

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 974

PLASTICS

METHOD OF DETERMINING THE BRITTLINESS TEMPERATURE BY IMPACT

1st EDITION

February 1969

COPYRIGHT RESERVED

The copyright of ISO Recommendations and ISO Standards belongs to ISO Member Bodies. Reproduction of these documents, in any country, may be authorized therefore only by the national standards organization of that country, being a member of ISO.

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 974, *Plastics – Method of determining the brittleness temperature by impact*, was drawn up by Technical Committee ISO/TC 61, *Plastics*, the Secretariat of which is held by the United States of America Standards Institute (USASI).

Work on this question led, in 1964, to the adoption of a Draft ISO Recommendation.

In July 1965, this Draft ISO Recommendation (No. 822) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Argentina	Greece	Romania
Australia	Hungary	Spain
Austria	India	Sweden
Belgium	Ireland	Turkey
Canada	Israel	U.A.R.
Chile	Italy	United Kingdom
Colombia	Japan	U.S.A.
Czechoslovakia	Netherlands	
Finland	New Zealand	

Four Member Bodies opposed the approval of the Draft :

France	Switzerland
Germany	U.S.S.R.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in February 1969, to accept it as an ISO RECOMMENDATION.

PLASTICS

METHOD OF DETERMINING THE BRITTLINESS TEMPERATURE BY IMPACT

1. SCOPE

- 1.1 This ISO Recommendation describes a method for determining the temperature at which plastics which are not rigid at normal ambient temperature exhibit brittle failure under specified conditions of deformation. A supplementary technique uses notched specimens and these show brittle failure at a much higher temperature. The method takes account of the statistical nature of brittle failure and makes provision for the testing of sufficient specimens to permit calculation of the brittleness temperature on a statistical basis.
- 1.2 The "brittleness temperature" test was originally developed to measure the temperature at which a polymer ceased to be flexible and became "glasslike". Because of the statistical nature of these failures, "brittleness temperature" is now defined as given in clause 3.1. The method specified in this ISO Recommendation establishes the temperatures at which there is a 50 % chance of failure in unnotched or notched specimens. It has been found useful for specification purposes although it does not necessarily relate to the lowest temperature at which the material may be used, since the basic polymer brittleness will be modified by any orientation produced during fabrication, by thermal history, and by the stress system applied, especially by the rate of impact. The typical precision of $\pm 5^{\circ}\text{C}$ should be recognized in establishing values used in material specifications.

2. PRINCIPLE OF METHOD

Bending a cantilever specimen through 90° around a mandrel of specified radius, at a constant testing speed in an inert medium, the temperature of which is accurately known and precisely controlled.

3. DEFINITIONS

- 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 *Testing speed.* The relative velocity between the striking edge of the test apparatus and a test specimen held in the specimen clamp.