
**Solution-polymerized SBR —
Evaluation methods of viscoelastic
properties**

*SBR polymérisé en solution — Méthodes d'évaluation des propriétés
viscoélastiques*



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Published in Switzerland

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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.

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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This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 3, *Raw materials (including latex) for use in the rubber industry*.

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.

Introduction

A variety of solution-polymerized styrene-butadiene rubber (S-SBR) have been developed and used for tires because they show excellent balance between rolling resistance and wet grip.

It is well known that functionalized S-SBR can strongly react with fillers, resulting in better dispersion and contributing to the low rolling resistance tire. These phenomena can be explained by the viscoelastic properties.

In other words, in order to describe the performance of S-SBR, it is necessary to evaluate viscoelastic properties. Therefore, a standard specifying the model compound formulation, mixing procedure, sample preparation, test conditions, etc. for evaluating the viscoelastic properties of the S-SBR compound is useful to the rubber industries.

Solution-polymerized SBR — Evaluation methods of viscoelastic properties

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to determine the applicability of any other restrictions.

1 Scope

This document specifies the standard test formulation, mixing procedure and test methods for evaluation of viscoelastic properties in a compound based on solution-polymerized styrene-butadiene rubber (S-SBR), including functionalized S-SBR^[7].

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 289-1, *Rubber, unvulcanized — Determinations using a shearing-disc viscometer — Part 1: Determination of Mooney viscosity*

ISO 2393, *Rubber test mixes — Preparation, mixing and vulcanization — Equipment and procedures*

ISO 4664-1, *Rubber, vulcanized or thermoplastic — Determination of dynamic properties — Part 1: General guidance*

ISO 6502-2, *Rubber — Measurement of vulcanization characteristics using curemeters — Part 2: Oscillating disc curemeter*

ISO 6502-3, *Rubber — Measurement of vulcanization characteristics using curemeters — Part 3: Rotorless curemeter*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4664-1 apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Test formulation

The standard test formulation given in [Table 1](#) shall be used for the evaluation of any type of S-SBR.

Formulation A is an oil-extended S-SBR formulation. Formulation B is a non oil-extended S-SBR formulation.