

Accelerated ageing of rubber

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53508

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Prüfung von Kautschuk und Elastomeren – Künstliche Alterung

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Foreword

This standard has been prepared by Technical Committee *Prüfung der physikalischen Eigenschaften von Kautschuk und Elastomeren* of the *Normenausschuss Materialprüfung* (Materials Testing Standards Committee).

The standard is based on ISO 188, from which it differs in the following points:

- it gives a different flow velocity for the oven with forced air circulation;
- it recommends testing certain properties using type S 2 dumb-bell test pieces;
- it recommends test temperatures and duration;
- it includes formulae for calculating standard deviations, the variation coefficient and confidence interval.

Amendments

This standard differs from the October 1993 edition in that references have been updated and the standard has been editorially revised.

Previous editions

DIN DVM 3508 = DIN 53508: 1939-02, 1954-12, 1960-05, 1977-07, 1993-10.

1 Scope

The test methods specified in this standard serve to determine the resistance of rubber to deterioration by subjecting test pieces to accelerated ageing (either by heating them in air at atmospheric pressure or in oxygen at an elevated pressure).

Various physical properties are measured at standard laboratory temperature before and after testing, and the relative or absolute differences are used to estimate the relative service life of the rubber.

The methods described in this standard are not suitable for assessing the effects of light or ozone on the deterioration of rubber.

Continued on pages 2 to 6.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 50011-2	Testing of materials, components and equipment – Ovens – Conditioning of test pieces
DIN 50011-12	Artificial climates in technical applications – Air temperature as a climatological quantity in controlled-atmosphere test installations
DIN 50014	Artificial climates in technical applications – Standard atmospheres
DIN 50035-1	Concepts relating to the ageing of materials – Basic concepts
DIN 50035-2	Concepts relating to the ageing of materials – Polymer materials
DIN 53504	Determination of tensile stress/strain properties of rubber
DIN 53505	Shore A and D hardness testing of rubber and plastics
DIN 53519-1	Determination of indentation hardness (IRHD) of soft rubber using standard specimens
DIN 53598-1	Statistical evaluation of random samples with examples from tests on elastomers and plastics
DIN EN ISO 2578	Plastics – Determination of time-temperature limits after prolonged exposure to heat (ISO 2578 : 1993)
ISO 5725-1 : 1994	Accuracy (trueness and precision) of measurement methods and results – Part 1: General principles and definitions
ISO 5725-2 : 1994	Accuracy (trueness and precision) of measurement methods and results – Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method

Technische Regeln für Druckbehälter (TRB) (Codes of practice for pressure vessels)

Unfallverhütungsvorschrift Sauerstoff (Accident prevention regulation on the use of oxygen) (VBG 62)

Druckbehälterverordnung (German Pressure Vessels Regulation), BGBl. (German Federal Law Gazette) I, 1989, No. 20, pp. 843–869

3 Concept

Accelerated ageing is a test method by means of which the expected deterioration of rubber in practical applications is ascertained by subjecting test pieces to accelerated deteriorating influences (e.g. elevated temperatures, or, in some cases, elevated oxygen pressures).

4 Test methods

In order to effectively assess its resistance to ageing, the intended service applications of the rubber should be considered, and test methods and conditions which approximate service conditions should be selected. Only those properties relevant to application in service shall be determined; in most cases, these will be tensile strength at break, elongation at break, stress/strain values (see DIN 53504) and hardness (see DIN 53505 or DIN 53519-1).

Note that test results, especially those obtained from long-term testing, cannot be compared when different types of ovens (i.e. with either forced or natural air circulation) are used.

Two methods of accelerated ageing are described in this standard.

4.1 Ageing in air at atmospheric pressure in one of the three following oven types, of which the oven described in subclause 4.1.1 is to be given preference.

4.1.1 Air oven with forced air circulation (air recirculation system with fresh air supply) (see subclause 6.2).

4.1.2 Air oven with natural air circulation (see subclause 6.3).

4.1.3 Cell-type oven (see subclause 6.4).

4.2 Ageing in oxygen at an elevated pressure (see subclause 6.5).

5 Test pieces

Accelerated ageing shall be carried out on test pieces prepared and conditioned as specified in the standards relevant to the appropriate property tests. The number of test pieces shall also be in accordance with these standards.