

# INTERNATIONAL STANDARD

**ISO  
4639-1**

First edition  
1987-08-15



---

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION  
ORGANISATION INTERNATIONALE DE NORMALISATION  
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

---

## **Rubber tubing and hoses for fuel circuits for internal combustion engines — Specification —**

### **Part 1: Conventional liquid fuels**

*Tuyaux et tubes en caoutchouc pour circuits à carburants pour moteurs à combustion interne —  
Spécifications —*

*Partie 1: Carburants liquides conventionnels*

Reference number  
ISO 4639-1:1987 (E)

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4639-1 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

# Rubber tubing and hoses for fuel circuits for internal combustion engines — Specification —

## Part 1: Conventional liquid fuels

### 1 Scope and field of application

This part of ISO 4639 specifies requirements for vulcanized compounds and rubber tubing and hoses for use in fuel circuits using conventional liquid fuels (containing non-oxygenated compounds). It does not cover any equipment used for the distribution of liquid fuels.

For the purpose of this International Standard, tubing and hoses are divided into three different types:

- Type 1: Homogeneous tubing for use at working pressures of up to 0,12 MPa inclusive;
- Type 2: Hoses with a working pressure in the 0 to 0,12 MPa inclusive range;
- Type 3: Hoses with a working pressure in the 0 to 0,3 MPa inclusive range;

In addition the three types 1, 2 and 3 are further divided into two grades:

- Grade A: operating in an environmental temperature of up to 100 °C.
- Grade B: operating in an environmental temperature of up to 125 °C.

### 2 References

ISO 37, *Rubber, vulcanized — Determination of tensile stress-strain properties.*

ISO 48, *Vulcanized rubbers — Determination of hardness (Hardness between 30 and 85 IRHD).*

ISO 188, *Vulcanized rubber — Accelerated ageing or heat-resistance tests.*

ISO/R 286, *ISO system of limits and fits — Part 1: General, tolerances and deviations.*

ISO 471, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO 815, *Vulcanized rubbers — Determination of compression set under constant deflection at normal and high temperatures.*

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

ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids.*

ISO 2285, *Rubber, vulcanized — Determination of tension set at normal and high temperatures.*

ISO 3302, *Rubber — Dimensional tolerances of solid moulded and extruded products.*

ISO 4671, *Rubber and plastics hose and hose assemblies — Methods of measurement of dimensions.*

ISO 4672, *Rubber products — Hoses — Low temperature flexibility tests.*

ISO 6133, *Rubber and plastics — Analysis of multi-peak traces obtained in determination of tear strength and adhesion strength.*

ISO 7233, *Rubber and plastics hoses and hose assemblies — Vacuum resistance — Methods of test.*

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

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

ISO 8308, *Rubber and plastics hoses and tubing — Determination of transmission of liquids through hose walls.*<sup>1)</sup>

### 3 Tubing and hose bores

The bore of all tubing and hoses shall be clean and free from any contamination when examined visually.

### 4 Sizes

#### 4.1 Tubing

Bore diameters and wall thicknesses shall be as specified in table 1.

<sup>1)</sup> At present at the stage of draft.

Tolerances shall be selected from the appropriate categories shown in ISO 3302.

Table 1 — Bore diameters and wall thicknesses

Dimensions in millimetres

| Nominal bore | Nominal wall thickness |
|--------------|------------------------|
| 3,5          | 3,5                    |
| 4            | 3,5                    |
| 5            | 4                      |
| 7            | 4,5                    |
| 9            | 4,5                    |
| 11           | 4,5                    |
| 13           | 4,5                    |

NOTE — For information, the unions on which the tubing is to be fitted have the following diameters:

4, 4,5, 6 or 6,35, 8, 10, 12 and 14 mm

4.2 Hoses

The dimensions, tolerances and concentricity of hoses shall comply with tables 2 and 3.

Table 2 — Hose dimensions

Dimensions in millimetres

| Bore diameter | Tolerance | Wall thickness | Outside diameter | Tolerance |
|---------------|-----------|----------------|------------------|-----------|
| 3,5           | ±0,3      | 3              | 9,5              | ±0,4      |
| 4             |           |                | 10               |           |
| 5             |           |                | 11               |           |
| 6             |           |                | 12               |           |
| 7             |           |                | 13               |           |
| 7,5           |           |                | 13,5             |           |
| 8             |           |                | 14               |           |
| 9             | ±0,4      | 3,5            | 15               | ±0,6      |
| 11            |           |                | 18               |           |
| 12            |           |                | 19               |           |
| 13            |           |                | 20               |           |
| 16            |           |                | 24               |           |
| 21            | ±0,4      | 4              | 29               | ±1        |
| 31,5          |           |                | 40               |           |
| 40            |           |                | 50               |           |

Table 3 — Hose concentricity<sup>1)</sup>

Dimensions in millimetres

| Internal diameter       | Maximum variation from concentricity  |
|-------------------------|---------------------------------------|
|                         | Internal diameter to overall diameter |
| Up to and including 3,5 | 0,4                                   |
| Over 3,5                | 0,8                                   |

1) See ISO 4671.

5 Physical tests and specifications

Physical tests and specifications shall be obtained from finished products where possible, or as agreed between manufacturer and user, excluding compression set, which shall be carried out on test stabs.

5.1 Hardness

Hardness, determined in accordance with the procedure in ISO 48 (standard test), shall comply with the values shown in table 4.

5.2 Tensile strength and elongation at break

Tensile strength and elongation at break, determined in accordance with the procedure in ISO 37 and on a No. 2 dumb-bell, shall comply with the values shown in table 4.

5.3 Change in properties after accelerated ageing

Accelerated ageing shall be carried out in accordance with ISO 188 in a ventilated drying oven under the following conditions, using test pieces as described in 5.1 and 5.2:

- Grade A: 70 <sup>+2</sup>/<sub>0</sub> h at 100 °C
- Grade B: 70 <sup>+2</sup>/<sub>0</sub> h at 125 °C

In both cases, the change in hardness, tensile strength and elongation at break shall not exceed the values shown in table 4.

5.4 Compression set

The compression set, when determined in accordance with ISO 815, using the large test piece, under the conditions shown in table 4, shall comply with the values shown in table 4.

5.5 Resistance to hydrocarbons

Any change in volume after a period of 70 h of immersion in fluid C at laboratory temperature (ISO 471) shall, when determined in accordance with the procedure shown in ISO 1817, comply with the values shown in table 4. This test shall apply to homogeneous tubing and to hose linings.

5.6 Resistance to oil No. 3

This test applies to homogeneous tubing and to hose covers.

Volumetric changes, when tested in accordance with ISO 1817, for 70 h in oil No. 3 at a temperature of 100 °C shall not exceed the values shown in table 4.

5.7 Leak test on tubing

This test applies only to homogeneous tubing.

The rubber tubing shall be placed over the polished end of a piece of metal tubing, machined to tolerance H14 as defined in ISO/R 286, having a diameter equal to that shown in the note