimensions*

ISO 965-1, *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, *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 5598:2008, *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 (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 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 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 and the following apply.

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

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

3.1

connector

device that connects tubes, hoses or pipes to each other or to components

[SOURCE: ISO 5598:2008, 3.2.122]

3.2

connection

assembly of parts belonging to piping

3.3

fastening thread

terminal thread of a complete connector

3.4**run**

two principal, axially aligned outlets of a tee connector or cross connector

[SOURCE: ISO 5598:2008, 3.2.632]

3.5**branch**

side outlet(s) of a tee connector or cross connector

[SOURCE: ISO 5598:2008, 3.2.81]

3.6**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

3.7**face-to-face dimension**

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

3.8**face-to-centre dimension**

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

3.9**assembly torque**

torque required to achieve a satisfactory final connection

[SOURCE: ISO 5598:2008, 3.2.46]

3.10**maximum working pressure**

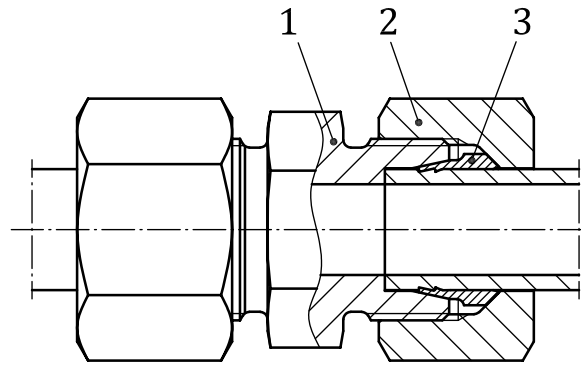
highest pressure at which a system or sub-system is intended to operate in steady-state operating conditions

Note 1 to entry: For components and piping see also related term “rated pressure”.

[SOURCE: ISO 5598:2008, 3.2.429, modified — NOTE 2 deleted.]

4 Materials**4.1 General**

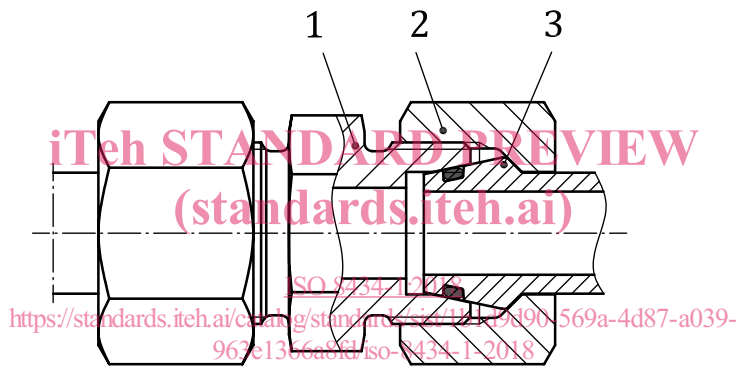
[Figures 1](#) and [2](#) show the cross-sections and component parts of typical 24° cone connectors.



Key

- 1 body
- 2 nut
- 3 cutting ring

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



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 document shall be made of acrylonitrile-butadiene rubber (NBR) with a hardness of (90 ± 5) IRHD, measured in accordance with ISO 48, and shall conform to the dimensions given in [Table 7](#) and shall meet or exceed the O-ring quality acceptance criteria of ISO 3601-3, grade N. In those cases where the pressure and temperature requirements of this document 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 document 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 °C and $+120$ °C with petroleum-base hydraulic fluids.

5.2 Connectors conforming to this document can contain elastomeric seals. Unless otherwise specified, connectors are made and delivered with elastomeric seals for use within the specified working temperature range with petroleum-base hydraulic fluids. The use of these connectors and elastomeric seals with other hydraulic fluids may result in a reduced working temperature range or may render the connectors unsuitable for the application. Manufacturers may supply, upon request, connectors with elastomeric seals for use with hydraulic fluids other than petroleum-base hydraulic fluids which will meet the specified working temperature range of the connectors.

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, for light-duty, and
- S, for 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 | | Thread | Maximum working pressure ^a | |
| | | | MPa | (bar ^b) | | 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 = 10⁵ N/m² = 10⁵ 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 pres- sure ^a MPa (bar) | Thread | Maximum working pressure ^a ISO 9974-2 (type E) ^b | | Thread | Maximum working pressure ^a ISO 1179-2 (type E) ^b | |
| | | | | | MPa | (bar) | | 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) |
| 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) |

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 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 ISO 9974-2 (type E) ^b MPa (bar) | ISO 9974-3 (type B) ^c MPa (bar) | Thread | Maximum working pressure ^a ISO 1179-2 (type E) ^b MPa (bar) | ISO 1179-4 (type B) ^c MPa (bar) |
| | 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.

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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 | T | Tube ID | T | Tube ID | T | Tube ID | T | Tube ID | T | Tube ID | T |
| 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 document, the manufacturer shall be consulted.

ID interior diameter
T tube wall thickness

6 Designation of connectors

6.1 Connectors shall be designated by an alphanumeric code to facilitate ordering. They shall be designated by the word “Connector” followed by ISO 8434-1, followed by a spaced hyphen, then the connector style letter symbols (see 6.2), followed by a spaced hyphen, then the series letter(s) (see 5.5), immediately followed by the outside diameter of the tube with which they are to be connected. For weld nipples, a multiplication sign (×) shall then follow, then the tube wall thickness. There shall be no spaces on either side of the multiplication symbol. For stud ends (connector ends), a multiplication symbol followed by the thread designation of the stud end, followed by a spaced hyphen and the sealing type shall be added.

6.2 The letter symbol designation of the connector style shall have three parts: the connection end type, immediately followed by the shape of the connector and by the indication that a complete connector is ordered.

6.3 Tube ends are assumed and thus do not need to be included in the code. However, if another type of end is involved, it shall be designated.

6.4 Reducing connectors and reducing elbows shall be designated by specifying the larger tube end first.