

Sixth edition
2022-06

Rubber, vulcanized or thermoplastic — Resistance to ozone cracking —

Part 1: Static and dynamic strain testing

*Caoutchouc vulcanisé ou thermoplastique — Résistance au
craquelage par l'ozone —*

Partie 1: Essais sous allongement statique et dynamique



Reference number
ISO 1431-1:2022(E)

© ISO 2022



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

This is a preview of "ISO 1431-1:2022". Click here to purchase the full version from the ANSI store.

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	2
5 Apparatus	2
5.1 Test chamber without humidity control (see Figure 1).....	2
5.2 Test chamber with humidity control (see Figure 2).....	3
5.3 Source of ozonized air.....	4
5.4 Means of adjusting the ozone concentration.....	5
5.5 Means of determining the ozone concentration.....	5
5.6 Means of adjusting the humidity.....	5
5.7 Means of adjusting the gas flow.....	5
5.8 Mounting test pieces for static strain testing.....	6
5.9 Mounting test pieces for dynamic strain testing.....	6
5.10 Purifying column and filter (key 7 and 4 in Figure 1 and Figure 2).....	7
5.11 Image analysis.....	7
5.12 Apparatus for measuring properties of the material.....	7
6 Calibration	7
7 Test pieces	7
7.1 General.....	7
7.2 Wide strip test piece.....	8
7.3 Narrow strip test piece.....	8
7.4 Dumbbell test piece.....	8
8 Conditioning	8
8.1 Conditioning in the unstrained state.....	8
8.2 Conditioning in the strained state (for static strain testing only).....	9
9 Test conditions	9
9.1 Ozone concentration.....	9
9.2 Temperature.....	9
9.3 Relative humidity.....	10
9.4 Maximum elongation.....	10
9.5 Exposure period.....	10
10 Static strain testing	10
10.1 General.....	10
10.2 Procedure A.....	10
10.3 Procedure B.....	11
10.4 Procedure C.....	11
11 Dynamic strain testing	11
11.1 General.....	11
11.2 Continuous dynamic exposure.....	11
11.2.1 Choice of procedure.....	11
11.2.2 Procedure A.....	12
11.2.3 Procedure B.....	12
11.3 Intermittent dynamic exposure.....	12
11.3.1 Exposure procedure.....	12
11.3.2 Procedure A.....	12
11.3.3 Procedure B.....	12

This is a preview of "ISO 1431-1:2022". [Click here to purchase the full version from the ANSI store.](#)

12	Expression of results	12
12.1	Procedure A.....	12
12.1.1	Procedure A.1 (Evaluation with visual assessment).....	12
12.1.2	Procedure A.2 (Evaluation with image analysing technique).....	13
12.2	Procedure B.....	13
12.3	Procedure C.....	13
12.3.1	Procedure C.1 (Evaluation with visual assessment).....	13
12.3.2	Procedure C.2 (Evaluation with image analysing technique).....	14
12.4	Procedure D (Evaluation with physical properties change).....	15
13	Test report	15
Annex A (informative) Ozone cracking — Explanatory notes		17
Annex B (normative) Calibration schedule		19
Annex C (informative) Ozone cracking — Rating scales		21
Bibliography		22

This is a preview of "ISO 1431-1:2022". Click here to purchase the full version from the ANSI store.

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 2, *Testing and analysis*.

This sixth edition cancels and replaces the fifth edition (ISO 1431-1:2012), which has been technically revised.

The main changes are as follows:

- relative humidity has been added as a selection of test condition in the scope ([Clause 1](#));
- test chamber with humidity control has been specified in [5.2](#);
- specification for high humidity test has been added in [5.5](#) and [9.3](#);
- dumbbell type test piece has been added in [7.4](#);
- exposure period has been specified in [9.5](#);
- two evaluation methods (visual observation and image analysis) have been added in [Clause 12](#);
- determination of the changes in physical or chemical properties has been added in [12.4](#).

A list of all parts in the ISO 1431 series can be found on the ISO website.

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.

Introduction

Ozone is generally present in small amounts in the atmosphere. However, even very small amounts of ozone can cause cracking in susceptible rubbers under tensile strain, resulting in loss of strength. Hence, it is necessary to test the resistance of rubbers to exposure to ozone.

Because of the uncertainties of natural exposure, testing for ozone resistance of rubbers is normally done in the laboratory using specially designed ozone cabinets.

Great caution is necessary in attempting to relate standard test results to service performance since the relative ozone resistance of different rubbers can vary markedly depending on the conditions, especially ozone concentration, temperature and relative humidity. In addition, tests are carried out on thin test pieces deformed in tension and the significance of attack for articles in service can be quite different owing to the effects of size and of the type and magnitude of the deformation.

Explanatory notes on the nature of ozone cracking are given in [Annex A](#).