

INTERNATIONAL  
STANDARD

**ISO**  
**37**

Third edition  
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**Rubber, vulcanized or thermoplastic —  
Determination of tensile stress-strain  
properties**

*Caoutchouc vulcanisé ou thermoplastique — Détermination des  
caractéristiques de contrainte-déformation en traction*



Reference number  
ISO 37:1994(E)

## 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.

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 37 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Physical and degradation tests*.

This third edition cancels and replaces the second edition (ISO 37:1977).

The major changes incorporated in this revision are as follows:

- a) Four dumb-bell test pieces are described. Types 1 and 2 are the same as in the previous edition. The miniature dumb-bell, type 3 in the previous edition, becomes type 4, with an additional intermediate-size dumb-bell being added as the new type 3.
- b) A reference to ISO 5893 is given in place of detailed requirements for the tensile-testing machine.
- c) The calculation of results is described more clearly.
- d) Means of determining the yield point have been included.
- e) Definitions of tensile properties, as they relate to rubber, are provided.

Annex A forms an integral part of this International Standard.

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# Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties

## 1 Scope

This International Standard describes a method for the determination of the tensile stress-strain properties of vulcanized and thermoplastic rubbers. The properties which may be determined are the tensile strength, the elongation at break, the stress at a given strain and the elongation at a given stress. Means of specifying or determining the yield point are also given.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 471:—<sup>1)</sup>, *Rubber — Times, temperatures and humidities for conditioning and testing.*

ISO 1826:1981, *Rubber, vulcanized — Time-interval between vulcanization and testing — Specification.*

ISO 3383:1985, *Rubber — General directions for achieving elevated or subnormal temperatures for test purposes.*

ISO 4648:1991, *Rubber, vulcanized or thermoplastic — Determination of dimensions of test pieces and products for test purposes.*

ISO 4661-1:1993, *Rubber, vulcanized or thermoplastic — Preparation of samples and test pieces — Part 1: Physical tests.*

ISO 5893:1993, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Description.*

## 3 Definitions

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

**3.1 tensile stress,  $S$ :** A stress applied so as to extend the test piece. It is calculated as the applied force per unit area of the original cross-section of the test length.

**3.2 elongation,  $E$ :** The extension, expressed as a percentage of the test length, produced in the test piece by a tensile stress.

**3.3 tensile strength,  $TS$ :** The maximum tensile stress recorded in extending the test piece to breaking point. [See figures 1 a) to 1 c).]

**3.4 tensile strength at break,  $TS_b$ :** The tensile stress recorded at the moment of rupture. [See figures 1 a) to 1 c).]

NOTE 1 The values of  $TS$  and  $TS_b$  may be different if, after yield  $S_y$ , the elongation continues and is accompanied by a drop in stress, resulting in  $TS_b$  being lower than  $TS$ . [See figure 1 c).]

**3.5 elongation at break,  $E_b$ :** The tensile strain in the test length at breaking point. [See figures 1 a) to 1 c).]

1) To be published. (Revision of ISO 471:1983)