
Rubber and plastics hoses — Methods of exposure to laboratory light sources — Determination of changes in colour, appearance and other physical properties

Tuyaux en caoutchouc et en plastique — Méthodes d'exposition à des sources lumineuses de laboratoire — Détermination du changement de coloration, d'aspect et d'autres propriétés physiques

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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 30013 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

It cancels and replaces ISO 8580:1987 and ISO 11758:1995, which have been combined and technically revised. It also cancels and replaces the Technical Corrigendum ISO 11758:1995/Cor.1:1998.

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WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This standard 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 safety and health practices and to ensure compliance with any national regulatory conditions.

1 Scope

This International Standard specifies methods for the exposure of rubber and plastics hoses to three types of laboratory light source (xenon-arc, fluorescent UV and open-flame carbon-arc lamps).

These methods are designed to simulate the exposure of hoses used in an outdoor environment (exposure to xenon-arc lamps by method A, exposure to fluorescent UV lamps by method A and exposure to open-flame carbon-arc lamps with type 1 filters) or in an indoor environment (exposure to xenon-arc lamps by method B, exposure to fluorescent UV lamps by method B and exposure to open-flame carbon-arc lamps with type 2 filters).

Four types of test piece (two strained and two unstrained upon exposure) are specified. Results from the three light sources and the different sets of exposure conditions specified are not comparable.

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 105-A02, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour*

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources*

ISO 4665, *Rubber, vulcanized or thermoplastic — Resistance to weathering*

ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance*

ISO 4892-2:—¹⁾, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 4892-3:2006, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

1) To be published (revision of ISO 4892-2:2006).

ISO 4892-4:2004, *Plastics — Methods of exposure to laboratory light sources — Part 4: Open-flame carbon-arc lamps*

ISO 7326:2006, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 7724-3²⁾, *Paints and varnishes — Colorimetry — Part 3: Calculation of colour differences*

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

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4665, ISO 4892-1 and ISO 8330 apply.

4 Principle

Test pieces are exposed to artificial laboratory light sources, and the resulting changes in colour, appearance and selected physical properties are determined for a simulated outdoor or indoor environment.

5 Test pieces

5.1 Types of test piece

5.1.1 General

Four types of test piece are detailed in Table 1. The type used shall be as specified in the product standard.

Results obtained with the various types of test piece are not comparable, even for the same property.

Table 1 — Types of test piece

	Type 1	Type 2	Type 3	Type 4
Bore size, mm	≤25	>25	>25	Any size
Test piece	Sample of hose	Strip cut longitudinally from hose	Strip cut longitudinally from hose cover or hose	Sample of hose
Test piece size, ^a mm	$L = \pi(r_b + d/2) + 2d$	$L = 150, W = 25$	$L = 100, W = 25$	$L \approx 150$
Test piece mounting method	Mandrel (see Figure 1)	Holder (see Figure 2)	Holder (see Figure 3)	Holder (see Figure 4)
Test piece condition during exposure	Strained	Strained	Not strained	Not strained
Elongation	Bent for minimum bend radius	Required elongation of hose cover	Not elongated	Not elongated
NOTE Types 1 and 2 are tested under strain, types 3 and 4 are tested without strain.				
^a W = width, L = length, r_b = minimum bend radius, d = hose outside diameter.				

2) Users should note that ISO 7724-3 will be withdrawn at some time in the future. It will be replaced by ISO 11664-4.

5.1.2 Type 1

The test piece shall consist of a sample of hose. The length shall be calculated from the equation

$$L = \pi \left(r_b + \frac{d}{2} \right) + 2d$$

where

L is the length, in mm, of the test piece;

r_b is the minimum bend radius, in mm, of the hose under test;

d is the outside diameter, in mm, of the hose under test.

Mount the test piece in a test piece holder as shown in Figure 1. The radius r_b shall be equal to the specified minimum bend radius for the hose under test or, if this is not specified, six times the inside diameter.

5.1.3 Type 2

The test piece shall consist of a strip cut longitudinally from a hose. The strip shall be 150 mm in length and 25 mm in width.

Mount the test piece in a test piece holder as shown in Figure 2, in such a way that the convex side will be exposed to the light during the exposure.

For details of the mounting of the test piece, see method 2 in ISO 7326:2006.

5.1.4 Type 3

The test piece shall normally consist of a strip of hose cover, cut longitudinally from the hose.

The strip shall be 100 mm in length and 25 mm in width.

If a hose cover test piece cannot easily be cut from the hose, the test piece shall consist of a strip cut longitudinally from the complete hose with its cover in place. The strip shall be 100 mm in length and 25 mm in width.

Mount the test piece in a test piece holder as shown in Figure 3, in such a way that the convex side will be exposed to the light during the exposure.

5.1.5 Type 4

The test piece shall consist of a sample of hose approximately 150 mm in length. If possible, test pieces shall be cut from different sections of the hose (e.g. from each end and from the middle).

Mount each test piece in a test piece holder as shown in Figure 4, ensuring that it is not subject to any stress but curves naturally in such a way that the convex side will be exposed to the light during the exposure.

5.2 Conditioning

Prior to testing, condition the test pieces, mounted as described in 7.2, under the applicable standard conditions as specified in ISO 23529 or ISO 291, as appropriate, in darkness or subdued light.