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*Draft Indian Standard*

**SULPHUR FOR RUBBER INDUSTRY — SPECIFICATION**

*(Second Revision of IS 8851)*

ICS 71.060.10

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Rubber and Rubber Products Sectional  
Committee, PCD 13

Last date for receipt of comment is  
**17 May 2024**

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**FOREWORD**

*(Formal clauses will be added later)*

This standard was first published in 1978 and subsequently revised in 1994.

In the first revision the requirements of sieve residue and relative density have been modified. The requirements of alkalinity and grit have been removed from Table 1. A requirement for melting point has been included in the standard.

Sulphur is one of the principal rubber vulcanizing agents. It is a critical additive. When chemically combined with rubber, sulphur develops basic performance properties in the vulcanized compound such as tensile strength, elongation, modulus, and hardness. In soft or elastic rubber compounds, sulphur is an essential but minor additive. In semi-hard rubber and ebonite, sulphur becomes a major compounding material while retaining its role as a vulcanizing agent.

The most stable molecular form of sulphur at ambient conditions is a ring structure containing eight sulphur atoms. Depending on conditions these molecules orient into one of two crystalline structures. At room temperature the crystals are rhombic and above 95°C they rearrange to monoclinic. Less than 1.5 percent of either crystalline structure of sulphur is soluble in any rubber at room temperature.

The second common molecular form of sulphur is polymeric sulphur, made up of unbranched chains of sulphur atoms. It is commonly referred to in the rubber industry as insoluble sulphur. When this material is created by rapid heating to above 160 °C and quenching to room temperature, the sulphur is amorphous. If formed under other conditions, the polymer chains may develop regions of pseudo crystallinity.

Rhombic sulphur (ordinary ground sulphur) which is the ordinary form of sulphur under normal conditions, is ground and classified to meet specific particle size requirements. The various grades of this type of sulphur contain less than 1 percent polymeric sulphur. The ground types of sulphur may also contain additives to enhance performance. Oil is added to sulphur to help control sulphur dust and improve dispersion in rubber. Finely ground solid minerals are also added to improve dispersion in rubber. Ordinarily the total additive level is 5 percent or less of

the sulphur formulation. Many of these types of sulphur may be added to rubber compounds as 100 percent sulphur. A separate Indian Standard, IS 14127 'Insoluble (Amorphous) sulphur for rubber industry' has been prepared.

Second revision of this standard has been undertaken to incorporate various editorial corrections, updation of references to ensure accuracy and relevance in the revised standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## 1 SCOPE

This standard prescribes the requirements and methods of sampling and test for sulphur for rubber industry.

## 2 REFERENCES

The following standards contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated were valid. All standards are subject to revision and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below:

IS No.	Title
IS 1070 : 2023	Reagent grade water — Specification ( <i>fourth revision</i> )
IS 6655 : 1972	Methods of test for sulphur
IS 6918 : 2002	Mercaptobenzothiazole — Specification ( <i>first revision</i> )
IS 7086 (Part 1) : 1973	Methods of sampling and testing for rubber compounding ingredient, Part 1

## 3 REQUIREMENTS

The material shall comply with the requirements given in Table 1 when tested according to the methods prescribed in col 4 of the table.

## 4 PACKING AND MARKING

### 4.1 Packing

The material shall be packed in packages as agreed to between the purchaser and the supplier.

### 4.2 Marking

4.2.1 Each package shall be marked with the following:

- a) Material highly inflammable;
- b) Name of the material;
- c) Indication of source of manufacture;
- d) Month and year of manufacture;
- e) Net mass of the material; and
- f) Batch or code number.

#### 4.2.1 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the rules and regulations framed thereunder, and the products may be marked with the Standard Mark.

## 5 SAMPLING

5.1 Representative samples of the material shall be drawn as prescribed in 15 of IS 7086 (Part 1).

### 5.2 Number of Tests

Test for all characteristics of the material given in Table 1 shall be conducted on composite sample.

### 5.3 Criteria for Conformity

The lot shall be declared as conforming to the requirements of the specification if all the test results on the composite sample satisfy the requirements.

## 6 TEST METHODS

6.1 Test shall be conducted according to the methods prescribed in col 4 of Table 1.

6.2 **Quality of Reagents** — Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be used in tests.

NOTE – ‘Pure chemicals’ shall mean chemicals that do not contain impurities which affect the results of analysis.

**Table 1 Requirements of Sulphur for Rubber Industry**  
(Clauses 3, 5.2 and 6.1)

Sl No.	Characteristics	Requirement	Method of Test, Ref to Cl No.
(1)	(2)	(3)	(4)
i)	Elemental sulphur, percent by mass, <i>Min</i>	99.5	3.1 of IS 6655
ii)	Sieve residue, percent by mass, <i>Max</i> (dry) a) Through 63 mesh b) Through 125 mesh c) Through 180 mesh	20 0.2 0.02	3 of IS 7086 (Part 1)
iii)	Relative density, 27 °C /27 °C	2.05 to 2.15	4 of IS 7086 (Part 1)
iv)	Moisture content, percent by mass	0.15	3.2 of IS 6655
v)	Ash, percent by mass, <i>Max</i> at 850 °C	0.20	3.3 of IS 6655
vi)	Acidity (as H <sub>2</sub> SO <sub>4</sub> ), percent by mass, <i>Max</i>	0.025	3.4 of IS 6655
viii)	Manganese, percent by mass, <i>Max</i>	0.002	11 of IS 7086 (Part 1)
ix)	Copper, percent by mass, <i>Max</i>	0.001	12 of IS 7086 ( Part 1)
x)	Iron, percent by mass, <i>Max</i>	0.003	13 of IS 7086 (Part 1)
xi)	Melting point, °C	113 to 119	Annex C of IS 6918