INTERNATIONAL STANDARD

ISO 6721-10

Second edition
1999-12-15

Plastics — Determination of dynamic mechanical properties —

Part 10: Complex shear viscosity using a parallel-plate oscillatory rheometer

Plastiques — Détermination des propriétés mécaniques dynamiques —

Partie 10: Viscosité complexe en cisaillement à l'aide d'un rhéomètre à oscillations à plateaux parallèles

Reference number
ISO 6721-10:1999(E)

Contents

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

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.

International Standard ISO 6721-10 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

This second edition cancels and replaces the first edition (ISO 6721-10:1997), which has been technically revised.

ISO 6721 consists of the following parts, under the general title *Plastics — Determination of dynamic mechanical properties*:

— *Part 1: General principles*

— *Part 2: Torsion-pendulum method*

— *Part 3: Flexural vibration — Resonance-curve method*

— *Part 4: Tensile vibration — Non-resonance method*

— *Part 5: Flexural vibration — Non-resonance method*

— *Part 6: Shear vibration — Non-resonance method*

— *Part 7: Torsional vibration — Non-resonance method*

— *Part 8: Longitudinal and shear vibration — Wave-propagation method*

— *Part 9: Tensile vibration — Sonic-pulse propagation method*

— *Part 10: Complex shear viscosity using a parallel-plate oscillatory rheometer*

Annex A of this part of ISO 6721 is for information only.

Plastics — Determination of dynamic mechanical properties —

Part 10: Complex shear viscosity using a parallel-plate oscillatory rheometer

1 Scope

This part of ISO 6721 specifies the general principles of a method for determining the dynamic rheological properties of polymer melts at angular frequencies typically in the range 0,01 rad·s^{-1} to 100 rad·s^{-1} by means of an oscillatory rheometer with a parallel-plate geometry. Angular frequencies outside this range can also be used (see note 1). The method is used to determine values of the following dynamic rheological properties: complex shear viscosity η^*, dynamic shear viscosity η', the out-of-phase component of the complex shear viscosity η'', complex shear modulus G^*, shear loss modulus G'' and shear storage modulus G'. It is suitable for measuring complex shear viscosity values typically up to approximately 10 MPa·s (see note 2).

NOTE 1 The angular-frequency measurement range is limited by the specification of the measuring instrument and also by the response of the specimen. When testing using angular frequencies lower than 0,1 rad·s^{-1} the test time can increase significantly as the time taken to obtain a single measurement is proportional to the reciprocal of the angular frequency. Consequently, when testing at low angular frequencies degradation or polymerization of the specimen is more likely to occur and have an effect on the results. At high angular frequencies the specimen may distort or fracture at the edge, consequently invalidating the test results.

NOTE 2 The range of complex shear viscosity values that can be measured is dependent on the specimen dimensions and also the specification of the measuring instrument. For a specimen of given dimensions, the upper limit of the range is limited by the machine's torque capacity, angular-displacement resolution and compliance. However, correction can be made for compliance effects.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 6721. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 6721 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 472:1999, *Plastics — Vocabulary*.

ISO 5725-1:1994, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions.*

ISO 6721-1:1994, *Plastics — Determination of dynamic mechanical properties — Part 1: General principles*.

3 Terms and definitions

For the purposes of this part of ISO 6721, the terms and definitions given in ISO 6721-1:1994, ISO 5725-1:1994 and ISO 472:1999 apply, plus the following: