
Plastics — Determination of thermal stability of poly(vinyl chloride), related chlorine-containing homopolymers and copolymers and their compounds — Discoloration method

Plastiques — Détermination de la stabilité thermique du poly(chlorure de vinyle), des homopolymères et copolymères chlorés apparentés et de leurs compositions — Méthode du changement de couleur

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Contents

Page

Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Principle.....	1
4.1 Method A: Oil-bath method.....	1
4.2 Method B: Oven method.....	2
5 Preparation and number of test specimens.....	2
6 Test temperature.....	2
7 Method A: Oil-bath method.....	2
7.1 Apparatus.....	2
7.2 Procedure.....	3
8 Method B: Oven method.....	3
8.1 Apparatus.....	3
8.2 Procedure.....	4
9 Expression of results.....	4
10 Precision.....	5
11 Test report.....	5
Bibliography.....	6

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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 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This third edition cancels and replaces the second edition (ISO 305:1990), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

- editorial changes have been applied to align the document with the ISO structure;
- [Clauses 2](#) and [3](#) have been added and subsequent clauses have been renumbered.

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.

Plastics — Determination of thermal stability of poly(vinyl chloride), related chlorine-containing homopolymers and copolymers and their compounds — Discoloration method

1 Scope

This document specifies two methods for the determination of the thermal stability of products and compounds based on vinyl chloride homopolymers and copolymers (referred to simply as PVC in the following text) by the extent of the discoloration that occurs when they are exposed, in the form of sheet, to elevated temperatures. The two methods are:

- Method A: Oil-bath method;
- Method B: Oven method.

These methods are particularly applicable to the determination of the resistance of PVC to degradation by heat, as assessed by the change in colour after different times of heating under standardized conditions. The results are comparative only, and can be unsatisfactory when coloured PVC materials are tested.

The stability times given by the two methods might not be similar and cannot be used for direct-comparison purposes.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Principle

4.1 Method A: Oil-bath method

Method A is a simple method, which requires little expenditure on apparatus and permits materials to be tested almost in the absence of air.

A series of test specimens is heated at an elevated temperature for different lengths of time in a temperature-controlled oil bath. The test specimens are placed between an aluminium block and an aluminium cylinder to promote heat transfer and restrict air access.

4.2 Method B: Oven method

Method B requires a forced-air oven, in which the air flow is adjusted to provide a sufficiently uniform temperature throughout the entire test area. This method is not applicable to materials that will cross-contaminate during oven exposure.

A series of test specimens is heated at an elevated temperature for different lengths of time in a forced-air-circulation oven. The test specimens are supported by new, clean aluminium foil laid on removable racks.

5 Preparation and number of test specimens

5.1 The test specimens shall consist of

- discs of diameter 14 mm and thickness approximately 1 mm, for method A;
- squares of side 15 mm and thickness approximately 1 mm, for method B.

They shall be punched out from the sheets to be tested.

5.2 The number of test specimens required is the expected time of the test in minutes divided by 5. If the stability of the compound is very high, remove the test specimens every 10 min to 15 min instead of every 5 min during the first stage of heating, before the appearance of discoloration. Thus, the number of test specimens used can be less than that specified above.

5.3 If the material to be tested is an extrusion or moulding material in granule, powder or pellet form, this shall be sheeted on a roll-mill under the conditions specified in the material specification, or as agreed upon between the interested parties (ISO 293 may be helpful in this respect).

5.4 If the material to be tested is in the form of a paste (plastisol), it shall be gelled to give a well fused sheet; the test specimens shall be punched out from the sheet thus obtained.

If the surface finish of specimens (particularly those made from unplasticized materials) prepared by milling does not ensure sufficient contact with the aluminium block and cylinder, press-polishing of the specimens is recommended as an optional additional step.

Warming of the milled unplasticized sheets permits test specimens to be cut without shattering.

6 Test temperature

The test temperature shall be that stated in the material specification or as agreed upon between the interested parties; in the latter case, the temperature shall be chosen so that the test duration is in the range of 60 min to 120 min. If there is no specification or agreement, a temperature of 180 °C shall be used.

7 Method A: Oil-bath method

7.1 Apparatus

7.1.1 **Thermostatically controlled oil bath**, capable of maintaining the temperature within $\pm 0,5$ °C in the range 120 °C to 200 °C, fitted with a suitable stirrer and a suitable device for holding a convenient number of test tubes immersed to a depth of 60 mm to 70 mm.

7.1.2 **Glass test tubes**, of the following dimensions:

- external diameter: 18 mm \pm 0,4 mm;
- wall thickness: 1,2 mm \pm 0,2 mm;