

# Indian Standard

## NATURAL RUBBER COMPOUNDS — SPECIFICATION

### PART 1 FOR MOULDED PRODUCTS

### ( Second Revision )

#### 1 SCOPE

This Indian Standard specifies compositional and physical property requirements for four non-black natural rubber compounds designated W40, W50, W60, W70, three non-black natural rubber/zinc oxide compounds designated Y40, Y50, Y60 and five black natural rubber compounds designated Z40, Z50, Z60, Z70, Z80.

These compounds are intended for the manufacture of items in the form of mouldings, moulded or calendered sheet and for items cut or punched from sheet.

NOTE 1 — The compounds do not necessarily have good electrical insulating properties.

NOTE 2 — The compounds may not be suitable for use when special properties are required, such as improved ozone or heat resistance, freedom from tarnishing of some metallic components (copper, silver), long term low temperature use or seals in castor oil based fluid systems.

#### 2 NORMATIVE REFERENCES

The following Indian Standards contain provision 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 editions of the standards indicated below:

IS No.	Title
3400 (Part 1) : 1987	Methods of test for vulcanized rubbers : Part 1 Tensile stress-strain properties ( <i>second revision</i> )
3400 (Part 2) : 1980	Methods of test for vulcanized rubbers : Part 2 Hardness ( <i>first revision</i> )
3400 (Part 4) : 1987	Methods of test for vulcanized rubbers : Part 4 Accelerated ageing ( <i>second revision</i> )
3400 (Part 9) : 1978	Methods of test for vulcanized rubbers : Part 9 Density ( <i>first revision</i> )
3400 (Part 10) : 1977	Methods of test for vulcanized rubbers : Part 10 Compression set at constant strain ( <i>first revision</i> )
6713 : 1972	Code of Practice for storage of vulcanized rubber

#### 3 REQUIREMENTS

##### 3.1 Classification

Compounds shall be classified according to their vulcanized hardness in international rubber hardness degrees (IRHD), and designated by grade as shown in Table 1.

Table 1 Compound Classification

Grade Designation			Hardness After Vulcanization (IRHD)
W40	Y40	Z40	40 <sup>+5</sup> <sub>-4</sub>
W50	Y50	Z50	50 <sup>+5</sup> <sub>-4</sub>
W60	Y60	Z60	60 <sup>+5</sup> <sub>-4</sub>
W70	—	Z70	70 <sup>+5</sup> <sub>-4</sub>
—	—	Z80	80 <sup>+5</sup> <sub>-4</sub>

##### 3.2 Composition

The compounds shall be based on high quality plantation (Hevea) rubber. This rubber shall be one or any combination of the following : pale crepe, or RSSI, or latex grade technically specified natural rubber. It shall be vulcanized with sulfur/organic accelerator(s) activated with upto 2 parts per hundred of rubber by mass (p.h.r.) of stearic acid and a minimum of 5 p.h.r. of zinc oxide. At least 1 p.h.r. of an antioxidant shall be incorporated in the mix.

Compounds designated 'W' shall be reinforced with a non-black filler or a mixture of non-black fillers. Compounds designated 'Y' shall be reinforced with zinc oxide only and shall contain no carbon black or mineral filler other than zinc oxide.

Compounds designated 'Z' shall be reinforced with carbon black(s), or with carbon black(s) and zinc oxide, and shall contain no other fillers.



## IS 5192 (Part 1) : 1994

If softeners are used in the mixed for processing, the total amount excluding stearic acid shall not exceed 5 p.h.r. for grades Y40 to Y60 and Z40 to Z60 and shall not exceed 10 p.h.r. for grades W40 to W70 and Z70 and Z80.

No reclaimed rubber or ground vulcanized rubber shall be used.

The colour of the compounds designated 'Z' shall be black.

### NOTES

1 The colour of the compounds designated 'W' and 'Y' should be as agreed between the purchaser and the supplier.

All ingredients of the mix shall be free from grit and extraneous material.

2 Chemical analysis may be carried out on either two-thickness sample sheets or sample items, as practicable, to verify that the composition of the mix conforms to this clause.

### 3.3 Physical properties of the vulcanized test sheet

Test pieces cut from the test sheet (see 5.2) shall conform to the relevant requirements given in Table 2 (see page 3) when tested by the methods specified in the table.

NOTE — Guidance for the preparation and testing of rubber products is given in Annex A.

## 4 PACKING AND MARKING

4.1 The material shall be packed as agreed between purchaser and the supplier.

### 4.2 Marking

4.2.1 Each package shall be marked with the following:

- a) Name of the material;
- b) Indication of the source of manufacture;

- c) Grade and designation;
- d) Month and year of the manufacturer (cure);
- e) Net mass of the material; and
- f) Lot or batch Number.

4.2.2 The package may also be marked with the Standard Mark.

4.2.3 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## 5 TEST METHODS

5.1 Test shall be carried out according to the methods prescribed in the Specification.

### 5.2 Preparation of test sheet

From each batch of rubber mix, a two-thickness test sheet of the following dimensions shall be prepared for testing.

The sheet shall be approximately 250 mm square with a thicker section along one side 35 mm to 50 mm wide and  $6.30 \pm 0.15$  mm thick. The remainder of the sheet shall be  $2.00 \pm 0.15$  mm thick. The thicker sections of the sheet shall not be additionally vulcanized.

If part of the 6.3 mm section is moulded in the form of cylindrical buttons conforming to IS 3400 (Part 10) : 1977 for the purpose of compression set tests, the mould cavities shall be individually charged with pellets and not by the flow of the excess rubber from the remainder of the mould. The minimum number of buttons moulded shall be nine and they shall be in a group at one end of the 6.3 mm section.

## ANNEX A

( Clause 3.3 )

### GUIDANCE FOR THE PREPARATION AND TESTING OF RUBBER PRODUCTS

A-1 This Indian Standard specifies requirements for the rubber compounds when they are tested using a press-cured sample sheet. Where manufactured articles are to be tested the shape and size may prevent the preparation of some or all test pieces. In this case agreement between manufacturer and purchaser should be sought on the procedure to verify conformity of the manufactured article. Where standard test pieces can be prepared from the articles they may be used for quality control tests.

A-2 Finished rubber items should be free from surface imperfections, voids, inclusions, flow marks, moulding faults and defects which would impair satisfactory performance and should show minimal accelerator bloom.

A-3 Finished rubber items should be stored in accordance with IS 6713 : 1972.



Table 2 Physical properties of two-thickness test sheets

( Clause 3.3 )

SL No. (1)	Characteristics (2)	Requirements Grade Designation (3)											Methods of Test Ref to IS No. (4)	
		W40	Y40	Z40	W50	Y50	Z50	W60	Y60	Z60	W70	Z70		Z80
i)	Hardness after vulcanization (IRHD)	<sup>+5</sup> 40 -4			<sup>+5</sup> 50 -4			<sup>+5</sup> 60 -4			<sup>+5</sup> 70 -4		<sup>+5</sup> 80 -4	3400 (Part 2) : 1980
ii)	Density (Mg/m <sup>3</sup> )	Agreed value ± 0.02*											3400 (Part 9) : 1978	
iii)	Minimum tensile strength (MPa)	17	19	19	17	17	17	14	17	17	10	14	10	3400 (Part 1) : 1987
iv)	Minimum elongation at break (percent)	500	600	600	400	500	500	400	400	400	250	300	200	
v)	Maximum compression set percent for 24 <sup>+0</sup> <sub>-2</sub> hrs at 70±1°C	30	30	30	30	30	30	30	30	30	30	30	40	3400 (Part 10) : 1977
vi)	Resistance to accelerated ageing													
a)	Maximum change in tensile strength (percent of original value)	-10			-10			-10			-10		-10	3400 (Part 4) : 1987
b)	Maximum change in elongation at break (percent of original value)	-15			-15			-15			-15		-15	-do-

\*No values are specified for density but it is recommended that a value be established for each composition.

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