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भाग 2 ऊष्मा प्रतिरोधी बेल्टिंग
(चौथा पुनरीक्षण)

Rubber Conveyor and Elevator
Textile Belting — Specification

Part 2 Heat Resistant Belting
(Fourth Revision)

ICS 53.040.20

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Price Group 5

FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Conveyor Belts Sectional Committee had been approved by the Production and General Engineering Division Council.

This Indian Standard was first published in 1972 and was subsequently revised in 1978, 1988 and 1993.

This revision has been brought out to take care of the experience gained since the last publication and to bring it in line with the current manufacturing practices vis-à-vis latest technological advancements. SI systems of units have been followed in the standard.

This standard is published in five parts. The other parts in this series are:

Part 1	General purpose belting
Part 3	Oil resistant belting
Part 4	Hygienic belting
Part 5	Fire resistant belting for surface application

The major modifications in this standard are:

- a) Introduction to various types of heat-resistant belting used in food industry along with relevant tests applicable to them have been included;
- b) Some new tests like fire resistance, electrical surface resistance test (antistatic test), volume swelling, heat resistance, non-stick test and tear resistance test have been added; and
- c) Method of testing tear strength test has also been provided.

The composition of the Committee, responsible for the formulation of this standard is given in [Annex B](#).

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*)'.

*Indian Standard***RUBBER CONVEYOR AND ELEVATOR TEXTILE BELTING —
SPECIFICATION****PART 2 HEAT RESISTANT BELTING***(Fourth Revision)***1 SCOPE**

This Indian Standard (Part 2) specifies the requirements of conveyor and elevator textile belting for use on flat or troughed idlers for conveying hot materials which are classified as follows given in [Table 1](#).

These classes do not correspond to the temperature of the transported product, they are generally lower to account for. Depending on the use for which the belt is intended, the manufacturer should state the class to be used for assessing compliance with this Indian Standard. For higher than the above specified material temperature, user may consult the manufacturer for an alternative grade and should agree on alternate temperature of ageing and /or duration.

2 REFERENCES

The standards listed in [Annex A](#) contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and encouraged to investigate the possibility of applying the most recent edition of these standards.

3 PERFORMANCE REQUIREMENTS

When tested under the method specified as per given in [4](#), the permissible variations in hardness, elongation at break and tensile strength shall be [Table 2](#).

4 TEST METHODS**4.1 Principle**

The following properties are measured, before and after exposure to heat according to [4.3.1](#):

- The hardness of covers as per IS 3400 (Part 2/Sec 1);
- Elongation at break of covers as per IS 3400 (Part 1); and
- Tensile strength of covers as per IS 3400 (Part 1).

NOTE — The temperatures selected for the tests are usually not those corresponding to the temperature of the product to be transported; they are generally lower to take account of:

- the possibility of the conveyor belt cooling, and
- the fact that contact between the product and the conveyor belt will not equalize the temperature.

Table 1 Resistance to Temperature °C (Max)*(Clause 1)*

Sl No.	Heat Resistance Grades	Guideline — Material Temperature Predominantly Lumps	Guideline — Material Temperature Predominantly Fines
(1)	(2)	(3)	(4)
i)	Heat Resistance Grade T ₁ (HR T ₁)	125	100
ii)	Heat Resistance Grade T ₂ (HR T ₂)	150	125
iii)	Heat Resistance Grade T ₃ (HR T ₃)	180	150

Table 2 Permissible Variations

(Clauses 3 and 4.2)

SI No.	Cover Characteristic	Variation for Belt Class					
		HR T ₁		HR T ₂		HR T ₃	
(1)	(2)	(3)		(4)		(5)	
i)	Hardness (IRHD)						
	a) variation of initial value; and	+ 20		+ 20		+ 20	
	b) maximum value	85		85		85	
ii)	Elongation at break (percent)						
	a) variation in percentage of initial value; and	- 50		- 50		- 55	
	b) minimum value	200		200		180	
iii)	Tensile strength (N/mm ²)						
	a) variation in percentage of initial value; and	- 25		- 30		- 40	
	b) minimum value	12		10		5	
iv)	Adhesion strength (N/mm)	Natural Fibers Carcass	Synthetic Filaments Carcass	Natural Fibers Carcass	Synthetic Filaments Carcass	Natural Fibers Carcass	Synthetic Filaments Carcass
v)	Between adjacent piles						
	a) variation in percentage of initial value; and	-50	-50	-50	-50	-50	-50
	b) minimum value	1.6	3.0	1.6	3.0	1.6	3.0
vi)	Cover to ply Adhesion (0.8 mm to 1.5 mm)						
	a) variation in percentage of initial value; and	-50	-50	-50	-50	-50	-50
	b) minimum value	1.05	1.6	1.05	1.6	1.05	1.6
vii)	Cover to ply Adhesion (0.8 mm to 1.5 mm)						
	a) variation in percentage of initial value; and	-50	-50	-50	-50	-50	-50
	b) minimum value	1.35	2.25	1.35	2.25	1.35	2.25
NOTE — Actual application condition may not match exactly within the frame of the standard, hence, the above acceptance parameters are for guidance only. End use and manufacture of the conveyor belt may decide on specific acceptance based on past performance and accuracy of application conditions.							

4.2 Classification

Conveyor belts shall be classified as presented in [1](#) and [Table 2](#).

4.2.1 Exposure to Heat

Cut a sample belt of full thickness measuring 400 mm × 400 mm from the centre of the belt at a distance of at least 100 mm from the edges. Place it in an air oven following IS 3400 (Part 4) for 72 h at a temperature of 100 °C for HR T₁ belts, 125 °C for HR T₂ belts and 150 °C for HR T₃ belts.

After exposure to heat, remove the belt sample from the oven and leave it to cool.

4.2.2 Preparation of Test Pieces for Evaluating Properties

4.2.2.1 Test pieces for measuring the hardness of covers

The test pieces shall either be the belt sample itself or covers removed from the belt by cutting away the covers from the belt sample. Test pieces shall be lightly buffed on each surface but left at maximum thickness. Condition the test pieces for 24 h at a temperature of (27 ± 2) °C and relative humidity of (65 ± 5) percent (atmosphere B in accordance with IS 17527).

4.2.2.2 Test pieces for measuring elongation at break and tensile strength

Cut away the covers from the belt samples as described in [4.2.1](#) and bring them to a thickness of (2 ± 0.2) mm by cutting on both faces and finishing off with a light buffing. Condition the test pieces for 24 h at a temperature of (27 ± 2) °C and relative humidity of (65 ± 5) percent (atmosphere B in accordance with IS 17527).

4.2.2.3 Test pieces for measuring the adhesion strength of the belt

Cut away the adhesion test piece specimen from the belt as per ISO 252. Condition the test pieces for 24 h at a temperature of (27 ± 2) °C and relative humidity of (65 ± 5) percent (atmosphere B in accordance with IS 17527).

4.3 Determination of Properties

4.3.1 Hardness

Using the test pieces prepared as described in [4.2.2.1](#) measure the hardness of covers using one of the methods specified in IS 3400 (Part 2/Sec 1) according to the available thickness of the rubber material.

4.3.2 Elongation at Break and Tensile Strength

Using the test pieces as described in [4.2.2.2](#) measure the elongation at break of covers and tensile strength in accordance with IS 3400 (Part 1).

4.3.3 Adhesion Strength

Using a test piece prepared as described in [4.2.2.3](#), measure the adhesion strength as described in ISO 252.

4.3.4 Initial Values

Determine the initial values of hardness, elongation at break and tensile strength by measuring these properties using test pieces cut from the same belt and prepared as described in [4.3.2](#), but without exposure to heat.

4.4 Expression of Results

Record the results for the hardness of covers, the elongation at break of covers and the tensile strength of covers for the samples not exposed to heat and those exposed to heat. Calculate the variation in hardness, and elongation at break and breaking strength between the results obtained for the samples not exposed to heat and those obtained for the samples exposed to heat.

5 TEST REPORT

The test report shall contain the following information:

- a) Identification of the conveyor belt tested;
- b) The belt class as given in [4.2](#);
- c) The test piece used (*see* [4.3.2](#));
- d) The conditions of exposure to heat;
- e) Details of the conditioning used;
- f) The results of the test as described in [4.4](#); and
- g) Date of the test.

6 PACKING

The belting shall be packed as mutually agreed between the purchaser and the manufacturer.

7 MARKING

7.1 The belting shall be marked at intervals of maximum 15 m on the carrying surface as follows:

- a) Manufacturer's name and trade-mark, if any;

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- b) Fabric designation, that is, CC (cotton-cotton), PP (Polyamide/Polyamide), EP (polyester/polyamide), etc;
- c) Belt type (full thickness breaking strength (N/mm)/No. of plies); and
- d) Last two figures of the year of manufacture.

7.2 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.

ANNEX A

(Clause 2)

LIST OF REFERRED STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
IS 1891 (Part 1) : 2021	Conveyor and elevator textile belting — Specification: Part 1 General purpose belting (<i>fifth revision</i>)	(Part 4) : 2012	Accelerated ageing and heat resistance (<i>third revision</i>)
IS 3400	Methods of test for vulcanized rubber:	IS 17071 : 2019	Conveyor belts — Adhesion between constitutive elements — Test methods
(Part 1) : 2021	Tensile stress — Strain properties	ISO 252 : 2023	
(Part 2) : 2023	Determination of hardness	IS 17527 : 2021	Conveyor belts — Test atmospheres and conditioning periods
(Sec 2) : 2023	Hardness between 10 IRHD and 100 IRHD (<i>fifth revision</i>)		

To access Indian Standards click on the link below:

https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/nowyourstandards/Indian_standards/isdetails/

ANNEX B

(Foreword)

COMMITTEE COMPOSITION

Conveyor Belts Sectional Committee, PGD 40

<i>Organization</i>	<i>Representative(s)</i>
National Thermal Power Corporation Limited, Ranchi	SHRI APURBA GHOSH (Chairperson)
Central Mine Planning and Design Institute Ltd, Ranchi	SHRI PARAG MAJUMDAR SHRI P. K. PAUL (<i>Alternate</i>) SHRI AJOY KUMAR SINGH (Convenor)
Directorate General of Mines Safety, Dhanbad	SHRI M. ARUMUGAM
Directorate General of Mines Safety, Dhanbad	SHRI D. B. NAIK SHRI KAUSHIK SENGUPTA (<i>Alternate</i>)
Fenner Conveyor Belting Pvt Ltd, Madurai	SHRI M. VIVEK SHRI SANTOSH N. KOSARKAR (<i>Alternate I</i>) SHRI N. SRIDHAR (<i>Alternate II</i>)
Forech India Ltd, Sonipat	SHRI I. K. BAHL SHRI TIMIR BHATTACHARYYA (<i>Alternate</i>)
Indian Rubber Manufacturers Research Association, Mumbai	DR K. RAJ KUMAR SHRIMATI SUCHISMITA SAHOO (<i>Alternate</i>)
International Conveyors Ltd, Aurangabad	SHRI U. D. DOUND SHRI PINAKI SEN (<i>Alternate I</i>) SHRI SUDEEP SAHA (<i>Alternate II</i>)
J K Fenner India Ltd, Madurai	SHRI S. MAJUMDAR SHRI D. SRINIVASAN (<i>Alternate</i>)
Multiple Fabric Company Ltd, Kolkata	SHRI SHABBIR TOPIWALA SHRI HAMZA TOPIWALA (<i>Alternate</i>)
NTPC Hyderabad, Secunderabad	SHRI VIVEK KUMAR UPADHYAY
NTPC Ltd, New Delhi	SHRI ABHIJIT NAG SHRI VIVEK KUMAR UPADHYAY (<i>Alternate</i>)
Oriental Rubber Industries Pvt Ltd, Pune	SHRI CHINMAY RAY SHRI VIKRAM MAKAR (<i>Alternate</i>)
Phoenix Conveyor Belt India Pvt Ltd, Kolkata	SHRI MAYUKH SAHA SHRI SUBRATA CHAKRABORTY (<i>Alternate I</i>) DR SUGATA CHAKRABORTY (<i>Alternate II</i>)
Scandia Belting Company Pvt Ltd, Kolkata	SHRI G. B. GANGULY SHRI PARTHA SARTHI BISWAS (<i>Alternate I</i>) SHRI ARSHED HUSSAIN (<i>Alternate II</i>)

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Member Secretary
SHRI VICHITRA VIR SINGH
SCIENTIST 'D'/JOINT DIRECTOR
(PETROLEUM, COAL AND RELATED PRODUCTS), BIS

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