
**Rubber- or plastics-coated fabrics —
Determination of resistance to ozone
cracking under static conditions**

*Supports textiles revêtus de caoutchouc ou de plastique —
Détermination de la résistance aux craquelures dues à l'ozone dans
des conditions statiques*

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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.

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).

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).

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.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*.

This fourth edition cancels and replaces the third edition (ISO 3011:1997), which has been technically revised.

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

- [Clause 3](#) has been added;
- a subclause on relative humidity has been added.

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.

Rubber- or plastics-coated fabrics — Determination of resistance to ozone cracking under static conditions

WARNING — Persons using this document should be familiar with normal laboratory practice. This document 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 document specifies a method for the determination of the resistance of fabrics coated with rubber or plastics to ozone cracking under static conditions.

The test is designed to determine the relative resistance to cracking of fabric coated with rubber or plastics when exposed under static strain to air containing ozone in the absence of direct sunlight.

Like all ageing tests, it should be considered as a means of comparing articles of the same composition and destined for the same application, but not as an absolute criterion. It is preferable to limit the significance of the test by considering it only as a means of control when a fabric attains a resistance superior to a threshold given in comparison with a certain type of degradation.

Taking these remarks into account, the results obtained at the time of test cannot be taken as a prediction of the length of life of the product.

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 1431-1:2012, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 2286-1, *Rubber- or plastics-coated fabrics — Determination of roll characteristics — Part 1: Methods for determination of length, width and net mass*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Principle

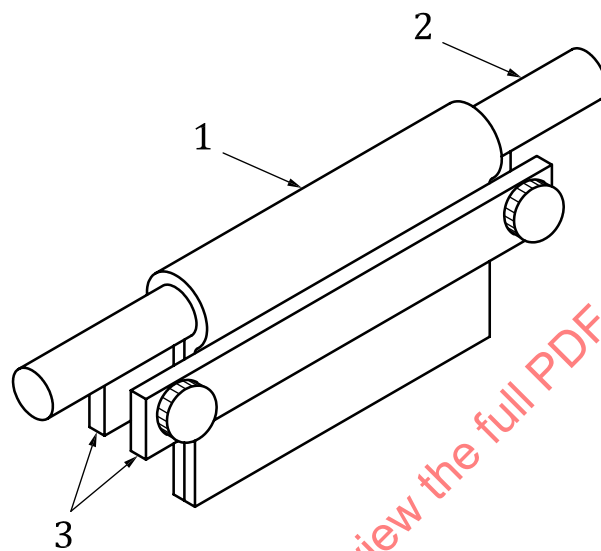
Test pieces are exposed to ozone under specified conditions. The effects of the ozone are assessed by measurement of the time at which the first crack appears or of the time of exposure during which no cracks appear as appropriate.

5 Apparatus

5.1 Test chamber and ancillary apparatus, as specified in ISO 1431-1.

5.2 Test piece holder, comprising a mandrel and clamps (see [Figure 1](#)).

The diameter of the mandrel shall be 2 times, 5 times, 10 times or 20 times the thickness of the test piece, as agreed between the interested parties, but it shall not be less than 0,8 mm. The mandrel and clamps shall be made of a material that does not absorb ozone, for example stainless steel, polymethacrylate, wood coated with a lacquer that does not absorb ozone, or duralumin, and shall have a smooth finish.



Key

- 1 test piece
- 2 mandrel
- 3 clamps

Figure 1 — Test piece holder

6 Test pieces

6.1 Type

The test pieces shall be of sufficient size to permit proper evaluation of the exposed surface after test, and satisfactory comparison of different test pieces. The preferred size is 25 mm wide and 100 mm long.

6.2 Selection

Test pieces shall be taken at least 50 mm from the selvedge of a sample which is as representative as possible of the whole consignment, in accordance with ISO 2286-1.

6.3 Number

Three test pieces in each direction of the fabric for each coated face shall be prepared.

7 Time intervals before testing

Unless otherwise specified for technical reasons, the following requirements apply:

For non-product tests, the minimum time between manufacture and commencement of testing shall be 16 h. The maximum time between manufacture and testing shall be 4 weeks.

For product tests, the minimum time between manufacture and commencement of testing shall be 120 h, during which period the test pieces shall be stored at the standard laboratory temperature. The maximum time between manufacture and testing shall be three months, and the maximum time between receipt of the product by the test laboratory and testing shall be two months.

For evaluations intended to be comparable, the tests shall, as far as possible, be carried out after the same time interval and at the same temperature.

8 Test conditions

8.1 Ozone concentration

The ozone concentration shall comply with the requirements of ISO 1431-1:2012, 9.1.

8.2 Temperature

The temperature of test shall comply with the requirements of ISO 1431-1:2012, 9.2.

8.3 Relative humidity

The relative humidity of the ozonized air shall normally be not more than 65 % at the test temperature.

Very high humidity can influence the results; when applicable, for products intended for use in damp climates, the test shall be carried out at a relative humidity in the range of 80 % to 90 %, if this is practicable.

8.4 Mounting of test pieces under stress and conditioning

The test piece shall be wrapped around the mandrel of the test piece holder with the surface under test on the outside and the ends of the test piece held by the clamps tightly enough for the mandrel just to be able to revolve freely in the test piece.

Several test pieces of the same thickness may be wrapped around a single mandrel.

Where multi-ply coatings are to be tested, they may be tested as single-faced fabrics, vulcanized under the same conditions as the final multi-ply product. Where this is not practical, then the rubber compound shall be tested in accordance with ISO 1431-1.

The test piece, assembled on its mandrel, shall be conditioned in a substantially ozone- and draught-free atmosphere at the standard laboratory temperature for 48 h, after which the test piece shall be placed in the test chamber.

9 Procedure

WARNING — Ozone is highly toxic. Appropriate measures shall be taken to minimize the exposure of the operator.

Carry out the procedure in accordance with ISO 1431-1:2012, Clause 10, disposing the test pieces in the chamber so that they are at least 10 mm from each other and from the wall of the chamber.

Examine the test pieces under a magnification of $\times 7$.

10 Test report

The test report shall include the following particulars:

- a) a reference to this document including its year of publication i.e. ISO 3011:2021;
- b) all details necessary for identification of the sample;
- c) the thickness of the test piece and the mandrel diameter;
- d) the ozone concentration and the method of measuring it;
- e) the temperature of test;
- f) the time, in hours, at which the first crack appeared on each test piece or the time of exposure during which no cracks appeared, as appropriate.

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