***भारतीय मानक***

***Indian Standard***

**Doc.No: TXD 34 (23882)**

***वस्त्रादि — पॉली विनाइल क्लोराइड (पीवीसी) लेपित तन्य कपड़ा वास्तुशिल्प झिल्ली — विशिष्टि***

**Textiles — Poly Vinyl Chloride (PVC) Coated Tensile Fabric Architectural Membranes — Specification**

ICS 59.080.40

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भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

NEW DELHI - 110002

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**December 2024 Price Group X**

Technical Textile for Buildtech Applications Sectional Committee, TXD 34

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textile for Buildtech Applications Sectional Committee had been approved by the Textiles Division Council.

Architectural membrane can disperse natural light with condensed heat load with higher light transmission during daytime and is sufficient to reduce artificial lighting requirement by 5 percent to 20 percent. It absorbs solar energy and reduces the heat load. Most of the structural fabrication is carried out off site. It is an excellent alternative to polycarbonate or glass as roof glazing system with low maintenance.

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 — POLY VINYL CHLORIDE (PVC) COATED TENSILE FABRIC ARCHITECTURAL MEMBRANES — SPECIFICATION

**1 SCOPE**

This standard specifies requirements for two types of PVC (Poly Vinyl Chloride) coated tensile fabric also known as architectural membrane for use in buildings, swimming pools and stadiums etc.

**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 edition of these standards.

**3 TERMS AND DEFINITIONS**

For the purpose of this standard the following definitions shall apply:

**3.1 Tensile Fabric Structure**

Tensile fabric structures are characterized by the tensioning of a membrane system, typically with wire or cable. Using tension throughout structure provides the membrane with critical structural support. Tensile architecture is the most common form of thin-shell structures.

**4 MATERIALS AND MANUFACTURE**

**4.1** Architectural membrane shall be manufactured from PVC polyester tensile fabric and PVDF (Polyvinylidene fluoride or polyvinylidene difluoride) coated on both sides of fabric.

**4.2** The membrane shall have a double lacquering made out of highly concentrated PVDF on both side, double side primer, double PVC coating and be weldable without grinding.

**5 REQUIREMENTS**

**5.1** The tensile Membrane shall be made with dimensions as per the agreement between the buyer and the seller. The tolerance given in Table 1 shall be permissible for length and width.

**Table 1**

(*Clause* 5.1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl No.** | **Dimension** | **Tolerance, percent** | **Method of Test, Ref to** |
| (1) | (2) | (3) | (4) |
| i) | Length | – 5 | IS 1954 |
| ii) | Width | – 5 | IS 1954 |

**5.2** The architectural membrane shall have variability in design and execution depending upon the desired output of the customer. It shall be designed for rapid construction having larger span for more coverage. The membrane structure shall be welded into a single weatherproof skin with no extension joints. The membrane shall be highly flexible and not suffering any peeling of the topcoat (lacquering).

**5.3** The tensile fabric shall conform to the requirements as specified in Table 2.

**Table 2 Requirements for PVC Coated Tensile Fabrics**

(*Clause* 5.3)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No.** | **Characteristic** | **Requirement** | | **Method of Test, Ref to** |
| Type 1 | Type 2 |
| (1) | (2) | (3) | (4) | (5) |
| i) | Recommended yarn count, dtex | 2 200 | 1 100 | IS 7703 (Part 1) |
| ii) | Mass per unit area, g/m2, *Min* | 1 550 | 900 | IS 1964 |
| iii) | Tensile strength, 50 mm strip, N,  *Min*     1. Warp 2. Weft | 10 000  9 000 | 4 200  4 000 | IS 1969 (Part 1) |
| iv) | Tear strength, N, *Min*     1. Warp 2. Weft | 2 000  2 000 | 500  450 | IS 6489 (Part 1) |
| v) | Colour fastness to light, *Min* | 6 | 6 | IS/ISO 105-B02 |
| vi) | Resistance to cracking | complies | | IS 16346 |
| vii) | Resistance to flame, mm/min, *Max* | 100 | | IS/ISO 3795 |
| viii) | Light transmission, percent | 4.5 to 5.5 | | ISO 9050 |
| ix) | Solar transmission, percent | 4.5 to 5.5 | | ISO 9050 |
| x) | Flex testing (100 000 cycles) | No Crack | | IS 7016 (Part 4) |
| xi) | Water proofness, at 200 psi | No Leak | | IS 7016 (Part 7) |

**6 PACKING**

The tensile fabric shall be packed in roll form with maximum roll width of 2.5 m or as agreed between the buyer and seller.

**7 MARKING**

**7.1** Unless otherwise agreed to between the buyer and seller, the tensile fabric roll shall be marked with the following information:

1. Product identification;
2. Length and width in metres;
3. Type of material (Type 1, Type 2);
4. Roll number/Lot number; and
5. Other declarations required as per law in force.

**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 SAMPLING**

**8.1 Lots**

All tensile membrane rolls/bundles of same construction and types dispatched to a buyer against one dispatch note shall constitute a lot.

**8.2** Unless otherwise agreed to between the buyer and the seller, the number of architectural membrane rolls/bundles to be selected at random from a lot shall be as given in col (3) of Table 3.Number of test specimen and criteria for conformity shall be as given in Table 4.

**Table 3 Scale of Sampling**

(*Clause* 8.2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No.** | **No. of Rolls/ Bundles in Lot** | **Sample**  **Size** | **Sub-Sample Size** | **Permissible No. of**  **Defective Rolls/Bundles** |
| (1) | (2) | (3) | (4) | (5) |
| i) | Up to 50 | 3 | 2 | 0 |
| ii) | 51 to 150 | 5 | 2 | 0 |
| iii) | 151 to 300 | 8 | 3 | 1 |
| iv) | 301 to 500 | 13 | 5 | 2 |
| v) | 501 and above | 20 | 5 | 3 |

**Table 4 Number of test Specimen and Criteria for Conformity**

(C*lause* 8.2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl No.** | **Characteristics** | **No. of Rolls/Bundles** | **Criteria for Conformity** |
| (1) | (2) | (3) | (4) |
|  | Material and manufacture, dimensions and mass | According to col (3) of Table 3 | The defective rolls do not exceed the corresponding number given in col (5) of Table 3 |
|  | All other requirements | According to col (4) of Table 3 | All the specimen shall pass the tests |

**ANNEX A**

(*Clause* 2)

**LIST OF REFERRED STANDARDS**

|  |  |
| --- | --- |
| *IS No./Other Standards* | *Title* |
|  | : |
| IS 1954 : 2024/  ISO 22198 : 2006 | Textiles — Fabrics — Determination of width and length (*third revision*) |
| IS 1964 : 2001 | Textiles — Methods for determination of mass per unit length and mass per unit area of fabrics (*second 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 6489 (Part 1) : 2011 | Textiles — Tear properties of fabrics: Part 1 Determination of tear force using ballistic pendulum method (Elmendorf) (*second revision*) |
| IS 7016 | Methods of test for coated and treated fabrics: |
| (Part 4) : 2003/ ISO 7854 : 1995 | Rubber- or plastics-coated fabrics — Determination of resistance to damage by flexing (*second revision*) |
| (Part 7) : 2023/ISO 1420 : 2016 | Determination of resistance to penetration by water (*third revision*) |
| IS 7703 (Part 1) : 1990 | Methods of test for man-made fibres continuous filament flat yarn: Part 1 Linear density (*first revision*) |
| IS 16346 : 2015 | Geosynthetics — Method of test for evaluation of stress crack resistance of polyolefin geomembranes using notched constant tensile load test |
|  |  |
|  |  |
| ISO 9050 : 2003 | Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors |

**ANNEX B**

(*Foreword*)

**COMMITTEE COMPOSITION**

Technical Textile for Buildtech Applications Sectional Committee, TXD 34

| *Organization* | *Representative(s)* |
| --- | --- |
| Indian Institute of Technology, Delhi | Professor Abhijit Majumdar **(*Chairperson*)** |
| Association of Synthetic Fibre Industries, New Delhi | Shri M. S. Verma  Shri Pinaki Ranjan Das (*Alternate*) |
| Bombay Textile Research Association, Mumbai | Representative |
| Central Building Research Institute, Roorkee | Shri S. K. Singh |
| Cement Manufacturers Association, Noida | Dr Sujit Ghosh  Shri K. Jayasankar (*Alternate*)  Shri Shubho Chakravarty (*Alternate*) |
| Central Public Works Department, Delhi | Representative |
| CSIR - Structural Engineering Research Centre, Chennai | Shri V. Ramesh Kumar  Shrimati Smitha Gopinath (*Alternate*) |
| Defence Research and Development Organization, Hyderabad | Representative |
| Garware Technical Fibres Limited, Pune | Shri Sachin P. Kulkarni  Shri Rajendra Ghadge (*Alternate*) |
| Indian Technical Textile Association, Mumbai | Dr Anup Rakshit  Shrimati Ruchita Gupta (*Alternate*) |
| Kalyani Polymers Private Limited, Bangaluru | Shri Rajiv Gauri  Shri Sunil Nama (*Alternate*) |
| Ministry of Surface Transport, New Delhi | Representative |
| Ministry of Textile, New Delhi | Dr Mukesh Kumar Sinha |
| National Highway Authority of India, New Delhi | Representative |
| National Institute of Technology, Jalandhar | Dr Palaniswamy N. K.  Dr A. K. Choudhary (*Alternate*) |
| NBCC, Delhi | Representative |
| Nina Concrete System Pvt Ltd, Mumbai | Shri Rakesh Gupta  Shri Kaushal Parikh (*Alternate*) |
| Northern India Textile Research Association, Ghaziabad | Representative |
| Plastindia Foundation, Mumbai | Shri Surender Chaudhary  Shri L. K. Singh (*Alternate*) |
| Reliance Industries Ltd, Mumbai | Shri Ajay Gupta  Shri Mayur Agarwal (*Alternate*) |
| Shapoorji Pallanji & Co P Limited, Mumbai | Shri Manoj Kawalkar  Shri Hemant Gopinath Joshi (*Alternate*) |
| Shri Ram Institute for Industrial Research, Delhi | Shrimati Archana Bisht  Dr Bhuvneshwar Rai (*Alternate*) |
| Techno Ceiling Products, Mumbai | Representative |
| The Synthetic and Art Silk Mills Research Association, Mumbai | Shri Ravi Prakash Singh  Shri Premnath Surwase (*Alternate*) |
| BIS Directorate General | Shri J. K. Gupta, Scientist ‘E’/Director and Head (Textiles) [Representing Director General (*Ex-officio*)] |

*Member Secretary*

Shri Swapnil

Scientist ‘B’/Assistant Director

(Textiles), BIS