
INTERNATIONAL STANDARD



305

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION · МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ · ORGANISATION INTERNATIONALE DE NORMALISATION

Plastics — Determination of thermal stability of polyvinyl chloride, related chlorine-containing polymers and copolymers, and their compounds — Discoloration method

Matières plastiques — Détermination de la stabilité thermique du polychlorure de vinyle, des polymères ou copolymères chlorés apparentés et de leurs compositions — Méthode du changement de couleur

First edition — 1976-07-15

(standards.iteh.ai)

ISO 305:1976

<https://standards.iteh.ai/catalog/standards/sist/92c70e18-7a52-4c64-9aaf-02394b493ed6/iso-305-1976>

UDC 678.743.22 : 678.01 : 536.495

Ref. No. ISO 305-1976 (E)

Descriptors : plastics, thermoplastic resins, polyvinyl chloride, copolymers, tests, measurement, thermal stability.

Price based on 2 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 61 has reviewed ISO Recommendation R 305 and found it technically suitable for transformation. International Standard ISO 305 therefore replaces ISO Recommendation R 305-1963 to which it is technically identical.

<https://standards.iteh.ai/catalog/standards/sist/92c70e18-7a52-4c64-9aaf-62946795cc06/iso-305-1978>

ISO Recommendation R 305 was approved by the Member Bodies of the following countries :

Australia	India	Spain
Austria	Israel	Sweden
Belgium	Japan	Turkey
Chile	Netherlands	United Kingdom
Czechoslovakia	New Zealand	U.S.A.
Hungary	Romania	U.S.S.R.

The Member Bodies of the following countries expressed disapproval of the Recommendation on technical grounds :

France	Poland*
Germany*	Switzerland
Italy	

* Subsequently, this Member Body approved the Recommendation.

The Member Body of the following country disapproved the transformation of ISO/R 305 into an International Standard :

France

Plastics – Determination of thermal stability of polyvinyl chloride, related chlorine-containing polymers and copolymers, and their compounds – Discoloration method

0 INTRODUCTION

The polymers and copolymers of vinyl chloride or related chlorine-containing monomers, and their compounds, tend to decompose at elevated temperature. The rate of decomposition is rather high at the processing temperatures (from 120 to 200 °C) but, in practice, can be prevented or at least reduced by the inclusion of suitable stabilizers.

The decomposition of the polymers causes a change in colour. The stabilizers may act as acceptors of hydrochloric acid or as inhibitors of the subsequent discoloration.

The thermal decomposition of polyvinyl chloride is influenced by oxygen.

1 SCOPE

This International Standard specifies a method for the determination of the thermal stability of polyvinyl chloride, related chlorine-containing polymers and copolymers, and their compounds, by the extent of the discoloration that occurs when they are exposed to elevated temperature in the form of sheet or film.

2 FIELD OF APPLICATION

This International Standard is suitable for determining the resistance of polyvinyl chloride compounds to degradation by heat, as assessed by the change in colour after specified times of heating under standardized conditions.

The results obtained are comparative only. For possible correlation of values, the temperature selected for testing should be near to that of the specific processing conditions.

A quantitative evaluation may, if needed, be obtained by comparison with a colour scale or by a photometric method.

3 REFERENCE

ISO 293, *Plastics – Compression moulding test specimens of thermoplastic materials.*

4 PRINCIPLE

Maintenance of a series of test specimens at an elevated temperature stated in the material specification or as agreed between the interested parties; the temperature being chosen so that the test duration is in the range 60 to 120 min. The test specimens are sandwiched between an aluminium block and an aluminium cylinder to aid heat transfer and restrict the access of air.

If comparative tests between different polymers or different stabilizers in standard compounds are to be carried out, it is necessary to prepare test sheets by a standard procedure agreed between the interested parties (see ISO 293).

5 APPARATUS

5.1 Thermostatic oil bath capable of maintaining the temperature within $\pm 1^\circ\text{C}$ in the range 120 to 200 °C, fitted with a suitable stirrer and a suitable device for holding a convenient number of test tubes (5.2) immersed to a depth of 6 to 7 cm.

5.2 Glass test tubes of the following dimensions :

- inside diameter : $16 \pm 0,1$ mm
- thickness of the walls : $0,4 \pm 0,2$ mm
- length : 150 mm at least

5.3 Aluminium blocks as shown in the figure.

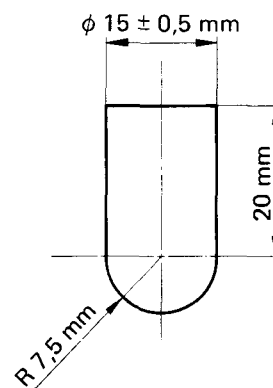


FIGURE – Aluminium block

5.4 Aluminium cylinders with diameter of $15 \pm 0,5$ mm and a height of 30 mm.

5.5 Timing device, for example a stop-watch.

6 TEST SPECIMENS

6.1 The test specimens shall consist of discs with a diameter of 14 mm and a thickness of approximately 1 mm. They shall be punched from the sheets which are to be tested.

6.2 If the material to be tested is an extrusion or moulding material in granules or in chips, this shall be sheeted on a roll mill under the conditions specified in the material specification or as agreed between the interested parties.

6.3 If the material to be tested is in the form of a paste (plastisol), this shall be gelatinized to a well fused sheet; the test specimens shall be punched from the sheet thus obtained.

7 PROCEDURE

7.1 Prepare a number of test tubes (5.2) equal to the time of the test in minutes divided by 5 (see clause 4). Place an aluminium block (5.3) in each tube; then insert a test specimen and cover it with an aluminium cylinder (5.4).

7.2 Place the test tubes vertically in an oil bath (5.1) which has been brought to the agreed temperature controlled to ± 1 °C and start the timing device (5.5).

7.3 Every 5 minutes take a test tube from the bath. Remove the test specimen from the tube and allow to cool, using a slight pressure if necessary, to prevent deformation. Number the test specimens consecutively.

NOTE — If the stability of the compound is very high, it may be useful, in order to avoid too great a number of specimens, to remove

the test specimens every 10 to 15 minutes instead of every 5 minutes during the first stage of heating, before the appearance of discolouration. In this case, the number of test tubes placed in the bath can be less than that specified in 7.1.

7.4 Fix the test specimens on a card with a note of the exposure time in minutes of each specimen and the test temperature.

7.5 Note the times, in minutes, from the start of the test to

- the first observed change in colour and
- complete blackening.

NOTE — In cases of dispute, when greater precision is required, it is recommended that test specimens be compared by means of an agreed colour scale or by means of a photometer.

8 TEST REPORT

The test report shall include the following particulars:

- a) reference to this International Standard;
- b) complete identification of the sample including the formulation of the compound and the method of preparation of the test specimens (for example thermal treatment);
- c) the test temperature;
- d) a piece of an untreated test specimen and the complete series of treated test specimens conveniently fixed on a card (see 7.4). (It is essential that this is stored in the dark.)
- e) the times, in minutes, from the start of the test to
 - the first observed change in colour and
 - complete blackening;
- f) date of test.