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Second edition
2020-01

Pneumatic fluid power — Push-in connectors for thermoplastic tubes

Transmissions pneumatiques — Raccords instantanés pour tubes thermoplastiques

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.

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).

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For an explanation of 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 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 second edition cancels and replaces the first edition (ISO 14743:2004), which has been technically revised. The main changes compared to the previous edition are as follows:

— new fitting size including inch dimensions has been added;

— new normative references have been added;

— updates on leakages performances and precisions have been added for cyclic endurance with vibration.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In pneumatic fluid power systems, power is transmitted and controlled through air under pressure within a circuit.

Components are connected through their ports by means of connectors (fittings) and conductors.

Pneumatic fluid power — Push-in connectors for thermoplastic tubes

1 Scope

This document specifies the general requirements and test methods for the design and performance of push-in connectors for use with thermoplastic tubes with outside diameters (OD) from 3 mm to 16 mm including dimensions in inches.

This document is intended to establish uniform methods of testing complete push-in connector assemblies as used in pneumatic fluid power applications. It is not applicable to air braking systems.

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 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 4759-1, *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 8573-1:2010, *Compressed air — Part 1: Contaminants and purity classes*

ISO 10619-1, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 16030, *Pneumatic fluid power — Connections — Ports and stud ends*

ANSI/ASME B1.1, *Unified Inch Screw Threads, (UN and UNR Thread Form)*

ANSI/ASME B1.20.1, *Pipe Threads, General Purpose, Inch*

ANSI/ASME B1.20.3, *Dryseal Pipe Threads (Inch)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 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 https://www.iso.org/obp

4 Working conditions

Push-in connectors shall provide connections from –0,09 MPa [–0,9 bar[1)]] to a working pressure of 1,6 MPa (16 bar) when used at temperatures between –20 °C and +80 °C.

1) 1 bar = 0,1 MPa = 105 Pa; 1 MPa = 1 N/mm^2

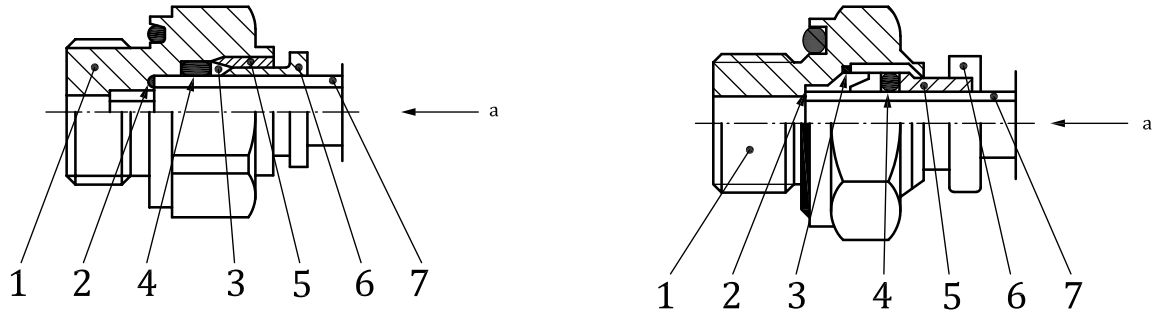
The connector assembly shall meet the performance requirements given in Clause 9 with tubes specified in Annex A and Annex B.

When tubing with a lower rated pressure is used, the maximum working pressure of the tube and connector assembly shall be that of the tubing.

In road vehicles, it is necessary to exercise special care to ensure that these connectors are never used in an air braking system.

5 Features

Design is optional to the manufacturer. Two examples are shown in Figure 1.



a) With sealing system located beyond the locking mechanism

b) With sealing system located in front of the locking mechanism

Key

1 body
2 tube stop
3 grab ring of tube
4 sealing of tube
5 releasing sleeve
6 removable button (optional)
7 tube
a Entry of the tube.

Figure 1 — Examples of design and description of the features of push-in connectors for use with thermoplastic tubes

6 OD of tube

The OD of the tube shall be chosen from the following range of sizes:

3 mm, 1/8 in (3,17 mm), 4 mm (5/32 in), 6 mm, 1/4 in (6,35 mm), 8 mm (5/16 in), 10 mm, 3/8 in (9,52 mm), 12 mm, 1/2 in (12,7 mm), 14 mm, and 16 mm (5/8 in).

7 Design

7.1 Push-in connector dimensions shown in Figures 2 to 7 shall conform to the dimensions given in Tables 1 to 7.

7.2 Hexagon tolerances across flats shall be in accordance with ISO 4759-1, Grade C. The minimum hexagon across-corner turn diameter of 1,092 times the normal across flats dimension shall be used.

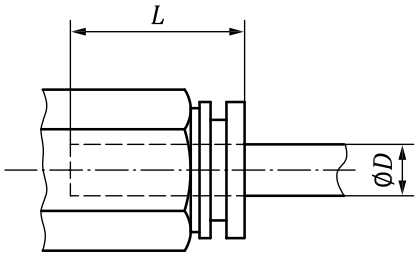
7.3 For connectors with the thread M and G, thread and stud end shall be in accordance with ISO 16030.

For connector with the thread R, thread and stud end shall be in accordance with ISO 7-1.

For connector with NPT thread, thread and stud end shall be in accordance with ANSI/ASME B1.20.1 and ANSI/ASME B1.20.3.

For connector with UNF thread, thread and stud end shall be in accordance with ANSI/ASME B1.1.

7.4 Details of contour shall be at the option of the manufacturer if the dimensions given in the Tables are maintained.



Key

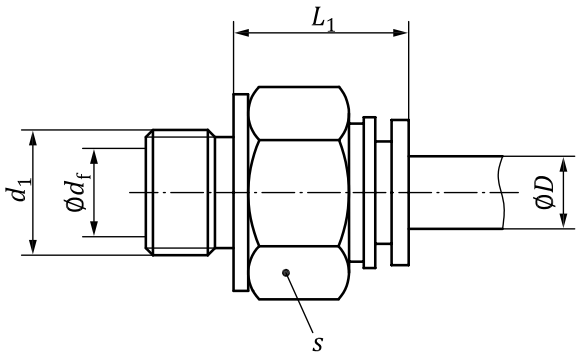
D tube OD

L maximum insertion depth

Figure 2 — Tube insertion depth

Table 1 — Maximum tube insertion depth

Tube OD *D*		Maximum insertion depth *L*
in (mm)	mm	mm
1/8 (3,17)	3	16
5/32 (4)	4	18
1/4 (6,35)	6	19
5/16 (8)	8	20
3/8 (9,52)	10	24
1/2 (12,7)	12	33
	14	33
5/8 (16)	16	35



Key

D tube OD

d_1 thread outside diameter

s hexagon socket dimension

L_1 Stud adaptor height

d_f flow diameter

Figure 3 — Stud adaptor (SDS)

Table 2 — SDS dimensions for tube OD in millimetres

Dimensions in millimetres

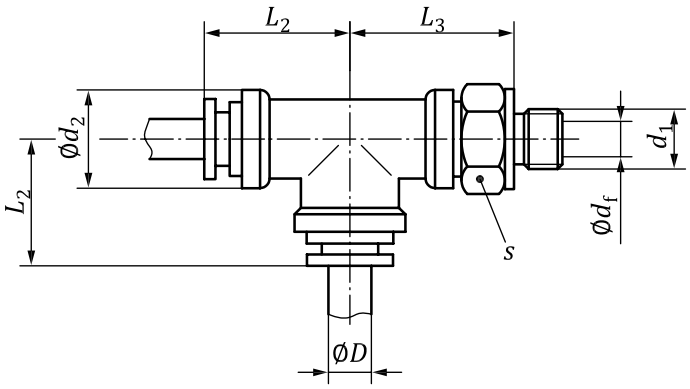
Tube OD D	d_1	L_1 max.	s^a max.	**Flow diameter** d_f min.
3	M3	17	10	1,2
	M5	17	10	1,8
4	M3	22	12	1,2
	M5	22	12	2
	M7	22	12	2,5
	G1/8, R1/8, 1/8NPT	22	14	2,5
	G1/4, R1/4, 1/4NPT	22	19	2,5
	R3/8	22	22	3
6	M5	23	12	2,5
	M7	23	14	3
	M10	23	15	4
	M12	23	17	4
	G1/8, R1/8, 1/8NPT	23	14	4
	G1/4, R1/4, 1/4NPT	23	19	4
	G3/8, R3/8	23	22	4
	G1/2, R1/2	23	26	4
8	M10, M12, G1/8, R1/8, 1/8NPT	24	17	5
	G1/4, R1/4, 1/4NPT	24	19	6
	G3/8, R3/8, 3/8NPT	24	22	6
	G1/2, R1/2	24	26	6
10	G1/4	27	19	7
	G3/8, R3/8, 3/8NPT	27	22	8
	G1/2	27	26	8
	R1/8	27	19	5
	R1/4, 1/4NPT	27	22	7
	R1/2, 1/2NPT	27	26	8
12	G1/4, R1/4	30	22	7
	G3/8, R3/8, 3/8NPT	30	22	9
	G1/2, 1/2NPT	30	26	10
	R 1/2	30	26	9
14	G3/8, R3/8	32	25	9
	G1/2	32	26	11
	R 1/2	32	26	10
16	G3/8, R3/8, 3/8NPT	34	30	9
	G1/2, R1/2, 1/2NPT	34	30	12

[a] Hexagon socket or OD at the choice of the manufacturer.

Table 3 — SDS dimensions for tube OD in inches

Tube OD D in	d_1 mm	L_1 mm max.	s^a mm max.	Flow diameter d_f mm min.
1/8	R1/8, 1/16NPT, 1/8NPT	18	14	1,8
	1/4 NPT	18	19	1,8
	10-32 UNF	18	13	1,8
5/32	R1/8, 1/8NPT	22	14	2,5
	R1/4, 1/4NPT	22	20	2,5
	10-32 UNF	22	13	2
1/4	R1/8, 1/8NPT	23	15	4
	R1/4, 1/4NPT	23	19	4
	1/16 NPT	23	14	3
	3/8 NPT	23	22	4
	10-32 UNF	23	14	2
	M5	23	12	2,5
	M7	23	14	4
5/16	R1/8, 1/8NPT	25	17	5
	R1/4, 1/4NPT	25	19	6
	R3/8, 3/8NPT	25	22	6
	R 1/2	25	26	6
3/8	R1/4, 1/4NPT	28	19	7
	R3/8, 3/8NPT	28	22	7
	R1/2, 1/2NPT	28	26	7
	1/8 NPT	28	19	4
1/2	R1/4, 1/4NPT	30	26	6
	R3/8, R1/2, 3/8NPT, 1/2NPT	30	26	7
5/8	G3/8, R3/8, 3/8NPT	34	30	9
	G1/2, R1/2, 1/2NPT	34	30	12

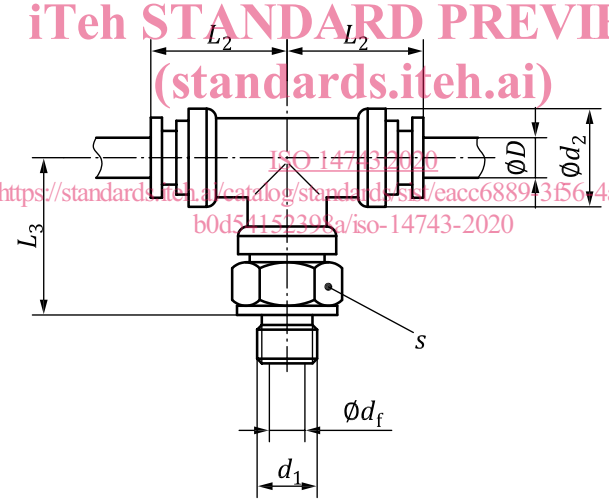
[a] Hexagon socket or OD at the choice of the manufacturer.



Key

D	tube OD	L_2	elbow and tee (branch or swivel) outer length dimension (from thread axis to perpendicular side connector end)
d_f	flow diameter	L_3	elbow and tee (branch or swivel) outer length dimension (from thread stop end surface to perpendicular side connector tubing axis)
d_1	thread outside diameter	d_2	connector body outer diameter

Figure 4 — Swivel male run tee (SWRT)



Key

D	tube OD	L_2	elbow and tee (branch or swivel) outer length dimension (from thread axis to perpendicular side connector end)
d_f	flow diameter	L_3	elbow and tee (branch or swivel) outer length dimension (from thread stop end surface to perpendicular side connector tubing axis)
d_1	thread outside diameter	d_2	connector body outer diameter

Figure 5 — Swivel male branch tee (SWBT)