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BUREAU OF INDIAN STANDARDS
(*New Delhi*)

AGENDA

Technical Textiles for Buildtech Applications Sectional Committee, TXD 34 12th Meeting

Date / Day	Time	Venue
08 November 2024 (Friday)	10:30 A.M.	Through CISCO Webex Video Conferencing

CHAIRMAN: Prof (Dr) Abhijit Majumdar, IIT, Delhi

MEMBER SECRETARY: Shri Swapnil, Scientist B/Assistant Director, Textiles

Item 0 WELCOME & INTRODUCTORY REMARKS

Item 1 CONFIRMATION OF THE MINUTES OF THE PREVIOUS MEETING

1.1 The minutes of the 11th meeting of TXD 34 held on 30 July 2024 through CISCO webex video conferencing were circulated vide BIS DG letter no. TXD 34/A2.11 dated 29 August 2024. No comments have been received.

1.1.1 The Committee may **CONFIRM** the minutes.

Item 2 SCOPE AND COMPOSITION OF TXD 34

2.1 The present scope and composition of the Committee are given in **Annex 1 (Pages 3 to 5)**.

2.1.1 The Committee may **REVIEW**.

Item 3 ISSUES ARISING OUT OF PREVIOUS MEETINGS OF TXD 34

3.1 Summary of actions taken on the various decisions of the previous meeting are given in **Annex 2 (Page 6)**.

3.1.1 The Committee may **NOTE**.

Item 4 DRAFT STANDARDS FOR FINALIZATION

4.1 In the last meeting of TXD 34, the committee **FINALIZE** the WC draft TXD 34 (23882) 'Textiles — Poly Vinyl Chloride PVC Coated Tensile Fabric Architectural Membranes — Specification' as given in **Annex 3 (Pages 7 to 12)** after incorporating the requirement of Tensile Elongation values for Type 1 in due consultation with M/s SRF Technical Fibres Limited, Chennai and Chairperson, TXD 34.

4.1.1 M/s SRF Technical Fibres Limited, Chennai suggested that Tensile elongation values are not required for Type 1 and Type 2 membranes in the specifications. They are not provided even by European manufactures of the same.

4.1.1.1 The committee may **DECIDE**.

Item 5 NEW WORK ITEM PROPOSAL

5.1 A proposal has been received on the subject 'Portable tents' from Shri Mohammad Sharif, OPP Pandit Motors Company Ajmer, Rajasthan. Inputs as received from Shri Mohammad Sharif are given in **Annex B (attached separately)**.

5.1.1 The committee may **DECIDE**.

Item 6 RESEARCH AND DEVELOPMENT PROJECT

6.1 In the 10th meeting of TXD 34 held on dated 06 November 2023, the committee prepared the Terms of Reference (ToR) for the R&D project on "A comprehensive study of the constructional and performance requirements of scaffolding nets used in construction activities for high rise buildings/structures". The above-mentioned R&D project was then approved by the review committee after Head (TXD) and Member Secretary (TXD 34) apprised the review committee about the project and explained the rationale behind the proposed R&D project. The approved ToR was then made available for public bidding. After receiving bids, the research evaluation committee decided to allocate the project to NIT, Jalandhar under the leadership of Dr. Palaniswamy N K.

6.1.1 The mid-term progress report, Statement of Expenditure and Utilization certificate along with Annex E as per R&D project guidelines as submitted by Dr. Palaniswamy N K, NIT, Jalandhar are given in **Annex C (attached separately)**. The ToR as approved by the review committee is given in **Annex 4 (Pages 13 to 18)**.

6.1.2 The committee may **REVIEW**.

Item 7 DATE AND PLACE OF NEXT MEETING

Item 8 ANY OTHER BUSINESS

ANNEX 1

(*Item* 2.1)

Scope & Composition of Technical Textiles for Buildtech Applications Sectional Committee, TXD 34

Scope: To formulate Indian Standards for terminology, testing and specification for technical textiles for build-tech applications such as building infrastructure, landscaping, decoration, hoardings etc.

Meeting(s) held	**Date & Place**
09th Meeting	28 August 2023 (Video Conferencing)
10th Meeting	06 November 2023 (Video Conferencing)
11th Meeting	30 July 2024 (Video Conferencing)

Sl No.	ORGANIZATION REPRESENTED	NAME OF THE REPRESENTATIVE PRINCIPAL/ (ALTERNATE)	ATTENDANCE
1.	Indian Institute of Technology Delhi	Prof (Dr) Abhijit Majumdar (Chairman)	3/3
2.	Association of Synthetic Fibre Industries, New Delhi	Shri M S Verma Shri S C Kapoor (Alternate)	1/3
3.	Bekaert Industries Private Ltd, Pune	Shri Ganesh Chaudhari Shri Navneet Narayan (Alternate)	0/3
4.	Bombay Textile Research Association, Mumbai	Nomination awaited	0/0
5.	Central Building Research Institute, Roorkee	Shri S. K. Singh	1/3
6.	Cement Manufacturers Association, Noida	Dr Sujit Ghosh Shri K Jayasankar (Alternate) Shri Shubho Chakravarty (Alternate)	3/3
7.	Central Public Works Department, Delhi	Nomination awaited	0/0
8.	CSIR-Structural Engineering Research Centre, Chennai	Shri V Ramesh Kumar Smt. Smitha Gopinath (Alternate)	2/3
9.	E I DuPont India Pvt Limited, Gurugram	Shri Manish Bansal Shri Atanu Achrya (Alternate)	0/3

10.	Entremonde Polycoaters Limited, Agra	Dr K. M. S. Reddy	0/0
11.	Garware Technical Fibres Limited, Pune	Shri Sachin P Kulkarni Shri Rajendra Ghadge (Alternate)	3/3
12.	Indian Technical Textile Association, Mumbai	Dr Anup Rakshit Ms. Ruchita Gupta (Alternate)	2/3
13.	Kalyani Polymers Private Limited, Bangalore	Shri Rajiv Gauri Shri Sunil Nama (Alternate)	1/1
14.	Ministry of Surface Transport, New Delhi	Nomination awaited	0/0
15.	Ministry of Textile, New Delhi	Dr Mukesh Kumar Sinha	1/2
16.	National Highway Authority of India	Nomination Awaited	0/0
17.	National Institute of Technology, Jalandhar	Dr. Palaniswamy N K Dr. A K Choudhary (Alternate)	1/1
18.	NBCC, Delhi	Nomination awaited	0/0
19.	Nina Concrete System Pvt Ltd, Mumbai	Shri Rakesh Gupta Shri Kaushal Parikh (Alternate)	2/3
20.	Northern India Textile Research Association, Ghaziabad	Nomination awaited	0/0
21.	Oriental Infrastructure Limited, New Delhi	Col A K Bhasin	0/3
22.	Owen Cornings, Mumbai	Ms. Niharika	0/3
23.	PEC University of Technology, Chandigarh	Dr S K Singh Dr Sanjay Mathur (Alternate)	0/3
24.	P N Safety Industries, Mumbai	Mr. Chetan Nalavade Mr. Ganesh Patil (Alternate)	1/2
25.	Plastindia Foundation, Mumbai	Shri Surender Chaudhary Shri L K Singh (Alternate)	2/3
26.	Reliance Industries Ltd, Mumbai	Shri Ajay Gupta Shri Manish Tiwari (Alternate)	3/3
27.	Shapoorji Pallanji & Co P Limited, Mumbai	Shri Manoj Kawalkar Hemant Gopinath Joshi (Alternate)	2/3
28.	Shri Ram Institute for Industrial Research, Delhi	Ms. Archana Bisht Dr. Bhuvneshwar Rai (Alternate)	1/3
29.	SRF Technical Fibres Limited, Chennai	Smt Angelina Divya	1/3
30.	Textiles Committee, New Delhi	Shri J.D. Barman	1/3

		Dr. P Ravichandran (Alternate)	
31.	The Synthetic and Art Silk Mills Research Association, Mumbai	Shri Ravi Prakash Singh Shri Premnath Surwase	3/3
32.	Techno Ceiling Products	Nomination Awaited	0/0

ANNEX 2
(*Item* 3.1)

SUMMARY OF ACTIONS TAKEN ON THE MINUTES OF THE PREVIOUS MEETINGS OF TXD 34

Item No.	Decision	Action taken
2.1	**SCOPE AND COMPOSITION OF TXD 34**	Updated composition is given in **Annex 1**.
4	**DRAFT STANDARD FOR FINALIZATION** The committee considered the WC draft TXD 34 (23882) 'Textiles — Poly Vinyl Chloride PVC Coated Tensile Fabric Architectural Membranes — Specification'.	Coming up for discussion under Agenda item **4**.
5.2	**COMMENT ON PUBLISHED INDIAN STANDARDS** The committee scrutinize the comments received from M/s Karan Safety Pvt. Ltd. on IS 11057 : 1984 and decided that M/s Karan safety Pvt. Ltd. shall provide clause wise changes proposed along with proper justification and data for the proposed changes in the standard and committee also decided that M/s Garware Technical Fibres Limited, Pune shall provide inputs along with proper justification and data for the proposed changes in the standard within 7 days.	Inputs awaited.
7	**STANDARDS DUE FOR REVIEW** In the last meeting, the committee scrutinized the standards due for review: a) IS 15272 : 2020 Textiles — Awnings for Leisure Accommodation Vehicles — Requirements and Test Methods (second revision) b) IS 12991 : 2005 Textiles — Camping tents and caravan awnings — Vocabulary and list of equivalent terms (*first revision*)	 Reaffirmed. Reaffirmed and WC under preparation for revision.
8	**ANY OTHER BUSINESS** The committee decided to issue an amendment on IS 16481 : 2022 after incorporating the requirement for resistance to ultraviolet light optional in the standard as most of the fibres are not exposed to ultraviolet light.	 Amendment under Preparation.

ANNEX 3
(*Item* 4.1)

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

Draft for comments only Doc: TXD 34 (23882)
19 October 2023

भारतीय मानक मसौदा

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

Draft *Indian Standard*

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

ICS : 59.080.40

Technical Textile for Buildtech Applications Sectional Committee, TXD 34

Last date for receipt of comments is 18 December 2023

FOREWORD

(*Formal foreword to be added later*)

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 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.

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.

1 SCOPE

1.1 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 editions 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 (percentage)	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	2200	1100	IS 7703 (Part 1)
ii)	Mass per unit area, g/m^2, *Min*	1550	900	IS 1964
iii)	Tensile strength, 50 mm strip, N, *Min*			IS 1969 (Part 1)
	a) Warp b) Weft	10000 9000	4200 4000	
iv)	Tensile elongations, Percent, *Min*			IS 1969 (Part 1)
	a) Warp b) Weft	— —	20 26	
v)	Tear strength, N, *Min*			IS 6489 (Part 1)
	a) Warp b) Weft	2000 2000	500 450	
vi)	Colour fastness to light, *Min*	6	6	IS/ISO 105 B02
vii)	Resistance to cracking	----- complies -----		IS 16346
viii)	Resistance to flame, mm/min, *Max*	100		IS/ISO 3795
ix)	Light transmission, Percent	------- 4.5 to 5.5 ------		ISO 9050
x)	Solar transmission, Percent	------- 4.5 to 5.5 ------		ISO 9050
xi)	Flex Testing (100000 cycles)	No Crack		IS 7016 (Part 4)
xii)	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:

a) Product identification;
b) Length and width in metres;
c) Type of material (Type 1, type 2);
d) Roll Number/Lot number; and
e) Other declarations required as per law in force.

7.2 BIS Certification Marking

7.2.1 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)

SI 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)
i.	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
ii.	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.	*Title*
IS 1954 : 1990	Determination of length and width of woven fabrics – Methods (*second revision*)
IS 1964 : 2001	Methods for determination of mass per unit length and mass per unit area of fabrics (*second revision*)
IS 1969 (part 1) : 2009	Textiles – Tensile properties of fabrics – Determination of maximum± force and elongation at maximum force: Part 1 Strip method (*third 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 (Part 4) : 2003 (Part 7) : 2023	Methods of test for coated and treated fabrics: Part 4 rubber - Or plastics - Coated fabrics - Determination of resistance to damage by flexing (*second revision*) Part 7 Determination of Resistance to Penetration by Water (*third revision*)
IS 7703 (Par 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
IS/ISO 3795 : 1989	Road Vehicles and Tractors and Machinery for Agriculture and Forestry - Determination of Burning Behaviour of Interior Materials
IS/ISO 105-B02 : 2014	Textiles – Tests for colour fastness – Part B02 Colour fastness to artificial light: Xenon arc fading lamp test

ANNEX 4
(*Item* 6.1.1)

TERMS OF REFERENCE FOR THE R&D PROJECT
(*Refer to the Guidelines on R&D Projects issued vide note SCMD/R&D dated 09-09-23*)

[Technical Textiles for Buildtech Applications sectional committee TXD 34 under Textile Department of BIS]

1. Title of the Project: A comprehensive study of the constructional and performance requirements of scaffolding nets used in construction activities for high rise buildings/structures.

2. Background

2.1 Scaffolding nets, also referred to as safety nets or debris nets, is a crucial component for construction and workplace safety. These are specialized nets designed to provide protection against falling debris during construction and maintenance work conducted at elevated heights. These nets serve dual purposes of providing containment of debris and at the same time providing adequate ventilation for air and light to pass through them. Scaffolding nets are mainly manufactured from tapes or monofilaments of nylon, High Density Polyethylene (HDPE) and polyester. However, mostly the use of HDPE scaffolding nets is prevalent in the market. Scaffolding nets made from tapes generally exhibit lower strength. Consequently, this project focuses exclusively on the HDPE monofilament scaffolding nets, given their prevalent usage and superior qualities.

2.2 Presently, it has been noticed that agricultural shade nets [As per IS 16008 (Part 1 and Part 2) for agriculture and horticulture shade nets] are being used in place of scaffolding nets in constructional work areas due to non-availability of Indian standard on the subject. However, it is crucial to note that these agricultural shade nets are not suitable for use in construction activities in high rise buildings and may pose significant risks to the safety and well-being of individuals involved in such activities.

2.3 Additionally, it is important to note that the Environmental Impact Assessment guidance manual for building, construction, townships, and area development projects by the Ministry of Environment and Forest addresses the importance of covering scaffolding as a measure to mitigate dust pollution. However, it does not provide specific details on the type of nets or materials to be used for such covering. Similarly, the guidelines for mitigating air pollution by the Brihan Mumbai Municipal Corporation state that all buildings under construction must be mandatorily covered with green cloth, tarpaulin, or jute sheet.

2.4 Considering the importance of scaffolding nets in ensuring the safety of workers involved in construction and maintenance activities and with an aim to mitigate the risk of life-threatening situations at for people working at construction sites of high rise structures and as well as safeguarding individuals in the vicinity of these sites, it has been decided to undertake a research and development project on scaffolding nets.

3. Objective

3.1 To collect and analyse the relevant the technical data/information for performance and constructional requirements of HDPE monofilament scaffolding nets used in construction activities for high rise buildings/structures from both primary and secondary sources.

4. Scope

4.1 Study and analysis of the available literature including but not restricted to the following:

-National and International standards and regulation,
-Journals and research papers,
-Guidelines of ministries/departments/regulators/users,
-Books and magazines, -Any other relevant
published information.

4.2 Collection of the database for manufacturers (small, medium and large-scale), testing infrastructure and user base in the country.

4.3 Collection of import and export data, type of standards and regulation being followed by domestic/foreign manufacturers, comparative analysis of these standards and regulation.

4.4 Undertake 2 visits to each of small, medium and large-scale manufacturer and collect the information on the following aspects: -

i) Data of the requirements of raw material.
ii) Manufacturing process.
iii) In-process controls being exercised during manufacturing.
iv) Testing method being used.
v) Testing infrastructure available.
vi) Post manufacturing quality/in-house data for all the varieties being manufactured.
vii) Sampling plan being followed.
viii) Marking and labelling of the product.
ix) Packaging requirements and storage conditions.
x) Sustainability practices [sustainable raw material, energy efficient processes and methodologies, renewable energy sources, 3Rs (Reduce, Reuse and Recycle), waste management and disposal mechanisms]
xi) Focused group discussions with teams involved in production, testing, and R&D to address quality issues, discuss challenges faced, and gather suggestions for improvement.

The feedback from other manufacturers (where visit is not carried out) shall be collected by circulating suitable questionnaire covering above information through email or any other digital means.

4.5 Undertake 2 visits to users and 2 visits to testing labs (one govt and one private NABL accredited lab) to collect information including but not restricted to the following: -

User

i) Standards and regulations being followed.
ii) Compliance mechanism being followed (test certificate from supplier, third party testing)
iii) Focused group discussion on quality issues, challenges being faced and suggestions, if any.

Lab

i) Standards and regulation being followed.
ii) Testing methods being followed. iii) Testing infrastructure
iv) Focused group discussion on testing related issues, challenges being faced and suggestion.

The feedback from users and labs where visit cannot be carried out shall be obtained through suitable questionnaire covering above information.

4.6 Collection of the samples (as per the sampling plan given below) and generation of test data for the following requirements of HDPE monofilament Scaffolding Nets after getting the samples tested from 2 NABL accredited labs.

- GSM
-Tensile strength,
-Elongation at break,
-Bursting strength,
-UV resistance, and -Constructional particulars

SAMPLING PLAN:

Sl No.	Type of Industry	Variety (GSMwise)	Lab	Quantity of samples
1	Small scale Manufacturer	120 to 149	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		150 to 169	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements

		170 to 199	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		200 or above	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
2	Medium scale Manufacturer	120 to 149	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the
				requirements
		150 to 169	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		170 to 199	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		200 or above	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
3	Large scale Manufacturer	120 to 149	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		150 to 169	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		170 to 199	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements
		200 or above	Lab 1	1 Sample of appropriate size for testing all the requirements
			Lab 2	1 Sample of appropriate size for testing all the requirements

Notes: 1 The test for UV resistance shall only be conducted on any one sample as the requirement is material dependant.

4.7 Preparation of a comprehensive report with detailed summary of the above information (in both hardcopy and soft copy).

5. Research Methodology:

5.1 Collect and analyse the data/information as specified in the scope [4.1, 4.2 and 4.3].

5.2 Visit manufacturers, users and labs and collect data/information as specified in the scope [4.4 and 4.5].

5.3 Collect and test the samples as specified in the scope 4.6.

5.4 Analysis the data/information and prepare a comprehensive project report.

6. Expected Deliverables

Comprehensive report (both hard copy and soft copy) consisting of outcomes of the study covering all the aspects of the scope appending the survey formats and responses, questionnaire, results and result analysis of testing, reports of visits and other relevant documents/information.

7. Requirement for the CVs:

The person shall be graduate in Textile Engineering or Textile Technology or Textiles Chemistry or Fibre science and technology.

8. Timeline and Method of Progress Review:

The duration of the project is 120 months from the date of the award of the project. The stagewise indicative timelines are as follows:

Indicative Time line	**Method of progress**
0 to 20 days	Literature review, desktop study, collection of data and information
21 to 50 days	Visit to manufacturer, user, testing lab and collection of samples
51 to 100 days	Testing of samples preparation and submission of first draft report.

101 to 120 days	Submission of the final project report.

9. Support BIS will Provide:

1. All the relevant Indian Standards and international Standards required during the project will be provided by BIS.
2. Licensee details relating to manufacturing similar products.
3. List of BIS approved laboratories testing similar products.
4. In case of queries/clarification, Shri Mayur Katiyar, Scientist B and Member Secretary of TXD 34 may be contacted on txd@bis.gov.in, 7317525252.