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भारतीय मानक मसौदा

रबर कन्वेयर और एलीवेटर टेक्सटाइल बेल्टिंग हेतु विशिष्टि
भाग 2 ऊष्मा प्रतिरोधी बेल्टिंग

(IS 1891-2 *का चौथा पुनरीक्षण*)

Draft Indian Standard

Rubber Conveyor and Elevator Textile Belting — Specification
Part 2 Heat Resistant Belting

(*Fourth Revision of* IS 1891-2)

ICS 53.040.10

Conveyor Belts Sectional Committee, PGD 40	Last Date for Comments: 07-05-2024

FOREWORD
(*formal clause to be added later on*)

This standard was first published in 1972 and revised in 1978 and 1988 in line with the manufacturing practices and to incorporate SI units. Third revision has been issued to raise the heat resistance to 160 °C. Accordingly, all the test requirements have been modified. Ageing period has been increased from 3 days to 168 h. Hardness test has been added.

This standard is published in five parts. The other part 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

This fourth 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 new technological advancements. SI systems of units have been followed in the standard.

The major changes made in this standard as compared to the second revision are:

a) All the amendments issued to the previous version of the standard have been amalgamate and the text of the standard has been suitably modified to make it more user friendly;
b) Introduction to various types of heat resistant belting used in food industry along with relevant tests applicable to them have been included;
c) 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
d) Method of testing tear strength test has also been given in the standard.

The composition of the Committee, responsible for the formulation of this standard is given at Annex A.

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*).

Draft Indian Standard

Rubber Conveyor and Elevator Textile Belting — Specification
Part 2 Heat Resistant Belting

(*Fourth Revision of* IS 1891-2)

1 SCOPE

This standard (Part 2) covers the requirements of conveyor and elevator textile belting for use on flat or troughed idlers for conveying hot materials which are classified as follows:

Resistance to Temperature ^{0}C (max)

Heat Resistance Grades	Guideline -Material Temperature predominantly Lumps	Guideline - Material Temperature predominantly Fines
Heat Resistance Grade T_1 (HR T_1)	125	100
Heat Resistance Grade T_2 (HR T_2)	150	125
Heat Resistance Grade T_3 (HR T_3)	180	150

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 Standard. For higher than the above-specified material temperature user may consult the manufacturer for an alternative grade and should agree on ageing alternate temperature of ageing and /or duration.

2 NORMATIVE REFERENCES

The standards listed below contain provisions which, though referenced in this text, constitute provisions of and necessary adjuncts to this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below;

IS No.	*Title*
IS 1891 (Part 1) : 2021	Conveyor and elevator textile belting – Specification Part 1 General purpose belting (*fifth revision*)
IS 1891 (Part 2) : 1993	Conveyor and elevator textile belting – Specification: Part 2 heat resistant belting (*third revision*)
IS 3400	Methods of Test for Vulcanized Rubber
(Part 1) : 2021	Tensile stress — Strain properties
(Part 2)	Determination of hardness
(Sec 1) : 2022	Hardness between 10 IRHD and 100 IRHD (*fifth revision*)
(Part 4): 2012	Accelerated ageing and heat resistance (*third revision)*
IS 17527 : 2021	Conveyor belts — Test atmospheres and conditioning periods
ISO 252 : 2023	Conveyor belts — Adhesion between constitutive elements — Test methods

3 PERFORMANCE REQUIREMENTS

When tested under the method specified in 4, the permissible variations in hardness, elongation at break and tensile strength shall be following Table 1.

Table 1 Permissible variations

(*Clauses* 3 *and* 4.2)

Sl No.	Cover characteristic	Variation For Belt Class					
		HR T1		HR T2		HR T3	
(1)	(2)	(3)		(4)		(5)	
i)	**Hardness** (IRHD)						
	— variation of initial value — maximum value	+ 20 85		+ 20 85		+ 20 85	
ii)	**Elongation at break** (%)						
	— variation in percentage of initial value — minimum value	– 50 200		– 50 200		– 55 180	
iii)	**Tensile strength** (N/mm2)						
	— variation in percentage of initial value — minimum value	– 25 12		– 30 10		– 40 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 plies** — variation in percentage of initial value — minimum value	-50 1.6	-50 3.0	-50 1.6	-50 3.0	-50 1.6	-50 3.0
vi)	**Cover to ply Adhesion (0.8mm to 1.5 mm)** — variation in percentage of initial value — minimum value	-50 1.05	-50 1.6	-50 1.05	-50 1.6	-50 1.05	-50 1.6
vii)	**Cover to ply Adhesion (0.8mm to 1.5 mm)** — variation in percentage of initial value — minimum value	-50 1.35	-50 2.25	-50 1.35	-50 2.25	-50 1.35	-50 2.25

NOTE — Actual application condition may not match exactly within the frame of the standard, hence, the above acceptance parameters are guideline only. End user and manufacturer of the conveyor belt may decide on specific acceptance based on past performance and accuracy of application conditions.

4 TEST METHODS

4.1 Principle

The following properties are measured, before and after exposure to heat according to **4.3.1:**

a) The hardness of covers per IS 3400 (Part 2);

b) Elongation at break of covers per IS 3400 (Part 1); and

c) Tensile strength of covers 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:

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

4.2 Classification

Conveyor belts shall be classified as presented in Table 1.

4.3 Procedure

4.3.1 *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.

4.3.2 *Preparation of Test Pieces for Evaluating Properties*

4.3.2.1 *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) % (atmosphere B in accordance with IS 17527)

4.3.2.2 *Test pieces for measuring elongation at break and tensile strength*

Cut away the covers from the belt samples treated as described in **4.3.1** 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) % (atmosphere B in accordance with IS 17527).

4.3.2.3 *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) % (atmosphere B in accordance with IS 17527).

4.4 Determination of Properties

4.4.1 *Hardness*

Using the test pieces prepared as described in **4.3.2.1,** 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.

4.4.2 *Elongation at Break and Tensile Strength*

Using the test pieces as described in **4.3.2.2**, measure the elongation at break of covers and tensile strength in accordance with IS 3400 (Part 1).

4.4.3 *Adhesion Strength*

Using a test piece prepared as described in **4.3.2.3**, measure the adhesion strength as described in ISO 252.

4.4.4 *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.

4.5 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) Reference to this Indian Standard IS 1891 Part 2.

b) Identification of the conveyor belt tested;

c) The belt class as given in **4.2**;

d) The test piece used (*see* **4.3.2**);

e) The conditions of exposure to heat;

f) Details of the conditioning used;

g) The results of the test as described in **4.4**; and

h) Date of the test.

6 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 product(s) may be marked with the Standard Mark.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION

Conveyor Belts Sectional Committee, PGD 40

Organization	*Representative(s)*
National Thermal Power Corporation Limited, New Delhi	SHRI APURBA GHOSH (***Chairperson***)
Directorate General of Mines Safety, Dhanbad	SHRI M ARUMUGAM
Central Mine Planning and Design Institute Limited, Ranchi	MR. SHRI PARAG MAJUMDAR MR. SHRI P.K. PAUL (*Alternate*) MR. AJOY KUMAR SINGH (*Convenor*)
Directorate General of Mines Safety, Dhanbad	SHRI D B NAIK MR. SHRI KAUSHIK SENGUPTA (*Alternate*)
Fenner Conveyor Belting Private Limited, Madurai	SHRI M VIVEK SHRI SANTOSH N KOSARKAR (*Alternate* I) MR. SHRI N.SRIDHAR (*Alternate* II)
Forech India Limited, Sonipat	SHRI I.K. BAHL SHRI TIMIR BHATTACHARYYA (*Alternate*)
Indian Rubber Manufacturers Research Association, Mumbai	MR. K. RAJ KUMAR MS. SUCHISMITA SAHOO (*Alternate*)
International Conveyors Limited, Aurangabad	SHRI U. D. DOUND MR. SHRI PINAKI SEN (*Alternate* I) MR. SHRI SUDEEP SAHA (*Alternate* II)
J K Fenner India Limited, Madurai	MR. SHRI S. MAJUMDAR MR. SHRI D SRINIVASAN (*Alternate*)
Multiple Fabric Company Limited, Kolkata	SHRI SHABBIR TOPIWALA SHRI HAMZA TOPIWALA (*Alternate*)
NTPC Hyderabad, Secunderabad	MR. SHRI VIVEK KUMAR UPADHYAY
NTPC Limited, New Delhi	MR. SHRI ABHIJIT NAG MR. SHRI VIVEK KUMAR UPADHYAY (*Alternate*)
Oriental Rubber Industries Private Limited, Pune	MR. SHRI CHINMAY RAY SHRI VIKRAM MAKAR (*Alternate*)
Phoenix Conveyor Belt India Private Limited, Kolkata	MR. SHRI. MAYUKH SAHA MR. SHRI SUBRATA CHAKRABORTY (*Alternate* I) MR. DR. SUGATA CHAKRABORTY (*Alternate* II)
Scandia Belting Company Private Limited, Kolkata	SHRI G. B. GANGULY SHRI PARTHA SARTHI BISWAS (*Alternate* I) MR. SHRI ARSHED HUSSAIN (*Alternate* II)
In Personal Capacity (*D*-1, *Kailashpuri Complex, Kusum Vihar. Phase-2, Koylanagar, Dhanbad, Jharkhand*)	MR. SHRI K. K. S. SINHA
In Personal Capacity (*A1-201, Doshi Firstnest Apartment, Thirumudivakkam Main Road Thirumudivakkam Chennai 600132*)	SH. K.EUGENE PACCELLI

BIS Directorate General	SHRI R.R. SINGH, SCIENTIST 'F' AND HEAD (PGD) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI VICHITRA VIR SINGH
SCIENTIST 'D'/JOINT DIRECTOR (PGD), BIS