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**Rubber and plastics hoses and tubing —  
Textile-reinforced types — Sub-ambient  
temperature crush test**

*Tuyaux et tubes en caoutchouc et en plastique — Types avec armature textile — Essai d'écrasement à température inférieure à la température ambiante*



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## Foreword

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ISO 28702 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

## Introduction

This International Standard can be used to test the low-temperature properties of hoses whereby the brittle temperature of materials used for the lining and cover can be assessed.

The method does not measure the flexibility of hoses at the test temperature.

Other sub-ambient temperature tests for hoses and hose assemblies are given in ISO 4672, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests* [to be replaced by ISO 10619-2 (in preparation)].

# Rubber and plastics hoses and tubing — Textile-reinforced types — Sub-ambient temperature crush test

## 1 Scope

This International Standard specifies a test method for measuring the low-temperature brittleness of rubber and plastics hoses with a textile reinforcement and tubing at sub-ambient temperatures by crushing a test piece of the hose.

This International Standard is only applicable to hoses with a nominal bore up to and including 100 mm.

## 2 Normative references

The following referenced documents are indispensable for the application 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 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

## 3 Principle

A hose test piece is compressed to 50 % of its inside diameter at the test temperature and, after decompression, is examined on the interior and exterior for the presence of any cracks or other abnormalities.

## 4 Apparatus

**4.1 Compression jig or any other suitable apparatus**, consisting of two flat plates large enough for the hose to be compressed to 50 % of its inside diameter.

**4.2 Conditioning chamber**, capable of being maintained at the specified temperature as selected in Clause 6.

## 5 Test piece

Cut a ring test piece of length approximately 25 mm from the hose under test.

## 6 Test temperature

The test shall be conducted at one of the following temperatures or at another sub-ambient temperature as defined in the relevant product standard.

- 0 °C ± 2 °C;
- 10 °C ± 2 °C;
- 25 °C ± 2 °C;
- 40 °C ± 2 °C;
- 55 °C ± 2 °C.

## 7 Procedure

Condition the test piece and compression jig in the conditioning chamber at the test temperature for 24 h and then hold the test piece between the two plates of the compression jig at the test temperature for at least another 30 min before testing. Guidance on achieving the specified temperature is given in ISO 23529.

After the specified conditioning periods, compress the test piece in the direction at right angles to the plates to 50 % of its inside diameter within a time of  $5\text{ s} \pm 2\text{ s}$ . An example of a compression jig is shown in Figure 1. The test may be carried out on any other suitable mechanical test equipment, however.

In principle, the test shall be carried out in the conditioning chamber. If this is not feasible, remove the test piece from the chamber and perform the test within 15 s.

After testing, leave the test piece to warm up to room temperature.

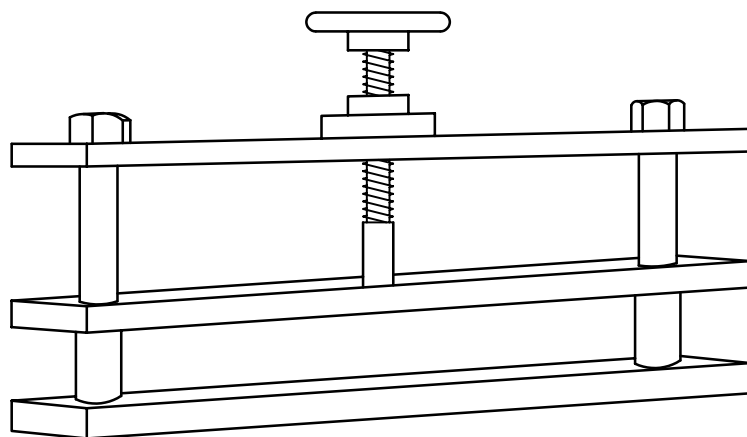
## 8 Examination of test piece after testing

Examine the interior and exterior of test piece with a  $\times 2$  magnifier. If any abnormalities such as cracks, fractures, or separation of layers are observed, record them.

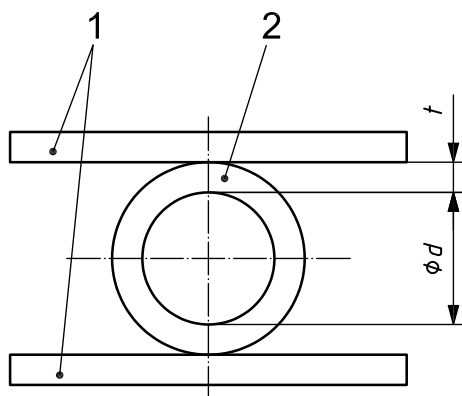
## 9 Test report

The test report shall include the following information:

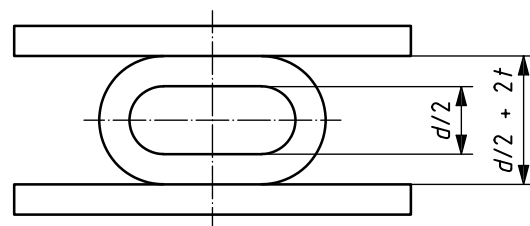
- a) a reference to this International Standard (ISO 28702:2008);
- b) the type of hose tested and its nominal bore;
- c) the test temperature;
- d) whether the test was carried out inside or outside the conditioning chamber;
- e) the results of the examination of the test piece after testing;
- f) the date of the test.



a) Example of a compression jig



b) Before compression



c) Under compression

**Key**

- 1 compression jig
- 2 test piece
- $d$  inside diameter of hose
- $t$  hose wall thickness

**Figure 1 — Crush method for compressing the hose test piece**

