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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 37

DETERMINATION OF TENSILE STRESS-STRAIN PROPERTIES OF VULCANIZED RUBBERS

2nd EDITION
September 1968

This second edition supersedes the first edition

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BRIEF HISTORY

The ISO Recommendation R 37, *Determination of tensile stress-strain properties of vulcanized natural and synthetic rubbers*, was drawn up by Technical Committee ISO/TC 45, *Rubber*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question by the Technical Committee began in 1948 and led, in 1953, to the adoption of a Draft ISO Recommendation.

In August 1954, this Draft ISO Recommendation (No. 53) was circulated to all the ISO Member Bodies for enquiry. It was approved by 23 Member Bodies. One Member Body (the U.S.A.) opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in March 1957, to accept it as an ISO RECOMMENDATION

BRIEF HISTORY RELATING TO THE 2nd EDITION

Work for the revision of ISO Recommendation R 37-1957 was subsequently started and, in 1962, a draft proposal was adopted by the Members of Technical Committee ISO/TC 45 as a Draft ISO Revision.

In November 1963, this Draft ISO Revision (No. 634) 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	Germany	Poland
Australia	Hungary	Spain
Austria	India	Sweden
Brazil	Israel	Switzerland
Canada	Italy	United Kingdom
Chile	Korea, Rep. of	U.S.A.
Colombia	Morocco	U.S.S.R.
Czechoslovakia	Netherlands	Yugoslavia
France	New Zealand	

One Member Body opposed the approval of the Draft :

Japan

The Draft ISO Revision was then submitted by correspondence to the ISO Council which decided, in September 1968, to accept it.

The title of ISO Recommendation R 37-1957 is amended as follows : *Determination of tensile stress-strain properties of vulcanized rubbers*.

This edition (2nd edition) supersedes the first edition of ISO Recommendation R 37-1957.

DETERMINATION OF TENSILE STRESS-STRAIN PROPERTIES OF VULCANIZED RUBBERS

1. SCOPE

This ISO Recommendation describes a method for the determination of tensile stress-strain properties of vulcanized rubbers.

2. PRINCIPLE OF METHOD

Standard test pieces, either in the shape of rings or dumb-bells, as described below, are stretched to breakage in a tension-testing machine capable of a substantially constant rate of traverse of the moving grip or pulley.

NOTES

1. Test pieces in the shape of rings and dumb-bells do not necessarily give the same values for the stress-strain properties. This is due mainly to the fact that in stretched rings the stress is not uniform over the cross-section. A second factor is the existence of grain, which may cause dumb-bells to give different values according as their length is parallel or perpendicular to the grain.
2. Rings give lower, sometimes much lower, tensile strength values than dumb-bells, the latter being much nearer to the true tensile strength of the rubber. The estimation of true tensile strength from ring data involves extrapolation of the stress-strain curve.*

3. APPARATUS

The tensile test machine should be capable of a substantially constant rate of traverse of the moving grip or pulley. This rate should be 500 ± 50 mm/min.

NOTE. — Inertia (pendulum) type dynamometers are apt to give results which differ because of frictional and inertial effects. An inertia-less (for example, electronic or optical transducer type) dynamometer gives results which are free from these effects, and is therefore to be preferred.

4. TEST PIECE

4.1 Dimensions of test piece

The test piece should be either in the shape of a ring or a dumb-bell, as described below.

(a) Ring test piece

Rings should be nominally of internal diameter 44.6 mm and external diameter 52.6 mm, the radial width nowhere deviating by more than ± 0.2 mm from the mean width. The thickness should be preferably between 4 and 6 mm. In any one ring the thickness should nowhere deviate by more than ± 0.2 mm from the mean thickness.

* See W.H. Reece, *Transactions of the Institution of the Rubber Industry*, 1935, 11, 312, and J.R. Scott, *Journal of Rubber Research* 1949, 18, 30.