

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

## **Part 4: 24° cone connectors with O-ring weld-on nipples**

The European Standard EN ISO 8434-4:2000 has the status of a British Standard.

ICS 23.100.30

## Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee MCE/18, Fluid power systems and components, upon which the following bodies were represented:

Association of British Mining Equipment Companies  
 British Compressed Air Society  
 British Fluid Power Association  
 British Hydromechanics Research Association  
 British Steel Industry  
 Department of Trade and Industry (National Engineering Laboratory)  
 Ministry of Defence  
 University of Bath

The following bodies were also represented in the drafting of the standard through subcommittees and panels:

British Iron and Steel Producers' Association  
 Engineering Equipment and Materials Users' Association

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 January 1997

© BSI 11-2000

The following BSI references relate to the work on this standard:  
 Committee reference MCE/18  
 Draft for comment 93/701682 DC

ISBN 0 580 26396 7

### Amendments issued since publication

Amd. No.	Date	Comments
11038	November 2000	Implementation of the European Standard

---

# Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	iv
Text of EN ISO 8434-4	2

---

## National foreword

This British Standard is the official English language version of EN ISO 8434-4:2000. It is identical with ISO 8434-4:1995.

This British Standard is published under the direction of the Engineering Sector Board whose Technical Committee MCE/18 has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international committee any enquiries on interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

NOTE International and European Standards, as well as overseas standards, are available from Customer Services, BSI, 389 Chiswick High Road, London W4 4AL.

### Change of identifier

Whenever BS ISO 8434-4:1995 appears in this standard it should be read as BS EN ISO 8434-4:2000.

### Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the Section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, pages 2 to 23 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

English version

**Metallic tube connections for fluid power and general use —  
Part 4: 24° cone connectors with O-ring weld-on nipples**

(ISO 8434-4:1995)

Raccords de tubes métalliques pour transmissions  
hydrauliques et pneumatiques et applications  
générales —  
Partie 4: Raccords à cône à 24°, à embout à souder à  
joint torique  
(ISO 8434-4:1995)

Metallische Rohrverschraubungen für Fluidtechnik  
und allgemeine Anwendung —  
Teil 4: Schweißnippel mit Dichtkegel und O-Ring  
für 24° -Konusanschluß  
(ISO 8434-4:1995)

This European Standard was approved by CEN on 8 April 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart, 36 B-1050 Brussels**

## Foreword

The text of the International Standard from Technical Committee ISO/TC 5, Ferrous metal pipes and metallic fittings, and ISO/TC 131, Fluid power systems, of the International Organization for Standardization (ISO) has been taken over as a European Standard by Technical Committee ECISS/TC 29, Steel tubes and fittings for steel tubes, the Secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2000, and conflicting national standards shall be withdrawn at the latest by November 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## Contents

	Page		
Foreword	2	Figure 5 — Elbow	7
Introduction	3	Figure 6 — Reducing swivel adaptor	7
1 Scope	3	Figure 7 — Reducing stud fitting	8
2 Normative references	3	Figure 8 — Compression end and weld-on nipple details	10
3 Definitions	4	Figure 9 — O-ring	11
4 Requirements for materials	4	Figure 10 — S and L series swivel stud straight adaptor (SWSDS) with stud end per ISO 1179-2 or ISO 9974-2	12
5 Pressure/temperature requirements	4	Figure 11 — Swivel stud straight adaptor (SWSDS) with stud end per ISO 6149-2 (S series) or ISO 6149-3 (L series)	14
6 Designation of fittings	5	Figure 12 — Swivel elbow (SWE), swivel branch tee (SWBT) and swivel run tee (SWRT)	15
7 Requirements for tubes	8	Figure 13 — Reducing swivel straight adaptor (RESWS)	16
8 Across-flats dimensions	8	Figure 14 — Weld-on reducing nipple (WDRE)	18
9 Design	8	Figure 15 — Components for use with weld-on nipples and swivel nut fittings (see ISO 8434-1 for dimensions)	20
10 Screw threads	8	Figure 16 — Components for use with weld-on nipples and swivel nut fittings (see ISO 8434-1 for dimensions)	21
11 Manufacture	9	Figure 17 — Components for use with weld-on nipples and swivel nut fittings (see ISO 8434-1 for dimensions)	21
12 Assembly instruction	9	Table 1 — Working pressures for carbon and stainless steel 24° cone connectors with O-ring weld-on nipples	5
13 Procurement information	9	Table 2 — Working pressure for carbon and stainless steel weld-on nipples with various tube wall thicknesses	6
14 Marking of components	9	Table 3 — Pressure deratings for fittings made from stainless steel and used at temperatures outside the ranges given in 5.1 and 5.2	6
15 Identification statement (Reference to this part of ISO 8434)	9	Table 4 — Dimensions of weld-on nipples	11
Annex A (normative) Port and stud end working pressures and combinations of tube outside diameters and port and stud end thread sizes	22	Table 5 — Dimensions of O-rings	12
Annex ZA (normative) Normative references to International publications with their relevant European publications	23	Table 6 — Dimensions of S and L series swivel stud straight adaptors with stud ends per ISO 1179 or ISO 9974-2	13
Figure 1 — Cross-section of typical 24° cone connector with O-ring weld-on nipple	4	Table 7 — Dimensions of swivel stud straight adaptors with stud ends per ISO 6149-2 (S series) or ISO 6149-3 (L series)	14
Figure 2 — Straight fitting	7	Table 8 — Dimensions of swivel elbows, swivel branch tees and swivel run tees	16
Figure 3 — Straight stud fitting	7	Table 9 — Dimensions of L and S series reducing swivel straight adaptors	17
Figure 4 — Tee	7	Table 10 — Dimensions of L and S series weld-on reducing nipples	18
		Table A.1 — Values for fluid power and general use	22
		Table A.2 — Values for general use only	22

## 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 (fittings) and conductors. Tubes are rigid conductors; hoses are flexible conductors.

## 1 Scope

This part of ISO 8434 specifies general and dimensional requirements for the design and performance of 24° cone connectors with O-ring weld-on nipples that are suitable for use with steel and stainless steel tubes with outside diameters from 6 mm to 42 mm, inclusive. These fittings are for use in fluid power and general applications where elastomeric seals can be used within the limits of pressure and temperature specified in this part of ISO 8434. S series fittings in accordance with this part of ISO 8434 may be used at working pressures up to 63 MPa (630 bar<sup>1)</sup>). L series fittings in accordance with this part of ISO 8434 may be used at working pressures up to 25 MPa (250 bar) (see Table 1).

They are intended for the connection of tubes and hose fittings to ports in accordance with ISO 6149-1, ISO 1179-1 and ISO 9974-1.

NOTE 1 For new designs in hydraulic fluid power applications, see the requirements given in 9.6.

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

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8434. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8434 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 48:1994, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*.

ISO 228-1:1994, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*.

ISO 261:—<sup>2)</sup>, *ISO general-purpose metric screw threads — General plan*.

ISO 1127:1992, *Stainless steel tubes — Dimensions, tolerances and conventional masses per unit length*.

ISO 1179-1:—<sup>3)</sup>, *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:—<sup>3)</sup>, *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 3304:1985, *Plain end seamless precision steel tubes — Technical conditions for delivery*.

ISO 3305:1985, *Plain end welded precision steel tubes — Technical conditions for delivery*.

ISO 3601-3:1987, *Fluid systems — Sealing devices — O-rings — Part 3: Quality acceptance criteria*.

ISO 4397:1993, *Fluid power systems and components — Connectors and associated components — Nominal outside diameters of tubes and nominal inside diameters of hoses*.

ISO 4759-1:1978, *Tolerances for fasteners — Part 1: Bolts, screws and nuts with thread diameters between 1,6 (inclusive) and 150 mm (inclusive) and product grades A, B and C*.

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

ISO 6149-1:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring seating — Part 1: Ports with O-ring seal in truncated housing*.

ISO 6149-2:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 2: Heavy-duty (S series) stud ends — Dimensions, design, test methods and requirements*.

ISO 6149-3:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 3: Light-duty (L series) stud ends — Dimensions, design, test methods and requirements*.

ISO 8434-1:1994, *Metallic tube connections for fluid power and general use — Part 1: 24 degree compression fittings*.

<sup>1)</sup> 1 bar = 0,1 MPa = 10<sup>5</sup> Pa; 1 MPa = 1 N/mm<sup>2</sup>.

<sup>2)</sup> To be published. (Revision of ISO 261:1973)

<sup>3)</sup> To be published.

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests.*

ISO 9974-1:—<sup>4)</sup>, *Connections for general use and fluid power — Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal seating — Part 1: Threaded ports.*

ISO 9974-2:—<sup>4)</sup>, *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).*

### 3 Definitions

For the purposes of this part of ISO 8434, the definitions given in ISO 5598 and the following definitions apply.

#### 3.1

##### **fluid power**

means whereby energy is transmitted, controlled and distributed using a pressurized fluid as the medium  
[ISO 5598]

#### 3.2

##### **connection; fitting**

leakproof device to connect pipelines (conductors) to one another, or to equipment  
[ISO 5598]

#### 3.3

##### **fastening thread**

terminal thread of a complete fitting

#### 3.4

##### **run**

two principal, axially aligned outlets of a tee or cross

#### 3.5

##### **branch**

side outlet(s) of a tee or cross

#### 3.6

##### **chamfer**

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

#### 3.7

##### **assembly torque**

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

#### 3.8

##### **working pressure**

pressure at which the apparatus is being operated in a given application  
[ISO 5598]

## 4 Requirements for materials

Figure 1 shows the cross-section and component parts of a typical 24° cone connector with O-ring weld-on nipple.

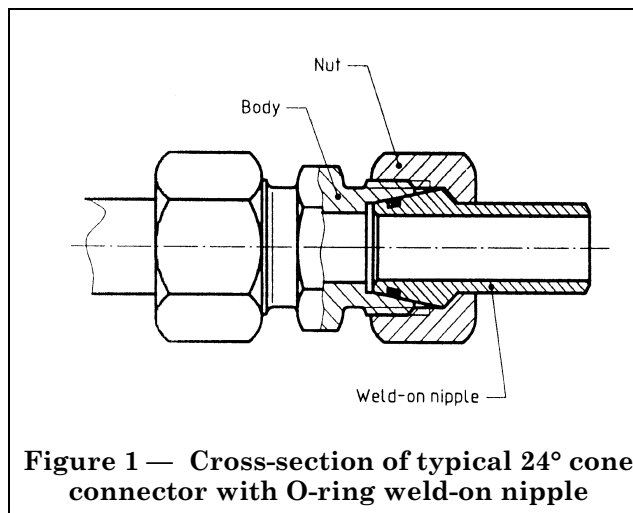


Figure 1 — Cross-section of typical 24° cone connector with O-ring weld-on nipple

### 4.1 Fitting bodies

Bodies shall be manufactured from carbon steel or stainless 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-on nipples shall be made of materials classified as suitable for welding.

### 4.2 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.

### 4.3 O-rings

Unless otherwise specified, for use at the pressure and temperature requirements given in clause 5 and Table 1, O-rings for use with fittings in accordance with this part of ISO 8434 shall be made of NBR (nitrile) with a hardness of  $(90 \pm 5)$  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 for grade N of ISO 3601-3.

## 5 Pressure/temperature requirements

5.1 Fittings complying with this part of ISO 8434 made of carbon steel and stainless steel shall meet or exceed without leakage the requirements of a vacuum of 6,5 kPa (0,065 bar) absolute pressure up to the working pressures given in Table 1 when used at temperatures between  $-35$  °C and  $+100$  °C.

<sup>4)</sup> To be published.



**5.2** Weld-on nipples in carbon and stainless steel with different wall thicknesses shall be suitable for use up to the working pressures given in Table 2 when used at temperatures between  $-35\text{ }^{\circ}\text{C}$  and  $+100\text{ }^{\circ}\text{C}$ .

**5.3** Fittings in stainless steel shall be suitable for use at the working pressures given in Table 1 and Table 2. For pressure derating for fittings made of stainless steel that are to be used at temperatures outside the ranges given in 5.1 and 5.2, see Table 3.

**5.4** For applications under conditions outside the pressure and/or temperature limits given in Table 1 and in 5.1 to 5.3, the manufacturer shall be consulted.

**5.5** According to different applications and different pressure ratings, there are two series of fittings. The series are referred to as:

- L: light duty
- S: heavy duty

Ranges of the tube outside diameters and pressure requirements are shown in Table 1.

**5.6** The fitting assembly shall not leak or fail when hydrostatically tested at four times the applicable recommended working pressure specified in Table 1. Testing shall be conducted at room temperature.

**5.7** The pressure/temperature requirements given in Table 1 to Table 3 and in 5.1 to 5.6 are for weld-on nipples and fitting bodies only. For port and stud end pressure/temperature requirements, the values specified in the respective port and stud end standards and in annex A of this part of ISO 8434 shall apply.

**Table 1 — Working pressures for carbon and stainless steel 24° cone connectors with O-ring weld-on nipples**

Series	Tube outside diameter <sup>a</sup> mm	Working pressure	
		MPa	(bar)
L	15	25	(250)
	18 to 22 incl.	16	(160)
	28 to 42 incl.	10	(100)
S	6 to 12 incl.	63	(630)
	16 to 25 incl.	40	(400)
	30 to 38 incl.	25	(250)
NOTE For higher pressure ratings and for dynamic conditions, the manufacturer shall be consulted.			
<sup>a</sup> Tube outside diameters per ISO 4397.			

## 6 Designation of fittings

**6.1** Fittings shall be designated by an alphanumeric code to facilitate ordering. They shall be designated by ISO 8434-4, followed by a spaced hyphen, then the fitting style letter symbols (see 6.2), followed by a spaced hyphen, then the series letter (see 5.5) immediately followed by the outside diameter of the tube with which they are to be connected, followed by a multiplication sign (×) then the wall thickness. For stud ends (connector ends), another spaced hyphen followed by the thread designation of the stud end and the sealing type shall be added.

Example

A straight stud fitting (SDS) for use with tubing of 12 mm OD and 2 mm wall thickness, with an M18 × 1,5 stud end in accordance with ISO 6149-2 (S series), is designated as follows:

**ISO 8434-4 – SDS – S12 × 2 – M18**

**6.2** The letter symbol designation of the fitting style shall have two parts: the connection end type, immediately followed by the shape of the fitting.

**6.3** Tube ends are assumed to be male 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 fittings and reducing elbows shall be designated by specifying the larger tube end first.

**6.5** Stud fittings shall be designated by specifying the tube end first, then the thread size for the stud end.

**6.6** For tee fittings, the order of designation of the connection ends shall be from larger to smaller on the run, followed by the branch end.

**6.7** For cross fittings, the order of designation of the connection ends shall be from left to right, followed by top to bottom, with the larger ends on the left and at the top.

**6.8** If the fitting has a tube union connection, it shall be designated first, then the designation shall proceed clockwise.

**6.9** The following letter symbols shall be used:

Connection end type	Letter
Bulkhead	BH
Swivel	SW
Weld-on	WD
Weld-in	WI
Port	P
Stud	SD
Reducing	RE

Shape	Letter	Component type	Letter
Straight	S	Nut	N
Elbow	E	Locknut	LN
Tee	T	Nipple	NP
Run tee	RT		
Branch tee	BT	Examples of compression fittings and designations are given in Figure 2 to Figure 7.	
Cross	K		

**Table 2 — Working pressures for carbon and stainless steel weld-on nipples with various tube wall thicknesses**

Dimensions in millimetres

Series	Tube OD <sup>a</sup>	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)	
		$d_2^b$	$e^c$	$d_2$	$e$	$d_2$	$e$	$d_2$	$e$	$d_2$	$e$	$d_2$	$e$
L	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						

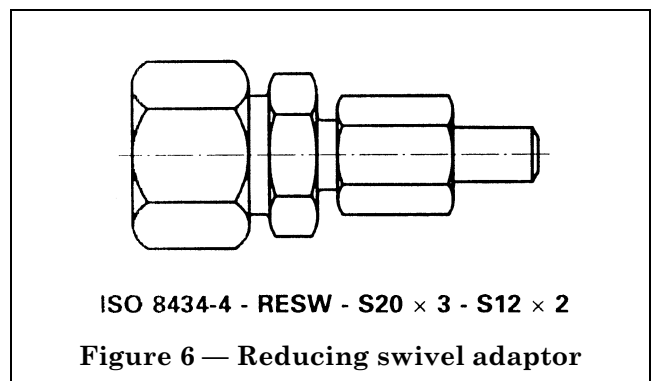
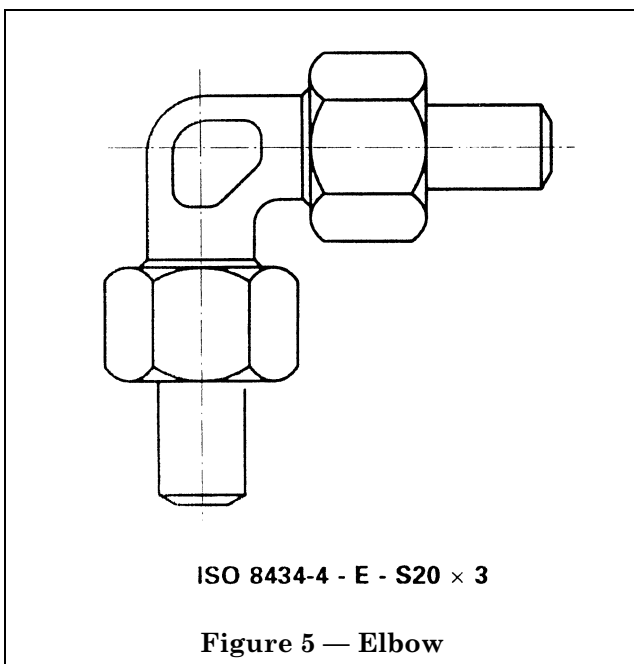
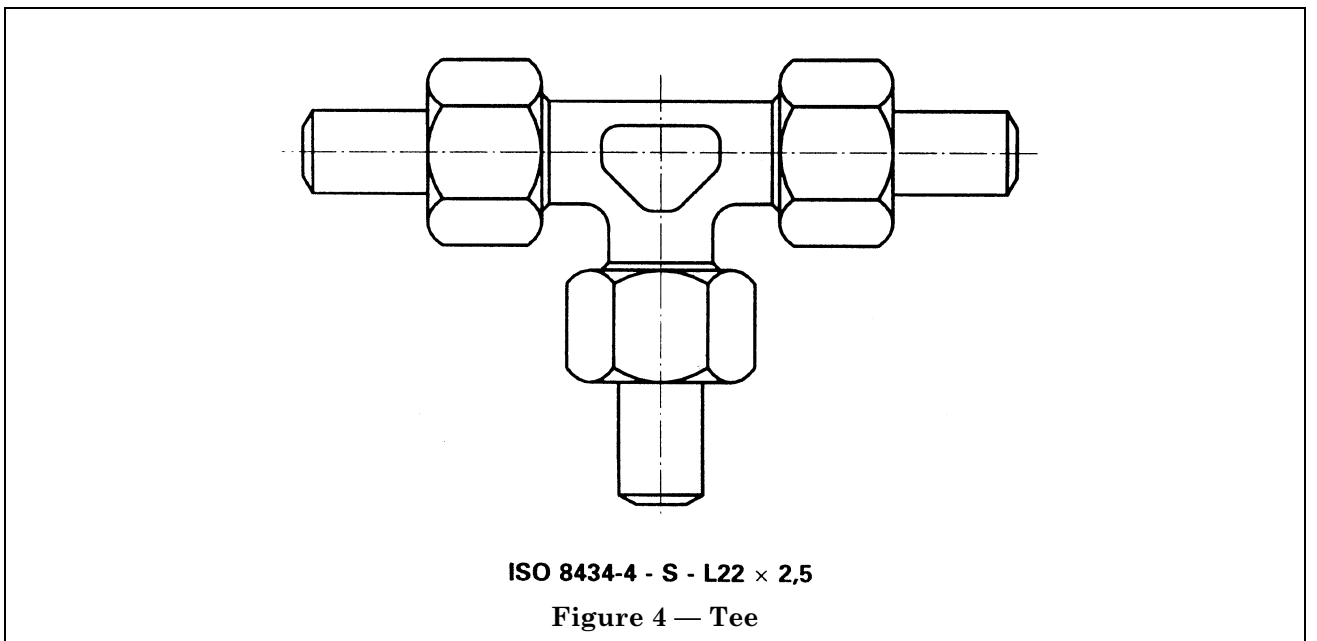
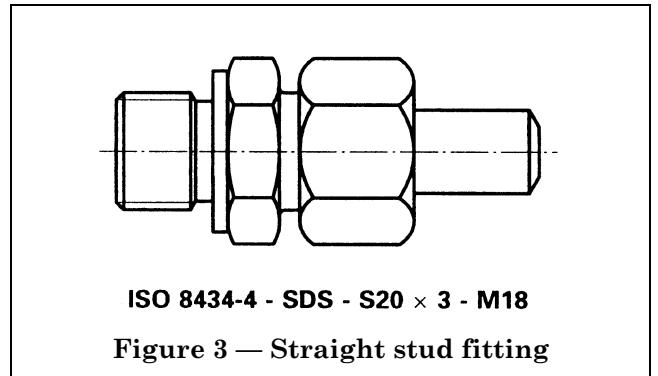
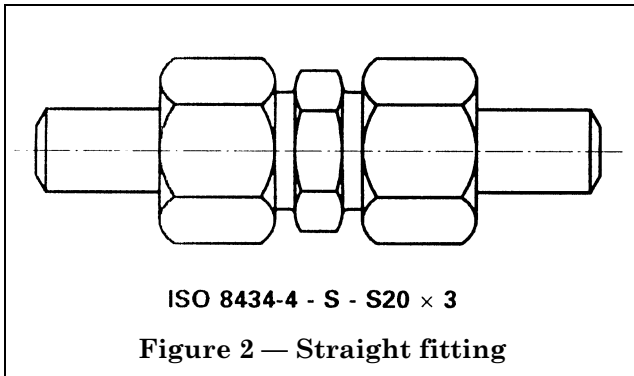
NOTE For pressure and/or temperature applications outside those given in this part of ISO 8434, the manufacturer shall be consulted.

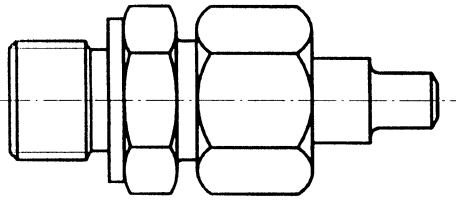
<sup>a</sup> OD = outside diameter  
<sup>b</sup>  $d_2$  = tube inside diameter  
<sup>c</sup>  $e$  = tube wall thickness

**Table 3 — Pressure deratings for fittings made from stainless steel and used at temperatures outside the ranges given in 5.1 and 5.2**

Working pressure for temperature range					
-35 °C to +50 °C		+100 °C		+200 °C	
MPa	(bar)	MPa	(bar)	MPa	(bar)
63	(630)	56,1	(561)	50,4	(504)
40	(400)	35,6	(356)	32	(320)
31,5	(315)	28	(280)	25	(250)
25	(250)	22,3	(223)	20	(200)
16	(160)	14,2	(142)	12,8	(128)
10	(100)	8,9	(89)	8	(80)

NOTE Intermediate values may be interpolated.





ISO 8434-4 - RESD - S20 × 3 - S12 × 2 - G 3/8  
A - E

Figure 7 — Reducing stud fitting

## 7 Requirements for tubes

Carbon steel tubes shall comply with ISO 3304 or ISO 3305 (cold-drawn and annealed or normalized). Stainless steel tubes shall comply with ISO 1127 (cold-drawn and annealed or normalized).

## 8 Across-flats dimensions

**8.1** The dimensions across flats for nuts and on the bodies of the fittings shall be as given in Table 6 to Table 9. For sizes up to and including 24 mm, tolerances for across-flats dimensions for forgings shall be  ${}_{-0,8}^0$  mm. For sizes larger than 24 mm they shall be  ${}_{-1}^0$  mm.

**8.2** Hex tolerances across flats shall be in accordance with ISO 4759-1:1978, product grade C. Minimum across-corner hex dimensions are 1,092 times the width across flats. The minimum side flat is 0,43 times the nominal width across flats. Unless otherwise specified or shown, hex corners shall be chamfered  $15^\circ$  to  $30^\circ$  to a diameter equal to the width across flats, with a tolerance of  ${}_{-0,4}^0$  mm.

## 9 Design

### 9.1 Fittings

The fittings shall conform to the requirements given in Figure 8 to Figure 17 and Table 4 to Table 10.

### 9.2 Dimensions

Dimensions specified apply to finished parts, including any plating or other treatments. The tolerance value for all dimensions not otherwise limited shall be  $\pm 0,4$  mm. The sealing seats of fittings shall be concentric with straight thread pitch diameters within 0,25 mm full indicator movement (FIM).

### 9.3 Passage tolerances

Where passages in straight fittings are machined from opposite ends, the offset at the meeting point shall not exceed 0,4 mm. No cross-sectional area at a junction of passages shall be less than that of the smallest passage.

### 9.4 Angular tolerances

Angular tolerances on axis of ends of elbows, tees and crosses shall be  $\pm 2,5^\circ$  for tube sizes 10 mm and less, and  $\pm 1,5^\circ$  for all larger sizes.

### 9.5 Contour details

Details of contour shall be chosen by the manufacturer provided the dimensions given in Table 4 to Table 10 are maintained. Wrench flats on elbows and tees shall conform to the dimensions given in the relevant tables. Abrupt reduction of a section shall be avoided. Junctions of small external sections and adjoining sections that are relatively heavy shall be blended by means of ample fillets.

### 9.6 Ports and stud ends

The dimensions of stud ends shall conform to those given in ISO 6149-2, ISO 1179-2 or ISO 9974-2 for the S series, and ISO 6149-3, ISO 1179-2 or ISO 9974-2 for the L series. For new designs in hydraulic fluid power applications, only ports and stud ends in accordance with the relevant parts of ISO 6149 shall be used. Ports and stud ends in accordance with the relevant parts of ISO 1179 and ISO 9974 shall not be used for new designs in hydraulic fluid power applications.

## 10 Screw threads

### 10.1 Compression ends

The screw threads on the compression ends of the fittings shall be ISO metric in accordance with ISO 261.

Threads shall be chamfered at the face of the fitting to an included angle of  $45^\circ$ . The diameter of the chamfer shall be equal to the minor diameter of the thread, with a tolerance of  ${}_{-0,4}^0$  mm.

### 10.2 Stud ends (connection ends)

The thread for stud ends (connection ends) of fittings shall be chosen from ISO 261 (for ISO 6149 or ISO 9974 stud ends) or ISO 228-1 (Class A) (for ISO 1179 stud ends).

NOTE 3 Parallel threads require an undercut with a sealing washer, O-ring or similar device to ensure a leakproof joint.

### 10.3 Thread undercuts and recesses

These shall be in accordance with the relevant stud end standard.

## 11 Manufacture

### 11.1 Workmanship

Workmanship shall conform to the best commercial practice to produce high-quality fittings. Fittings shall be free from visual contaminants, all hanging burrs, loose scale and slivers that might 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 of  $R_a \leq 6,3 \mu\text{m}$ , except where otherwise specified.

### 11.2 Finish

The external surfaces and threads on all fittings, nuts and adaptors, except weld-on fittings and nipples, shall be protected with an appropriate coating to pass a minimum 18-h neutral salt spray test in accordance with ISO 9227, unless otherwise agreed upon by the manufacturer and user. Any appearance of red rust during the salt spray test shall be considered failure. Fluid passages shall be excluded from the plating or coating requirements but shall be protected from rust. Weld-on fittings and nipples shall be protected from corrosion by an oil film or phosphate coating.

### 11.3 Shaped fittings

Shaped fittings up to and including size 12 mm tube outside diameter may be machined from forgings or barstock. Shaped fittings larger than size 12 mm tube outside diameter shall be made from forgings.

### 11.4 Corners

Unless otherwise noted, all sharp corners shall be broken to 0,15 mm max.

## 12 Assembly instruction

The assembly of the fittings with the connecting tubes shall be carried out without external loads.

The manufacturer shall draw up assembly instructions for the use of the fittings. These instructions shall include at least the following:

- details relating to the material and quality of suitable tubes;
- details concerning the preparation of the selected tube;
- instructions regarding the assembly of the fitting, such as the number of wrenching turns or assembly torque.

## 13 Procurement information

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

- description of fitting;
- material of fitting;
- material, outside diameter and wall thickness of tube;
- fluid to be conveyed;
- working pressure;
- working temperature.

## 14 Marking of components

Fitting bodies, weld-on nipples and nuts shall be permanently marked with the manufacturer's name, trademark or code identifier, unless otherwise agreed upon by the user and manufacturer. Nuts shall also be marked with the tube outside diameter and fitting series.

## 15 Identification statement (Reference to this part of ISO 8434)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 8434:

*“Dimensions and design for 24° cone connectors with O-ring weld-on nipples in accordance with ISO 8434-4:1995, *Metallic tube connections for fluid power and general use — Part 4: 24° cone connectors with O-ring weld-on nipples.*”*

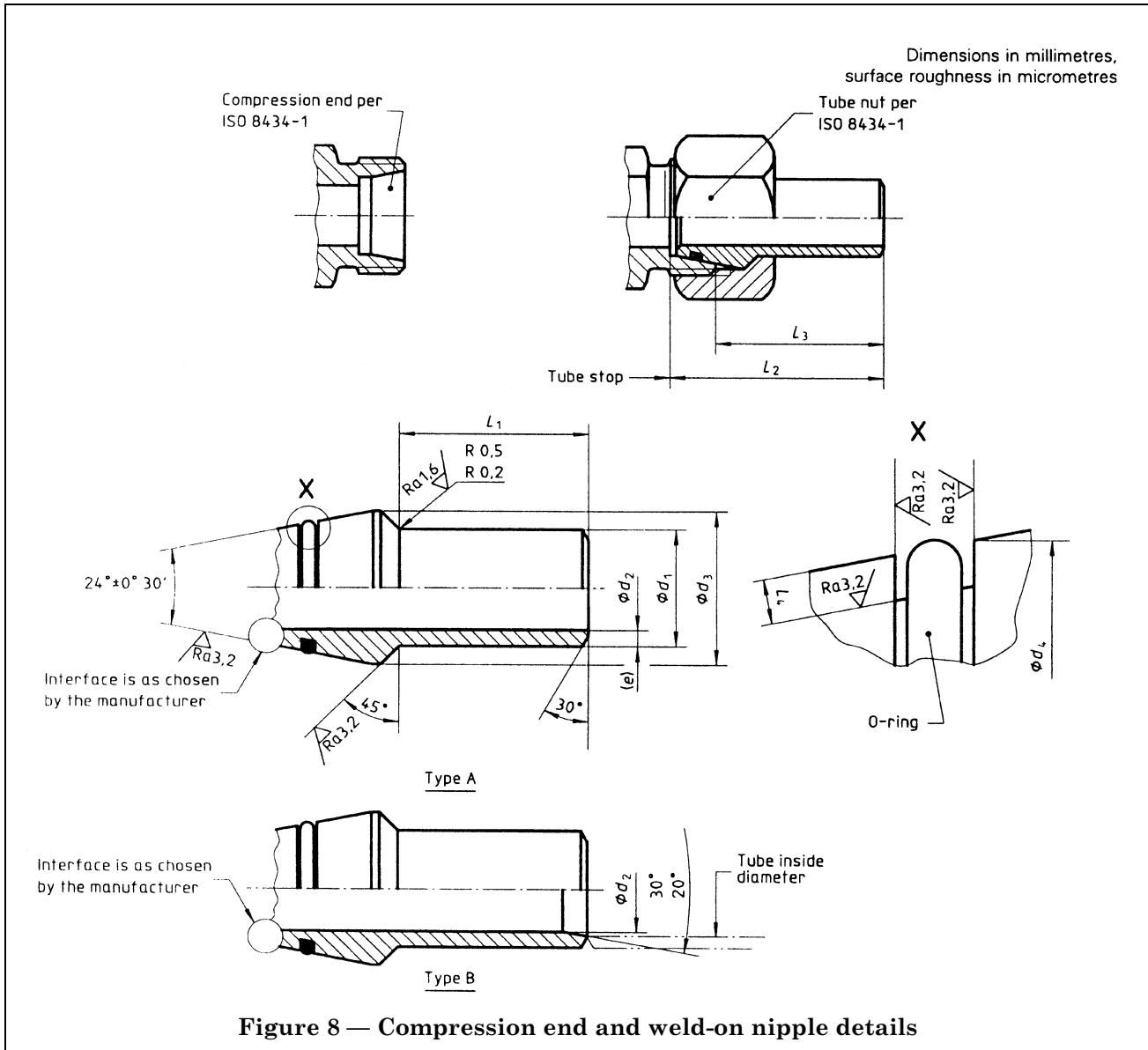


Table 4 — Dimensions of weld-on nipples

Dimensions in millimetres

Series	Tube OD	$d_1$ $\pm 0,1$	$d_2^a$ $+ 0,20$ $- 0,05$	$d_3$		$d_4$ max.	$L_1$ $\pm 0,2$	$L_2$ $\pm 1$	$L_3$ $\pm 1$	$L_4$ $\pm 0,1$
				min.	max.					
L	15	15	10	18	20	17	22	35	28	1,5
	18	18	13	21	24	20	23	37	29,5	1,5
	22	22	17	25	27	24	24,5	39,5	32	1,5
	28	28	23	31	33	30	27,5	42,5	35	1,5
	35	35	29	40	42	37,7	30,5	49,5	39	1,9
	42	42	36	47	49	44,7	30,5	50	39	1,9
S	6	6	2,5	9	11	7,8	19	32	25	1,1
	8	8	4	11	13	9,8	19	32	25	1,1
	10	10	6	14	16	12	20	33,5	26	1,1
	12	12	8	16	18	14	20	33,5	26	1,1
	16	16	11	20	22	18	26	40,5	32	1,5
	20	20	14	24	27	22,6	28,5	47	36,5	1,8
	25	25	19	29	33	27,6	33,5	53,5	41,5	1,8
	30	30	24	35	39	32,7	35,5	57,5	44	1,8
	38	38	32	43	49	40,7	39,5	64,5	48,5	1,8

NOTE The dimensions given in this table are for the lowest working pressures given in Table 2. Refer to Table 2 for tube inside diameters and wall thicknesses required for other working pressures.

<sup>a</sup> Maximum permissible inside diameter of type A weld-on nipples. If the inside diameter of a tube is larger than  $d_2 + 0,5$  mm, use of type B weld-on nipples is recommended.

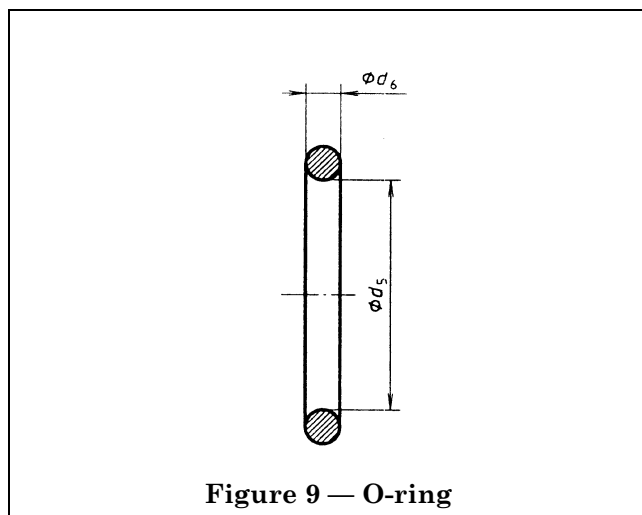


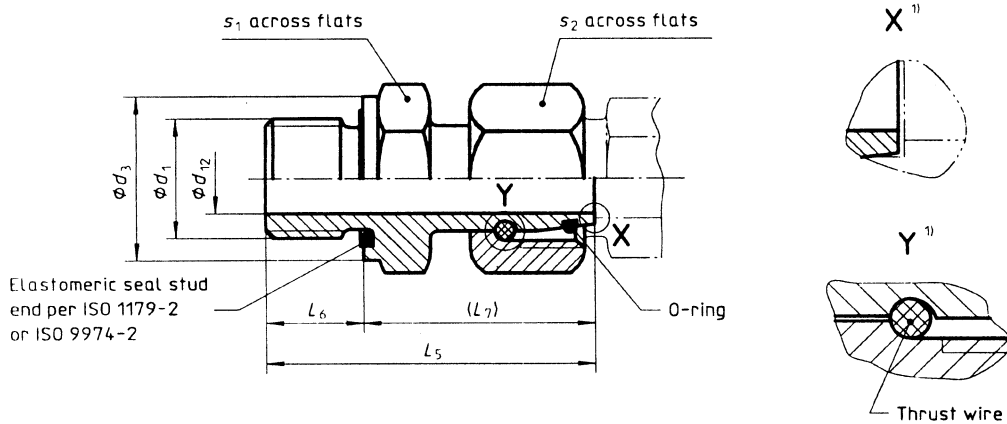
Figure 9 — O-ring

Table 5 — Dimensions of O-rings

Dimensions in millimetres

Series	Tube OD	Inside diameter		Cross-section	
		nom.	tol.	nom.	tol.
L	15	12	±0,18	2	±0,09
	18	15	±0,18	2	±0,09
	22	20	±0,22	2	±0,09
	28	26	±0,22	2	±0,09
	35	32	±0,31	2,5	±0,09
	42	38	±0,31	2,5	±0,09
S	6	4	±0,14	1,5	±0,08
	8	6	±0,14	1,5	±0,08
	10	7,5	±0,16	1,5	±0,08
	12	9	±0,16	1,5	±0,08
	16	12	±0,18	2	±0,09
	20	16,3	±0,18	2,4	±0,09
	25	20,3	±0,22	2,4	±0,09
	30	25,3	±0,22	2,4	±0,09
	38	33,3	±0,31	2,4	±0,09

NOTE All designs shall meet the performance requirements of this part of ISO 8434 using O-rings to these dimensions. O-rings of other sizes may be used as long as the sealing function is ensured.



1) As chosen by the manufacturer.

Figure 10 — S and L series swivel stud straight adaptor (SWSDS) with stud end per ISO 1179-2 or ISO 9974-2

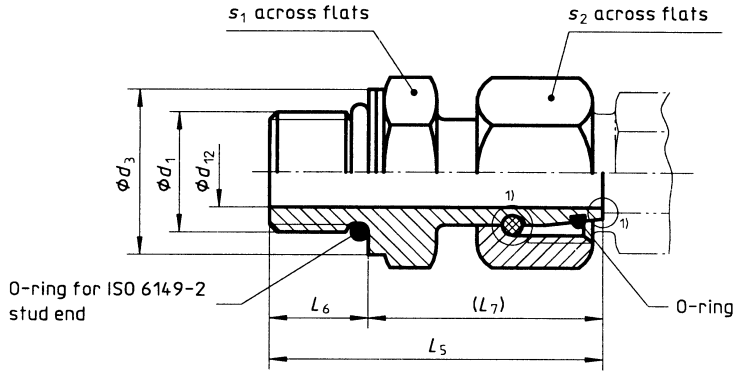


Table 6 — Dimensions of S and L series swivel stud straight adaptors with stud ends per ISO 1179-2 or ISO 9974-2

Series	Tube OD	$s_2$	Dimensions in millimetres														
			ISO 1179-2 stud end					ISO 9974-2 stud end									
			$d_1$ (ISO 228-1 thread)	$d_3$	$d_{12}$	$L_5$ $\pm 0,5$	$L_6$ $\pm 0,2$	$L_7$	$s_1$	$d_1$ (ISO 261 thread) <sup>a</sup>	$d_{12}$	$L_5$ $\pm 0,5$	$L_6$ $\pm 0,2$	$L_7$	$s_1$		
L	15	27	G 1/2 A	26,9	10	46	14	32	27	M18 × 1,5	23,9	10	43,5	12	31,5	24	
	18	32	G 1/2 A	26,9	13	45,5	14	31,5	27	M22 × 1,5	26,9	13	45,5	14	31,5	27	
	22	36	G 3/4 A	31,9	17	48,5	16	32,5	32	M26 × 1,5	31,9	17	48,5	16	32,5	32	
	28	41 <sup>b</sup>	G 1 A	39,9	22	53	18	35	41	M33 × 2	39,9	22	53	18	35	41	
	35	50	G 1 1/4 A	49,9	28	62,5	20	42,5	50	M42 × 2	49,9	28	62,5	20	42,5	50	
	42	60	G 1 1/2 A	54,9	34	68,5	22	46,5	55	M48 × 2	54,9	34	68,5	22	46,5	55	
	S	6	17	G 1/4 A	18,9	2,5	39	12	27	19	M12 × 1,5	16,9	2,5	39	12	27	17
		8	19	G 1/4 A	18,9	4	41,5	12	29,5	19	M14 × 1,5	18,9	4	41,5	12	29,5	19
		10	22	G 3/8 A	21,9	6	44	12	32	22	M16 × 1,5	21,9	6	44	12	32	22
		12	24	G 3/8 A	21,9	8	46	12	34	22	M18 × 1,5	23,9	8	46	12	34	24
12		24	G 1/2 A	26,9	8	48,5	14	34,5	27								
16		30	G 1/2 A	26,9	11	51	14	37	27	M22 × 1,5	26,9	11	51	14	37	27	
16		30	G 3/4 A	31,9	11	55	16	39	32								
20		36	G 3/4 A	31,9	14	59	16	43	32	M27 × 2	31,9	14	59	16	43	32	
25		46	G 1 A	39,9	18	66	18	48	41	M33 × 2	39,9	18	66	18	48	41	
30		50	G 1 1/4 A	49,9	23	71	20	51	50	M42 × 2	49,9	23	71	20	51	50	
38	60	G 1 1/2 A	54,9	30	82	22	60	55	M48 × 2	54,9	30	82	22	60	55		

<sup>a</sup> For ISO 261 threads, fittings complying with Figure 11 and Table 7 (ISO 6149-2 and ISO 6149-3 stud ends) are preferred.

<sup>b</sup> Alternative hex size: 46 mm.



1) As chosen by the manufacturer; see figure 10.

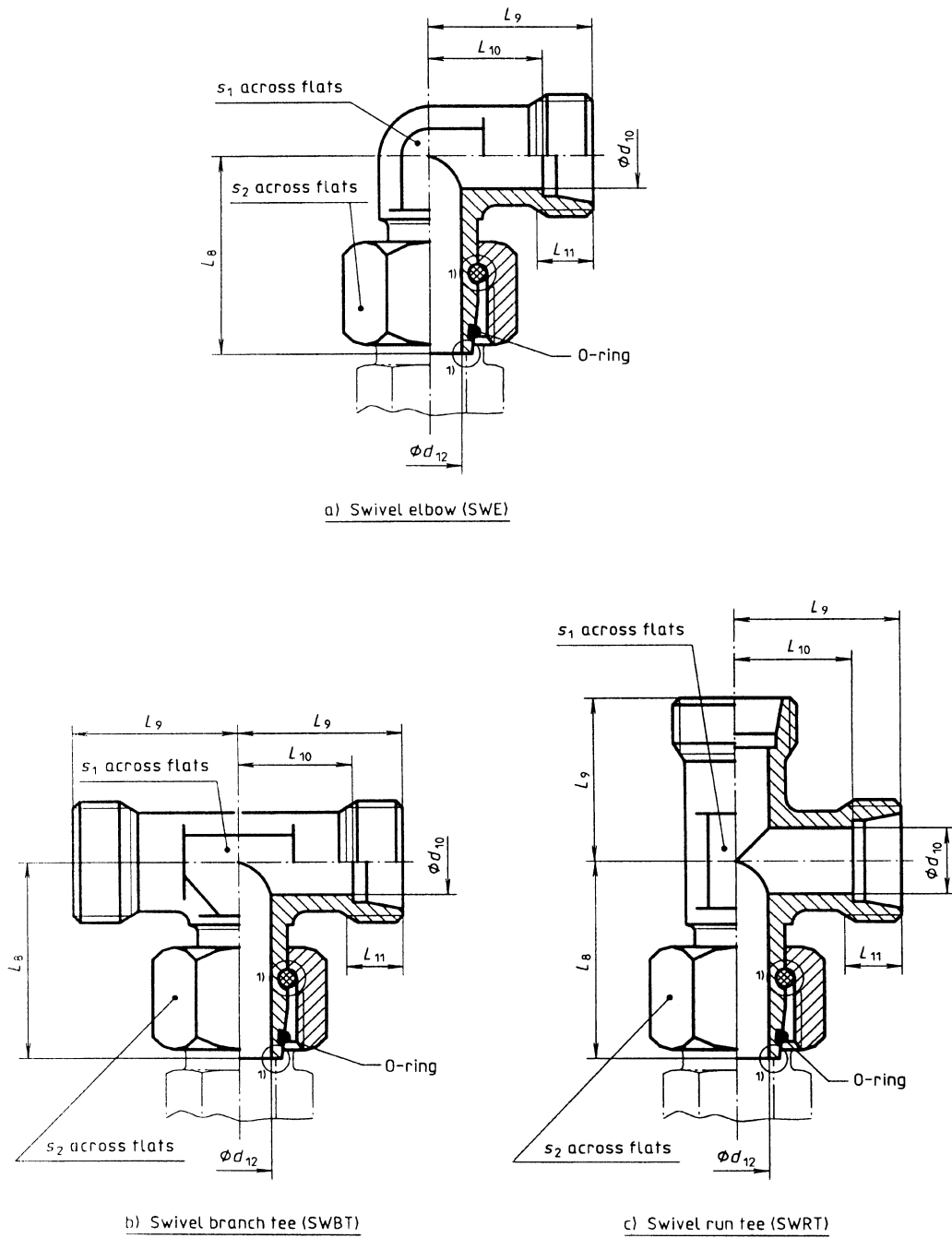
**Figure 11 — Swivel stud straight adaptor (SWSDS) with stud end per ISO 6149-2 (S series) or ISO 6149-3 (L series)**

**Table 7 — Dimensions of swivel stud straight adaptors with stud ends per ISO 6149-2 (S series) or ISO 6149-3 (L series)**

Dimensions in millimetres

Series	Tube OD	$d_1$	$d_3$ $\pm 0,1$	$d_{12}$	$L_5$ $\pm 0,5$	$L_6$ $\pm 0,2$	$L_7$	$s_1$	$s_2$
<b>L</b>	15	M18 × 1,5	23,8	10	44	12,5	31,5	24	27
	18	M22 × 1,5	26,8	13	44,5	13	31,5	27	32
	22	M27 × 2	31,8	17	48,5	16	32,5	32	36
	28	M33 × 2	40,8	22	51	16	35	41	41 <sup>a</sup>
	35	M42 × 2	49,8	28	58,5	16	42,5	50	50
	42	M48 × 2	54,8	34	64	17,5	46,5	55	60
<b>S</b>	6	M12 × 1,5	16,8	2,5	38	11	27	17	17
	8	M14 × 1,5	18,8	4	40,5	11	29,5	19	19
	10	M16 × 1,5	21,8	6	44,5	12,5	32	22	22
	12	M18 × 1,5	23,8	8	48	14	34	24	24
	16	M22 × 1,5	26,8	11	52	15	37	27	30
	20	M27 × 2	31,8	14	61,5	18,5	43	32	36
	25	M33 × 2	40,8	18	66,5	18,5	48	41	46
	30	M42 × 2	49,8	23	70	19	51	50	50
	38	M48 × 2	54,8	30	81,5	21,5	60	55	60

<sup>a</sup> Alternative hex size: 46 mm.



1) As chosen by the manufacturer; see figure 10.

**Figure 12 — Swivel elbow (SWE), swivel branch tee (SWBT) and swivel run tee (SWRT)**

Table 8 — Dimensions of swivel elbows, swivel branch tees and swivel run tees

Dimensions in millimetres

Series	Tube OD	$d_{10}$	$d_{12}$	$L_8$ $\pm 0,5$	$L_9$ $\pm 0,3$	$L_{10}$	$L_{11}$ min.	$s_1^a$	$s_2$
L	15	12	10	32,5	28	21	9	19	27
	18	15	13	35,5	31	23,5	9	24	32
	22	19	17	38,5	35	27,5	10	27	36
	28	24	22	41,5	38	30,5	10	36	41 <sup>b</sup>
	35	30	28	51	45	34,5	12	41	50
	42	36	34	56	51	40	12	50	60
S	6	4	2,5	27	23	16	9	12 (14)	17
	8	5	4	27,5	24	17	9	14 (17)	19
	10	7	6	30	25	17,5	9	17 (19)	22
	12	8	8	31	29	21,5	9	17 (22)	24
	16	12	11	36,5	33	24,5	11	24	30
	20	16	14	44,5	37	26,5	12	27	36
	25	20	18	50	42	30	14	36	46
	30	25	23	55	49	35,5	16	41	50
	38	32	30	63	57	41	18	50	60

<sup>a</sup> Dimensions in parentheses are for fittings manufactured from barstock.

<sup>b</sup> Alternative hex size: 46 mm.

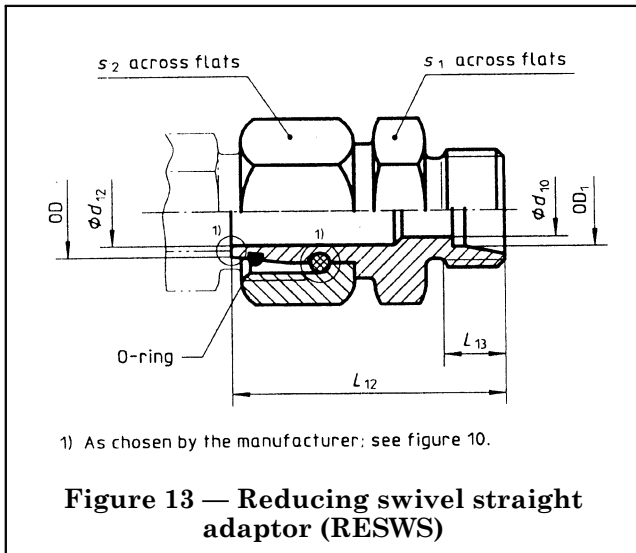
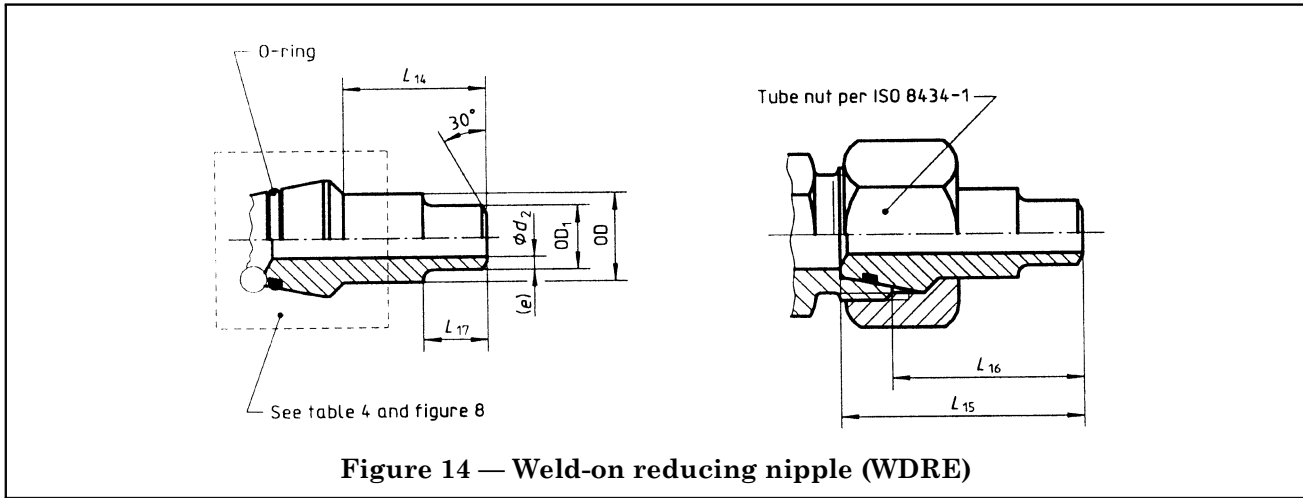


Table 9 — Dimensions of L and S series reducing swivel straight adaptors

Series	Working pressure MPa (bar)		Tube OD		$d_{10}$	$d_{12}$	$L_{12}$ ±0,5	$L_{13}$	Dimensions in millimetres			
			OD	OD <sub>1</sub>					$s_1^a$	$s_2^a$		
L	16	(160)	18	15	12	12	37	9	24	32		
			22	15	12	17	41	9	27	36		
	10	(100)	28	15	12	22	43	9	32 (36)	41 (46)		
				18	15	22	43	9				
			35	22	19	28	46	9	41 (46)	50		
				22	19	28	46	10				
				28	24	28	48	10				
			42	15	12	34	49,5	9	50	60		
	18	15		34	49,5	9						
	22	19		34	51,5	10						
28	24	34		51,5	10							
S	63	(630)	8	6	4	4	34	9	14	19		
			10	6	4	6	34,5	9	17	22		
				8	5	5	34,5	9				
			12	6	4	8	37	9	19	24		
	8	5		8	37	9						
	40	(400)	16	6	4	11	39	9	22	30		
				8	5	11	39	9				
				10	7	11	39	9				
			20	6	4	14	43	9	27	36		
				8	5	14	43	9				
				10	7	14	43	9				
				12	8	14	43	9				
			25	(250)	30	16	12	12	45	11	41	50
						6	4	18	45,5	9		
						8	5	18	45,5	9		
						10	7	18	45,5	9		
						12	8	18	45,5	9		
	38	(380)	38	16	12	18	47,5	11	50	60		
				20	16	18	49,5	12				
				6	4	30	54,5	9				
8				5	30	54,5	9					
10				7	30	54,5	9					
12				8	30	54,5	9					
16				12	30	56,5	11					
20				16	30	58,5	12					
25	20	30	60,5	14								
30	25	30	62,5	16								

<sup>a</sup> Alternative hex size in parentheses.



**Figure 14 — Weld-on reducing nipple (WDRE)**

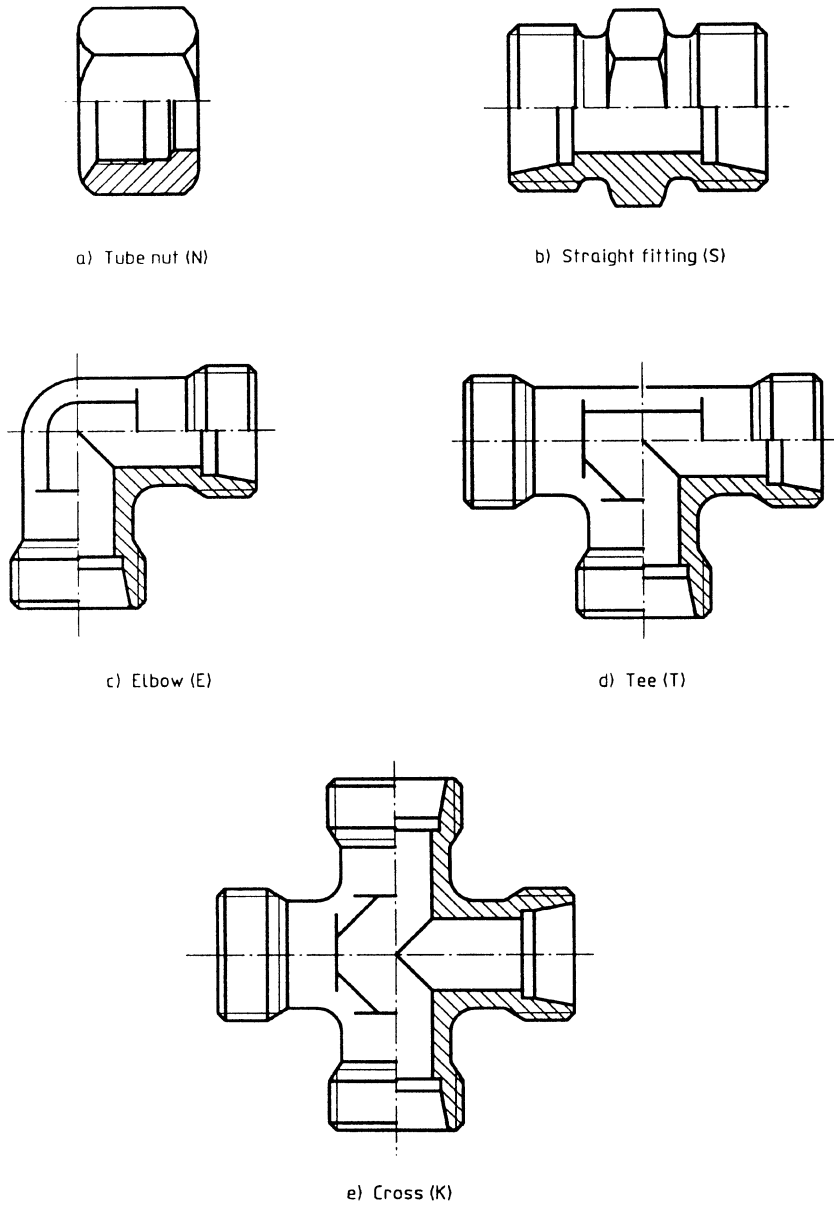
**Table 10 — Dimensions of L and S series weld-on reducing nipples**

Dimensions in millimetres

Series	Working pressure MPa (bar)	Tube OD		$d_2$	$e$	$L_{14}$ $\pm 0,2$	$L_{15}$ $\pm 1$	$L_{16}$ $\pm 1$	$L_{17}$	
		OD	OD <sub>1</sub>							
L	16 (160)	18	15	12	1,5	23	37	29,5	16	
		22	18	15	1,5	24,5	39,5	32	18	
	10 (100)	28	22	18	18	2	27,5	42,5	35	21
			15	12	1,5					
		35	28	24	2	30,5	49,5	39	25	
			22	18	2					
			18	15	1,5					
		42	15	12	1,5					
	35		31	2	30,5	50	39	28		
	28		24	2						
	22	18	2							
		18	15	1,5						
	15	12	1,5							

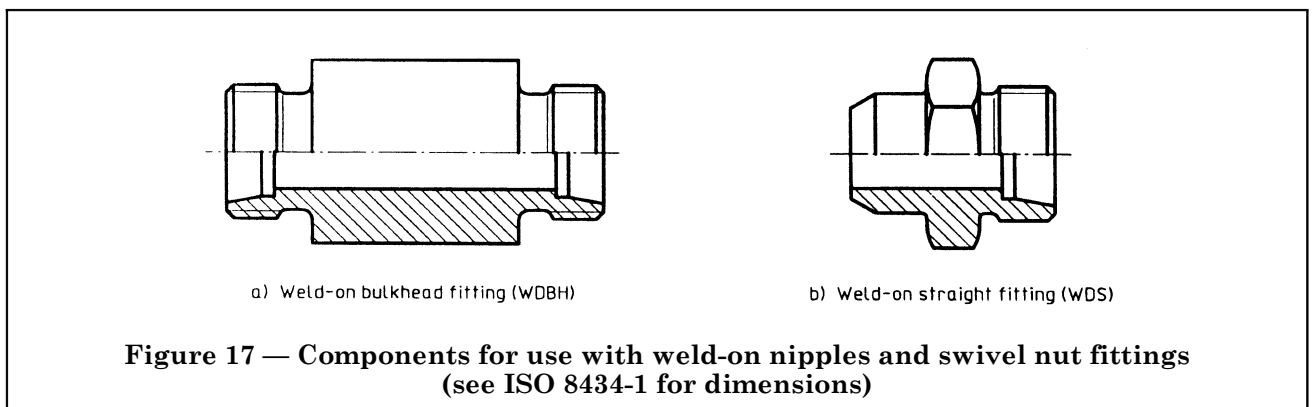
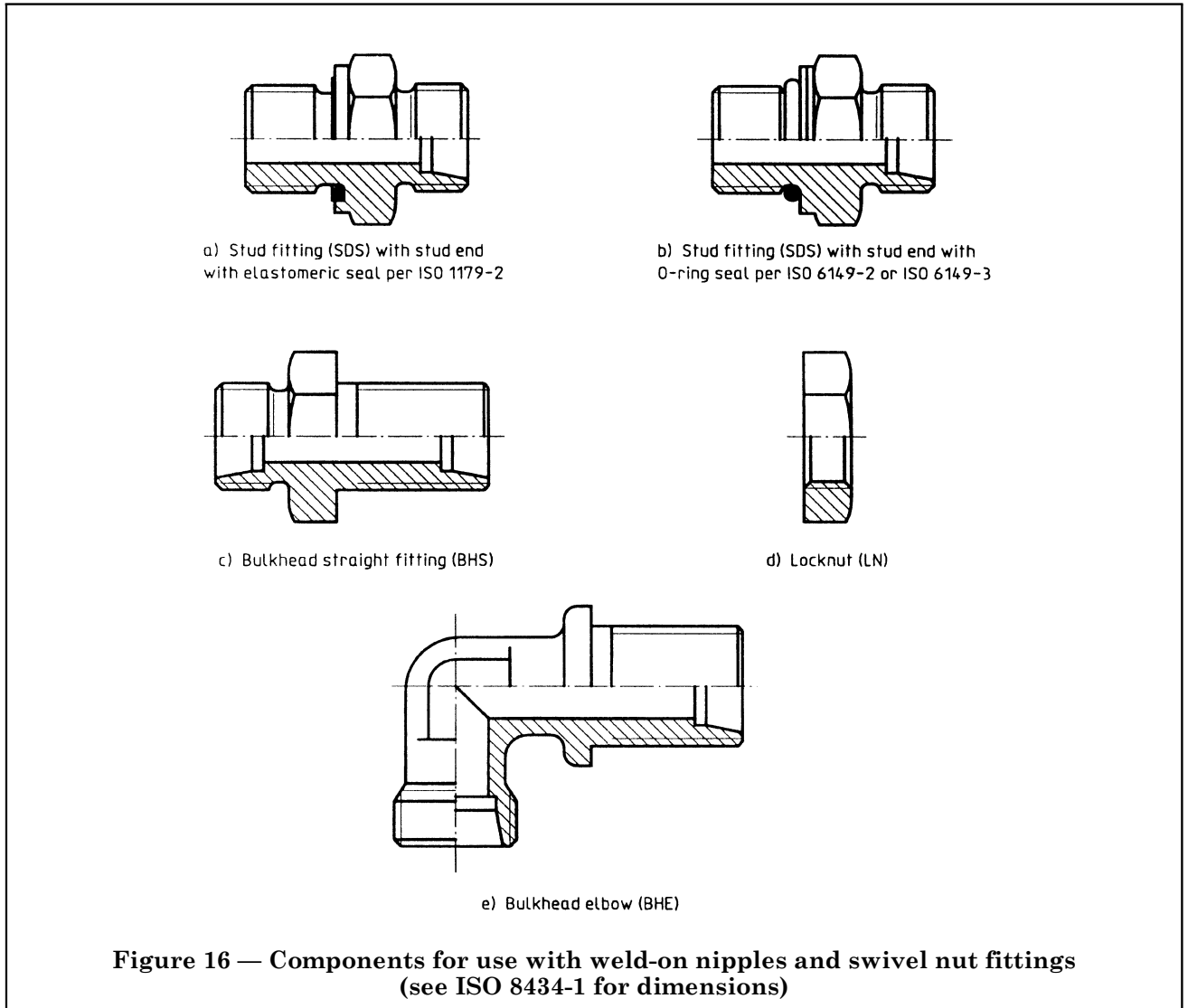
Table 10 — Dimensions of L and S series weld-on reducing nipples (continued)

Series	Working pressure		Tube OD		$d_2$	$e$	$L_{14}$ $\pm 0,2$	$L_{15}$ $\pm 1$	$L_{16}$ $\pm 1$	$L_1$	
	MPa	(bar)	OD	OD <sub>1</sub>							
S	63	(630)	8	6	2	2	19	32	25	11	
			10	8	3	2,5	20	33,5	26	12	
				6	2	2					
			12	10	4	3					
				8	3	2,5	20	33,5	26	13	
				6	2	2					
	40	(400)	16	12	8	2					
				10	6	2					
				8	5	1,5	26	40,5	32	15	
				6	3	1,5					
			20	16	10	3					
				12	8	2					
				10	6	2	28,5	47	36,5	17	
				8	5	1,5					
			25	6	3	1,5					
				20	13	3,5	33,5	53,5	41,5	20	
				16	10	3					
				12	8	2					
	25	(250)	30	10	6	2					
				8	5	1,5					
				6	3	1,5					
25				20	2,5						
16				12	2						
12				9	1,5	35,5	57,5	44	22		
10				7	1,5						
38			8	5	1,5						
			6	4	1						
			30	24	3						
			25	20	2,5						
			20	16	2						
			16	12	2	39,5	64,5	48,5	26		
			12	9	1,5						



**Figure 15 — Components for use with weld-on nipples and swivel nut fittings  
(see ISO 8434-1 for dimensions)**





## Annex A (normative)

## Port and stud end working pressures and combinations of tube outside diameters and port and stud end thread sizes

See Table A.1 for values for fluid power applications and general use, and Table A.2 for values for general use only.

Table A.1 — Values for fluid power and general use

Series	Tube OD mm	$d_2$ mm	ISO 6149-2 (S series) or ISO 6149-3 (L series) with non-adjustable stud ends		ISO 1179-2 <sup>a</sup>	
			Thread	Working pressure <sup>b</sup> MPa (bar)	Thread	Working pressure <sup>b</sup> MPa (bar)
L	15	10	M18 × 1,5	25 (250)	G 1/2 A	25 (250)
	18	13	M22 × 1,5	16 (160)	G 1/2 A	16 (160)
	22	17	M27 × 2	16 (160)	G 3/4 A	16 (160)
	28	23	M33 × 2	10 (100)	G 1 A	10 (100)
	35	29	M42 × 2	10 (100)	G 1 1/4 A	10 (100)
	42	36	M48 × 2	10 (100)	G 1 1/2 A	10 (100)
S	6	2,5	M12 × 1,5	63 (630)	G 1/4 A	63 (630)
	8	4	M14 × 1,5	63 (630)	G 1/4 A	63 (630)
	10	5	M16 × 1,5	63 (630)	G 3/8 A	63 (630)
	12	6	M18 × 1,5	63 (630)	G 3/8 A	63 (630)
	16	10	M22 × 1,5	40 (400)	G 1/2 A	40 (400)
	20	12	M27 × 2	40 (400)	G 3/4 A	40 (400)
	25	16	M33 × 2	40 (400)	G 1 A	40 (400)
	30	22	M42 × 2	25 (250)	G 1 1/4 A	25 (250)
	38	28	M48 × 2	25 (250)	G 1 1/2 A	25 (250)

NOTE Working pressures are for those fittings where the smallest  $d_2$  (inside diameter) is used. See Table 2 for working pressures for fittings with larger  $d_2$  dimensions.

<sup>a</sup> Type E with elastomeric sealing.  
<sup>b</sup> With a design factor of 4 to 1.

Table A.2 — Values for general use only

Series	Tube OD mm	$d_2$ mm	ISO 9974-2 <sup>a</sup>		
			Thread	Working pressure <sup>b</sup> MPa (bar)	
L	15	10	M18 × 1,5	25	(250)
	18	13	M22 × 1,5	16	(160)
	22	17	M26 × 1,5	16	(160)
	28	23	M33 × 2	10	(100)
	35	29	M42 × 2	10	(100)
	42	36	M48 × 2	10	(100)
S	6	2,5	M12 × 1,5	63	(630)
	8	4	M14 × 1,5	63	(630)
	10	5	M16 × 1,5	63	(630)
	12	6	M18 × 1,5	63	(630)
	16	10	M22 × 1,5	40	(400)
	20	12	M27 × 2	40	(400)
	25	16	M33 × 2	40	(400)
	30	22	M42 × 2	25	(250)
	38	28	M48 × 2	25	(250)

NOTE Working pressures are for those fittings where the smallest  $d_2$  (inside diameter) is used. See Table 2 for working pressures for fittings with larger  $d_2$  dimensions.

<sup>a</sup> Type E with elastomeric sealing.  
<sup>b</sup> With a design factor of 4 to 1.

**Annex ZA (normative)****Normative references to International publications with their relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

<b>Publication</b>	<b>Year</b>	<b>Publication</b>	<b>EN</b>	<b>Year</b>
ISO 1127	1992	<i>Stainless steel tubes — Dimensions, tolerances and conventional masses per unit length</i>	EN ISO 1127	1996
ISO 8434-1	1994	<i>Metallic tube connections for fluid power and general use — Part 1: 24° compression fittings</i>	EN ISO 8434-1	1997

---

---

## BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

### Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.  
Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

### Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

### Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre.  
Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.  
Tel: 020 8996 7002. Fax: 020 8996 7001.

### Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager.  
Tel: 020 8996 7070.