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**Plastics — Determination of the brittleness  
temperature by impact**

*Plastiques — Détermination de la température de fragilité au choc*



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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 974 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

This second edition cancels and replaces the first edition (ISO 974:1980), which has been technically revised.

## Introduction

Plastics are used in many applications requiring low-temperature flexing with or without impact. Polymer brittleness is affected by any orientation produced during fabrication, by thermal history and by the application of stress to the material, especially the rate of applied stress as in impact. Brittleness temperature data may be used to predict the behaviour of plastic materials at low temperature only in applications in which the conditions of deformation are similar. The brittleness temperature test was originally developed to measure the temperature at which a polymer ceases to be flexible and becomes "glasslike".

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# Plastics — Determination of the brittleness temperature by impact

## 1 Scope

This International Standard specifies a method for the determination of the temperature at which plastics that are not rigid at normal ambient temperature exhibit brittle failure under specified impact conditions. A supplementary technique using notched specimens develops brittleness values at a much higher temperature than are observed for unnotched specimens of the same plastic material. The method utilizes a statistical technique to quantify the brittleness failure temperature. Provisions are made for the testing of sufficient specimens to permit the calculation of the brittleness temperature on a statistical basis. Statistical techniques have been developed to quantify the brittleness temperature as is defined in 3.1.

The method establishes the temperature at which there is a 50 % chance of failure in either unnotched or notched specimens. This method has been found useful for specification purposes, although it does not necessarily measure the lowest temperature at which the material may be used. In the measurement of the brittleness temperature, the precision of the measurement should preferably be  $\pm 5^\circ\text{C}$  at the worst when establishing values used in material specifications.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 175:1999, *Plastics — Methods of test for the determination of the effects of immersion in liquid chemicals*.

ISO 291:1997, *Plastics — Standard atmospheres for conditioning and testing*.

## 3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

### 3.1

#### **brittleness temperature**

the temperature at which there is a 50 % probability of failure in a specimen when tested by the method specified

It may be designated  $T_{50}$ .

### 3.2

#### **test speed**

the relative velocity between the striking edge of the test apparatus and a test specimen held in the specimen clamp