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Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification

Appareils d'essai du caoutchouc et des plastiques — Types pour traction, flexion et compression (vitesse de translation constante) — Spécifications

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analyses*.

This fourth edition cancels and replaces the third edition (ISO 5893:2002), of which it constitutes a minor revision. A few editorial changes have been made.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification

1 Scope

This document specifies requirements for tensile-testing systems operating at constant rate of traverse and suitable for testing rubbers, plastics and adhesives, although any one system might only be applicable to a narrower range of materials. It also covers such systems when used for flexural, shear and compression tests.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
tensile-testing system
machine composed of a nominally fixed member and a movable member, to which may be attached suitable grips or jigs for holding a test piece

Note 1 to entry: The movable member is power-driven and might be equipped with adjustable speed control. The machine has a force-measuring system complete with indicator and/or recorder. In addition, a system might be included for measuring the extension or deflection of the test piece.

3.2
applied force
force which produces the distortion in the test piece, measured along the strain axis of the machine

Note 1 to entry: For the purpose of this definition, "grip" is taken to mean "platen" or other member for application of force to the test piece when the machine is used for tests other than tensile tests. Depending on the arrangement of the grips or jigs, the test piece will be in tension, shear, compression or flexure.

3.3
elongation
increase in the gauge length of a tensile test piece when subjected to a tensile force

3.4
deflection
distortion, in the direction of the applied force, of a test piece in compression, shear or flexure

4 Designation of machine class

Machines shall be designated according to their accuracy in measuring the following parameters:

a) force (class 0,5, 1, 2 or 3 as given in ISO 7500-1);

b) elongation or deflection (class A, B, C, D or E as given in Table 1).

For example, a machine of the highest accuracy is designated “Force: class 0,5; Elongation (deflection): class A”.

It is not implied that test machines are available commercially in all the theoretically possible classes.

If, for any application, it is not considered necessary to specify the accuracy of measurement of either of these parameters, then no class number or letter is quoted.

NOTE Stringent specifications of test machine accuracy are of little value unless testing technique is closely controlled. Correlation of test data from different laboratories depends as much upon testing techniques as on machine specifications. Operator errors, test piece installation technique and test piece variability are major sources of error.

Care shall be taken to avoid exposure of the machine to draughts or to radiant heat.

5 Design features

5.1 Size and construction

The size and construction shall be such that the machine is capable of testing all materials for which it is intended to be used and has no features which might adversely affect the test results.

The moving grip shall be capable of traversing a distance sufficient to accommodate the maximum elongation of the test piece. In the case of the more highly extensible materials, a traverse distance in excess of 1 m might be necessary.

5.2 Axial alignment of the machine

The coupling between the force-measuring system and the test piece grips or jigs shall be accurately aligned with the strain axis. When fitted in place, the test piece shall also be accurately aligned with the strain axis, and the test axis of the test piece shall coincide with the direction of the applied force.

NOTE Non-axial alignment of a test piece in the grips and lack of test piece symmetry are particularly important causes of variation in test results.

5.3 Test piece grips

For testing dumb-bell, parallel-strip and similar tensile test pieces of flexible materials, the machine shall be provided with a type of grip which closes automatically as the tension increases (e.g. wedge or pneumatic) and which exerts a uniform pressure across the whole width of the test piece. For rigid materials, screw-action grips are also suitable. The test piece shall be held in such a manner that slippage relative to the grips is prevented as far as possible.

For testing ring test pieces, the machine shall be provided with two pulleys, both of which are free to rotate; one at least being automatically rotated by the machine at between 3 r/min and 50 r/min to equalize the strain in the ring during the test. The pulleys shall be 25 mm in diameter for large rings (44,6 mm ID) and 4,5 mm in diameter for small rings (8,0 mm ID).

For testing adhesion in the peel mode, the machine shall be provided either with the grips described in the relevant test method or with grips which exert a uniform pressure across the whole width of the test piece.

