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**Rubber hoses and hose assemblies for  
automobile power-steering systems —  
Specification**

*Tuyaux et flexibles en caoutchouc pour circuits de direction  
assistée — Spécifications*

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# Contents

	Page
Foreword .....	iv
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Types of hose</b> .....	<b>2</b>
<b>5 Construction and materials</b> .....	<b>2</b>
<b>6 Dimensions and tolerances</b> .....	<b>2</b>
<b>7 Performance requirement</b> .....	<b>3</b>
7.1 Impulse resistance .....	3
7.2 Burst pressure requirement .....	3
7.3 Change in length .....	3
7.4 Low-temperature flexibility .....	3
7.5 Adhesion .....	4
7.6 Ozone resistance .....	4
7.7 Volumetric expansion .....	4
7.8 Contamination .....	4
7.9 Corrosion of end fittings .....	4
7.10 Proof pressure requirement .....	4
7.11 Cold-start requirement (type approval test for type 4 hose assemblies only) .....	4
7.11.1 Requirement .....	4
7.11.2 Test method .....	5
7.12 Low-pressure burst pressure requirement (type 4 hose assemblies only) .....	5
<b>8 Marking</b> .....	<b>5</b>
<b>Annex A (normative) Method of test for volumetric expansion</b> .....	<b>6</b>
<b>Annex B (normative) Method of test for contamination</b> .....	<b>8</b>
<b>Annex C (informative) Typical outside-diameter ranges</b> .....	<b>10</b>

## 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](http://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](http://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 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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 45, Rubber & Rubber Products, Subcommittee SC 1, Rubber and plastics hoses and hose assemblies

This second edition cancels and replaces the first edition (ISO 11425:1996), of which it constitutes a minor revision.

The main changes compared to the previous edition are as follows:

- In Clause 2, normative references have been updated.

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](http://www.iso.org/members.html).

# Rubber hoses and hose assemblies for automobile power-steering systems — Specification

**WARNING** — Attention is drawn to the need to ensure that appropriate precautions are taken to ensure the safety of personnel carrying out the methods of test specified in this document.

## 1 Scope

This document specifies requirements for five types of hose and hose assembly used in automobile power-steering systems, the five types differing in their pressure ratings and volumetric expansion. They are for use with fluids in the temperature range  $-40\text{ °C}$  to  $+135\text{ °C}$ .

This document is based on performance tests. In order to take account of technological developments, no requirements are included for specific materials, detailed construction or manufacturing methods.

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

ISO 2719, *Determination of flash point — Pensky-Martens closed cup method*

ISO 2909, *Petroleum products — Calculation of viscosity index from kinematic viscosity*

ISO 2977, *Petroleum products and hydrocarbon solvents — Determination of aniline point and mixed aniline point*

ISO 3016, *Petroleum products — Determination of pour point*

ISO 3819, *Laboratory glassware — Beakers*

ISO 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies*

ISO 4788, *Laboratory glassware — Graduated measuring cylinders*

ISO 4793, *Laboratory sintered (fritted) filters — Porosity grading, classification and designation*

ISO 6803, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing*

ISO 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8033, *Rubber and plastics hoses — Determination of adhesion between components*

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

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

ISO 10619-2, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures*

ISO/TR 11340:1994, *Rubber and rubber products — Hydraulic hose assemblies — External leakage classification for hydraulic systems*

### 3 Terms and definitions

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

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

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

#### 3.1 hose assembly

hose with either permanent or re-usable end fittings attached

### 4 Types of hose

Hoses shall be one of the following five types:

- a) Type 1: low-pressure hydraulic fluid return hoses and hose assemblies.
- b) Type 2: medium-pressure low volumetric expansion hoses and hose assemblies.
- c) Type 3: medium-pressure medium volumetric expansion hoses and hose assemblies.
- d) Type 4: medium-pressure high volumetric expansion hoses and hose assemblies.
- e) Type 5: high-pressure low volumetric expansion hoses and hose assemblies.

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### 5 Construction and materials

The hose shall consist of: <https://standards.iteh.ai/catalog/standards/sist/0f19a052-9472-44f0-ac83-24163f9a9654/iso-11425-2018>

- a) a rubber lining;
- b) a reinforcement;
- c) a rubber cover or alternatively, for type 5 only, a textile cover.

The hose shall be uniform in quality and free from porosity, air holes and foreign inclusions.

### 6 Dimensions and tolerances

6.1 The hose shall have a inside diameter in accordance with the requirements of [Table 1](#). When determined in accordance with ISO 4671, the actual bore shall be within  $\pm 0,4$  mm of the inside diameter.

**Table 1 — Inside diameter**

Dimensions in millimetres

Type 1	Type 2	Type 3	Type 4	Type 5
—	6,3	—	—	—
9,5	9,5	9,5	9,5	9,5
—	12,7	—	—	12,7

6.2 The concentricity based on a total indicator reading between the bore and the outside surface of the cover, determined in accordance with ISO 4671 shall be not more than 0,75 mm.

NOTE Typical ranges of outside diameters available are given in [Annex C](#).

## 7 Performance requirement

### 7.1 Impulse resistance

When subjected to a pulse test carried out in accordance with ISO 6803, using the following conditions, each of at least four test pieces shall withstand a minimum of 225 000 cycles with no more than ISO/TR 11340:1994 class 3 leakage at fittings, and no rupture or ballooning of the hose.

Test fluid temperature:  $135\text{ °C} \pm 2\text{ °C}$

Ambient temperature during test:  $100\text{ °C} \pm 5\text{ °C}$  cycle rate: 30 to 40 per min

Cycle data:

Pressure rise time:  $0,20\text{ s} \pm 0,10\text{ s}$

Pressure dwell time:  $0,65\text{ s} \pm 0,20\text{ s}$

Pressure drop time:  $0,20\text{ s} \pm 0,10\text{ s}$

Test pressure: Design working pressure as given in [Table 2](#).

### 7.2 Burst pressure requirement

When tested in accordance with ISO 1402 the hose or hose assembly shall withstand the minimum burst pressure given in [Table 2](#).

**Table 2 — Hydrostatic-pressure requirements**

Type	Inside diameter mm	Design working pressure MPa	Proof pressure MPa	Minimum burst pressure MPa
1	9,5	1,75	3,5	7,0
2	6,3	9,0	18,0	36,0
	9,5	8,0	16,0	32,0
	12,7	7,0	14,0	28,0
3	9,5	10,0	20,0	40,0
4	9,5	9,0	18,0	36,0
5	9,5	15,5	31,0	62,0
	12,7	14,0	28,0	56,0

NOTE All pressure values specified are gauge pressures.

### 7.3 Change in length

Hoses of types 1, 3 and 4 shall not change in length by more than +0 % and –8 % and hoses of types 2 and 5 shall not change in length by more than +2 % and 4 % at the appropriate design working pressure given in [Table 2](#).

### 7.4 Low-temperature flexibility

After conditioning at a temperature of  $-40\text{ °C} \pm 2\text{ °C}$  for a period of 72 h, bend a test piece around a mandrel having a diameter eight times the outside diameter of the hose, using the method without torque measurements described in ISO 10619-2.

The test piece shall not fracture and the cover shall not show any cracks or breaks.

After this test, the test piece shall be allowed to attain ambient temperature and shall then withstand the appropriate proof pressure given in [Table 2](#), using the method described in ISO 1402, without any sign of leakage or other defect.

Following the proof pressure test, the test piece shall be sectioned and the lining shall show no evidence of cracking upon visual examination.

### 7.5 Adhesion

When determined in accordance with ISO 8033, for type 1, 2, 3 and 4 hoses, and for type 5 hoses supplied with a rubber cover, the adhesion between lining and reinforcement, between layers of reinforcement and between reinforcement and cover shall not be less than 1,5 kN/m.

### 7.6 Ozone resistance

When tested in accordance with ISO 7326:2016, Method 1, the test piece shall show no sign of cracking.

### 7.7 Volumetric expansion

This requirement applies to type 3 and 4 hoses only. When tested by the method described in [Annex A](#), the hose or hose assembly shall comply with the requirements of [Table 3](#).

**Table 3 — Volumetric expansion**

Hose type	Volumetric expansion at 9 MPa
3	10 cm <sup>3</sup> /m to 26 cm <sup>3</sup> /m
4	26 cm <sup>3</sup> /m to 55 cm <sup>3</sup> /m

### 7.8 Contamination

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When determined by the method described in [Annex B](#), the total amount of impurities shall not exceed 100 mg/m<sup>2</sup> and the maximum particle size shall be 70 µm.

### 7.9 Corrosion of end fittings

When tested in accordance with ISO 9227 for 168 h, the hose assembly and fittings shall show no evidence of corrosion of the base metal

### 7.10 Proof pressure requirement

Each length of hose or each hose assembly subjected to the appropriate proof pressure given in [Table 2](#), using the method described in ISO 1402 for a period of 1 min, shall show no sign of rupture or leakage.

### 7.11 Cold-start requirement (type approval test for type 4 hose assemblies only)

#### 7.11.1 Requirement

When tested in accordance with [7.11.2](#), the assembly shall show no signs of cracks or leakage at the end of 15 cycles.



### 7.11.2 Test method

**7.11.2.1** Bend the hose assembly into a U shape, fill with test fluid (see [A.3](#)) and lower the temperature to  $-40\text{ °C} \pm 2\text{ °C}^1$ .

**7.11.2.2** Apply a pressure pulse of 11 MPa for 1,5 s, twenty times.

**7.11.2.3** Allow the assembly to warm up to ambient laboratory temperature and leave for 2 h.

**7.11.2.4** Apply a pressure pulse of 11 M Pa for 1,5 s, twenty times.

**7.11.2.5** Repeat the procedure described in [7.11.2.1](#) to [7.11.2.4](#) (starting at “lower the temperature to  $-40\text{ °C} \pm 2\text{ °C}$ ”) a further fourteen times.

**7.11.2.6** Examine the hose assembly visually for signs of cracks or leakage, ignoring any leakage associated with the couplings.

### 7.12 Low-pressure burst pressure requirement (type 4 hose assemblies only)

Fill the hose assembly with test fluid (see [A.3](#)) and maintain at  $-40\text{ °C} \pm 2\text{ °C}^1$  for 12 h. The hose assembly shall then withstand a minimum burst pressure of 36 MPa applied in accordance with ISO 1402.

## 8 Marking

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Each length of hose shall be legibly and indelibly marked at intervals of no more than 250 mm with the following information:

- a) the manufacturer's name or identification;  
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- b) the number of this document and its year of publication;
- c) the hose type;
- d) the inside diameter of the hose, in millimetres;
- e) the quarter and last two digits of the year of manufacture, e.g. 4Q18;
- f) the design working pressure in megapascals.

EXAMPLE     XXX /ISO 11425:2018/3/9,5/4Q18/15,5.

1) A temperature of  $-40\text{ °C}$  can be obtained by using methanol or ethanol with crushed dry ice (solid carbon dioxide) and maintained by carefully adding further pieces of dry ice.