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**Plastics — Methods of test for the  
determination of the effects of immersion  
in liquid chemicals**

*Plastiques — Méthodes d'essai pour la détermination des effets de  
l'immersion dans des produits chimiques liquides*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 175 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

This third edition cancels and replaces the second edition (ISO 175:1999), of which it constitutes a minor revision.

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## Introduction

Because of their varied applications, plastics are frequently brought into contact with liquids such as chemical products, motor fuels, lubricants, etc., and, possibly, with their vapours.

Under the action of a liquid, a plastic material may be subjected to several phenomena which may occur simultaneously. On the one hand, absorption of liquid and extraction of constituents soluble in the liquid may occur. On the other hand, a chemical reaction, often resulting in a significant change in the properties of the plastic, may occur. The equilibrium swelling ratio for a crosslinked polymer in a liquid that is a solvent for the same but non-crosslinked polymer is a measure of the degree of crosslinking.

The behaviour of plastics in the presence of liquids can be determined only under arbitrarily fixed conditions aimed at making comparisons between different materials. The choice of test conditions (nature of the liquid, immersion temperature and immersion time), as well as the choice of the properties in which changes are to be measured, depends on the eventual application of the plastic under test.

It is not possible, however, to establish any direct correlation between the experimental results and the behaviour of the plastic in service. These tests do, nevertheless, permit a comparison to be made of the behaviour of different plastic materials under specified conditions, thus allowing an initial evaluation of their behaviour in relation to certain groups of liquids.

**NOTE** In view of its special importance, the particular case of the determination of the quantity of water absorbed is dealt with in ISO 62. ISO 175 is concerned with the effects of water only where changes in the dimensions and physical properties of the plastic occur as a result of the action of the water.

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# Plastics — Methods of test for the determination of the effects of immersion in liquid chemicals

## 1 Scope

**1.1** This International Standard specifies a method of exposing test specimens of plastic materials, free from all external restraint, to liquid chemicals, and methods for determining the changes in properties resulting from such immersion. It does not cover environmental stress cracking (ESC) which is dealt with by the various parts of ISO 22088.

**1.2** It only considers testing by immersion of the entire surface of the test specimen<sup>1)</sup>.

NOTE This method may not be appropriate for simulating partial or infrequent wetting of plastics.

**1.3** It is applicable to all solid plastics that are available in the form of moulding or extrusion materials, plates, tubes, rods or sheets having a thickness greater than 0,1 mm. It is not applicable to cellular materials.

## 2 Normative references

The following referenced documents are indispensable for the application 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 291:2008, *Plastics — Standard atmospheres for conditioning and testing*

ISO 294-3, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 3: Small plates*

ISO 2818, *Plastics — Preparation of test specimens by machining*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources*

IEC 60296, *Fluids for electrotechnical applications — Unused mineral insulating oils for transformers and switchgear*

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1) Although it is not within the scope of this International Standard, it may also be of interest, when dealing with volatile liquids or those which give off vapours, to subject the specimen to only the gaseous phase above the liquid. In this event, it is advisable to proceed exactly as indicated, but to suspend the specimen above the liquid, seal the container and maintain it at the test temperature throughout.