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भारतीय मानक मसौदा

वस्त्रादि – कन्वेयर बेल्ट के लिए बुने हुये उपचारित कृत्रिम कपड़े – विशिष्टि

Draft *Indian Standard*

TEXTILES — WOVEN TREATED SYNTHETIC FABRICS FOR CONVEYOR BELTS — SPECIFICATION

ICS 53.040.20,59.080.40

Industrial Fabrics Sectional Committee TXD 33	Last date for comments **24 August 2025**

FOREWORD **(***Formal clauses will be added later***)**

Woven synthetic fabrics like polyester and nylon are widely used in conveyor belts due to their superior strength, flexibility, and resistance to wear, heat, and chemicals compared to traditional materials like cotton fabric.

These fabrics serve as the reinforcing carcass (inner layer) of the belt, providing the necessary tensile strength to handle heavy loads while maintaining dimensional stability. Unlike metal-reinforced belts, synthetic fabric belts are lighter, more resistant to corrosion, and easier to install, making them ideal for industries like mining, food processing, and other industrial application. Synthetic fabrics used in conveyor belts are treated primarily with resorcinol-formaldehyde-latex (RFL) to enhance adhesion between the fabric and rubber layers, ensuring strong bonding and resistance to delamination.

IS 5996 : 1984 ‘Specification for cotton belting ducks' covers the requirements of cotton belting ducks used in the manufacture of conveyor and elevator beltings.

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 : 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.

TEXTILES — WOVEN TREATED SYNTHETIC FABRICS FOR CONVEYOR BELTS — SPECIFICATIONS

1 SCOPE

1.1 This standard specifies the requirements for woven treated synthetic fabrics used in conveyor belts, manufactured from polyamide, polyester, or their combination.

1.2 This standard does not cover the requirement of fabrics made from cotton, rayon and aramid fibres used in conveyor belts.

NOTE — Woven treated synthetic fabrics provide the necessary tensile strength for power transmission and support the load carried by the conveyor belt.

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 parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMS AND DEFINITIONS

For the purpose of this standard, the following definitions in addition to those given in IS 1324 shall apply
:-

3.1 Carcass and Plies — The carcass is the core of the conveyor belt, providing the required strength and shape. It is typically made of multiple layers of fabric, known as plies. Each ply is coated with a bonding agent to ensure adhesion between the layers and to the outer covers.

3.2 Crimp — The percentage increase in length of the yarn, caused by its curvature or waviness due to interlacing with the cross yarns in a woven fabric. The increase in length of warp yarns is called warp crimp and that of weft yarn is called weft crimp.

3.3 Dip Pick-Up — It is the amount of dip on fabric treated with resorcinol formaldehyde latex (RFL) and other coatings on to the fabric during dipping (treating) process. It is expressed as percentage of the oven dry mass of the pretreated fabric.

3.4 EE (Polyester/ Polyester) Fabric — Fabric with both warp and weft yarns made of polyester. It is suited for conveyor belts requiring high cross rigidity in application.

3.5 EN (Polyester/Nylon 6) — Fabric with warp yarns made of polyester and weft yarns made of Nylon 6. It is suitable for conveyor belts used in medium-duty applications where a balance of strength, flexibility, and abrasion resistance is essential.

3.6 EP (Polyester/Nylon 6,6) Fabric — Fabric with warp yarns made of polyester and weft yarns made of Nylon 66. It is suitable for conveyor belts used in medium to heavy-duty applications.

3.7 NN (Nylon 6/Nylon 6) Fabric — Fabric with both warp and weft yarns made of Nylon 6. It is well-suited for conveyor belts used in light to medium-duty applications requiring high flexibility and good impact and abrasion resistance.

3.8 PP (Nylon 6,6/Nylon 6,6) Fabric — Fabric with both warp and weft yarns made of Nylon 66. It is ideal for conveyor belts used in heavy-duty applications that demand excellent abrasion resistance and high tensile strength.

3.9 Skim — A thin layer of elastomeric rubber compound applied to a fabric for lamination between two adjacent fabric plies and between fabric ply and the cover rubber.

4 TYPES

The synthetic fabric for conveyor belting shall be of following types depending upon the warp and weft yarn material used in the fabric: -

a) *Type I*- NN (Nylon 6/Nylon 6) Fabric
b) *Type II*- EE (Polyester/Polyester) Fabric
c) *Type III*- PP (Nylon 66/Nylon 66) Fabric
d) *Type IV*- EP (Polyester/Nylon 66) Fabric
e) *Type V*- EN (Polyester/Nylon 6) Fabric

5 MANUFACTURES

5.1 The yarn used in the manufacture of woven treated synthetic fabrics shall be continuous filament made of nylon 6, nylon 6,6, polyester or their combination. The filament yarn used for nylon 6 fabric and polyester fabric shall conform to IS 7867 and IS 17264 respectively.

5.2 Woven treated synthetic fabric shall be treated for adhesion with suitable elastomeric compounds and heat-set to ensure adequate performance. The fabric shall be reasonably free from foreign matter and defects, such as knots, lumps and irregularities of twist in yarn and free from oil stains when examined visually. The synthetic fabric is classified according to the code letters given in Table 1, depending on yarn used in the warp (longitudinal) and weft (transverse) direction.

Table 1 Code Designation of Yarn
(Clause 5.2*)*

Code Letter	Yarn
P	Nylon 66
N	Nylon 6
E	Polyester
If a fabric contains a secondary yarn, its identity shall be indicated by the use of characters in parentheses to designate the yarn type.	

6 REQUIREMENTS

6.1 The construction parameters of woven treated synthetic fabric for conveyor belt shall be as agreed to between the buyer and the seller subject to the tolerances and test method as given in Table 2 (*see* Note): -

Table 2 Tolerance on Construction Parameters of Woven Treated Synthetic Fabric for Conveyor Belt

(*Clause* 6.1)

Sl No.	Characteristic	Tolerances (on declared parameters)	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Ends/dm	± 2 percent	IS 1963, Method A
ii)	Picks/dm	± 2 percent	
iii)	Dimension (length and width), mm	+ 20 mm - 0 mm	IS 1954
iv)	Skew/Bow	≤ 3.0 percent	IS/ISO 13015

v)	Crimp (warp direction), mean value	shall not be less than 3 percent or as agreed to between supplier and the purchaser.	IS 3442
vi)	Dip pick-up	± 1 percent	IS 4910 (Part 4)/Annex B

Note — The parameter given in Table 2 for woven treated synthetic fabric for conveyor belt shall be declared by the manufacturer.

6.2 Woven treated synthetic fabrics of different types, used in the conveyor belt, shall conform to the requirements given in Table 3 to Table 7.

Table 3 Performance Requirements of NN (Nylon 6/Nylon 6) Woven Treated Synthetic Fabrics for Conveyor Belt

(*Clause* 6.2)

S.No (1)	Characteristic (2)	Type and Grades (3)													Method of Test, Ref to (4)
		NN 090	**NN 100**	**NN 125**	**NN 160**	**NN 160P**	**NN 200**	**NN 250**	**NN 250P**	**NN 315**	**NN 350**	**NN 350P**	**NN 400**	**NN 500**	
i)	GSM (gm)	315 ± 3 percent	335 ± 3 percent	385 ± 3 percent	455 ± 3 percent	480 ± 3 percent	525 ± 3 percent	625 ± 3 percent	685 ± 3 percent	735 ± 3 percent	820 ± 3 percent	900 ± 3 percent	1000 ± 3 percent	1280 ± 3 percent	IS 1964
ii)	Thickness (*mm*)	0.63 ± 0.10	0.55 ± 0.10	0.65 ± 0.10	0.74 ± 0.10	0.75 ± 0.10	0.85 ± 0.10	1.00 ± 0.10	1.10 ± 0.10	1.10 ± 0.10	1.20 ± 0.10	1.25 ± 0.10	1.40 ± 0.15	1.75 ± 0.20	IS 7702
iii)	Breaking strength (600 mm × 25 mm) – warp way (KN/M), *Min*	126	135	160	192	200	245	295	330	355	410	430	490	625	IS 1969 (Part 1)
iv)	Breaking strength (600 mm × 25 mm)- weft way (KN/M), *Min*	50	50	62	62	65	65	75	75	70	70	70	75	75	IS 1969 (Part 1)
v)	Coefficient of variation for breaking strength (warp and weft way), percentage	CV shall not more than 10 percent													IS 1969 (Part 1)
vi)	Warp wise crimp (percent), *Min*	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	IS 3442
vii)	Fabric elongation at break, warp way, (percent), *Min*	20	20	20	20	20	20	20	20	20	24	24	24	24	IS 1969 (Part 1)
viii)	Fabric elongation at break, weft way, (percent), *Min*	24													IS 1969 (Part 1)
ix)	Initial elongation @ 10 percent load (percent) *Max*	4.0	4.0	4.5	4.5	4.5	4.5	5.0	5.0	5.0	5.5	5.5	5.5	5.5	IS 1969 (Part 1)
x)	Elongation at reference load, percent	Shall not be more than 10 percent													IS 1969 (Part 1)
xi)	Adhesion (ply to ply) (KN/M), *Min*	7.8													IS 3400 (Part 5)
xii)	Hot air shrinkage of fabric – warp way (percent), *Max*	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	IS 17468
xiii)	Hot air shrinkage of fabric – weft way (percent), *Max*	0.5													IS 17468

xiv)	Heat retention strength test, warp way, 150 ˚C for 30 min	Minimum 90 percent	Annex C

Note — The other GSM may be permitted as agreed to between the supplier and the purchaser with a tolerance of ± 3 percent.

Table 4 Performance Requirements of EE (Polyester/Polyester) Woven Treated Synthetic Fabrics for Conveyor Belt

(*Clause* 6.2)

S. No. (1)	**Characteristic (2)**	**Type and Grades (3)**										**Method of Test, Ref to (4)**
		EE 080	**EE 100**	**EE 125**	**EE 160**	**EE 200L**	**EE 200P**	**EE 250 L**	**EE 250 P**	**EE 315L**	**EE 315P**	
i)	GSM (gm)	305 ± 3 percent	335 ± 3 percent	420 ± 3 percent	530 ± 3 percent	620 ± 3 percent	680 ± 3 percent	775 ± 3 percent	860 ± 3 percent	950 ± 3 percent	990 ± 3 percent	IS 1964
ii)	Thickness (mm)	0.40 - 0.50	0.45 - 0.55	0.53 - 0.63	0.70 - 0.80	0.75 - 0.95	0.85 - 1.05	0.95 - 1.15	1.10 - 1.30	1.20 - 1.40	1.20 - 1.40	IS 7702
iii)	Breaking strength (600 mm × 25 mm) - warp way (KN/M), *Min*	120	130	160	205	240	263	304	330	343	380	IS 1969 (Part 1)
iv)	Breaking strength (600 mm × 25 mm) – weft way (KN/M), *Min*	37	45	43	67	70	78	67	75	78	75	IS 1969 (Part 1)
v)	Coefficient of variation for breaking strength (warp and weft way), percentage	CV shall not be more than 10 percent										IS 1969 (Part 1)
vi)	Warp crimp, (percent), *Min*	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	IS 3442
vii)	Fabric elongation at break, warp way, (percent), *Min*	20										IS 1969 (Part 1)
viii)	Fabric elongation at break, weft way, (percent), *Min*	20										IS 1969 (Part 1)
ix)	Initial elongation @ 10 percent load (percent), *Max*	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.0	3.0	3.0	IS 1969 (Part 1)
x)	Elongation at reference load, percent	Shall not be more than 10 percent										IS 1969 (Part 1)
xi)	Adhesion (ply to ply) (KN/M), *Min*	7.8										IS 3400 (Part 5)
xii)	Hot air shrinkage of fabric – warp way (percent), *Max*	3.0										IS 17468
xiii)	Hot air shrinkage of fabric – weft way (percent), *Max*	0.5										IS 17468

xiv)	Heat retention strength test, warp way, 150 ˚C for 30 min	Minimum 90 percent	Annex C

Note — The other GSM may be permitted as agreed to between the supplier and the purchaser with a tolerance of ± 3 percent.

Table 5 Performance Requirements of PP (Nylon 66/Nylon 66) Woven Treated Synthetic Fabrics for Conveyor Belt

(*Clause* 6.2)

S. No. (1)	**Characteristic (2)**	**Type and Grades (3)**								**Method of Test, Ref to (4)**
		PP 100	**PP 125**	**PP 160**	**PP 200**	**PP 250**	**PP 315**	**PP 350**	**PP 400**	
i)	GSM (gm)	345 ± 3 percent	390 ± 3 percent	485 ± 3 percent	550 ± 3 percent	690 ± 3 percent	735 ± 3 percent	860 ± 3 percent	1030 ± 3 percent	IS 1964
ii)	Thickness (mm)	0.55 ± 0.05	0.65 ± 0.10	0.75 ± 0.10	0.90 ± 0.10	1.05 ± 0.15	1.15 ± 0.15	1.25 ± 0.15	1.40 ± 0.15	IS 7702
iii)	Breaking strength (600 mm × 25 mm) – warp way (KN/M), *Min*	140	165	205	250	330	370	420	490	IS 1969 (Part 1)
iv)	Breaking strength (600 mm × 25 mm) – weft way (KN/M), *Min*	50	60	75	75	75	75	75	75	IS 1969 (Part 1)
v)	Coefficient of variation for breaking strength (warp and weft way), percentage	CV shall not be more than 10 percent								IS 1969 (Part 1)
vi)	Warp crimp, (percent), *Min*	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0	IS 3442
vii)	Fabric elongation at break, warp way, (percent), *Min*	20	20	20	20	24	24	28	28	IS 1969 (Part 1)
viii)	Fabric elongation at break, weft way, (percent), *Min*	24	24	24	24	24	24	24	24	IS 1969 (Part 1)
ix)	Initial elongation @ 10 percent load (percent), *Max*	4.0	4.0	4.5	4.5	5.0	5.0	5.5	5.5	IS 1969 (Part 1)
x)	Elongation at reference load, percent	Shall not be more than 10 percent								IS 1969 (Part 1)
xi)	Adhesion (ply to ply) (KN/M), *Min*	7.8								IS 3400 (Part 5)
xii)	Hot air shrinkage of fabric – warp way (percent), *Max*	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	IS 17468
xiii)	Hot air shrinkage of fabric – weft way (percent), *Max*	0.5								IS 17468

xiv)	Heat retention strength test, warp way, 150 ˚C for 30 min	Minimum 90 percent	Annex C

Note — The other GSM may be permitted as agreed to between the supplier and the purchaser with a tolerance of ± 3 percent.

Table 6 Performance Requirements of EP (Polyester/Nylon 66) Woven Treated Synthetic Fabrics for Conveyor Belt

(*Clause* 6.2)

S. No. (1)	**Characteristic (2)**	**Type and Grades (3)**												**Method of Test, Ref to (4)**
		EP 080	**EP 100**	**EP 125**	**EP 160**	**EP 200**	**EP 250**	**EP 315**	**EP 350**	**EP 400**	**EP 500**	**EP 630**	**EP 800**	
i)	GSM (gms)	305 ± 3 percent	335 ± 3 percent	460 ± 3 percent	530 ± 3 percent	640 ± 3 percent	840 ± 3 percent	960 ± 3 percent	1100 ± 3 percent	1300 ± 3 percent	1675 ± 3 percent	2200 ± 3 percent	2400 ± 3 percent	IS 1964
ii)	Thickness (mm)	0.45 ± 0.05	0.50 ± 0.05	0.65 ± 0.05	0.75 ± 0.05	0.90 ± 0.10	1.15 ± 0.10	1.30 ± 0.15	1.50 ± 0.15	1.70 ± 0.15	2.30 ± 0.20	2.50 ± 0.20	3.15 ± 0.20	IS 7702
iii)	Breaking strength (600 mm × 25 mm) – warp way, (KN/M), *Min*	120	137	166	200	254	333	380	440	530	675	843	960	IS 1969 (Part 1)
iv)	Breaking strength (600 mm × 25 mm) – weft way (KN/M), *Min*	40	40	74	65	69	76	80	110	100	100	170	196	IS 1969 (Part 1)
v)	Coefficient of variation for breaking strength (warp and weft way), percentage	CV shall not be more than 10 percent												IS 1969 (Part 1)
vi)	Warp crimp (percent), *Min*	2.5	3.0	3.0	3.0	3.0	3.0	3.0	3.5	3.5	4.0	4.0	4.0	IS 3442
vii)	Fabric elongation at break, warp way, (percent), *Min*	18	20	20	20	20	20	20	20	20	20	20	20	IS 1969 (Part 1)
viii)	Fabric elongation at break, weft way, (percent), *Min*	24												IS 1969 (Part 1)
ix)	Initial elongation @ 10 percent load (percent), *Max*	2.0	2.0	2.5	2.5	2.5	3.0	3.0	3.5	3.5	4.0	4.0	4.0	IS 1969 (Part 1)
x)	Elongation at reference load, percent	Shall not be more than 10 percent												IS 1969 (Part 1)
xi)	Adhesion (ply to ply) (KN/M), *Min*	7.8												IS 3400 (Part 5)

xii)	Hot air shrinkage of fabric – warp way (percent), *Max*	3.0	IS 17468
xiii)	Hot air shrinkage of fabric – weft way (percent), *Max*	0.5	IS 17468
xiv)	Heat retention strength test, warp way,150 ˚C for 30 min.	Minimum 90 percent	Annex C

Note — The other GSM may be permitted as agreed to between the supplier and the purchaser with a tolerance of ± 3 percent.

Table 7 Performance Requirements of EN (Polyester/Nylon 6) Woven Treated Synthetic Fabrics for Conveyor Belt

(*Clause* 6.2)

S. No (1)	**Characteristic (2)**	**Type and Grades (3)**							**Method of Test, Ref to (4)**
		EN 100	**EN 125**	**EN 160**	**EN 200**	**EN 250**	**EN 315**	**EN 350**	
i)	GSM (gms)	360 ± 3 percent	440 ± 3 percent	540 ±3 percent	650 ± 3 percent	850 ± 3 percent	960 ± 3 percent	1095 ± 3 percent	IS 1964
ii)	Thickness (mm)	0.55 ± 0.10	0.67 ± 0.10	0.78 ± 0.10	0.90 ± 0.10	1.20 ± 0.10	1.35 ± 0.15	1.45 ± 0.15	IS 7702
iii)	Breaking strength (600 mm × 25 mm) – warp way (KN/M), *Min*	135	170	210	265	330	380	450	IS 1969 (Part 1)
iv)	Breaking strength (600 mm × 25 mm) – weft way (KN/M), *Min*	50	55	67	78	78	70	75	IS 1969 (Part 1)
v)	Coefficient of variation for breaking strength (warp and weft way) , percentage	CV shall not be more than 10 percent							IS 1969 (Part 1)
vi)	Warp crimp (percent), *Min*	3.0	3.0	2.5	3.0	3.0	3.0	3.0	IS 3442
vii)	Fabric elongation at break, warp way, (percent), *Min*	18	20	20	20	20	20	20	IS 1969 (Part 1)
viii)	Fabric elongation at break, weft way, (percent), *Min*	24	24	24	24	24	24	24	IS 1969 (Part 1)
ix)	Initial elongation @ 10 percent load (percent), *Max*	2.0	2.5	2.5	2.5	3.0	3.0	3.5	IS 1969 (Part 1)

x)	Elongation at reference load, percent	Shall not be more than 10 percent	IS 1969 (Part 1)
xi)	Adhesion (ply to ply) (KN/M) *Min*	7.8	IS 3400 (Part 5)
xii)	Hot air shrinkage of fabric – warp way (percent), *Max*	3.0	IS 17468
xiii)	Hot air shrinkage of fabric – weft way (percent), *Max*	0.5	IS 17468
xiv)	Heat retention strength test, warp way, 150 °C for 30 min	Minimum 90 percent	Annex C

Note — The other GSM may be permitted as agreed to between the supplier and the purchaser with a tolerance of ± 3 percent.

7 MARKING

7.1 The synthetic fabric for conveyor belt shall be marked at intervals of maximum 15 m on the carrying surface as follows: -

a) Manufacturer's name, initials or trade mark
b) Type and grade and fabric designation (NN, EE, PP EP and EN)
c) Batch no./lot no.
d) Length of fabric roll (m)
e) Width (mm)
f) Date and year of manufacture
g) Net / gross weight of fabric roll; and
h) Any other statutory requirement as required by the law in force or as agreed to between the buyer and the seller.

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.

8 PACKING

The fabric shall be rolled and packed suitably to prevent contamination from dust, ingress of moisture or physical damage. The fabric roll shall be packed securely so as to allow normal handling and transport without tearing and exposing the contents. Details of the packing shall be as agreed to between the buyer and the seller. Packaging of the product shall be, such as to maintain the integrity of the product throughout its shelf life.

9 SAMPLING AND CRITERIA FOR CONFORMITY

9.1 Lot

The number of rolls of fabric of the same type, designation, constructional particulars and of same width delivered to the purchaser under one dispatch note shall constitute a lot.

9.1.1 Each lot shall be tested separately for ascertaining the conformity of the lot.

9.1.2 Unless otherwise agreed between the buyer and the seller, the number of rolls selected at random for inspection shall be as per col (3) of Table 8. To ensure the randomness of selection, IS 4905 may be followed.

9.1.3 The lot shall be declared as conforming to the requirements of this standard, if no defective/failure of synthetic fabric is found.

Table 8 Sample Size and Criteria for Conformity

(Clauses 9.1.2*)*

Sl. No (1)	**Number of Rolls of Fabric in the Lot** (2)	**Sample Size** (No. of rolls) (3)
i)	Up to 3	1
ii)	4 to 13	2
iii)	14 to 20	3
iv)	21 to 32	4
v)	33 to above	5

ANNEX A

(Clause 2)

List of Referred Standards

IS No.	*Title*
IS 1324 : 2021	Textiles — Man-made fibres, yarns and fabrics — Glossary (*second revision*)
IS 1954 : 2024 /ISO 22198 : 2006	Textiles — Fabrics — Determination of width and length (*third revision*)
IS 1963 : 2025	Textiles — Woven fabrics — Determination of number of threads per unit length *(third revision)*
IS 1964 : 2025	Textiles — Mass per unit length and mass per unit area of fabrics — Methods of test *(third revision)*
IS 3442 : 2023	Textiles — Method for determination of crimp and linear density of yarn removed from fabric (*second revision*)
IS 4905 : 2015 /ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
IS 4910 (Part 4) : 2023	Tyre yarns, cords and tyre cord fabrics made from man-made fibres — Methods of test Part 4 Dip pick-up *(second revision)*
IS 5996:1984	Specification for cotton belting ducks (*second revision*)
IS 6359: 2023	Method for conditioning of textiles (*first revision*)
IS 7867 : 2024	Textiles — Continuous filament polyamide (Nylon 6) yarn — Specification *(Second Revision)*
IS 7702 : 2012/ ISO 5084 : 1996	Textiles — Determination of thickness of textiles and textile products (*first revision*)
IS 1969 (Part 1) : 2018/ ISO 13934-1 : 2013	Textiles — Tensile properties of fabrics — Part 1 Determination of maximum force and elongation at maximum force using the strip method (*fourth revision*)
IS 3400 (Part 5) : 2022/ISO 36 : 2020	Methods of test for rubber, vulcanized or thermoplastic Part 5 Adhesion of rubbers to textile fabrics *(fourth revision)*
IS/ISO 13015 : 2013	Woven Fabrics — Distortion — Determination of skew and bow
IS 17264 : 2022	Textiles - Polyester industrial yarn - Specification (*first revision*)
IS 17468 : 2020/ ISO 17493:2016	Clothing and equipment for protection against heat — Test method for convective heat resistance using a hot air circulating oven

ANNEX B

[*Clause* 6.1, *Table* 2, Sl No. (vi)]

TEST METHOD FOR DETERMINATION OF DIP PICK-UP FOR COMBINATION OF NYLON AND POLYESTER FABRICS USED IN CONVEYOR BELTING

B-1 PRINCIPLE

This procedure is used to determine the dip pick-up of dried RFL (Resorcinol-Formaldehyde-Latex) in conveyor belting fabrics. A weighed quantity of fabric (such as EE, EP, NN, PP, EN) is dissolved in a suitable solvent system, which dissolves the textile fibres while leaving the dip as an undissolved residue. The residue is oven-dried and weighed. Dip pick-up is calculated as a percentage of the oven-dry mass of the pure textile material.

B-2 APPARATUS AND REAGENTS (*See* IS 4910 Part 4)

B- 2.1 Magnetic Stirrer
B-2.2 250 ml Conical Flask with Stopper
B-2.3 Vacuum Pump
B-2.4 Di Chloro Methane and Trichloro Acetic Acid
B-2.5 90 percent Formic Acid
B-2.6 Analytical Balance (accuracy ±0.1 mg)
B-2.7 Hot Air Oven (150 ± 1°C)
B-2.8 Desiccator
B-2.10 Sintered Glass Crucible (Grade G-4)
B-2.11 Suction Flask and Suction Device
B-2.12 Standard Laboratory Glassware (measuring cylinders, pipettes, etc.)

Note :- IS 4910 Part 4 should also be referred for apparatus and reagents and for procedure for dip pick up for nylon and polyester fabric.

B-3 PROCEDURE

B-3.1 Take a square piece of the dipped nylon/polyester fabric sample weighing approximately 1–2 gms. Ensure that the piece includes both warp and weft yarns.

B-3.2 Cut the fabric into small pieces of approximately 2–3 mm in length.

B-3.3 Place the cut pieces in a hot air oven and dry them at 150 ± 1°C for 20 min.

B-3.4 Remove the sample, allow it to cool in a desiccator, and weigh the dried sample (*M*m) accurately. The mass shall be taken as constant when the difference between two successive weighings made at an interval of 20 min is less than 0.1 percent.

B-3.5 Transfer the dried sample into a 250 ml conical flask. Add the appropriate solvents and stir the contents as mentioned below in table 9: -

Table 9 Solvent used for Dip Pick up of Fabric
(Clause 6.1, B 3.5*)*

Sl No	Fabric type	Solvent	Quantity	Stir Time
i)	EE (Polyester/Polyester) Fabric EP (Polyester/Nylon 66) Fabric	Di Chloro methane and Trichloro Acetic Acid - Mixed solution (3:1 ratio)	Mixed solution – 75 ml	45 min
ii)	NN (Nylon 6/Nylon 6) Fabric PP (Nylon 66/Nylon 66) Fabric	90% Formic Acid	100 ml	45 min
iii)	EN (Polyester/Nylon 6) Fabric	i) Di Chloro methane and Trichloro Acetic Acid - Mixed solution (3:1 ratio) ii) 90% Formic Acid	i) Add 75 ml ii) After 45 mins, add 25 ml in same flask	i) 45 min ii) 45 min

B-3.6 After stirring for 45 min, filter the contents of the flask through a sintered glass crucible (preferably grade G-4).

B-3.7 Thoroughly wash both the flask and the residue retained in the crucible with three portions of 25 ml each of the same solvent(s) used earlier, followed by washing with distilled water.

B-3.8 Dry the crucible containing the residue in a hot air oven at 150 ± 1°C until a constant mass is obtained. Record this weight as *M*r (dip residue).

B-4 CALCULATION

B-4.1 Dip pick up % = $\frac{Mr}{Mm-Mr} \times 100$

Where,

*M*r = Oven dry mass of the residue, in g; and

*M*m = Oven dry mass of textile material, in g

B – 4.2 Report the average of two values of the dip pick up in percentage.

ANNEX C

[*Clause* 6.2, *Table* 3 *to Table* 7, Sl No. (xiv)]

TEST METHOD FOR DETERMINING PERCENTAGE OF HEAT STRENGTH RETENTION

C-1 PRINCIPLE

This procedure is used to determine the percentage heat strength retention of RFL-treated synthetic fabric for conveyor belting. The sample is first tested for its initial tensile strength. Another portion is exposed to elevated temperature (heat ageing), cooled to room temperature, and retested for tensile strength. The percentage of retained tensile strength after heat exposure is calculated and reported.

C-2 TEST CONDITION

C-2.1 The sample shall be exposed to 150 ± 1°C for 30 min in a hot air oven.

C- 2.2 The exposed sample shall be cooled to room temperature and shall be conditioned as per IS 6359.

C-3 APPARATUS

C-3.1 Constant Rate-of-Extension (CRE) – Machine (*see* IS 1969 Part 1)
C-3.2 Hot Air Oven - Temperature Range 100°C – 250°C

C-4 PROCEDURE

C-4.1 Cut 3 test pieces, each of approximately 1200 mm length in the warp direction, maintaining a minimum 10 cm margin from either selvedge.

C-4.2 From the 1200 mm warp direction sample, ravel several yarns from this cut edge until a full-length of 1200 mm warp yarn is available; then cut 50 ± 1mm of strip and ravel out threads in both the sides to make it 25 mm.

C-4.3 Divide each sample into two equal parts of 600 mm:

- One part is used for initial tensile testing (before heat ageing).

-The second part is subjected to heat ageing at 150°C for 30 min in a hot air oven.

C-4.4 During heat ageing, hang the sample freely:

- Avoid contact with the oven's walls, floor, or ceiling.

- If required, fold only the top and bottom edges to fit, but do not fold the central test portion (~300–400 mm).

C-4.5 After heat exposure, allow the sample to condition at a temperature (27 ± 2°C) for at least 1 hour before tensile testing.

C-4.6 Set the gauge length of the tensile tester to 200 ± 1 mm.

C-4.7 Clamp the sample centrally between jaws, ensuring no slack or twisting.

C-4.8 Set the clamping pressure depending on fabric strength, in the range of 150–250 kp/cm.

C-4.9 Configure the test parameters (speed of crosshead, preload, elongation at specified load etc.) as per IS 1969 (Part 1).

C-5 Calculation

C-5.1 Calculate the average tensile strength from the test results of three individual specimens, separately for both before heat ageing and after heat ageing conditions.

$$\%\ Heat\ Strength\ Retention\ = \frac{Average\ of\ After\ Heat\ Ageing\ Tensile}{Average\ of\ Before\ Heat\ Ageing\ Tensile} \times 100$$

C-6 Test report

C-6.1 Test report shall include the following

a) Name of the Instrument used
b) Test atmospheric conditions
c) Intermediate elongation measured load
d) Heat ageing conditions