

INTERNATIONAL STANDARD



2322

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

## Rubber, styrene-butadiene (SBR) — Emulsion-polymerized general purpose types — Test recipe and evaluation of vulcanization characteristics

*Caoutchouc butadiène-styrène (SBR) — Types pour usage général, polymérisés en émulsion —  
Formule d'essai et évaluation des caractéristiques de vulcanisation*

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**Descriptors :** elastomers, synthetic elastomers, styrene-butadiene rubber, test specimens, tests, vulcanizing.

## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2322 was drawn up by Technical Committee ISO/TC 45, *Rubber and rubber products*, and circulated to the Member Bodies in March 1974.

It has been approved by the Member Bodies of the following countries :

|                     |             |                |
|---------------------|-------------|----------------|
| Australia           | France      | Romania        |
| Belgium             | Germany     | Spain          |
| Brazil              | Hungary     | Sweden         |
| Bulgaria            | India       | Turkey         |
| Canada              | Italy       | United Kingdom |
| Chile               | Netherlands | U.S.A.         |
| Czechoslovakia      | New Zealand | Yugoslavia     |
| Egypt, Arab Rep. of | Poland      |                |

No Member Body expressed disapproval of the document.

Rubber, styrene-butadiene (SBR) – Emulsion-polymerized general purpose types – Test recipe and evaluation of vulcanization characteristics

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies standard materials, equipment and processing methods, for evaluating vulcanization characteristics of emulsion-polymerized general purpose styrene-butadiene rubbers (SBR), including oil-extended rubbers.

2 REFERENCES

ISO/R 37, *Determination of tensile stress-strain properties of vulcanized rubbers.*

ISO 667, *Compounded rubber – Determination of the rate of cure using the shearing disk viscometer.*

ISO 1795, *Raw rubber in bales – Sampling.*

ISO 1796, *Raw rubber – Sample preparation.*

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

ISO 3417, *Raw rubber – Measurement of curing characteristics with the oscillating disk curemeter.*<sup>1)</sup>

3 STANDARD TEST RECIPE

3.1 Standard test formula

The standard test formula is given in the following table.

The materials shall be NBS<sup>2)</sup> Standard reference materials as indicated in the table, or shall be in accordance with equivalent national standards.

3.2 Procedure

3.2.1 Equipment and procedure

Equipment and procedure for the preparation, mixing and vulcanization shall be in accordance with ISO 2393.

| Material                                              | NBS Standard reference material number | Parts by mass |
|-------------------------------------------------------|----------------------------------------|---------------|
| Non-pigmented SBR (including oil in oil-extended SBR) | —                                      | 100,00        |
| Sulphur                                               | 371                                    | 1,75          |
| Stearic acid                                          | 372                                    | 1,00          |
| Oil furnace black (HAF)*                              | 378                                    | 50,00         |
| Zinc oxide                                            | 370                                    | 3,00          |
| TBBS**                                                | 384                                    | 1,00          |
|                                                       |                                        | Total 156,75  |

\* The current Industry Reference Black may be used in place of NBS 378, but this may give slightly different results.

\*\* *N-tert-butyl-2-benzothiazole sulphenamide* (powder form). This material must be stored under dry and cool conditions.

3.2.2 Mill mixing procedure

The standard laboratory mill batch mass, in grams, shall be based on four times the formula mass. The surface temperatures of the rolls shall be maintained at 50 ± 5 °C throughout the mixing.

NOTE — All mill openings shall be adjusted to maintain a good rolling bank at the nip of the rolls during mixing.

|                                                                                                                         | Duration (min) |
|-------------------------------------------------------------------------------------------------------------------------|----------------|
| 3.2.2.1 Band the rubber with the mill opening set at 1,1 mm and make 3/4 cuts every 30 s from alternate sides . . . . . | 7              |
| 3.2.2.2 Add the sulphur slowly and evenly across the rubber . . . . .                                                   | 2              |
| 3.2.2.3 Add the stearic acid. Make one 3/4 cut from each side . . . . .                                                 | 2              |

1) At present at the stage of draft.  
2) National Bureau of Standards of the U.S.A.