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Indian Standard

SPECIFICATION FOR RUBBER CONVEYOR AND ELEVATOR BELTING

PART II HEAT-RESISTANT BELTING

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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SPECIFICATION FOR RUBBER CONVEYOR AND ELEVATOR BELTING

PART II HEAT-RESISTANT BELTING

0. FOREWORD

0.1 This Indian Standard (Part II) was adopted by the Indian Standards Institution on 5 January 1972, after the draft finalized by the Pulleys and Belts Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 This standard for rubber conveyor and elevator belting is issued in many parts. Part I covers the requirements for general purpose conveyor and elevator belting. This part covers the requirements for heat-resisting conveyor belting for conveying hot materials above 65°C and up to 100°C for fine and up to 120°C for coarse materials. Conveyor belting for other applications, for example, oil-resistant and for foodstuff processing will be covered in other parts.

0.3 Appendix A gives the information to be supplied by the purchaser with enquiry or order.

0.4 It is proposed to cover PVC and plastic heat-resistant belting by a separate specification.

0.5 The results obtained by adhesion tests have been undertaken for investigation and that suitable results would be added when the Committee has considered them (*see* **5.3.2**).

0.6 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, shall be rounded off in accordance with IS : 2-1960*. 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

1.1 This standard covers the requirements for rubberized canvas heat-resitant conveyor belting for conveying hot materials above 65°C and up to 100°C for fine and up to 120°C for coarse materials.

*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 4240-1967* shall apply.

3. CONSTRUCTION

3.1 The belting shall consist of plies of woven fabric suitably impregnated with rubber and having rubber covers, the whole being vulcanized together in a uniform manner.

3.1.1 The construction of the carcass of the belting may be either full width ply or stepped ply.

3.1.2 When required for the purpose of carcass protection and for improving the adhesion of rubber cover, a layer of open mesh or cord fabric may be placed between the rubber covers and the outer plies or may be embedded in the rubber cover. Where such a layer is incorporated, it shall be included in the cover thickness specified by the purchaser and shall not be counted as additional thickness. It shall neither be included in the cover thickness for the purpose of test under **5**, nor shall such a layer be counted as one of the fabric plies.

3.2 Transverse Joints — Transverse joints in the plies shall be made at an angle of between 45° to 70° and the minimum distance between transverse joints in the same ply shall be as follows:

a) *Outer Plies* — Transverse joints in the outer plies shall not be less than 50 m apart.

b) *Inner Plies* — Transverse joints in the inner plies shall not be less than 10 m apart, but there shall not be more than two joints in any one ply in each 100 m of belting.

c) *Adjacent Plies* — Not less than 3 m apart for open edge construction. For folded edge the cutting of the fabric at an angle of 45° to 70° with the longitudinal axis of the belt, as specified above, ensures that the joint in one ply does not coincide with the remaining portion of the same joint in the next ply.

d) *Non-adjacent Plies* — Not less than the width of the belt.

3.3 Longitudinal Joints

3.3.1 *Spacing of Joints* — Where there is a longitudinal joint in a ply, for belting up to and including 500 mm in width, the distance from either edge shall be not less than one-eighth of the width of the belting. For belting over 500 mm in width, the distance of the joint from either edge shall be not less than 100 mm. In the inner plies the joints shall be so

*Glossary of conveyor terms and definitions.

arranged that they are evenly balanced on either side of the centre line of the belting, and no two joints in the inner plies shall coincide in adjoining plies.

3.3.2 *Number of Joints* — In the outer plies the number of longitudinal joints shall be limited as follows:

a) *Carrying Side* — The outer ply on the carrying side of belting up to and including 500 mm in width shall not have more than one longitudinal joint and in the case of belting over 500 mm in width, it shall not have more than two longitudinal joints.

b) *Pulley side* — The outer ply on the pulley side of belting up to and including 1 200 mm in width, shall not have more than one longitudinal joint, and in the case of belting over 1 200 mm in width, the outer ply shall not have more than two longitudinal joints.

3.4 Rubber Cover — The cover shall not be less than 1·0 mm thick on each side of the belting. When measured as described in Appendix D of IS : 1891 (Part I)-1968* the average value of the cover thickness shall not fall below the specified thickness by more than the amounts shown in Table 1.

TABLE 1 TOLERANCE ON COVER THICKNESS

Specified Cover Thickness	Tolerance
Up to and including 4 mm	— 0·2 mm
Over 4 mm	— 5 percent

Note — In the case of straight stepped ply construction the specified cover thickness will apply at the middle of the belt in the area of maximum cover thickness within the confines of innermost steps and shall be so measured.

In the case of reverse stepped ply construction the specified cover thickness will apply at the middle of the belt in the area of maximum number of plies within the confines of innermost steps and shall be so measured.

4. DIMENSIONS AND TOLERANCES

4.1 Length — The length of the belting shall be as specified by the purchaser subject to the following tolerances:

a) For belts delivered in the endless state and mounted in that way — ± 0·5 percent

b) For open belts, the maximum difference between delivered length and the ordered length — + 2·0 percent, — 0·5 percent

*Specification for rubber conveyor and elevator belting: Part I General purpose belting (*first revision*).

4.1.1 The length of the endless belt shall be measured in accordance with the method described in Appendix E of IS : 1891 (Part I)-1968*.

4.2 Width — Unless otherwise agreed the belting shall be in one of the widths specified in Table 2.

TABLE 2 WIDTHS AND TOLERANCES FOR HEAT-RESISTANT CONVEYOR BELTING

Sl No.	Width mm	Tolerance	Total Variation in Any One Belt
i)	300	± 5·0 mm	5·0 mm
ii)	400	± 6·5 mm	6·5 mm
iii)	500		
iv)	650		
v)	800		
vi)	1 000	± 1 percent of belt width	1 percent of belt width
vii)	1 200		
viii)	1 400		
ix)	1 600		
x)	1 800		
xi)	2 000		

NOTE — The tolerance for non-standard widths shall be that applicable to the next higher standard width.

5. TEST REQUIREMENTS OF FINISHED BELTING

5.1 Tensile Strength and Elongation at Break of Rubber Cover — When tested as described in Appendix F of IS : 1891 (Part I) - 1968* the tensile strength and elongation at break of rubber cover shall be not less than the following values:

Tensile strength	11 N/m² (1·1 kgf/mm² approx)
Elongation at break	350 percent

5.2 Adhesion — The adhesion between the cover and the plies and between the individual plies shall be such that when tested in the manner described in Appendix J of IS : 1891 (Part I) - 1968* shall be such that separation shall in no case exceed 25 mm per minute under the loads given in Table 3.

*Specification for rubber conveyor and elevator belting: Part I General purpose belting (*first revision*).

TABLE 3 LOADS FOR ADHESION TESTING

(*Clause* 5.2)

Sl No.	Adhesion Between	Load N/C m
i)	Ply to ply	29·5 (3·0 kgf/cm approx)
ii)	Cover to ply:	
	a) Covers up to and including 1·0 mm thick	No test
	b) Covers over 1·0 and up to and including 1·5 mm thick	19·5 (2·0 kgf/cm approx)
	c) Covers over 1·5 mm thick	24·5 (2·5 kgf/cm approx)

Note — No individual value obtained at the time of measurement should be below the values specified above by more than 0·8 kgf/cm.

5.3 Heat Resistance Test —

5.3.1 *Rubber Cover* — After exposure to a temperature of 100 ± 1°C for 72 hours the procedure being carried out as described in IS : 3400 (Part IV)-1965* the tensile strength of the face and back rubber covers shall not vary by more than $^{+10}_{-35}$ percent and the elongation at break by more than $^{+10}_{-45}$ percent from the original values.

5.3.2 *Adhesion* — After exposure of the belt pieces prepared as per **J-1.1** of IS : 1891 (Part I)-1968† to a temperature of 100 ± 1°C for 72 hours the procedure being carried out as described in IS : 3400 (Part IV) - 1965* the adhesion values between the cover and the plies and between the individual plies shall not vary by more than 50 percent from the original values (*see* **0.5**).

5.4 Troughability

5.4.1 The troughability of the belting, if specified by the purchaser, shall be determined in accordance with the method described in Appendix K of IS : 1891 (Part I)-1968†. The troughability, so determined, shall not be less than the values given in Table 4.

TABLE 4 MINIMUM TROUGHABILITY VALUES

Troughing Angle	Troughability *Min*
Up to and including 20°	0·05
25°	0·07
30°	0·09

*Methods of test for vulcanized rubbers : Part IV Accelerated ageing.

†Specification for rubber conveyor and elevator belting: Part I General purpose belting (*first revision*).

6. SAMPLING

6.1 Depending upon the length of the conveyor belt of the same characteristics (type, grade, width, etc) ordered, the samples shall be drawn in accordance with Table 5.

TABLE 5 SAMPLING PLAN FOR CONVEYOR BELTS

Length Ordered m	No. of Samples
Under 500	1
501 to 1 000	2
1 001 ,, 2 000	3
2 001 ,, 3 500	4
3 501 ,, 5 000	5
5 001 ,, 7 000	6
7 001 ,, 10 000	7

*A sample shall consist of the full width of the finished belting and not less than 600 mm in length.

6.1.1 When placing the order, the purchaser shall state whether tests are required and the additional length required for the sample, if necessary, shall be included in the total length ordered and paid for by the purchaser.

7. TESTING FACILITIES AND REJECTION

7.1 The vendor shall, at his own cost, supply all labour and appliance for the tests. In the absence of facilities at his own premises for carrying out the prescribed tests, the tests shall be carried out by an approved authority at the cost of the vendor.

7.1.1 If, in spite of the vendor being able and willing to carry out the specified tests at his own premises, the purchaser requires the tests to be carried out by an independent authority, the cost of carrying out such independent testing shall, if the results are satisfactory, be borne by the purchaser. If the results are not satisfactory, the cost shall be borne by the vendor.

7.2 Rejection — Should any sample fail to comply with the specified test requirements, two additional samples shall be drawn and tested at the cost of the vendor. In the event of either of these two samples failing to comply with the test requirements, the supply shall be rejected.

8. MARKING

8.1 The belting shall be marked as follows at the intervals of 5 to 10 m on the carrying surface:

a) The symbol *T* to denote heat resistance quality of the belting,

b) The last two figures of the year of the manufacture,

c) Letters or trade-mark identifying the manufacturer, and

d) The number of this standard.

8.1.1 The belting may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. PACKING

9.1 The belting shall be packed as mutually agreed to between the purchaser and the vendor.

APPENDIX A

(*Clause* 0.3)

INFORMATION TO BE SUPPLIED BY THE PURCHASER WITH ENQUIRY OR ORDER

A-1. REPLACEMENT BELTING

A-1.1 When the belt is to be a replacement on an existing conveyor, the following information will be required.

1) Details of existing belt;

2) Belt width;

3) Belt speed;

4) Pulley diameters;

5) Method of take-up and amount available;
6) Type of drive including coupling and configuration of drive;
7) Whether drive pulleys are lagged or bare;
8) Angle of carrying idlers; and
9) Profile sketch indicating position of drive, take-up, tripper and vertical curve radii should be available, if possible.

A-2. BELTING FOR NEW INSTALLATION

A-2.1 The following additional information where possible and applicable shall be supplied when the belt is to be used for a new installation:

1) Material to be conveyed;
2) Conditions: wet, dry, sticky, greasy, abrasive; state temperature if known, or describe conditions. Whether cleaners are required;
3) Bulk density of material in kg/m^3;
4) Size of largest lumps (3 dimensions);
5) Average size of materials;
6) Percentage of largest pieces;
7) Method of handling material immediately prior to feeding the plant;
8) State if the feed is to be regulated, and type of feeder preferred;
9) Height of material fall at loading;
10) Conveyor duty ... weight per hour, per day of ... hours;
11) Peak load which will be fed to conveyor ... weight per minute;
12) Type of belt joint required;
13) Method of discharging conveyor;
14) Amount of lift or fall;
15) Initial length (centres of head and tail pulleys);
16) Ultimate length (centres of head and tail pulleys);
17) Position of drive;
18) Power supply ... volts, ac or dc, and if ac, cycle per second and number of phases;
19) Type of motor to be used and starting torque;
20) Counter sketch of proposed installation;
21) Arc of contact of belt with driving pulley;
22) Preferred idler arrangement and troughing angle;
23) Environmental conditions; and
24) Any special features or test requirements.