

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 188

VULCANIZED RUBBERS

ACCELERATED AGEING OR HEAT RESISTANCE TESTS

2nd EDITION

November 1971

This second edition supersedes the first edition

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Printed in Switzerland

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

BRIEF HISTORY

The ISO Recommendation R 188, *Accelerated ageing or simulated service tests on vulcanized natural or 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 led to the adoption of Draft ISO Recommendation No. 171, which was circulated to all the ISO Member Bodies for enquiry in July 1957.

The Draft was approved by 26 Member Bodies. One Member Body opposed the approval of the Draft : France.

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

BRIEF HISTORY RELATING TO THE SECOND EDITION

Work started on the revision of ISO Recommendation R 188 soon after its publication in 1961 as there appeared to be certain inadequacies. Draft ISO Recommendation No. 1630 was adopted as a result and was circulated to all the ISO Member Bodies for enquiry in July 1968.

The Draft was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	India	Spain
Belgium	Iran	Sweden
Brazil	Israel	Switzerland
Canada	Italy	Thailand
Czechoslovakia	Netherlands	U.A.R.
France	New Zealand	United Kingdom
Germany	Poland	U.S.A.
Hungary	South Africa, Rep. of	U.S.S.R.

No Member Body opposed the approval of the Draft.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as the second edition of ISO Recommendation R 188.

The title of this ISO Recommendation has been modified as follows : *Vulcanized rubbers – Accelerated ageing or heat resistance tests*.

This edition (second edition) cancels and replaces the first edition of ISO Recommendation R 188.

VULCANIZED RUBBERS

ACCELERATED AGEING OR HEAT RESISTANCE TESTS

INTRODUCTION

Accelerated ageing tests or exposure to heat tests are designed to estimate the relative resistance of rubber vulcanizates to deterioration with the passage of time. For this purpose, the rubber is subjected to controlled deteriorating influences for definite periods, after which appropriate properties are measured and compared with the corresponding properties of the unaged rubber.

The purpose of the test may be to assess the deterioration of the rubber either

- (a) during prolonged periods at normal or at high temperature in air, or
- (b) during use at elevated temperatures and at elevated oxygen pressure.

Two types of test method are given in this ISO Recommendation, namely :

- (a) air oven methods (using a cell type oven or a normal oven);
- (b) oxygen pressure method.

The selection of the time, temperature and atmosphere to which the test pieces are exposed will depend on the purpose of the test and the type of polymer.

In the air oven tests, deterioration is accelerated by raising the temperature and, in the oxygen pressure test, by increasing the oxygen concentration and the temperature. The degree of acceleration thus produced varies from one vulcanizate to another and from one property to another.

Consequences of this are :

- (a) Accelerated tests do not truly reproduce under all circumstances the changes produced by natural ageing.
- (b) They sometimes fail to indicate accurately the relative natural or service life of different rubbers; thus tests at temperatures greatly above ambient or service temperatures may tend to equalize the apparent life of rubbers which deteriorate at different rates in storage or service. Tests at one or more intermediate temperatures are useful in assessing the reliability of accelerated ageing at high temperatures.
- (c) Accelerated tests using different properties may not agree in assessing the relative life of different rubbers and may even arrange them in different orders of merit. Therefore, deterioration should be measured by the changes in the property or properties which are of practical importance, provided they can be measured reasonably accurately.

Attention is drawn to the fact that air oven and oxygen pressure ageing tests should not be used to simulate natural ageing which occurs in the presence of either light or ozone when the rubbers are stretched.