INTERNATIONAL STANDARD

ISO 7326

Second edition
1991-02-15

Rubber and plastics hoses — Assessment of ozone resistance under static conditions

Tuyaux en caoutchouc et en plastique — Évaluation de la résistance à l'ozone dans des conditions statiques

Reference number
ISO 7326:1991(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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

International Standard ISO 7326 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

This second edition cancels and replaces the first edition (ISO 7326:1984), clause 1 of which has been technically revised.

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Introduction

The methods described in this International Standard provide a means of assessing the resistance of hoses to the deleterious effects of atmospheric ozone under static conditions.

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Rubber and plastics hoses — Assessment of ozone resistance under static conditions

1 Scope

This International Standard specifies three methods for determining the resistance of the outer covers of hoses to ozone:

method 1 — for bore sizes up to and including 25 mm carried out on the hose itself;

method 2 — for bore sizes greater than 25 mm carried out on a test piece from the hose wall;

method 3 — for bore sizes greater than 25 mm carried out on a test piece from the cover.

Method 1 or 2 shall normally be used. Method 3 shall be used only if it is not possible to carry out the test in accordance with method 2.

The results of tests carried out in accordance with method 1 may not be comparable with the results obtained when tests are carried out in accordance with methods 2 and 3, notwithstanding that the cover compounds of the hoses under test are identical in composition and are cured to the same degree. The test method to be used shall be as specified in the product standard.

NOTE 1 For hoses with built-in fittings from which it is not possible to take test pieces, the ozone resistance may be assessed on slabs in accordance with ISO 1431-1, using test sheets of the appropriate polymeric compound vulcanized to the same degree.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 471:1983, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO 1431-1:1989, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static strain test.*

ISO 1826:1981, *Rubber, vulcanized — Time-interval between vulcanization and testing — Specification.*

ISO 4661-1:1986, *Rubber, vulcanized — Preparation of samples and test pieces — Part 1: Physical tests.*

3 Apparatus

3.1 Ozone cabinet, with apparatus for generating ozone and monitoring and controlling the ozone concentration, as described in ISO 1431-1.

3.2 Test piece holder, as shown in figure 1 (for method 1).

3.3 Test piece holder, as shown in figure 2 (for method 2), made, for example, of wood coated with paint or aluminium.

3.4 Jig, for elongation of test pieces (for method 3).

Details given in ISO 1431-1:1989, sub-clause 5.6, should be followed.

All apparatus placed in the test cabinet shall be fabricated from materials which do not absorb or decompose ozone.

4 Test pieces

4.1 Type of test piece

4.1.1 Method 1

The test piece shall consist of a hose sample. The length shall be calculated by the formula

$$L = \pi(r_b + d_{ext}) + 2d_{ext}$$

where

L is the length of the test piece;

r_b is the bend radius of the hose under test, as specified in 7.1.1;

d_{ext} is the outside diameter of the hose under test.

4.1.2 Method 2

The test piece shall consist of a strip cut longitudinally from the hose. The strip shall be 150 mm long and 25 mm wide.

4.1.3 Method 3

The test piece shall consist of a strip of the hose cover, 25 mm in width, removed longitudinally from the hose. Lightly buff the underside of the strip in accordance with ISO 4661-1 to remove any reinforcement impressions and thus ensure uniformity of strain along the length of the strip.

4.2 Number of test pieces

Two test pieces shall be tested.

5 Conditioning of test pieces

No test shall be carried out within 24 h of manufacture.

For evaluations which are intended to be comparable, the test shall, as far as possible, be carried out after the same time interval after manufacture. ISO 1826 shall be followed for time between sample manufacture and testing.

The test pieces, mounted as described for the appropriate procedure, shall be conditioned for 48 h in a substantially ozone-free atmosphere at standard temperature (see ISO 471), in darkness or subdued light.

6 Test conditions

Unless other conditions are specified in the relevant hose specification, the test pieces shall be exposed in the ozone cabinet to an ozone concentration of (50 ± 5) parts per hundred million (pphm) by volume at (40 ± 2) °C for $(72\ ^{0}_{-2})$ h.

NOTE 2 It has been found that differences in atmospheric pressure can influence ozone cracking when test pieces are exposed to constant ozone concentrations expressed in parts per hundred million. This effect may be taken into account by expressing the ozone content in the ozonized air in terms of the partial pressure, i.e. in millipascals, and making comparisons at constant ozone partial pressure. At standard conditions of atmospheric pressure and temperature (101 kPa, 273 K), a concentration of 1 pphm is equivalent to a partial pressure of 1,01 mPa.

7 Procedure

7.1 Method 1

7.1.1 Mount each test piece on a test piece holder (3.2), 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 not specified, six times the internal diameter.

7.1.2 Seal the ends of the test pieces with caps to prevent absorption of ozone by the inner lining and reinforcement.

7.1.3 Examine the test pieces after periods of exposure of 2 h, 4 h, 24 h, 48 h and 72 h, whilst still in the extended condition, under × 2 magnification, ignoring the area adjacent to the fixing points. If cracks are discovered, record their nature and the time at which they were first observed.

7.2 Method 2

7.2.1 Mount each test piece on a test piece holder (3.3), as shown in figure 2, so that the required elongation of the hose cover, measured over a distance of 20 mm, is reached. If not otherwise specified, the elongation of the cover shall be 20 %. Coat the edge and the lining of each test piece with an ozone-resistant lacquer.

7.2.2 Examine the test pieces after periods of exposure of 2 h, 4 h, 24 h, 48 h and 72 h, whilst still in the extended condition, under × 2 magnification, ignoring the area adjacent to the fixing points. If cracks are discovered, record their nature and the time at which they were first observed.

7.3 Method 3

7.3.1 Mount each test piece in a jig (3.4) and apply 20 % elongation.

7.3.2 Examine the test pieces after periods of exposure of 2 h, 4 h, 24 h, 48 h and 72 h, whilst still in the extended condition, under × 2 magnification, ignoring the area adjacent to the fixing points. If cracks are discovered, record their nature and the time at which they were first observed.

8 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) a full description of the hose tested;

c) the method used (1, 2 or 3);

d) details of the test conditions, i.e. ozone concentration, temperature, exposure period and elongation;

e) whether cracks were observed and, if so, their nature and the time the cracks were first observed;

f) the date of test.

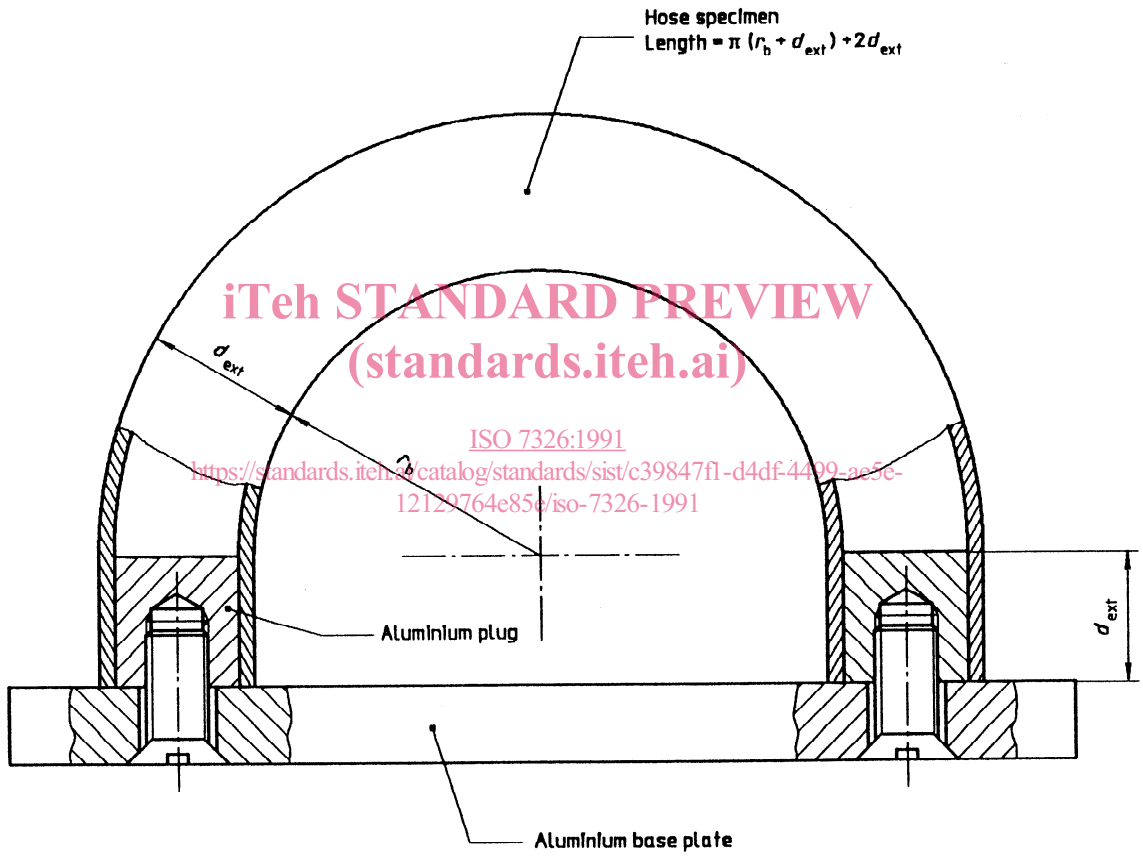

Figure 1 — Arrangement for mounting hose for method 1

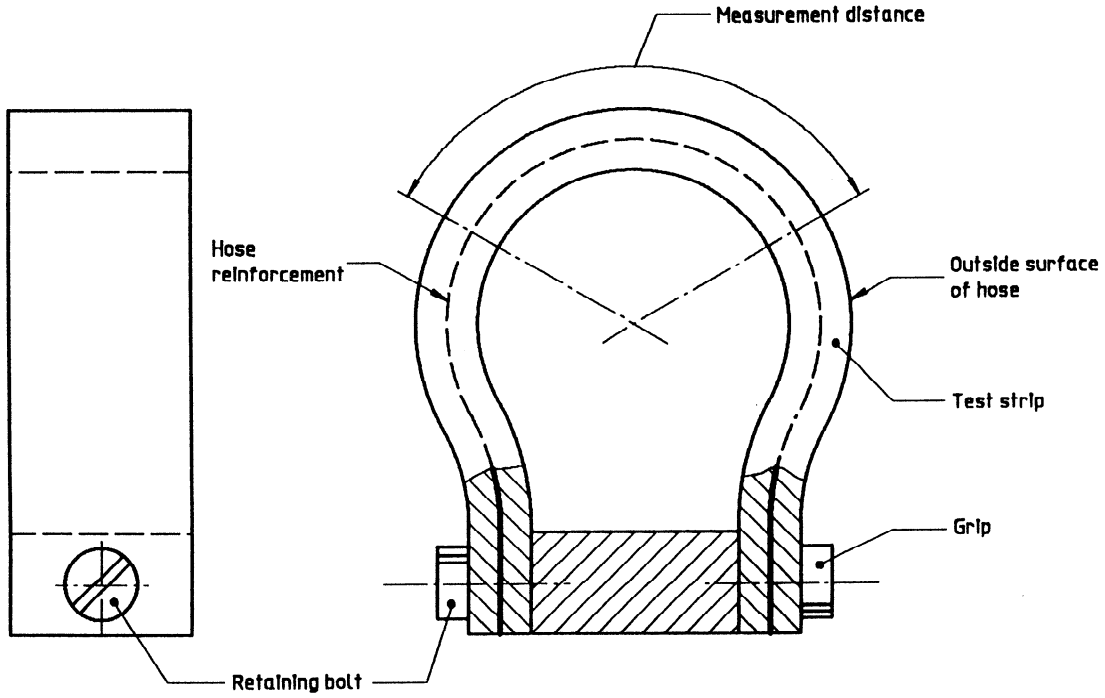

Figure 2 — Test pieces mounted on holder for method 2

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