TECHNICAL SPECIFICATION

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Polyurethane tubing for use primarily in pneumatic installations — Dimensions and specification

Tubes en polyuréthanne utilisés principalement dans les installations pneumatiques — Dimensions et spécifications

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Foreword

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

Introduction

This Technical Specification has been prepared to provide minimum acceptable requirements for the satisfactory performance of thermoplastic polyurethane tubing used mainly in pneumatic applications.

The tubing conveys compressed air which controls and powers pneumatic systems.

This Technical Specification will be revised to an International Standard when ISO 14743 has been revised and published in ISO/TC 131.

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WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure compliance with any national regulatory conditions.

1 Scope

This Technical Specification specifies the requirements for flexible thermoplastic polyurethane tubing conveying compressed air, for use in the ambient temperature range from 23 °C to 60 °C, in sizes from 3 mm to 12 mm outside diameter. Working pressure depends on the tube size and the service temperature (see Table 4). Tubing may be used with push on connectors which are specified in ISO 14743.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1307, *Rubber and plastics hoses — Hose sizes, minimum and maximum inside diameters, and tolerances on cut-to-length hoses*

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 10619-1:2011, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO 8331, *Rubber and plastics hoses and hose assemblies — Guidelines for selection, storage, use and maintenance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8330 apply.

4 Materials and construction

The tubing shall be manufactured from polyester or polyether based polyurethane and shall be homogenous, and free from surface imperfections. The tubing is extruded and can be coloured to user requirements. For applications where there is moisture or water present above 40 °C, polyurethane materials with good hydrolysis resistance would be required. This must be specified by the user to the supplier of the tubing.

5 Dimensions and tolerances

5.1 Outside diameters, wall thickness and tolerances

The outside diameters and tolerances of tubing shall meet the requirements given in Table 1.

Table 1 — Outside diameters, wall thickness and tolerances

Outside diameter		Wall thickness	
Diameter mm	Tolerance mm	Thickness mm	Tolerance mm
3	±0,10	0,50	+ 0,10 - 0,05
4	±0,10	0,75	+ 0,10 - 0,05
5	±0,10	1,00	+ 0,10 - 0,05
6	±0,10	1,00	+ 0,10 - 0,05
8	±0,10	1,25	+ 0,10 - 0,05
8	±0,10	1,00	+ 0,10 - 0,05
10	±0,15	1,50	+ 0,15 - 0,07
10	±0,15	1,00	+ 0,15 - 0,05
12	±0,15	2,00	+ 0,15 - 0,07

5.2 Length tolerances

The tolerances on cut lengths shall be in accordance with ISO 1307.

6 Performance requirements

6.1 Hydrostatic testing at 23 °C ± 2 °C

When subjected to the burst pressure test specified in ISO 1402 at 23 °C ± 2 °C, tubing shall meet the requirements specified in Table 2.

Table 2 — Burst testing at 23 °C ± 2 °C

Outside diameter mm	Wall thickness mm	Minimum burst pressure MPa	Minimum burst pressure bar
3	0,5	5,40	54,0
4	0,75	6,23	62,3
5	1,0	6,75	67,5
6	1,0	5,40	54,0
8	1,25	5,00	50,0
8	1,0	3,84	38,4
10	1,5	4,76	47,6
10	1,0	3,00	30,0
12	2,0	5,40	54,0

6.2 Hydrostatic testing at 60 °C ± 2 °C

When subjected to the burst pressure test specified in ISO 1402 at 60 °C ± 2 °C, tubing shall meet the requirements given in Table 3. Tests shall be conducted at 60 °C in a proper temperature controlled cabinet, and compressed gas (either air or nitrogen) can be used as a burst test media.

Table 3 — Burst testing at 60 °C ± 2 °C

Outside diameter mm	Wall thickness mm	Minimum burst pressure MPa	Minimum burst pressure bar
3	0,5	3,46	34,6
4	0,75	3,98	39,8
5	1,0	4,32	43,2
6	1,0	3,45	34,5
8	1,25	3,20	32,0
8	1,0	2,47	24,7
10	1,5	3,04	30,4
10	1,0	1,92	19,2
12	2,0	3,45	34,5

6.3 Maximum working pressure

The maximum working pressure shall be as specified in Table 4.

Table 4 — Maximum working pressures at 23 °C and 60 °C

Outside diameter mm	Wall thickness mm	Maximum working pressure at 23 °C MPa	Maximum working pressure at 23 °C bar	Maximum working pressure at 60 °C MPa	Maximum working pressure at 60 °C bar
3	0,5	1,35	13,5	0,86	8,6
4	0,75	1,55	15,5	0,99	9,9
5	1,0	1,68	16,8	1,08	10,8
6	1,0	1,35	13,5	0,86	8,6
8	1,25	1,25	12,5	0,80	8,0
8	1,0	0,96	9,6	0,61	6,1
10	1,5	1,19	11,9	0,76	7,6
10	1,0	0,75	7,5	0,48	4,8
12	2,0	1,35	13,5	0,86	8,6
NOTE Maximum working pressures are based on a factor of safety of 4:1 on minimum burst pressures because the main use of this tubing is for conveying compressed air.					

6.4 Minimum bend radius

When tested in accordance with ISO 10619-1:2011 method A1, the minimum bend radius shall be as specified in Table 5, and the value of T/D shall be greater than 0,9.