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***भारतीय मानक***

**वस्त्रादि — ऑटोमोटिव टायरों के लिए पॉलियामाइड टायर कॉर्ड**

**का कपडा — विशिष्टि**

*( पहला**पुनरीक्षण )*

*Indian Standard*

**TEXTILES — POLYAMIDE TYRE CORD FABRIC FOR AUTOMOTIVE**

**TYRES — SPECIFICATION**

*( First Revision )*

ICS 59.080.30

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**B U R E A U OF I N D I A N S T A N D A R D S**

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**August 2024 Price Group**

Technical Textiles for Mobiltech Applications Sectional Committee, TXD 38

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textiles for Mobiltech Applications Sectional Committee had been approved by the Textiles Division Council.

Polyamide tyre cords play a pivotal role in enhancing the strength and resilience of automotive tyres. Their high tensile strength and flexibility contribute to improved performance and safety on the roads. This Indian standard on polyamide tyre cords further ensures that these cords meet quality and safety benchmarks, assuring consumers of reliable and durable tyres of automotive vehicles.

This standard was first published in 1987. The first revision of this standard has been made in the light of experience gained since its publication and to incorporate the following major changes:

1. The title of the standard has been modified;
2. Scope of the standard has been modified to incorporate the three additional varieties of yarn with nominal linear density of 210 (3 ply), 280 (2 ply) and 315 (2 ply);
3. Existing varieties have been rationalized to align the requirements of twist per metre (TPM), breaking strength, elongation at predetermined load, elongation at breaking load and thickness as per the current industrial practices;
4. Amendments to Indian Standards have been incorporated;
5. References to the Indian standards have been updated; and
6. BIS certification marking clause has been modified.

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*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

**TEXTILES — POLYAMIDE TYRE CORD FABRIC FOR AUTOMOTIVE**

**TYRES — SPECIFICATION**

*(First Revision)*

**1 SCOPE**

**1.1** This standard prescribes the requirements of nine varieties of grey polyamide tyre cord fabric used in the manufacturing of automotive tyres.

**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 subjected 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 TERMINOLOGY

# 

For the purpose of this standard the following definitions in addition to those given in IS 4910 (Part 1) shall apply.

**3.1** **Tyre Cord** — A particular construction of filaments of polyamide, used as the structural reinforcement of pneumatic tyres.

**3.2** **Tyre Cord Warp Sheet (Tyre Cord Fabric)** — A planar textile structure consisting of tyre cord warp with widely spaced weft threads. The latter merely serves to hold the warp cords in position for processing.

# 4 MANUFACTURE

## **4.1 Yarn**

## 

The yarn used for the manufacture of tyre cord shall be continuous filament yarn of Nylon 6 or Nylon 66 when tested as per the method prescribed in IS 667. The yarn should be satisfactory in evenness and reasonably free from defects, such as undrawn yarn, broken filaments, oil stains and other extraneous material.

## **4.2 Tyre Cord**

## 

The tyre cord shall be made out of 2 or 3 yarns as stated in **4.1** by plying these together by applying necessary twist. The tyre cord shall be well and evenly twisted and shall be reasonably free from defects, such as knots, slubs, kinks, etc, that would affect the serviceability of the cord.

## **4.3 Cord Joints**

Cord joints shall be sewn spliced or air spliced in such a manner as to obtain at least 85 percent of the minimum breaking load specified for the cord at the joined portion. The maximum number of sewn joints for a particular length of cord shall be subject to agreement between the buyer and the seller.

## **4.4 Weft Yarn**

The weft yarn used in the manufacture of tyre cord fabric shall be made of cotton or other suitable fibre with a linear density of 14 tex to 30 tex (20 s to 42 s count).

## **4.5 Tab (or Header)**

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Tabs (or headers) shall be provided at each end of the warp sheet roll and at intermediate positions in the roll as agreed to between the buyer and the seller.

## **4.6 Tabby**

One tabby shall be provided for each creel load or for a suitable number of rolls as agreed to between the buyer and the seller.

# 5 REQUIREMENTS

**5.1** The constructional particulars of the fabric, namely, end/dm, picks/dm, fibre used in the weft, total number of ends, linear density of weft, roll length and width and mass (g/m2) shall be as agreed to between the buyer and the seller subject to the tolerances given in Table 1 when tested as per the test method indicated against corresponding characteristic.

# Table 1 Tolerance Construction Particulars of Tyre Cord Fabric

# ( *Clause* 5.1 )

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl No.** | **Characteristics** | **Tolerances** | **Method of Test, Ref to** |
| (1) | (2) | (3) | (4) |
| i) | Ends/dm | ± 1.25 percent | IS 1963 |
| ii) | Picks/dm | ± 10 percent |
| iii) | Width, mm | ± 20 mm | IS 1954 |
| iv) | Mass, g/m2 | ± 3 percent | IS 1964 |
| v) | Total number of warp ends | Nil | — |

**5.2** Tyre cords of different varieties, as used in the tyre cord fabric, shall conform to the requirements given in Table 2.

# Table 2 Requirements of Polyamide Cords for Fabric (Warp Sheet) for Automotive Tyres

# ( *Clause* 5.2 )

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variety No.** | **Nominal**  **Linear Density of Yarn,**  **Tex** | **No. of Plies** | **Linear**  **Density of Cord,**  **Tex** | **Twister per Metre** | | **Breaking strength on**  **25 cm Test length**  **N (kgf), *Min*** | **Elongation at predetermined load, percent** | | | | | | **Elongation at Breaking**  **Load, percent** | **Thickness, mm** |
| Singles  (Z twist) | Plied  (S twist) | 44 N | 66.6 N | 89.2 N | 111 N | 133 N | 153 N |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 1 | 94 | 2 | 210 | 472 | 472 | 130 (13.3) | 13.0 | **—** | **—** | **—** | **—** | **—** | 31.0 | 0.54 |
| 2 | 94 | 2 | 215 | 510 | 510 | 130 (13.3) | 14.0 | **—** | **—** | **—** | **—** | **—** | 32.0 | 0.55 |
| 3 | 140 | 2 | 315 | 394 | 394 | 200 (20.4) | **—** | 13.0 | **—** | **—** | **—** | **—** | 31.0 | 0.66 |
| 4 | 140 | 3 | 475 | 315 | 315 | 295 (30.1) | **—** | **—** | **—** | 14.0 | **—** | **—** | 33.0 | 0.80 |
| 5 | 188 | 2 | 420 | 335 | 335 | 270 (27.5) | **—** | **—** | 13.0 | **—** | **—** | **—** | 32.0 | 0.75 |
| 6 | 210 | 2 | 475 | 315 | 315 | 295 (30.1) | **—** | **—** | **—** | 14.0 | **—** | **—** | 32.0 | 0.80 |
| 7 | 210 | 3 | 710 | 260 | 260 | 440 (44.9) | **—** | **—** | **—** | **—** | **—** | 14.0 | 32.0 | 0.97 |
| 8 | 280 | 2 | 630 | 260 | 260 | 400 (40.8) | **—** | **—** | **—** | **—** | 14.0 | **—** | 32.0 | 0.95 |
| 9 | 315 | 2 | 710 | 260 | 260 | 440 (44.9) | **—** | **—** | **—** | **—** | **—** | 14.0 | 32.0 | 0.97 |
| **Tolerance** | **—** | **—** | + 3 percent | + 16 tpm | + 16 tpm | — | + 2 percent | | | | | | + 5 | + 0.04 mm |
| **Method of Test** | IS 4910 (Part 2) | — | IS 4910 (Part 2) | — | — | IS 4910 (Part 3) | IS 4910 (Part 3) | | | | | |  | IS 4910 (Part 8) |

**5.3** The requirements of tyre cord for heat shrinkage and heat shrinkage force, heat degradation and creep characteristics shall also be as agreed to between the buyer and the seller and the test shall be carried out as per the method given in IS 4910 (Part 5), IS 4910 (Part 7) and IS 4910 (Part 10) respectively.

# 6 PACKING

# 

**6.1** Unless otherwise agreed to between the buyer and the seller, the tyre cord fabric shall be packed as given in **6.2**.

**6.2** Tyre cord fabric shall be attached to a roller of suitable dimensions and wound evenly and tightly onto the roller. The roll shall be covered with at least one layer of polyethylene film of a minimum 100-micron thickness (*see* IS 2508) and finally wrapped in one layer of hessian cloth conforming to Type 1 of IS 2818 or any other sacking cloth. Discs of suitable size shall be applied at the roll ends and final wrapping layer of hessian/sacking cloth shall be securely sewn in order to protect the roll from contamination of ingress of moisture or physical damage.

# 7 MARKING

**7.1** Each roll of the tyre cord fabric shall be marked with the following by attaching the printed label:

1. Manufacturer’s name and recognized trademark, if any;
2. Width of the roll/sheet;
3. Variety of cord;
4. Length, mass of roll;
5. Date of manufacture;
6. Lot number / Batch Number; and
7. Any other information as required by the law in force / provided by the manufacturer.

## **7.2 BIS Certification Marking**

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and Rules and Regulations made thereunder. The details of the conditions under which the license for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

# 8 SAMPLING

**8.1** The sampling and criteria for conformity of tyre cord fabric shall be as prescribed in IS 4910 (Part 12).

**ANNEX A**

*(Clause 2)*

# LIST OF REFERRED STANDARDS

|  |  |
| --- | --- |
| *IS No.* | *Title* |
| IS 832 (Part 1) : 2021 | Textiles — Determination of twist in yarns Part 1 Direct counting method  (*third revision*) |
| IS 1954 : 1990 | Determination of length and width of woven fabrics — Methods  (*second revision*) |
| IS 1963 : 1981 | Methods for determination of threads per unit length in woven fabrics  (*second revision*) |
| IS 1964 : 2001 | Textiles — Methods for determination of mass per unit length and mass per  unit area of fabrics (*second revision*) |
| IS 2508 : 2016 | Polyethylene films and sheets — Specification (*third revision*) |
| IS 2818 : 2015 | Textiles — Hessian — Specification (*third revision*) |
| IS 4910 | Tyre yarns, cords and tyre cord fabrics made from man-made fibres —  Method of Test |
| (Part 1) : 2023 | Definition of terms (*second revision*) |
| (Part 2) : 2023 | Linear Density (*second revision*) |
| (Part 3) : 2023 | Load and elongation characteristics (*second revision*) |
| (Part 5) : 2023 | Heat shrinkage and heat shrinkage force (*second* *revision*) |
| (Part 7) : 2023 | Heat degradation (*second revision*) |
| (Part 8) : 2023 | Thickness (*second revision*) |
| (Part 10) : 2023 | Creep (*second revision*) |
| (Part 12) : 2023 | Sampling for tyre yarns, cords and tyre cord fabrics made from polyamide  (*first revision*) |

**ANNEX B**

(*Foreword*)

**COMMITTEE COMPOSITION**

Technical Textiles for Mobiltech Applications Sectional Committee, TXD 38

|  |  |
| --- | --- |
| *Organization* | *Representative(s)* |
| Northern India Textile Research Association, Ghaziabad | Dr M S Parmar (***Chairperson***) |
| Arvind Limited, Ahmedabad | Ms. Mamtha Chaudhary  Shri Pabitra Sahoo (*Alternate*) |
| Autoliv India Ltd, Mysore | Shri Boobalan N  Shri Rahul Guglani (*Alternate*) |
| Automotive Research Association of India, Pune | Shri Khairatkar V Sarai |
| Autotech Nonwovens Private Limited, Surat | Shri Sanjeev Saxena  Shri Punit Sirohia (*Alternate*) |
| BMD Pvt Ltd, Banswara | Dr. Navdeep K Phogat |
| Century Enka Limited, Pune | Shri Veeresh M Hiremath  Shri Krishnagopal Ladsaria (*Alternate*) |
| Consumer VOICE, New Delhi | Shri M A U Khan  Shri B K Mukhopadhyay (*Alternate*) |
| Federation of Indian Chamber of Commerce & Industry, New Delhi | Shri Tushar Patel  Shri A R Rajesh (*Alternate*) |
| Garware Technical Fibres Limited, Pune | Shri Vignesh Kumar  Shri Aviraj Jadhav (*Alternate*) |
| ICAR- Central Institute for Research on Cotton Technology, Mumbai | Dr G Krishna Prasad  Dr A Arputharaj (*Alternate*) |
| Indian Technical Textile Association, Mumbai | Dr Anup Rakshit  Shri Ankit Desai (*Alternate*) |
| Kusumgar Corporates Pvt Ltd, Mumbai | Shri Siddharth Y Kusumgar  Dr M K Talukdar (*Alternate*) |
| Northern India Textile Research Association, Ghaziabad | Dr Neha Kapil |
| Office of the Textile Commissioner, Mumbai | Shri Humayun K |
| RFM Automotives, Binola, Haryana | Shri H K Dua  Shri Anurag Gupta (*Alternate*) |
| Sanrhea Technical Textiles Limited, Kalol, Gandhinagar, Gujrat | Shri Mahendra Singh Hada  Shri Bhavesh B Shah (*Alternate*) |
| S G S Limited, Gurugram | Shri Dr. Karthikeyan K.  Shri Dinesh Sivabalan (*Alternate*) |
| SRF Limited, Gurugram | Shri Bharat kumar  Shri Siva Kumar (*Alternate*) |
| Supreme Nonwoven, Mumbai | Shri Punit Gupta  Shri C K Jain (*Alternate*) |
| Testtex India Laboratories P Ltd, Mumbai | Smt. Meeta Shingala |
| Textiles Committee, New Delhi | Shri Kartikeya Dhanda  Shri Ravichandra (*Alternate*) |
| The Synthetic & Art Silk Mills Research Association, Mumbai | Shri Sanjay Saini  Shri Premnath Surwase (*Alternate*) |
| Uniproducts Pvt Ltd, Rewari, Haryana | Shri Vikas Yadav |
| BIS Directorate General | Shri J. K. Gupta, Scientist ‘E’/ Director and Head (Textiles) [Representing Director General (*Ex-officio*)] |

*Member Secretary*

Ms. SHIKHA YADAV

Scientist ‘B’/ Assistant Director

(Textiles), BIS