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BUREAU OF INDIAN STANDARDS

AGENDA

Industrial Fabrics Sectional Committee, TXD 33 **22nd Meeting**

Date	Time	Venue
07 November, 2024 (Thursday)	1100 h	Video Conference through CISCO Webex

CHAIRPERSON: **Dr. G. Thilagavathi**
Professor & Head (Textiles)
PSG College of Technology, Coimbatore

MEMBER SECRETARY: **Shri Dharmbeer, Scientist D/Joint Director, 'Textiles'**
Bureau of Indian Standards, New Delhi

Item 0 WELCOME & INTRODUCTORY REMARKS

Item 1 CONFIRMATION OF THE MINUTES OF THE PREVIOUS MEETING

1.1 The minutes of the 21st meeting of TXD 33 committee held on 26 July 2024 through CISCO Webex Videoconferencing were circulated vide email dated 05 August 2024.

No comments have been received.

1.1.1. The Committee may **APPROVE** the minutes as circulated.

Item 2 SCOPE AND COMPOSITION OF TXD 33

2.1 The present scope and composition of the committee TXD 33 is given in **Annex 1 Pages (5-6).**

2.1.1 The Committee may REVIEW.

2.2 Dr. Suresh Sundaramurthy, Associate Professor & Head, Department of Chemical Engineering, National Institute of Technology, Bhopal, India has requested for membership of TXD 33. He has done B.Tech/M.E/P.hd (Chemical Engineering) and 18 years of experience in teaching, research and consultancy in chemical field.

2.2.1 The Committee may **DECIDE**.

Item 3 ISSUES ARISING OUT OF PREVIOUS MEETING OF TXD 33

3.1 Summary of actions taken on the various decisions of the 21st meeting is given in **Annex 2 Pages (7-8).**

3.1.1 The Committee may **NOTE**.

Item 4 DRAFT STANDARD FOR APPROVAL FOR WIDE CIRCULATION

4.1 Non-Woven Industrial Filter Fabric

In the last meeting, the committee decided that based on the panel recommendation, BIS shall prepare the preliminary draft for Non-woven Industrial Filter Fabric.

The updated draft document is given at **Annex 3 Pages (9 to 19).**

The comments/inputs received from Dr. A. Mukhopadhyay, NIT Jalandhar on non-woven Industrial Filter Fabric is attached in **Annex 4.**

4.1.1 The Committee may **DECIDE.**

4.2 Industrial Nonwoven Wipes

In the last meeting, the committee requested Shri V. Muthu Kumar to include specific test method and technical parameters like oil absorption, soil release efficiency, fibre shredding, GSM, fibre composition (where applicable) etc. and co-ordinate with following stakeholders for their technical inputs:-

a) Dr. J. Sakthivel J.C, PSG College of Technology, Coimbatore
b) Shri Basudev Basu, M/s Welspun India Pvt. Ltd., Gujarat
c) Shri N.R Sarkar, Pacific Harish industries limited, Mumbai
d) Shri Aditya Agarwal, M/s Jeevan Ecotex Pvt Ltd, Mumbai
e) Shri Ayan Chakraborty, Ginni Filaments, Haridwar
f) Smt. Deepali Plawat from ATIRA, Ahmedabad
g) Dr Manisha Mathur from SASMIRA, Mumbai

The latest working draft received from PSGTech is given at **Annex 5 Pages (20 to 32).**

4.2.1 The Committee may **DECIDE.**

Item 5 NEW SUBJECTS FOR FORMULATION OF INDIAN STANDARD

5.1 Conveyor Belting Fabric

In the last meeting, the committee requested Shri Krishan Agarwal, M/s Forech India Limited, Sonipat, and Shri Santipada Bhunia, M/s Madura Industrial Textiles, Mumbai, to share their inhouse data/technical inputs regarding raw materials, physical requirements, and test methods for preparation of preliminary draft on fabrics for conveyor belts.

The working draft on Conveyor Belting Fabric is given at **Annex 6 Pages (33 to 42).**

The comments/technical inputs received from SRF Limited, Chennai and M/s Forech India Limited, Sonipat on the working draft are given at **Annex 7 Pages (43 to 47)/See Attachment of Annex 7.**

5.1.1 The Committee may **DECIDE.**

5.2 Abrasive cloths, Woven air slide fabrics and Woven press filter cloth bags

In the last meeting of TXD 33, the committee requested Shri Pramod Khosla, Khosla Profil Pvt. Ltd, Mumbai to share technical inputs/working draft for raw material, performance requirement and test methods for new subjects on Abrasive cloths, Woven air slide fabrics and Woven press filter cloth bags.

The technical inputs received from PSGTECH and Khosla Profil Pvt. Ltd, Mumbai on Abrasive Cloths, Woven Air Slide Fabrics And Woven Press Filter Cloth Bags is given at **Annex 8 Pages (48 to 50)/See attachment of Annex 8.**

5.2.1 The Committee may **DECIDE.**

Item 6 REVIEW OF PUBLISHED STANDARDS

6.1 As per procedure of BIS, standards which were published/reaffirmed five years ago or earlier are required to be reviewed to assess adequacy of the requirements specified. Review is carried out keeping in view the changes in technology, current industrial practices and the needs/expectations of the consumers/users so as to decide regarding further reaffirmation/revision/withdrawal/amendment/archive of the standards under review.

As of now there is no standard due for review.

6.1.1 The Committee may **NOTE.**

6.2 Review of Pre-2000 standards:

Based on technical inputs and comments from committee members, the draft revisions of the following standards has been prepared and are given in **Annex 9 (Pages 51 to 202).**

1)	IS 1178 : 1986	Specification for cotton filter cloth (second revision)
2)	IS 1422 : 1983	Specification for cotton duck (third revision)
3)	IS 1424 : 1983	Specification for cotton canvas (third revision)
4)	IS 4388 : 1982	Specification for cotton fabrics for reinforcement of rubber hoses (first revision)

5)	IS 4501 : 1981	Specification for aprons, rubberized, acid and alkali resistant (first revision)
6)	IS 4810 : 1968	Specification for fumigation sheets and covers, rubberized
7)	IS 5915 : 1970	Specification for single texture rubberized waterproof fabrics
8)	IS 5996 : 1984	Specification for Cotton Belting Ducks (Second Revision)
9)	IS 6110 : 1983	Specification for double - Texture rubberised waterproof fabrics (Fourth Revision)
10)	IS 6803 : 1972	Specification for special proofed canvas and duck
11)	IS 8699 : 1977	Specification for PVC coated fabrics for footwear industry
12)	IS 9998 : 1981	Specification for cotton liner fabrics
13)	IS 11574 : 1986	Specification for polyamide filter cloth
14)	IS 11575 : 1986	Specification for polyester filter cloth
15)	IS 13510 :2000	Textiles —Duck, Polyester/cotton Blended, Rip-Stop — Specification (*Second Revision)*

6.2.1 The Committee may **DECIDE.**

Item 7 DATE AND PLACE OF NEXT MEETING

Item 8 ANY OTHER BUSINESS

ANNEX 1

(Item 2.1)

Scope & Composition of Industrial Fabrics Sectional Committee, TXD 33

Scope : To formulate Indian standards for terminology, testing and specifications for industrial fabrics, coated and treated fabric and their products including non-woven textiles made from natural and man-made fibres/filaments and blends thereof.

Meetings held	**Date and Place**
20th Meeting	15 March 2024 (through Cisco Webex)
21st Meeting	26 July 2024 (through Cisco Webex)

SL NO.	**ORGANIZATION REPRESENTED**	**NAME OF THE REPRESENTATIVE PRINCIPAL/(ALTERNATE)**	**ATTENDANCE**
1.	PSGTECH	Dr. G. Thilagavathi (Professor and HOD, Textiles) (Chairperson)	2/2
2.	ACB India Limited, Gurugram	Shri G. Sambasiva Rao	1/2
3.	Ahmedabad Textile Research Association, Ahmedabad	Smt. Deepali Plawat (Shri Jigar Dave)	2/2
4.	Arvind Advance Material Ltd., Gandhinagar	Ms. Palak Kakkar	2/2
5.	DMSRDE, Kanpur	Shri Kamal Kumar	2/2
6.	Director General of Quality Assurance, Mumbai	Shri Manoj Pandey (Shri Anuj Shukla)	1/2
7.	Entermonde Polycoaters Limited, Nashik	Dr K M S Reddy (Shri Ajey Godbole)	1/2
8.	Forech India Limited, Sonipat	Shri Krishan Agrawal (Shri Timir Bhattacharyya)	2/2
9.	Garware Technical Fibres Limited, Pune	Shri S J Chitnis (Shri Rajendra Ghadge)	2/2
10.	ICAR- National Institute of Natural Fibre Engineering & Technology, Kolkata	Dr. Sanjoy Debnath (Dr. Manik Bhowmick)	2/2
11.	Institute of Handloom Technology, Salem	Dr. Praba Karan C.	2/2
12.	Indian Technical Textile association, Mumbai	Dr Anup Rakshit (Smt. Ruchita Gupta)	2/2
13.	Jeevan Ecotex Pvt Ltd, Mumbai,	Shri Aditya Agarwal	2/2

14.	Khosla Profil Pvt. Limited, Mumbai	Shri Rajkumar Khosla (Shri Rahul Bajaj)	2/2
15.	Kirti Filtration and Automation Pvt Ltd, Vadodara	Shri Kulin Masturlal (Smt Kirti Masturlal)	1/2
16.	Kusumgar Corporates, Mumbai	Shri Y K Kusumgar (Dr M K Talukdar)	2/2
17.	Madura Industrial Textiles, Mumbai	Shri Santipada Bhunia (Shri Shakti Subramanian)	1/2
18.	Masturlal Private Limited, Mumbai	Shri Shramik Masturlal	1/2
19.	Ministry of Textiles (NTTM), New Delhi	Shri Ajay Pandit (Shri Sourabh Awasthi)	2/2
20.	Office of the Textile Commissioner, Mumbai	Shri Narottam Kumar (Shri Amar K Chaphpekar)	2/2
21.	Ordinance Equipment Factory, Kanpur	Shri Vipul Awasthi	2/2
22.	Pacific Harish Industries Ltd, Mumbai	Shri Munjal Udeshi	2/2
23.	PSG College of Technology, Coimbatore	Shri V Muthukumar (Dr. J. C. Sakthivel)	2/2
24.	Rajkumar Dyeing and Printing Works Private Limited, Kolkata	Nomination Awaited	2/2
25.	Rubber Board, Kerala	Nomination Awaited	1/2
26.	Shiva Texyarn Limited, Coimbatore,	Shri Senthil Ram (Shri Sureshbabu Kakkan)	2/2
27.	SRF Limited, Gurugram	Smt Angelina Divya (Shri S. Somasundaram)	2/2
28.	Supertech Fabrics Private Limited, Vadodara	Shri Utsav Gupta (Smt. Parul Gupta)	1/2
29.	Supreme Nonwoven Industries, Mumbai	Shri Punit Gupta (Shri Dishir Bhayani)	2/2
30.	Textiles Committee, Mumbai	Shri J D Barman (Shri R. Chandran)	2/2
31.	The Synthetics and Art Silk Mills Research Association, Mumbai	Dr Manisha Mathur (Smt Ashwini Sudam)	2/2
32.	Ultratech Cement, Mumbai	Shri Raju Goyal (Shri Sanjeev Srivastava)	2/2
33.	Vedanta Limited, Mumbai	Shri Shreyas Gangane	1/2
34.	Welspun India	Shri Rajeev Sharma (Shri Basudev Basu)	2/2

ANNEX 2
(Item 3.1)

SUMMARY OF ACTIONS TAKEN ON THE MINUTES OF 21st MEETING

Item No.	Decision	Action taken
2.1	Certain modifications were suggested in the scope and composition of the committee.	Updated scope and composition have been given at **Annex 1**
3.1	**ISSUES ARISING OUT OF THE PREVIOUS MEETING OF TXD 33** b) (Item 6.2) - The committee requested Shri V. Muthu Kumar, PSG College of Technology, Coimbatore to co-ordinate with Shri Pramod Khosla, Khosla Profil Pvt. Ltd., Mumbai and Ms. Angeline Divya, SRF Limited, Chennai and other stakeholders for preparation of working draft/technical input for Epoxy Impregnated Fabrics.	The working draft/technical inputs are yet to be received.
4.1	**COMMENTS ON PUBLISHED STANDARD** The following draft amendment was **FINALIZED** for publication as amendment 1 to IS 8164 : 2023 after wide circulation and approval of Chairperson: - 1) Amendment No. 1 to IS 8164 : 2023, Hospital Rubber Sheeting Without Reinforcing Fabric — Specification (first revision) [Doc No.: TXD 33 (26327)]	Amendment has been published.
5.1	**DRAFT STANDARD FOR APPROVAL FOR WIDE CIRCULATION** **Non-Woven Industrial Filter Fabric** The committee decided to circulate the preliminary draft for non-woven industrial filter fabric to TXD 33 members for a period of 15 days for their comments and suggestion.	Coming up for discussion under **agenda item 4.1.**
5.2	**DRAFT STANDARD FOR APPROVAL FOR WIDE CIRCULATION** **Industrial Nonwoven Wipes**	

	The committee requested Shri V. Muthu Kumar to include specific test method and technical parameters like oil absorption, soil release efficiency, fibre shredding, GSM, fibre composition (where applicable) etc. and co-ordinate with stakeholders for their technical inputs.	Coming up for discussion under **agenda item 4.2.**
6.1	**NEW SUBJECT FOR FORMULATION OF INDIAN STANDARD** **a) Conveyor Belting Fabric** The committee requested Shri Krishan Agarwal, M/s Forech India Limited, Sonipat, and Shri Santipada Bhunia, M/s Madura Industrial Textiles, Mumbai, to share their inhouse data/technical inputs regarding raw materials, physical requirements, and test methods within 15 days for preparation of preliminary draft on fabrics for conveyor belts. **b) Abrasive cloths, Woven air slide fabrics and Woven press filter cloth bags** The committee requested Shri Pramod Khosla, Khosla Profil Pvt. Ltd, Mumbai to share technical inputs/working draft for raw material, performance requirement and test methods for new subjects on Abrasive cloths, Woven air slide fabrics and Woven press filter cloth bags	Coming up for discussion under **agenda item 5.1**. Coming up for discussion under **agenda item 5.2.**
7.1	**REVIEW OF INDIAN STANDARDS** The committee decided to reaffirm above standard for a further period of 5 years.	Standard Reaffirmed.
7.2	**REVIEW OF INDIAN STANDARDS** Revision of Pre-2000 Standards	Coming up for discussion under **agenda item 6.2.**

ANNEX 3

(*Item* **4.1**)

DRAFT STANDARD FOR APPROVAL FOR WIDE CIRCULATION

NON-WOVEN INDUSTRIAL FILTER FABRIC

Working draft on

INDIAN STANDARD FOR NON WOVEN INDUSTRIAL FILTER FABRIC FOR DRY DUST AND HOT GAS FILTERATION

Objective of Standard :

This standard has been prepared to provide specifications for nonwovens for the application stated above. These High Performance nonwovens should have desired Tensile strength, Elongation, Thickness, Bursting Strength, Air Permeability, Dust Holding Capacity Thermal Resistance behaviour, Oil and water repellency and Surface resistivity required for operation in sector specific as appropriate .

Product Description :

These Nonwoven Fabrics are manufactured with the use of felting needles , followed by Fabric procesing technology including Sienging, Heat setting , speaciality coating and can be in form of roll goods / shapes. Depending on chemical and/or moisture content of the gas stream, its temperature and other conditions, appropriate Filter media may be used to manufacture the bags out of cotton, nylon, polyester, fiberglass or other high performance fibre materials namely but not limited to Poly-phenylene sulphide, Homo polymer Acrylic, Co polymer Acrylics, PTFE, Aramids etc . Nonwoven filter media are either self support felted or manufactured using woven scrim. Media may be coated with OWR finish and laminated with PTFE as per desired application suitable for application specific air permeability requirement.

Scope of application :

The scope of these Needle Punched Non woven filter media is in Hot Air Filteration in Boilers House across various segments of industries and can be revered purged. Guide lines are mentioned in Annexure

Importance of application :

These Filter media improves effectiveness of Dust control equipments. It improves Air pollution levels of sorrounding environment. Poor air quality can cost heavily, not just in fines, but by creating potential hazards that can damage the factory or affect employees and external parties.

When the air is filled with dirt, dust, debris, chemicals or gasses, it can affect the lungs of anyone who breathes this air in. Not only that, but this particulate can collect on nearby equipment and area thus posing a significant fire hazard.

Need and importance of Standard:

The need for Standard has arisen owing to impact of Filter media on Health and Safety of people and environment. There are numerous laws and regulations in place for work place safety. Some of these regulations are related to environment and quality of exhaust air from Industries. The standardization will enforce to optimize the quality standard of OEM equipment for control of such effluent.

References: ISO Standards as mentioned below :

- Standard Test Method for GSM – ISO 9073-1
- Standard Test Method for Thickness- ISO 9073-2
- Standard Test Method for Tensile Sterngth and Elongation- ISO 9073-3
- Standard Test Method for Shrinkage- IS 17493
- Standard Test Method for Pore Size – ASTM D 6767
- Standard Test Method for Air Permeability- 1SO 9073-15
- Standard Test Method for Bursting Strength- ISO 9073-5
- Standard Test Method for Thermal Reistance-ISO 17493
- Standard Test Method for Oil and water repellency- ISO 22958
- Standard Test Method for Surface Resistivity – (Attached Annex)
- Standard Test Method for Peel Strength – ISO 11339:2010
- Standard Test Method for Sampling plan procedure- ISO 2500-Part 1

Materials: As appropriate for various applications, various fibres namely Polyester ,PolyPhenylene Sulphide, Meta Aramid, CoPolymer Acrylic , Homepolymer Acrylic , P-84 and PTFE Fibres are used. ***Scrim , as appropriate, can be used . PTFE Film Lamination is also used considering AP / ultra fine dust control requirement.***

Conditioning of Samples:

Condition the specimens for physical tests in air maintained at ***20 ± 2 °C and 65 ± 4 %*** relative humidity as per test specified.

Requirements: The material when tested in accordance with the requirements specified in Table as Annxure. The requirements may be mutually agreed as well as per different working requirement and ***statutory and regulatory norms.***

1. Test :

1.1. Acceptance criteria should be met as specified in the specifications (Annex attached) defined for various Filter Medias:

1.1.1. Physical Tests : Tests carried out to prove conformity to the requirements of this standard. These tests are intended to check the Physical properties of product.

1.1.2. Performance Tests: Tests carried out to determine performance compatibility.

1.2. Categories of Tests:

1.2.1. Physical test comprises of all requirements as per specifications mentioned in Annexure

1.2.2. Performance : This test comprises of all requirements as per specifications mentioned in Annexure

2. Sampling, Inspection and Testing :

2.1. Sampling shall be as per standard IS 2500 – part 1. AQL level of 4% will be followed

2.2. Inspection of product shall be carried out to ensure product and packing conformity.

2.3. Testing shall be carried out as per test method specified in standard .

3. Identification, Delivery, Storage and Handling :

- The finished product shall be identified by the details on label . ***Detail may include traceability requirement such but not limited to Lot no / Batch No and detail of roll such as Roll length / Roll width / Net Weight.***
- The product shall be stored in ambient condition. Care shall be taken while handling the product to avoid any physcial damage.
- Vehicle / Container shall be checked physically to ensure safety and hygiene of the product.

4. **Application:** Application Matrix guidleines is defined below:

Type of Plant	Application	Type of Filter Media
Cement	Mines	Polyester (with / without water repellent
	Crusher	Polyester (with / without water repellent
	Rawmill and Klin	Fibre Glass / Fibre Glass with membrane lamination
	Coal Mill	HPA / Mixed HPA with AS and Water repellent
	Clinker Cooler	Few plant use MA/ P-84
	Clinker Stock Pile	MA
	CEMENT Mill	HPA/ Polyester/ Mixed HPA / CPA with water repellent
	Packing plant	Polyester / CPA with water repellent
	Venting application	Polyester with or without water repellent
	Coal application	Polyester with AS and with or without water repellent
Steel		Polyester with water repellent
	Coal Dust	HPA / Mixed HPA with AS and Water repellent
	Ultra Fine dust	Membrane laminated with PTFE
Sponge Iron	Coal application	Polyester with AS and with or without water repellent
	Except Coal	Polyester with or without water repellent
Power Plant	Ash Handling	MA with or without water repellent
	Flue Gas and ash	PPS with or without water repellent
	Venting application	Polyester with or without water repellent
	Coal venting	Polyester with AS and with or without water repellent
Boiler application	Flue Gas and ash	PPS with or without water repellent
		MA with or without water repellent
		P-84 with or without water repellent
		P-84+PPS with or without water repellent
		Fibre Glass with acid resistance finish
		Fibre Glass with PTFE membrane laminated
		100% PTFE
Ambient air suction from atmosphere	Air suction	HDPE PP Panel filter
		PP FILTER BAGS
		Polyester Filter media
Slurry Filteration		Woven / Non woven PP with or without water application
		Non woven PP with both side Sienged

5. **Special Finishing:** As appropriate, below finish treatment and charactersitics will be inculcated in Filter media:

5.1. Oil and water repellency:

5.2. **PTFE Lamination** : Air pearmeability of 20-50 ltr/ dm2/ min@ 200 Pa will be achieved. Peel Strength of min 0.75 N should be achieved.

Characteristic	Unit	Test Method	Material and Specification					
			PPS + PPS scrim	CPA + CPA scrim	HPA + HPA scrim	MA + MA scrim	PET+ PET Scrim	(50%PTFE + 50%P84)+ PTFE scrim
Weight	GSM	ISO 9073-1	550 ± 7%	550 ± 7%	550 ± 7%	550 ± 7%	550 ± 7%	550 ± 7 %
Thickness	mm	ISO 9073-2	2.00 ± 10%	2.30 ± 10%	2.40 ± 10%	2.40 ± 10%	2.00 ± 10%	1.70 ± 10%
Tensile strength								
Machine Direction	N/5cm	ISO 9073-3	>1000	>700	>700	>1000	>1000	>600
Cross Direction	N/5cm		>1000	>750	>750	>1000	>1100	>650
Elongation at Break								
Machine Direction	%	ISO 9073-3	< 60	< 60	< 60	< 60	< 60	< 60
Cross Direction	%		< 60	< 60	< 60	< 60	< 60	< 60
Shrinkage								
Machine Direction	%	IS 17493	≤1.50 after exposure at 190°C for 1h	≤1.50 after exposure at 140°C for 1h	≤1.50 after exposure at 140°C for 1h	≤1.50 after exposure at 200°C for 1h	≤1.50 after exposure at 140°C for 1h	≤1.50 after exposure at 240°C for 1h
Cross Direction	%		≤1.50 after exposure at 190°C for 1h	≤1.50 after exposure at 140°C for 1h	≤1.50 after exposure at 140°C for 1h	≤1.50 after exposure at 200°C for 1h	≤1.50 after exposure at 140°C for 1h	≤1.50 after exposure at 240°C for 1h
Pore Size	micron		20±5	20±5	20±5	20±5	20±5	25±5
Performance Properties								
Air Permeability	l/dm2/min @ 200 Pa	ISO 9073-15	120 ± 20%	120 ± 20%	120 ± 20%	120 ± 20%	120 ± 20%	150 ± 20%
Bursting Strength	Psi	ISO 9073-5	>500	>400	>400	>500	>500	>420

Working Temparature		IS 17493						
Continuous Service	℃		180	130	130	200	130	260
Surge	℃		190	140	140	210	140	270
*N - Newton, GSM - Gram per meter square,			PPS - Polyphenylene Sulphide	CPA – Co Polymer Acrylic	HPA – Homo Polymer Acrylic	MA – Meta Aramid	PET – Poly Ethylene Terephathalate	PTFE-Polytetra Fluoro Ethylene, P84-Polyimide

5.3. **Antistatic Property:** Antistatic property i.e surface resistivity will be achieved through use of Antistatic scrim / Fibre / Finish as appropriate. Surface resistivity should be < 2.5X 10^{9} ohm

6. TABLE : Specifications

Product	**PPS with PPS Scrim Supported Filter Media**		
Texture	**Singed & Calendered**		
Treatment	**Oil and Water Repellent Treatment**		
Properties	**Unit**	**Test Method**	**Specification**
Material Properties			
Weight	GSM	ISO 9073-1	550 ± 7 %
Thickness	Mm	ISO 9073-2	2.00 ± 10%
Tensile strength			
Machine Direction	N/5cm	ISO 9073-3	>1000
Cross Direction	N/5cm		>1000
Elongation at Break			
Machine Direction	%	ISO 9073-3	< 50
Cross Direction	%		< 50
Shrinkage		IS 17493:2016	
Machine Direction	%	190°C for 1h	≤1.50
Cross Direction	%		≤1.50

Pore Size	micron	ASTM D 6767	20±5
Performance Properties			
Air Permeability	l/dm2/min @ 200 Pa	ISO 9073-15	120 ± 20%
Bursting Strength	Psi	ISO 9073-5	>500
Working Temperature			
Continuous Service	℃	IS 17493: 2016	180
Surge	℃		190
* PPS -Polyphenylene Sulphide, N - Newton, GSM - Gram per meter square			

TABLE : Specifications

Product	**CPA with CPA Scrim Supported Filter Media**		
Texture	**Singed & Calendared**		
Treatment	**Oil and Water Repellent Treatment**		
Properties	**Unit**	**Test Method**	**Specification**
Material Properties			
Weight	GSM	ISO 9073-1	550 ± 7.5%
Thickness	Mm	ISO 9073-2	2.30 ± 10%
Tensile strength			
Machine Direction	N/5cm	ISO 9073-3	>700
Cross Direction	N/5cm		>750
Elongation at Break			
Machine Direction	%	ISO 9073-3	< 50
Cross Direction	%		< 50
Shrinkage		IS 17493: 2016	
Machine Direction	%	140°C for 1h	≤1.50
Cross Direction	%		≤1.50
Pore Size	Micron	ASTM D 6767	20±5

Performance Properties			
Air Permeability	l/dm2/min @ 200 Pa	ISO 9073-15	120 ± 20%
Bursting Strength	Psi	ISO 9073-5	>400
Working Temperature		IS 17493: 2016	
Continuous Service	℃		130
Surge	℃		140

* CPA – Co- Polymer Acrylic, N - Newton, GSM - Gram per meter square

TABLE : Specifications

Product	**HPA with HPA Scrim Supported Filter Media**		
Texture	**Singed & Calendared**		
Treatment	**Oil and Water Repellent Treatment**		
Properties	**Unit**	**Test Method**	**Specification**
Material Properties			
Weight	GSM	ISO 9073-1	550 ± 7.5%
Thickness	Mm	ISO 9073-2	2.40 ± 10%
Tensile strength			
Machine Direction	N/5cm	ISO 9073-3	>700
Cross Direction	N/5cm		>750
Elongation at Break			
Machine Direction	%	ISO 9073-3	< 50
Cross Direction	%		< 50
Shrinkage		IS 17493: 2016	
Machine Direction	%	140°C for 1h	≤1.50
Cross Direction	%		≤1.50
Pore Size	Micron	ASTM D 6767	20±5
Performance Properties			
Air Permeability	l/dm2/min @ 200 Pa	ISO 9073-15	120 ± 20%
Bursting Strength	Psi	ISO 9073-5	>400
Working Temperature		IS 17493: 2016	
Continuous Service	℃		130
Surge	℃		140

* HPA – Homo Polymer Acrylic, N - Newton, GSM - Gram per meter square,

TABLE : Specifications

Product	**MA with MA Scrim Supported Filter Media**		
Texture	**Singed & Calendared**		
Treatment	**Oil and Water Repellent Treatment**		
Properties	**Unit**	**Test Method**	**Specification**
Material Properties			
Weight	GSM	ISO 9073-1	550 ± 7.5%
Thickness	Mm	ISO 9073-2	2.40 ± 10%
Tensile strength			
Machine Direction	N/5cm	ISO 9073-3	>1000
Cross Direction	N/5cm		>1000
Elongation at Break			
Machine Direction	%	ISO 9073-3	< 50
Cross Direction	%		< 50
Shrinkage		IS 17493: 2016	
Machine Direction	%	200°C for 1h	≤1.50
Cross Direction	%		≤1.50
Pore Size	Micron	ASTM D 6767	20±5
Performance Properties			
Air Permeability	l/dm2/min @ 200 Pa	ISO 9073-15	120 ± 20%
Bursting Strength	Psi	ISO 9073-5	>500
Working Temperature		IS 17493: 2016	
Continuous Service	℃		200
Surge	℃		210
* MA –Meta Aramid, N - Newton, GSM - Gram per meter square,			

TABLE : Specifications

Product	**Polyester with Polyester Scrim Supported Filter Media**
Texture	**Singed & Calendared**

Treatment	Oil and Water Repellent Treatment		
Properties	**Unit**	**Test Method**	**Specification**
Material Properties			
Weight	GSM	ISO 9073-1	550 ± 7.5%
Thickness	Mm	ISO 9073-2	2.00 ± 10%
Tensile strength			
Machine Direction	N/5cm	ISO 9073-3	>1000
Cross Direction	N/5cm		>1100
Elongation at Break			
Machine Direction	%	ISO 9073-3	< 50
Cross Direction	%		< 50
Shrinkage		IS 17493: 2016	
Machine Direction	%	140°C for 1h	≤1.50
Cross Direction	%		≤1.50
Pore Size	Micron	ASTM D 6767	20±5
Performance Properties			
Air Permeability	l/dm2/min @ 200 Pa	ISO 9073-15	120 ± 20%
Bursting Strength	Psi	ISO 9073-5	>500
Working Temperature		IS 17493: 2016	
Continuous Service	℃		130
Surge	℃		140
* PET – Polyethylene Terephthalate, N - Newton, GSM - Gram per meter square,			

TABLE : Specifications

Product	PTFE (50%) + P84 Fibre (50%) with PTFE Scrim Supported Filter Media		
Texture	**Singed & Calendared**		
Treatment	**Oil and Water Repellent Treatment**		
Properties	**Unit**	**Test Method**	**Specification**
Material Properties			

Weight	GSM	ISO 9073-1	550 ± 7.5%
Thickness	Mm	ISO 9073-2	1.70 ± 10%
Tensile strength			
Machine Direction	N/5cm	ISO 9073-3	>600
Cross Direction	N/5cm		>650
Elongation at Break			
Machine Direction	%	ISO 9073-3	< 50
Cross Direction	%		< 50
Shrinkage		IS 17493: 2016	
Machine Direction	%	240°C for 1h	≤1.50
Cross Direction	%		≤1.50
Pore Size	micron	ASTM D 6767	25±5
Performance Properties			
Air Permeability	l/dm2/min @ 200 Pa	ISO 9073-15	150 ± 20%
Bursting Strength	Psi	ISO 9073-5	>420
Working Temperature		IS 17493: 2016	
Continuous Service	℃		260
Surge	℃		270
* PTFE –Poly Tetra Fluoro Ethylene, P84 –Polyimide ,N - Newton, GSM - Gram per meter square			

ANNEX 5

(*Item* **4.2**)

DRAFT STANDARD FOR APPROVAL FOR WIDE CIRCULATION

INDUSTRIAL WET WIPES

TITLE= to be added

FOREWORD= to be added

1. SCOPE

This standard prescribes about the manufacturing, constructional details and other requirements for industrial (woven, nonwoven and knitted) wet wipes for institutional use like in Hospitals, various type of Industry for cleaning / disinfecting of various types of solid surfaces.

2. REFERENCES

The following standards contain provision which through reference in this text constitute provision 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. MANUFACTURE

Industrial wet wipes are manufactured under the controlled environmental condition to avoid the microbial contamination. The continuous manufacturing like - impregnation, cutting, sealing and packing is the main process step to manufacture wet wipes.

4. MATERIALS

The industrial wet wipes shall be made from woven, non-woven (spun lace, spun bond, melt blown, needle-punch non - woven and wet laid technology), Multilayers (including combination of woven / non-woven / knitted) and knitted fabric of cotton, polypropylene, viscose rayon and polyester fibers.

5. WORKMANSHIP AND FINISH

The industrial wet wipes shall be clean and free from substances liable to cause tendering during storage. The manufacture and preparation of the wet wipes shall be conducted under proper

hygienic conditions **(Good manufacturing practice).** The size of the wipes shall be as per the agreement between buyer and seller.

6 REQUIREMENTS

6.1 The industrial wet wipes shall conform to the requirements specified in Table 1 & 2.

Table 1. Physical Performance Requirements for Industrial Wet Wipes

Sl. No.	Characteristic	Requirement	Method of Test
1	Fiber identification	Refer Table 2 and 3	IS 667, TAPPI T401
2	Weight in grams per square meter - g/m^2		IS 15891 (Part 1), WSP 130.1
3	Absorption: a) Sinking time, s, *Max*		IS 15891 (Part 6), WSP 10.2
	b) Water holding capacity, percent, *Min*		BP 2007, WSP 10.2
4	Breaking strength in machine direction in Newton (Dry) *Minimum*		IS 15891 (Part 18) or IS 15891 (Part 3) or ISO 9073-3 Option B
5	Breaking strength in cross direction in Newton (Dry) Minimum		IS 15891 (Part 18) or IS 15891 (Part 3) or ISO 9073-3 Option B
6	Leakage test	The packet should pass leakage test with 75 mm Hg for 30 seconds	ANNEXURE C
7	Lint and other particles generation in the dry state	Optional	ISO 9073 – 10
8	Soil Release : Oil release method – Satin Release Grade (Optional)	After 2 washes : 5 (Stain equivalent to standard Satin 5)	IS 15853 – 2009 Annex C
9	pH	4.5 - 8.0	IS 1390
10	Wipe dimensions	As agreed by buyer and seller (Minimum +/ - 10mm)	

Table 2. Physical Performance Requirements for Industrial Wet Wipes (Needle Punched)

Sl. No.	Characteristic	Needle punched or Thermal bonded or Chemical bonded	Method of Test
1	Weight in grams per square meter - g/m^2	80 - 300	IS 15891 (Part 1) or WSP 130.1
2	Absorption: a) Sinking time, s, *Max*	15	IS 15891 (Part 6), WSP 10.2
	b) Water holding capacity, percent, *Min*	600	BP 2007, WSP 10.2
3	Oil Holding capacity / Absorption (%) Min	500	
4	Abrasion Weight loss % Max	5	(Wheel CS- 10, Cycle -150, Vaccum -60%. Weight – 500grams, Speed – 72RPM)
6	Breaking strength in machine direction in Newton / 5cm (Dry) *Minimum*	100	IS 15891 (Part 18) or IS 15891 (Part 3) or ISO 9073-3 Option B
7	Breaking strength in cross direction in Newton / 5cm (Dry) Minimum	100	IS 15891 (Part 18) or IS 15891 (Part 3) or ISO 9073-3 Option B
8	Soil Release: Oil Released method Stain Release grade	After 2 washes Grade 5- Stain equivalent to standard stain 5	IS 15853-2009 Annex C

Table 3. Physical Performance Requirements for Industrial Wet Wipes (Spun lace)

Sl. No.	Characteristic	Spun lace product	Method of Test
1	Weight in grams per square meter - g/m^2	30 -120	IS 15891 (Part 1) or WSP 130.1
2	Absorption: a) Sinking time, s Max	15	IS 15891 (Part 6), WSP 10.2
	b) Water holding capacity, % min	500	BP 2007, WSP 10.2

3	Breaking strength in machine direction in Newton / 5cm (Dry) *Minimum*	30	IS 15891 (Part 18) or IS 15891 (Part 3) or ISO 9073-3 Option B
4	Breaking strength in cross direction in Newton / 5cm (Dry) Minimum	10	
5	Breaking strength in machine direction in Newton / 5cm (Wet) *Minimum*	10	
6	Breaking strength in cross direction in Newton / 5cm (Wet) *Minimum*	3	
7	Soil Release: Oil Released method Stain Release grade	After 2 washes Grade 5- Stain equivalent to standard stain 5	IS 15853-2009 Annex C

Table 4. Microbiological Requirements for industrial Wet Wipes

Sl. No.	Characteristic	Requirement	Method of Test
1	Anti-bacterial activity (*optional*), absorption method	More than 2 log reduction	ISO 20743
2	EN 1276 is for evaluation of antibacterial performance with mechanical activity. EN 16615 is for evaluation of anti-bacterial performance without mechanical activity.	More than 5 Log reduction	The mentioned test is optional tests as per customer's requirement for antibacterial claim.
3	Total viable count	Less Than 100	IS 14648
4	Total Fungal Count (cfu/g)	Less Than 10	IS 14648
5	Pathogen Test	Absent	IS 14648
A	Pseudomonas aeruginosa	Absent	IS 14648
B	Staphylococcus aureus	Absent	IS 14648

C	Candida albicans	Absent	IS 14648
D	E. coli	Absent	IS 14648

6.2 Different types of industrial wet wipe materials and their process and their applications specified in Table 3.

Table 5: Industrial wet wipe materials and their process and their applications

TYPE OF INDUSTRY	FABRIC	SOLVENT	APPLICATION
Manufacturing, Engineering and Maintenance	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	. Cleaning machinery and tools . Absorbing fluids and oil . Hand cleaning
Transportation	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	Vehicle cleaning and maintenance . Window cleaning
Food industry	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	. Machine cleaning and maintenance . Absorbing fluids . Hand cleaning

Electronic and Computer industry	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	. Delicate and intricate cleaning . Dust removal
Automotive industry	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	. Surface preparation before painting . Polishing . Oil and chemical absorbents
Printing	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	. Machine cleaning and maintenance . Absorbing ink and other fluids . Hand cleaning
Janitorial	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	. Delicate polishing . Equipment cleaning and maintenance . Dust removal . Wet floor cleaning

Optical industry	Woven / Nonwoven / Knitted Fabric or Multilayered Fabric (As Per Mutually agreed by the customer and based on the performance activities)	Formulation will be either purified water base / IPA / Alcohol / Mix of these or other solvents & list of ingredients as per Mutually agreed by the customer and based on the performance activities	. Polishing . Dust removal.

6.3 Good Manufacturing Practice Guideline for Hygiene Requirement

The industrial wet wipes shall be manufactured under good hygienic conditions. The general guidelines for good manufacturing practice to maintain hygiene requirement at manufacturing facility are given in **Annex B**.

7 PACKING

The industrial wet wipes 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.

8 MARKING

8.1 Each pack of the wipes shall be legibly and indelibly marked with following information:

Marking will be as per following rules:

1. Legal metrology act or
2. Pharma guide line (….) or
3. Any applicable law related to the product / category / type of licence

A) Name of the product;
b) Dimension /size of the product;
c) Number of wipes in a pack;
d) Manufacturer’s name, initials or trademark, if any;
e) Country of origin;

f) Direction for use.
g) Label claim should have sufficient back-up data
h) Apart from above requirements, the packets should abide by existing Legal metrology rule

8.2 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 product(s) may be marked with the Standard Mark.

9 SAMPLING AND CRITERIA FOR CONFORMITY

9.1 Lot All the wipes of the same material and dimensions produced under similar conditions of manufacture shall constitute a lot.

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

9.1.2 The number of wipes to be selected from the lot shall depend on the size of the lot and shall be in accordance with column 2, column 3 and column 5 of Table 4.

9.1.3 These wipes shall be selected at random from the lot. For this purpose, reference may be made to IS 4905.

9.2 Number of Tests and Criteria for Conformity

9.2.1 All the wipes selected as per column 3 of Table 4 shall be examined for workmanship and finish (*see* **5**).

9.2.1.1 Any wipe failing in one or more of the above requirements shall be termed as defective. The lot shall be considered as conforming to the above requirements, if the total number of defectives found in the sample is less than or equal to the acceptance number given in column 4 of Table 2. Otherwise, the lot shall be rejected.

Table 6 Number of Wipes to be selected
(*Clause* 9.1.2 *and* 9.2)

Sl	Lot Size	Non-Destructive Testing	Destructive Testing

No.

		No. of Wipes to be Selected	Acceptance Number	No. of Wipes to be Selected	Acceptance Number
	N	*n*	*a*	n_1	a_1
(1)	(2)	(3)	(4)	(5)	(6)
i) Up to 280		13[1]	1	8	0
ii) 281 to 500		20	2	8	0
iii) 501 to 1200		32	3	13	0
iv) 1201 to 3200		50	5	13	0
v) 3201 and 10,000		80	10	20	1
VI) 10,001 to 35,000		295	16	20	2
VII) 35,001 to 1, 50,000		420	21	80	2
VIII) 1, 50,001 to 5, 00,000		720	31	80	4
iX) 5, 00,001 and above		1100	35	150	4

[1] or lot size when less than 13.

9.2.2 Out of the sample already found satisfactory according to **9.2.1.1**, a sub-sample as per column 5 of Table 4 shall be taken. This sub-sample shall be further tested for the remaining requirements.

9.2.3 The lot shall be considered as conforming to the requirements of the specification if the total number of defective products found in the sample (as per **9.2.2**) is less than, or equal to the acceptance number as given in column 6 of Table 4.

ANNEX A
(*Clause* 2)
LIST OF REFERRED STANDARDS

IS No, WSP No:	**Title**
IS 667: 1981, TAPPI T 401	Methods for identification of textile fibers (*first revision*)
IS 1390: 2019 (*second*	Textiles — Determination of pH of aqueous extract ISO 3071: 2005 *revision*)

IS 4905: 201 5 ISO 24153: 2009	Random sampling and randomization procedures (*first revision*)
IS 14648: 2011	Microbiological examinations of cosmetics and cosmetic raw materials — Methods of test (*second revision*)
IS 14944: 2001	Surgical dressings — Methods of test
IS 15891 (Part 1): 2011 ISO 9073-1: 1989, WSP 130.1	Textiles — Test methods for nonwovens — Part 1 Determination of mass per unit area
IS 15891 (Part 6): 2012 ISO 9073-6: 2000, WSP 10.2	Textiles — Test methods for nonwovens — Part 6 Absorption
IS 15891(Part 18): 2017	Textiles – Test methods for nonwovens Part 18 Determination of breaking strength and elongation of nonwoven materials using grab tensile test.
ISO 9073-18: 2007, WSP 110.4	Textiles – Test methods for nonwovens Part 18 Determination of breaking strength and elongation of nonwoven materials using grab tensile test.
ASTM D 3078	Standard Test Method for Detecting Gross Leaks
ISO 20743	Textiles — Determination of antibacterial activity of textile Products.
IS 14648	For bacterial efficacy,
IS 14648	For fungal efficacy.
IS 14648	For sporicidal efficacy.

ANNEX B

(*Clause* 6.3)

GOOD MANUFACTURING PRACTICE FOR HYGIENE REQUIREMENT

Maintaining hygiene at production facility is essential for ensuring products are appropriate for consumers use. **(ISO 22716:2007)** Following is recommended guidelines for ensuring hygiene at facilities:

a) Location shall be free from objectionable odours, smoke, dust and other contaminants.

b) Separate areas shall be demarcated for storing raw materials, production and final product storage.

c) Separate area shall be demarcated for storing personal effects and personal protective equipment of unit workers to minimize risk of contamination.

d) Toilet and hand-washing station shall be provisioned away from storage/production area.

e) Provision of 70 percent isopropyl alcohol (IPA) solution for hand sanitization inside the production facility. (Isopropanol (IPA) Grade and Uses CAS 67-63-0 IPA or 2-Propanol or Dimethylcarbinol).

f) Appropriate lighting and proper ventilation of the facility shall be ensured.

g) Flooring shall be either concrete, tiled or with chips to ensure ease of cleaning. Floors, walls, ceilings, doors and windows shall be easy to clean and without crevices or openings that shall not allow accumulation of dirt.

h) Regular pest control measures shall be put in place.

j) Adequate receptacles for disposing waste generated within the facility shall be made available and shall be frequently emptied and cleaned.

k) Poster/sign encouraging safety and hygiene practices like use of personal protective equipment, use of hand sanitizer etc. shall be displayed.

m) Pre-packaged finished product shall be checked thoroughly and ensured to be free from foreign particles, dirt, hair, and other visible contaminants.

n) Hand hygiene shall be practised during manufacturing.

p) A cleaning and maintenance schedule shall be drawn up for cleaning of the facility, toilets, washing areas, waste receptacles and for cleaning/ disinfection of the equipment.

ANNEXURE C

Testing procedure for 6. Leakage test. (Ref page no: 2 – 6.1)

OBJECTIVE: To lay down procedure for operation of Vacuum leak test apparatus.

PROCEDURE:

1. Clean the vacuum chamber surface area and ensure the chamber water is replaced every 2 day (if required) with purified water.
2. Check the water level it should be up to plate level.
3. Put the samples in the chamber of apparatus & close with lid, one sample in upward and second sample in downward direction.
4. Close the vacuum chamber Lid in position that sample is set under whole plate.
5. Start the vacuum leak tester “SET’ position so that vacuum is created in vacuum Chamber.
6. Take the vacuum in chamber up to 3.0-inch Hg (75 mm Hg). If pressure is increased to more than 3.0-inch Hg (75 mm Hg), slightly close the valve & maintain 3.0-inch Hg (75 mm Hg) pressures in vacuum chamber for 30 second.
7. During the vacuum position obscure the Pack if any repetitive Air Bubbles are generated.
8. If no any repetitive air bubbles is generated that means no leak observed in Packet.
9. If repetitive air bubbles are generated that means packet has leakage.
10. Give instructions to packing machine operator to seal the pack properly at leak side.
11. Take 5 more packets before and after this packet and perform leak test on all of them.

12. If none of them has leakage — it must be stray case.

13. After testing stop the vacuum Pump and Release the pressure by moving the open Valve in

    "Vent' position.

14. The leakage Test Pass packet is clean and may be used for other test. Fail packet is discarded.

15. The sealing operator must check two packets generated first time at the time of line started.

16. As per BMR perform the leak test of pack & record the observation in Leak Test Apparatus Log Book & in respective BMR.

ANNEX 6
(Item 5.1)

NEW SUBJECTS FOR FORMULATION OF INDIAN STANDARD

WORKING DRAFT ON TEXTILES — FABRICS FOR CONVEYOR BELTS — SPECIFICATION

FOREWORD

Conveyor belts are mechanical devices used for the transportation of materials or goods. They are widely employed in various industries including mining, agriculture, and manufacturing to move products efficiently and continuously over short to medium distances. The performance of belts mainly depends on high-quality fabrics which endure the demanding operational environments characterized by heavy loads, abrasive materials and varying weather conditions. It directly decides the durability, strength and overall performance of conveyor belts. This standard aims to support the development of high-quality conveyor belt fabrics that meet the stringent demands of modern industries.

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.

1 SCOPE

This standard covers the requirements of conveyor belt fabrics, ensuring that it meets the necessary performance criteria for various industrial applications.

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

3.1 Carcass & 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 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.

3.3 EE (Polyester/Polyester) Fabric — Fabric with both warp and weft yarns made of polyester, providing good dimensional stability and high tensile strength. It is suitable for conveyor belts used in medium to heavy-duty applications where high tensile strength and dimensional stability are required.

3.4 PP (Nylon 66/Nylon 66) 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.

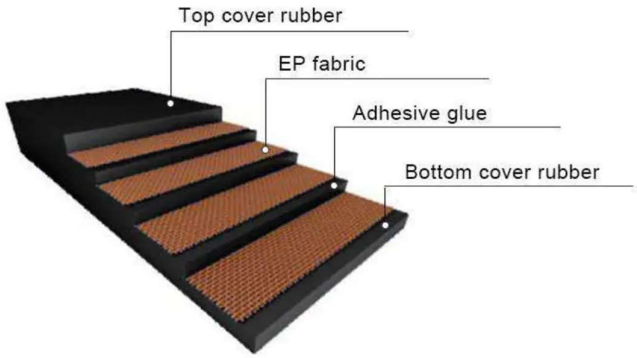
3.5 EP (Polyester/Nylon 66) Fabric — Fabric with warp yarns made of polyester and weft yarns made of Nylon 66. It is suitable for conveyor belts used in medium to heavy-duty applications.

3.6 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.

3.7 Warp Crimp — The percentage increase in the length of the warp yarn, caused by its curvature or waviness due to interlacing with the weft yarns in a woven fabric.

4 CONSTRUCTION

4.1 The conveyor belt as a whole consists of one or more layers that ensure its strength, stability and cut resistance. The main parts include: Carcass, Covers, Adhesive layer and Edge Reinforcement



4.1.1 The carcass is the internal structure of the conveyor belt, providing it with tensile strength and shape. It supports the load being transported and withstands the stress of movement and weight.

4.1.2 Covers are the outer layers of the conveyor belt that protect the carcass from damage, wear, and environmental factors. Top cover provides resistance to wear and impact, protecting carcass from materials being conveyed & bottom cover provides resistance to wear and friction with the conveyor system's components.

4.1.3 The adhesive layer binds the carcass to the covers, ensuring the integrity and cohesion of the belt.

4.1.4 Edge reinforcement strengthens the sides of the conveyor belt, preventing fraying, tearing, and edge damage during operation.

4.2 Carcass of the belt is made of individual layers of woven fabric called plies. Each ply is composed of lengthwise yarns called "warp" and crosswise yarns called "weft." The warp yarns are tension-bearing, providing the necessary longitudinal strength, while the weft yarns offer cross rigidity and impact tolerance. Fabric is also passed through calendar rollers to apply the bonding agent and achieve desired thickness.

4.3 Carcass provides the belt with its tensile strength, flexibility and durability. The construction of the carcass can vary depending on the specific requirements of the application. The carcass shall consist either of one or more plies of woven fabric or of solid woven fabric and shall be coated with a polymer mix.

4.4 Single-ply carcass belts are made of one layer of fabric, offering flexibility and ease of installation. Duo-ply carcass belts are made of two plies of woven textile fabric and multi-ply belts consist of two or more layers of fabric, bonded together by an intermediate layer of elastomer providing additional strength and durability.

4.5 The belting shall be woven in a minimum of two plies (thickness shall be not less than 4 mm). The minimum thickness requirement can be met by a two-ply solid woven belting.

4.6 The fabric used shall be made of cotton or synthetic yarn or combination thereof evenly and firmly woven and free from manufacturing faults as is normal in the best manufacturing practice. Belt fabric/cord 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 6)

Code Letter	Yarn
C	Cotton
Z	Staple Rayon
R	Rayon
P	Nylon 66
N	Nylon 6
E	Polyester
D	Aramid
G	Glass
If a fabric contains a secondary yarn, its identity shall be indicated by the use of characters in parentheses to designate the yarn type.	

5 REQUIREMENTS

5.1 Fabrics for conveyor belts come in four main types depending on the warp and weft yarn material used:

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

Table 2 Physical Requirements of NN (Nylon 6/Nylon 6) Conveyor Belt Fabrics

(*Clause* 5.1)

Characteristic	TYPES/ GRADES	Method of Test,

	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	Ref to
GSM (gms)	315 ± 3%	335 ± 3%	385 ± 3%	455 ± 3%	480 ± 3%	525 ± 3%	625 ± 3%	685 ± 3%	735 ± 3%	820 ± 3%	900 ± 3%	1000 ± 3%	1280 ± 3%	S 1964:200 ISO 3801
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	S 7702:201 ISO 5084
Breaking Strength - Warp (KN/M) Min	126	135	160	192	200	245	295	330	355	410	430	490	625	IS 1969 (art 1) : 20 SO 13934-
Breaking Strength - Weft (KN/M) Min	50	50	62	62	65	65	75	75	70	70	70	75	75	IS 1969 Part 1) :201 SO 13934-
Warp Crimp (%) 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	S 3442:198 SO 13934-
Warp EB (%) Min	20	20	20	20	20	20	20	20	20	24	24	24	24	IS 1969 Part 1) : 20 SO 13934-
Weft EB (%) Min	24	24	24	24	24	24	24	24	24	24	24	24	24	IS 1969 (art 1) : 20 SO 13934-
Initial Elongation @ 10% Load (%) 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 (art 1) : 20 SO 13934-
Adhesion P/P (KN/M) Min	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	IS 3400 (Part 7): 2021. ISO 36
Heat Aged Strength - Warp (%) 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	15748:202 ISO 17493
Heat Aged Strength - Weft (%) Max	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	15748:202 ISO 17493

Table 3 Physical Requirements of EE (Polyester/Polyester) Conveyor Belt Fabrics
(*Clause* 5.1)

Characteristic	TYPES/ GRADES										Method of Test, Ref to
	EE 080	EE 100	EE 125	EE 160	EE 200L	EE 200P	EE 250 L	EE 250 P	EE 315L	EE 315P	

GSM (gms)	305 +/- 3%	335 +/- 3%	420 +/- 3%	530 +/- 3%	620 +/- 3%	680 +/- 3%	775 +/- 3%	860 +/- 3%	950 +/- 3%	990 +/- 3%	IS 1964:2001 ISO 3801
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 7702:2012 ISO 5084
Breaking Strength - Warp (KN/M) Min	120	130	160	205	240	263	304	330	343	380	IS 1969 Part 1) : 2018 ISO 13934-1
Breaking Strength - Weft (KN/M) Min	37	45	43	67	70	78	67	75	78	75	IS 1969 Part 1) : 2018 ISO 13934-1
Warp Crimp (%) Min	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	IS 3442:1980 ISO 13934-1
Warp EB (%) Min	20	20	20	20	20	20	20	20	20	20	IS 1969 Part 1) : 2018 ISO 13934-1
Weft EB (%) Min	20	20	20	20	20	20	20	20	20	20	IS 1969 Part 1) : 2018 ISO 13934-1
Initial Elongation @ 10% Load (%) 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) : 2018 ISO 13934-1
Adhesion P/P (KN/M) Min	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	IS 3400 (Part 7): 2021. ISO 36
Heat Aged Strength - Warp (%) Max	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	S 15748:2021 ISO 17493
Heat Aged Strength - Weft (%) Max	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	S 15748:2021 ISO 17493

Table 4 Physical Requirements of PP (Nylon 66/Nylon 66) Conveyor Belt Fabrics
(*Clause* 5.1)

Characteristic	**TYPES/ GRADES**								**Method of Test, Ref to**
	PP 100	**PP 125**	**PP 160**	**PP 200**	**PP 250**	**PP 315**	**PP 350**	**PP 400**	

GSM (gms)	345 ±3%	390 ± 3%	485 ± 3%	550 ± 3%	690 ± 3%	735 ± 3%	860 ± 3%	1030 ±3%	IS 1964:2001 ISO 3801
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 7702:2012 ISO 5084
Breaking Strength - Warp (KN/M) Min	140	165	205	250	330	370	420	490	IS 1969 (Part 1) : 2018 ISO 13934-1
Breaking Strength - Weft (KN/M) Min	50	60	75	75	75	75	75	75	IS 1969 (Part 1) : 2018 ISO 13934-1
Warp Crimp (%) Min	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0	IS 3442:1980 ISO 13934-1
Warp EB (%) Min	20	20	20	20	24	24	28	28	IS 1969 (Part 1) : 2018 ISO 13934-1
Weft EB (%) Min	24	24	24	24	24	24	24	24	IS 1969 (Part 1) : 2018 ISO 13934-1
Initial Elongation @ 10% Load (%) Max	4.0	4.0	4.5	4.5	5.0	5.0	5.5	5.5	IS 1969 (Part 1) : 2018 ISO 13934-1
Adhesion P/P (KN/M) Min	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	IS 3400 (Part 7): 2021. ISO 36
Heat Aged Strength - Warp (%) Max	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	IS 15748:2021 ISO 17493
Heat Aged Strength - Weft (%) Max	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	IS 15748:2021 ISO 17493

Table 5 Physical Requirements of EP (Polyester/Nylon 66) Conveyor Belt Fabrics
(*Clause* 5.1)

Characteristic	TYPES/ GRADES												Method of Test, Ref to
	EP 080	**EP 100**	**EP 125**	**EP 160**	**EP 200**	**EP 250**	**EP 315**	**EP 350**	**EP 400**	**EP 500**	**EP 630**	**EP 800**	
GSM (gms)	305 +/- 3%	335 +/- 3%	460 +/- 3%	530 +/- 3%	640 +/- 3%	840 +/- 3%	960 +/- 3%	1100 +/- 3%	1300 +/- 3%	1675 +/- 3%	2200 +/- 3%	2400 +/- 3%	IS 1964:2001 ISO 3801
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 7702:2012 ISO 5084
Breaking Strength - Warp (KN/M) Min	120	137	166	200	254	333	380	440	530	675	843	960	IS 1969 (Part 1) : 2018 ISO 13934-1
Breaking Strength - Weft (KN/M) Min	40	40	74	65	69	76	80	110	100	100	170	196	IS 1969 (Part 1) : 2018 ISO 13934-1
Warp Crimp (%) 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 3442:1980 ISO 13934-1
Warp EB (%) Min	18	20	20	20	20	20	20	20	20	20	20	20	IS 1969 (Part 1) : 2018 ISO 13934-1
Weft EB (%) Min	24	24	24	24	24	24	24	24	24	24	24	24	IS 1969 (Part 1) : 2018 ISO 13934-1
Initial Elongation @ 10% Load (%) 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) : 2018 ISO 13934-1
Adhesion P/P (KN/M) Min	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	IS 3400 (Part 7): 2021. ISO 36
Heat Aged Strength - Warp (%) Max	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	IS 15748:2021 ISO 17493
Heat Aged Strength - Weft (%) Max	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	IS 15748:2021 ISO 17493

Table 6 Physical Requirements of EN (Polyester/Nylon 6) Conveyor Belt Fabrics
(*Clause* 5.1)

	TYPES/ GRADES	Method of

Characteristic	EN 100	EN 125	EN 160	EN 200	EN 250	EN 315	EN 350	Test, Ref to
GSM (gms)	360 ± 3%	440 ± 3%	540 ± 3%	650 ± 3%	850 ± 3%	960 ± 3%	1095 ± 3%	IS 1964:2001 ISO 3801
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 7702:2012 ISO 5084
Breaking Strength - Warp (KN/M) Min	135	170	210	265	330	380	450	IS 1969 (Part 1) : 2018 ISO 13934-1
Breaking Strength - Weft (KN/M) Min	50	55	67	78	78	70	75	IS 1969 (Part 1) : 2018 ISO 13934-1
Warp Crimp (%) Min	3.0	3.0	2.5	3.0	3.0	3.0	3.0	IS 3442:1980 ISO 13934-1
Warp EB (%) Min	18	20	20	20	20	20	20	IS 1969 (Part 1) : 2018 ISO 13934-1
Weft EB (%) Min	24	24	24	24	24	24	24	IS 1969 (Part 1) : 2018 ISO 13934-1
Initial Elongation @ 10% Load (%) Max	2.0	2.5	2.5	2.5	3.0	3.0	3.5	IS 1969 (Part 1) : 2018 ISO 13934-1
Adhesion P/P (KN/M) Min	7.8	7.8	7.8	7.8	7.8	7.8	7.8	IS 3400 (Part 7): 2021. ISO 36
Heat Aged Strength - Warp (%) Max	3.0	3.0	3.0	3.0	3.0	3.0	3.0	IS 15748:2021 ISO 17493
Heat Aged Strength - Weft (%) Max	0.5	0.5	0.5	0.5	0.5	0.5	0.5	IS 15748:2021 ISO 17493

6 MARKING

6.1 The belting fabric shall be marked at intervals of maximum 15 m on the carrying surface as follows:

a) Name of the product

b) Fabric Designation (CC, NN, EP & EE)
c) Thickness (mm)
d) Width (mm)
e) Last two figures of the year of manufacture
f) Manufacturer's identification number
g) Manufacturer's name, initials or trade mark
h)Any other statutory requirement as required by the law in force or as agreed between buyer and purchaser

The manner in which these details are identified shall be decided by the manufacturer or by agreement with the purchaser.

6.2 BIS Certification Marking

6.2.1 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.

7 PACKING

7.1 The belting fabric shall be suitably packed as mutually agreed to between the purchaser and the supplier.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Lot

The number of conveyor belt fabric pieces of the same type and composition and constructional particulars delivered to a buyer against one dispatch note shall constitute a lot.

8.2 The number of conveyor belt fabrics to be selected at random shall be according to col 2 and 3 of Table 3. To ensure the randomness of selection, IS 4905 may be followed.

Table 7 Sample Size
(Clauses 8.2, 8.3.1 and 8.3.2)

Sl.No	**Lot Size**	**Sample Size**	**Permissible Number of Non-conforming pieces**	**Sub-sample size**	**Sub-sub sample size**
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 50	5	0	3	2
ii)	51 to 150	8	0	5	3

iii)	151 to 300	13	1	5	3
iv)	301 to 500	20	1	8	5
v)	501 to 1 000	32	3	10	7
vi)	1 001 to above	50	3	10	7

8.3 Number of Tests and Criteria for Conformity

8.3.1 The number of pieces to be selected for IS 15852 : 2009 major flaws shall be in accordance with col 3 of Table 7. For constructional details, such as count of yarn, threads per decimetre, mass in g/m^2, length, width and manufacture, the number of pieces selected shall be in accordance with col 5 of Table 7. For all other tests, the number of pieces selected shall be given in col 6 of Table 7.

8.3.2 All the pieces selected from the lot shall be visually examined for major flaws and tested for all other requirements as specified in **3.1, 3.2** and Table 2-6. A piece shall be declared defective if it contains one or more major flaws or it does not meet any of the requirements specified in Table 2-6. The lot shall be declared conforming to the requirements of this standard if the total number of defective pieces does not exceed the value given in col 4 of Table 7.

ANNEX 7
(Item 5.1)

NEW SUBJECTS FOR FORMULATION OF INDIAN STANDARD

TECHNICAL INPUTS FROM SRF ON CONVEYOR BELTING FABRIC

a) **Shri Somasundaram S., SRF Chennai**

Dear Sir,
With reference proposed formation of Standards for **Conveyor Belting Fabric products** under TXD-33, pls find the documents for the same

- **Specifications for EE, EP, EN, NN & PP Fabrics for various classes**
- **Test methods for determination of Breaking Strength, Elongation & Adhesion, Crimp, GSM, Thickness, Shrinkage**

The details of the proposed standards and the references are as mentioned below.

S.No	Details	ASTM Ref	ISO Ref	Proposed Standard
1	Test method for determination of Breaking Strength, Elongation @ break & Elongation at Specified Load	ASTM D 5035	ISO 13934-1	Internal Test method attached
2	Test method for determination of Adhesion Strength	ASTM D 4393	ISO 36	Internal Test method attached
3	Test method for determination of Crimp	ASTM D 3883	ISO 13934-1	Internal Test method attached
4	Test method for determination of GSM	ASTM D 3776	ISO 3801	Internal Test method attached
5	Test method for determination of Hot Air Shrinkage	ASTM D 2646	ISO 17493	Internal Test method attached
6	Test method for determination of Thickness	ASTM D 1777	ISO 5084	Internal Test method attached
7	Specifications for EE, EN, EP, NN, PP Fabrics	-	-	Specifications attached

Test method for determining % Heat Strength Retention

1 SCOPE :

1.1 This test method prescribes a method for determination of % Heat Strength retention of RFL treated woven fabrics.

2 SAMPLING :

2.1 Sample for the lot shall be drawn so as to be representative of the lot. Sample drawn in accordance with the relevant material specification or as agreed to between the buyer and the seller shall be held to be representative of the lot.

3 CONDITIONING OF TEST SPECIMENS:

3.1 Unless otherwise agreed between the buyer and the seller, the test sample shall be conditioned to a state of moisture equilibrium from the dry side in the standard atmosphere at 65 ± 2 percent relative humidity and 20 ± 2°C temperature. may also be used provided it is declared in the test report.

4 ATMOSPHERIC CONDITIONS FOR TESTING:

4.1 The test shall be carried out in a standard atmosphere (*see* **3.1**).

5 APPARATUS:

5.1 Testing Machine

UTM- /Zwick –Z100 (Computer Interfaced) – Constant Rate-of- Traverse (CRT)
Machine Speed: 460mm/min or based on Buyer and seller agreement.
Hot Air Oven
Temp Range 100C – 250C

6. PROCEDURE:

This Test method is based on ASTM D 5035, ISO 13934-1 or based on buyer test method

6.1 Test on Conditioned Specimen

6.1.1 Specimen Preparation:
3 test pieces shall be cut with the length parallel to the warp threads for taking samples for testing of both before & after heat ageing can be done (Approx ~ 1200mm). Ensure sample taken after 10cm from both selvedges.

6.1.2 Preparation of raveled strips:

From the 1200mm length warp direction sample, ravel several yarns from this cut edge until a full length of 1200mm warp yarn is available; then cut 50 +/-5mm of strip and ravel out threads in both the sides to make it 25 mm.

Check for the presence of required no. of threads in the raveled strip equivalent to the EPI/PPI of the roll.

a. Cut 600mm length sample and use for tensile testing (Represents Before Heat ageing data)

b. Balance 600mm length sample put in Hot Air oven at
    a. Temperature – 160C
    b. Time – 30 mins

Ensure the sample is hanged properly without touching any sides of Hot Air oven, Top & Bottom portion (Fold the sample at Top & Bottom if it touches the floor), Ensure sample not folded in the center which goes for testing portion (~ 300-400mm) and hanged freely

Remove the Samples from Hot Air oven after heat ageing and condition at Lab temperature for 1 hr before starting the testing.

Follow the instructions for Tensile testing for both Before & After Ageing Samples as given below.

Set the jaws of the machine 200 mm +/-1mm apart.

Clamp the test piece centrally in jaws without any slackness

Apply pressure depends upon the Fabric strength (Pressure range :150-250 kp/cm)

Select, speed of Crosshead movement (jaw movement), Pre-Load, Elongation at Specified Load, using the Computer Programmed setting manual.

Then start the testing. Before Starting the test initial force to be, make it as Zero

7. Expression of results:

Calculate the Average value of 3 strips of Breaking Strength which is displayed in the Computer monitor and report as per Customer specified units in Customer specification sheet for both Before & After Heat Ageing.

% Heat Strength Retention = Average of After Heat Ageing Tensile/ Average of Before Heat Ageing Tensile x 100

8. Report :

8.1 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

Safety Precautions:

1.Trained personnel only to be involved in testing
2. Use Scissors and scale smoothly for avoiding hand/finger injuries.
3. Use of rubber gloves for avoiding electrical shock/Chemicals
4. Before testing ensure the Grip pin has to properly fixed both top and bottom jaw.
5. During closing of the grips leave fingers from the gripping portion. Ensure your full Concentration on testing.
6. Dont allow to stand nearby the grips during testing.
7. Use Googles for testing.

EMS Related:

1. Waste to be disposed as per procedure
2. Usage of resource like power, water, chemicals, solutions, polythene Sheet, rubber compounds, Oil etc. without wastage/spillage etc.
3. Chemical /oil /rubber spillage to be avoided by using secondary containment.
4. LDPE cover to be reused to a maximum recycling frequency

PACKING 7.1

7.1 Unless otherwise agreed to between the buyer and the seller, the Belting fabric shall be packed as given in 7.2.

7.2 Belting fabric shall be attached to a shell roll of suitable dimensions and wound evenly and tightly on to the Shell roll. The roll shall be covered with at least one layer of polyethylene film of minimum 100-micron thickness (see IS 2508) and finally wrapped in one layer of HDPE 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 hdpe/hessian/sacking cloth shall be securely sewn in order to protect the roll from contamination and ingress of moisture or physical damage.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Unless otherwise agreed to between the buyer and the seller, one tabby shall be taken for each creel load in a lot.

8.2 Unless otherwise agreed to between the buyer and the seller, 3 tests for breaking load & Elongation at break, Heat strength retention test on both warp and weft each. 3 tests for Crimp, Thickness, GSM and 1 test for Adhesion covering across the width.

8.3 Sample for testing can be taken by leaving approximately 10cm from both and take requisite number of specimens for testing as given in 4.2.1.

8.4 The above procedure can be illustrated by the following example. Suppose the total width of the tabby is 150 cm. Gut out 10 cm from both ends. Divide the remaining 130 cm width of tabby in 3 equal parts of 43 cm each cutting along the warp direction. For carrying out tests for determination of breaking load, 3 test specimens are required according to 4.2.1. Thus, we take three specimens from each part of the tabby for carrying out tests for breaking load.

b) Shri I.K. Bahl, Forech, Sonipat

Table 6 Constructional Particulars and Tolerances

(see ……)

Sl. No.	Characteristic	Tolerance	Method of Test. Ref. to
(1)	(2)	(3)	(4)
i)	Ends/dm	± 2.0 percent	IS 1963
ii)	Picks/dm	± 2.0 percent	IS 1963
iii)	Mass, g/m^2	± 3.0 percent	IS 1964 / ISO 3801
iv)	Thickness, mm	± 10.0 Percent	IS 7702 /ISO 5084
v)	Width, cm	-0 / + 1.0 percent	IS 1954
vi)	Length of Roll, m	-0 / + 2.0 percent	IS 1954
vii)	Skew/Bow	≤ 3.0 percent, $\bar{X}$ = ≤ 1.0 percent	IS/ IS0 13015
viii)	Dip Pick-up, %	± 1.0	IS 4910 (Part 4)

Table 7- Sampling Plan for Fabrics for Conveyor belts

(Clause … ..)

Number of fabric rolls of one type and width in shipment or lot	No. of samples
3 or less	1
4 to 10	2
11 to 30	3
31 to 75	4
76 or more	5

ANNEX 8
(Item 5.2)

NEW SUBJECTS FOR FORMULATION OF INDIAN STANDARD

Abrasive cloths, Woven air slide fabrics and Woven press filter cloth bags

Technical Inputs on Air slide Fabric from PSGTECH, Coimbatore

Indian standard
(Standard Test methods for woven air slide fabrics)

Draft Prepared by: V. Muthukumar, Testing Manager, PSGTECHS COE INDUTECH

1. SCOPE

1.1 This standard specifies the various test methods and other requirements for woven air-slide fabrics used for cement industry, aluminum industry, railway wagons, thermal power plants including the raw meal, ash handling and kiln dust, feeding processes in cement and aluminum, silos, domes and hoppers.

2. REFERENCES

2.1 The following standards contain provision which through reference in this text constitute provision 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. TYPES OF AIR SLIDE FABRICS

3.1 Textile cloth fabrics are extensively used in air slides, aeration pads, fluxo channels fluid or arms for pneumatic conveying of dry products like cement and other raw materials. The excellent weave structure of filter media assists it to regulate the air flow and permits only a specific volume of air to permeate at a desired water gauge pressure.
Further, a loose, medium or dense weave structure used in the air slides result in controlling air flow to low, medium or high.
Some common types of air slide fabrics made up of (1) Multifilament Polyester (2) Aramid (3) Spun Polyester and (4) hybrid of spun and multifilament polyester.

4. AIR SLIDE FABRICS SPECIFICATION

Material	Multifilament (Polyester with bonded or twisted)	Aramid	Polyester Spun	Multilayer (warp - POLY MF 6000 DN and weft - POLY MF

					12000 DN + POLY SPUN 4/10' HYBRID)
WEAVE		Plain weave	Multilayer Plain weave	Multilayer Plain weave	Multilayer Plain weave
GSM (ASTM D 3883)		3800 to 7000			
Width (mm)		2000	1800	2000	24000
Thickness (mm)		3 - 8	2.5 - 8	3-8	4.70
Melting Point (Deg C)		270	400	270	270
CONTINUOUS TEMPERATURE (Deg C)		180	270	180	180
POROSITY 300MM WG +/- 15% (ASTM D 737 – 96)		400 m3/m2/h at 800 mmWg			
RUPTURE STRENGTH ON 5 X 20 CM STRIP +/- 10% (ASTM D 5035)	WARP (N/Nm)	>8000			
	WEFT (N/Nm)	>4500			

CONDITIONING OF SAMPLES

STANDARD TESTING CONDITIONS

Atmospheric condition of specified fabric: Temperature- 20°C±2°C, Relative humidity (RH) - 65%±4% followed by ISO standard.

7. FABRIC TESTING

7.1 REQUIRED PROPERTIES FOR AIR SLIDE FABRICS

Air slide fabrics are exposed to substantial stresses from temperature, contact pressure, friction, Tensile stress and moisture so the essential required properties for air slide fabrics are:

1- Constant air permeability.

2- High abrasion resistance.

3- High tensile strength in both directions.

4- Abrasion resistance

5- Temperature resistance.

NOTE – ALL TESTS SAMPLES SHOULD BE OBTAINED FROM THE LEFT, CENTRE AND RIGHT OF THE FABRIC WIDTH.

7.2 The air slide fabrics shall conform to the requirements specified in Table

(*Clause* 7.2)

Sl. No.	Characteristic	Requirement	Method of Test, Ref to
1	Air Permeability (m3 /m2 /hr)	400 AT 800 MMWG	IS 13775:1 - 1993

2	Dimensional Stability up to (120°C) (shrinkage of fabric ratio % in both direction)	0.100-0.80	ASTM D6207 - 03
3	Tensile Strength (kg/cm2)-(Warp)	>800	ASTM D 4595 – 83
	(Weft)	>450	
4	Elongation % (Warp)	8-20	ASTM D 4595 – 83
	(Weft)	6.5-16	
5	Abrasion Resistance (loss of weight ratio % at 3000 cycle)	1-3	DIN EN ISO 5470-1

ANNEX 9
(Item 6.2)

REVIEW OF PRE-2000 Standards

DRAFT REVISION OF INDIAN STANDARDS

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXXX)
November
2024
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भारतीय मानक **मसौदा**
वस्त्रादि — सूती फिल्टर कपड़ा के लिए विशिष्टि
(IS 1178 का तीसरा पुनरीक्षण)
Draft *Indian Standard*
Textiles — Specification for Cotton Filter Cloth
(Third Revision of IS 1178*)*

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33	last date for receipt of comments is Nov 2024

FOREWORD

(Formal clauses will be added later)

This standard was first revised in 1973. The present revision has been made in the light of the experience gained in implementing the standard since its first revision in 1973.

In the present revision, thirteen varieties have been included instead of only two varieties in the first revision due to the production and use of such type of filter cloths in the industry. The revised version covers a significant portion of the total cotton filter clothes consumed by various industries. Cotton filter clothes are generally used in sugar, cement, chemical and oil industries.

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 prescribes constructional details and other particulars of thirteen varieties of grey cotton filter cloth.
1.2 This standard does not specify the general appearance, feel, etc, of the filter cloth.
2 REFERENCE

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 encourage to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 MANUFACTURE

3.1 Yarn—The cotton yarn used in the manufacture of the filter cloth shall be satisfactory in evenness and reasonably free from neps and spinning defects.

3.2 Cloth —The filter cloth shall be free from dressing and filling materials and from substances liable to cause subsequent tendering.

3.2.1 The filter cloth, when visually examined, shall be reasonably free from spinning, weaving and processing defects.

4 REQUIREMENTS

4.1 Construction—The filter cloth shall comply with the requirements of Table 1 excepting the count of warp and weft which have been given only for guidance.

4.2 The other requirements of the filter cloth shall be as given in Table 2.

5 MARKING

5.1 The filter cloth shall be marked with the following:

a) Name of the material;
b) Variety No.;
c) Width and length of the piece;
d) Manufacturer's name, initials or trade-mark, if any; and
e) Month and year of manufacture.

5.1.1 The filter cloth 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 there under. The ISI 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 which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may he obtained from the Indian Standards Institution.

5.2 At both ends of the piece, the filter cloth shall be marked with an identification mark.

5.3 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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 PACKING

6.1 The filter cloth shall be packed in bales or cases in conformity with the procedures laid down in IS: 1347 or in IS: 293 as required.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 For determining the conformity in respect of the physical characteristics, namely, ends and picks, mass per square metre, breaking load width, length and thickness the scale of sampling and criteria for conformity as given in IS: 3919 shall be followed.

Table 1 Particulars of Cotton Filter Cloth
(*Clause* **4.1**)

Variety No.	**Universal Count (*See* Note 1)**		**Ends/dm**	**Picks/dm**	**Mass**	**Breaking Strength on 5.0 × 20 cm Strips, *Min***		**Weave**	**Thickness**
	warp	weft				Warp-way	Weft-way		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					g/m^2	N	N		mm
(i)	42 tex/3	42 tex/3	190	134	450	1500	900	2/2 Twill	1.00
(ii)	37 tex/4 or 49 tex/3	37 tex/4 or 49 tex/3	190	134	520	1700	1100	2/2 Twill	1.00
(iii)	37tex/4	59 tex/2	190	166	520	1700	1100	2/2 Twill	0.95
(iv)	37 tex/4 or 49 tex/3	37 tex/4 or 49 tex/3	190	150	550	1700	1300	2/2 Twill	1.00
(v)	49 tex/3	42 tex/3	220	134	550	1900	900	2/2 Twill	1.00
(vi)	49 tex/2	81 tex/2	250	160	550	1400	1400	2/2 Broken Twill	1.00
(vii)	49 tex/3	49 tex/6	190	94	610	1300	1700	Plain	1.05
(viii)	49 tex/3	59 tex/3	250	94	610	2200	900	2/2 Twill 2 ends as 1	1.05
(ix)	42 tex/3	42 tex/6	250	110	690	2000	1700	2/2 Twill 2 ends as 1	1.40
(x)	49 tex/3	49 tex/6	300	106	820	2700	1800	2/2 Twill 2 ends as 1	1.45
(xi)	42 tex/3	49 tex/6	330	106	20	2700	1800	2/2 Twill 2 ends as 1	1.40

(xii)	59 tex/3	49 tex/6	250	94	820	2700	1700	2/2 Twill 2 ends as 1	1.70
(xiii)	94 tex/11	81 tex/13	85	45	1640	4000	2400	Plain	2.55
Tolerance, percent	—	—	± 2.5	± 5	+5 − 2.5	—	—	—	± 0.05 mm
Method of Test	—	—	IS : 1963	IS :1964		IS : 1969		Visual	IS : 7702

NOTES —
1 Universal Count of 37, 42, 49, 59, 81 and 94 tex are approximately equal to cotton count of 16, 14,12, 10, 7.3 and 6.3s.
2 IN=0.102 kgf approximately.

TABLE 2 OTHER REQUIREMENTS OF FILTER CLOTH
(*Clause* **4.2**)

Sl No.	Characteristic	Requirement	Method of Test
(1)	(2)	(3)	(4)
(i)	Width, cm	As agreed, ± 1 percent subject to a minimum of 1 cm in each direction	IS: 1954
(ii)	Length	As agreed $^{+2}_{-1}$Percent	IS: 1954

ANNEX A
(Clause **2***)*
LIST OF REFERRED INDIAN STANDARDS

IS NO.	*TITLE*
293.1980	Code For Seaworthy Packaging Of Cotton Yarn And Cloth (*Third Revision*)
1347-1972	Specification For Inland Packaging Of Cotton Cloth And Yarn (*First Revision*)
1954 : 1990	Determination Of Length And Width Of Woven Fabrics - Methods (*Second Revision*)
1963:1881	Methods For Determination Of Threads Per Unit Length In Woven Fabrics *(Second Revision)*
1964 : 2001	Textiles — Methods For Determination Of Mass Per Unit Length And Mass Per Unit Area Of Fabrics *(Second Revision)*
1969 (Part 1) : 2018	Textiles — Tensile Properties Of Fabrics Part 1 Determination Of Maximum Force And Elongation At Maximum Force Using The Strip Method *(Fourth Revision)*
3919 : 1966	Methods For Sampling Cotton Fabrics For Determination Of Physical Characteristics
IS 7702 : 2012 ISO 5084:1996	Determination Of Thickness Of Textiles And Textile Products (*First Revision*)

भारतीय मानक **मसौदा**

वस्त्रादि – कपास डक के लिए विशिष्टि

(आईएस 1422 का *चौथा पुनरीक्षण*)

Draft *Indian Standard*

Textiles — Specification for Cotton Duck

(*Fourth Revision* of IS 1422)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33

last date for receipt of comments is XXXX 2024

FOREWORD

(Formal clauses will be added later)

The standard, formulated in 1959, was revised in 1970, 1977 and 1983. The last revision has been made in the light of experience gained in implementing the standard. Provisions of waterproofing and the requirements of the proofed cloth have been eliminated in this revision as these are covered in IS: 2089 and IS: 6803 this revised version relates to basic fabric mainly.

This fourth revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) The title of the standard has been updated;
ii) Amendments has been incorporated;
iii) BIS certification clause has been incorporated;
iv) Packing and marking clause has been incorporated;
v) Latest sampling clause has been incorporated;
vi) ICS number has been incorporated in place of udc number; and
vii) References to Indian standards have been updated.

Variety No. 1 of cotton duck prescribed in this standard is based on IND/TC/0201 (d) 'Specification for Duck, Cotton, 745 g/m^2 (22 oz); Variety No. 2 on IND/TC/O123 (b) 'Specification for Duck, Cotton, 610 g/m^2 (18 oz); Variety No. 3 on IND/TC/O124 (b) 'Specification for Duck, Cotton, 475 g/m^2 (14 oz); and Variety No. 4 on IND/TC/ 0202 (b) 'Specification for Duck, Cotton 340 gm^2 (10 oz); issued by the Ministry of Defence, Government of India. Variety No. 5 is an alternate to Variety No. 4.

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 prescribes the constructional details and other particulars of five varieties of cotton duck. The cotton duck may be grey, scoured or dyed.

1.2 This standard does not specify the general appearance, feel, finish, etc., of the cloth (*see* also **5.3**).

1.3 The cotton duck covered under this specification is not suitable for belting**.**

2 REFERENCE

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 encourage to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

3.1 For the purpose of this standard, the following definitions shall apply.

3.2 Duck

A closely woven plain weave, strong, heavy cloth. It is used as sails, boot linings, tarpaulin, etc.

4 MANUFACTURE

4.1 Yarn — The yarn used for the manufacture of the cloth shall be satisfactory in evenness and reasonably free from neps and spinning and doubling defects.

4.2 The cloth should be free from sizing, filling and dressing materials and substance liable to cause subsequent tendering. The dyed cloth should be free from stains, streaks, patches and specks.

5 REQUIREMENTS

5.1 Constructional Particulars

The constructional particulars of grey, scoured or dyed cloth shall conform to Table 1. The count of single yarn is approximate and given for the guidance of the manufacturers. The number of counts and plies, however, shall not be changed.'

5.2 The cloth shall also conform to the requirements given in Table 2.

5.3 Sealed Sample

If, in order to illustrate or specify the general appearance, feel and such other characteristics of the cloth, a sample has been agreed upon and sealed, the supply shall be in conformity with the sample in such respects.

5.3.1 The custody of the sealed sample shall be a matter of prior agreement between the buyer and the seller.

6 MARKING

6.1 The, cloth shall be marked with the following:

a) Manufacturer's name, initials or trade-mark;
b) Name of the material;
c) Variety number;
d) Identification mark at both ends;
e) Month and year of manufacture';
f) Width and length of the piece; and
g) Any other particulars required by the buyer or by the law or regulation in force.

Table 1 Constructional Particulars of Cotton Duck
(*Clause* **5.1**)

Variety No.	Count and Ply of Yarn (Approximate) (see Note)	Ends/dm	Picks/dm	Mass	Breaking Strength on 5.0 × 20 cm Strips, Min	Length	Width	Weave

(1)	Warp Cotton Count (2)	Weft (Universal Count) (3)	(4)	(5)	g/m^2 (6)	Warp-way N (7)	Weft-way N (8)	m (9)	cm (10)	(11)
i)	10s/4 (59 tex × 4)	10s/6 (59 tex × 6)	16	9	745	2010	2010			
ii)	10s/3 (59 tex ×3)	10s/4 (59 tex × 4)	16	10	610	1670	1670			
iii)	14s/3 (42 tex ×3)	10s/3 (59 tex × 3) or 14s/4 (42 tex × 4)	18	11	475	1320	1320	As agreed	As agreed	Plain
iv)	18s/2 (33 tex × 2)	18s/3 (33 tex × 3)	24	14	340	930	930			
v)	14s/2 (42 tex × 2)	14s/2 (42 tex × 2)	22	16	340	930	930			
Tolerance Percent	—	—	±5	±5	±5	—	—	—	±1	—
Method of Test	—	—	IS : 1963		IS : 1964	IS : 1969 (Part 1)/ISO 13934-1		IS : 1954/ISO 22198 : 2006		visual

Table 2 Requirements for Cotton Duck

(*Clause* **5.2**)

Sl No.	Characteristic	Requirement	Method of Test
(1)	(2)	(3)	(4)
(i)	Scouring loss, percent, *Max*:		IS: 1383 (Mild Method)
	Grey	5.0	
	Scoured or Dyed	2.5	
(ii)	*p*H value (scoured or dyed)	6.0 to 8.5	IS: 1390 (Cold method)
(iii)	Shrinkage or elongation percent, *Max*		IS: 2977
	Grey	5.0	
	Scoured or Dyed	2.5	
(iv)	Colour fastness (for dyed duck) to:		
	a) Light	4 or better	IS/ISO 105 B01 or IS/ISO 105 B02
	b) Washing : Test 3	4 or better	IS/ISO105 C10

6.1.1 The cloth may also be marked with the Standard Mark**.**

6.1.2 *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 there under. The details of the conditions under which

the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 PACKING

7.1 The cloth shall be packed in bales or cases or rolls or pellets in conformity with the procedure laid down either in IS 1347 or IS 293 as required. The package thus obtained shall also be marked with name and full address of the manufacturer.

8 SAMPLING

8.1 For ascertaining the conformity in respect of length, width, breaking strength, mass, ends and picks, the number of tests and criteria for conformity as given in IS: 3919 shall be followed.
8.2 For ascertaining the conformity of the material in respect of scouring loss, *pH* value, shrinkage or elongation, and colour fastness, the scale of sampling and criteria for conformity as given in IS: 5463 shall be followed.

ANNEX A

(Clause **2***)*

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 293 : 1980	Code for seaworthy packaging of cotton yarn and cloth (*Third Revision*)
IS 1347 : 1972	Specification for inland packaging of cotton cloth and yarn (*First Revision*)
IS 1383 : 2023	Methods for Determination of Scouring Loss in Grey and Finished Cotton Textile Materials (*Second Revision*)
IS 1963:1881	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 2089 : 1977	Specification for common proofed canvas/duck and paulins (tarpaulins) (*Second Revision*)
IS 2977 : 1989	Fabrics (other than wool) – Method for determination of dimensional changes on soaking in water (*First Revision*)
IS 3919 : 1966	Methods for sampling cotton fabrics for determination of physical characteristics

IS 5463 : 2022	Methods for sampling of cotton fabrics for chemical tests (*First Revision*)
IS 6803 : 1972	Specification for special proofed canvas and duck
IS/ISO 105-B01 : 2014	Textiles — Tests for colour fastness part B01 colour fastness to light : daylight
IS/ISO 105-B02 : 2014	Textiles – Tests for colour fastness – part B02 colour fastness to artificial light: Xenon arc fading lamp test
IS/ISO 105-C10 : 2006	Textiles — Tests for colour fastness part C10 colour fastness to washing with soap or soap and soda
IS 1390 : 2022	Textiles — Determination of *p*H of aqueous extract (*Third*
ISO 3071 : 2020	*Revision*)
IS 1954 : 2024	Textiles — Fabrics — Determination of Width and Length *(*
ISO 22198 : 2006	*Third Revision*)
IS 1969 (Part 1) : 2018	Textiles — Tensile properties of fabrics part 1 determination of
ISO 13934-1:2013	maximum force and elongation at maximum force using the strip method (*Fourth Revision*)

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXX)
XXXX 2024

भारतीय मानक मसौदा

वस्त्रादि — कपास कैनवस के लिए विशिष्टि

(आईएस 1424 का *चौथा पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Specification for Cotton Canvas

(Fourth Revision of IS 1424*)*

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33

last date for receipt of comments is XXXX 2024

FOREWORD

(Formal clauses will be added later)

The standard, formulated in 1959, was revised in 1970, 1977 and 1983. The last revision has been made in the light of experience gained in implementing the standard. Provision for waterproofing and the requirements of the proofed cloth has been eliminated in this revision as these are covered in IS : 2089 and IS : 6803. This revised version related to basic fabric mainly.

This fourth revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) The title of this standard has been updated;
ii) BIS certification clause has been incorporated;
iii) Packing and marking clause has been incorporated;
iv) Latest sampling clause has been incorporated;
v) ICS number is incorporated in place of udc number; and
vi) References to Indian standards have been updated.

Variety No. 1 of cotton canvas prescribed in this standard is based on IND/TC/221 (c) 'Specification for Canvas, Cotton, 816 g'; Variety No. 2 on IND/TC/0135 (c) 'Specification for Canvas, Cotton, 678 g'; Variety No. 3 on IND/TC/0122 (c) 'Specification for Canvas, Cotton, 544 g'; and Variety No. 4 on IND/TC/0133 (c) 'Specification for Canvas, Cotton, 408 g'; issued by the Ministry of Defence, Government of India.

Cotton canvas covers cloth with a great variety of uses. Canvas may be used in belting, rubber canvas footwear, insertion sheets and in different types of proofed fabrics, tarpaulins, and bags.

This edition 4.2 incorporates Amendment No. 1 (June 1986) and Amendment No. 2 (July 1990). Amendment No. 2 is being issued to specify that the number of plies of the plied yarn are mandatory; however, the count of single yarn is approximate and given for guidance only. Side bar indicates modification of the text as the result of incorporation of the amendments.

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 prescribes the constructional details and other particulars of four varieties of cotton canvas. The cotton canvas may be grey, scoured or dyed.

1.2 This standard does not specify the general appearance, feel, finish, etc.; of the cloth (see *also* **5.3**).

2 REFERENCE

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 encourage to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

3.1 Canvas — A strong, firm, single or double end plain weave cloth made with single or plied yarns and in which the warp predominates.

4 MANUFACTURE

4.1 Yarn — The yarn used for the manufacture of the cloth shall be satisfactory in evenness and reasonably free from neps and spinning and doubling defects.

4.2 Cloth — The cloth should be free from sizing and dressing materials and other substances liable to cause subsequent tendering. The dyed cloth should be free from stains, streaks, patches and specks.

5 REQUIREMENTS

5.1 Constructional Particulars

The constructional particulars of grey, scoured or dyed cloth shall conform to Table 1. The count of single yarn is approximate and given for the guidance of the manufacturers. The number of plies, however, shall not be changed.

5.2 The canvas shall also conform the requirement given in Table 2.

5.3 Sealed Sample

If, in order to illustrate or specify the general appearance, feel and other such characteristics of the cloth, a sample has been agreed upon and sealed, the supply shall be in conformity with the sample in such respects.

5.3.1 The custody of the sealed sample shall be a matter of prior agreement between the buyer and the seller.

6 MARKING

6.1 The cloth shall be marked with the following:

a) Manufacturers name, initials or trade mark;
b) Name of the material;
c) Variety number;
d) Identification mark at both ends;
e) Year of manufacture;
f) Width and length of the piece; and
g) Any other particulars required by the buyer or by the law or regulation in force.

Table 1 Constructional Particulars of Cotton Canvas
(*Clause* 5.1)

Sl No. (1)	**Characteristic** (2)		**Requirement** (3)				**Tolerance, Percent** (4)	**Method of Test** (5)
1	**Variety No.**		**1**	**2**	**3**	**4**		
2	Count of yarn (Approximate) (*see* Note 1)	Cotton Count Warp (Universal Count) Weft	10s/3 (59 tex x 3) 10 s/4 (59 tex x 4)	14s/3 (342 tex x3) 10 s/3 (59 tex x 3) or 12 s/4 (49 tex x 4)	18 s/3 (33 tex x3) 14 s/3 (42 tex × 3) or 18 s/4 (33 tex × 4)	20 s/2 (30 tex x2) 22 s/3 (27 tex × 3)	—	—
3	Ends/cm		23	26	28	36	± 5	IS : 1963
4	Picks/dm		115	125	145	180	± 5	
5	Mass, g/m^2		815	680	545	410	± 5	IS : 1964
6	Breaking load on 5x20 cm	Warp way	2500	2100	1760	1370	—	IS : 1969
	Ravelled Strips, *Min, N*	Weft way	2100	1760	1470	1080	—	
7	Length, *M*		As agreed				—	IS : 1954
8	Width, *cm*		As agreed				± 1	
9	Weave		Plain or Oxford				—	Visual

NOTES

1 To convert cotton count to universal count, in tex, divide 590.5 by the cotton count.

2 1 N (newton) is approximately equal to 0.102 kgf.

3 The count of single yarn is approximate and given for the guidance of the manufacturers. The number of plies, however, shall not be changed.

Table 2 Requirements for Cotton Canvas
(*Clause* **5.2**)

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of Test (4)
i)	Scouring Loss, Percent, *Max*:		IS : 1383 (Mild method)
	a) Grey	5.0	
	b) Scoured or Dyed	2.5	
ii)	*p*H Value (scoured or dyed)	6.0 to 8.5	IS : 1390 (Cold method)
iii)	Shrinkage or elongation, percent, *Max:*		IS : 2977
	a) Grey	5.0	
	b) Scoured or Dyed	2.5	
iv)	Colour fastness (dyed duck) to :		
	a) Light	4 or better	IS/ISO 105 B01 or IS/ISO 105 B02
	b) Washing : Test 3	4 or better	IS/ISO 105 C10

6.1.1 The cloth 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. The ISI 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 which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. 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.

6.1.2 *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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 PACKING

7.1 The cloth shall be packed in bales or cases in conformity with the procedure laid down either in IS: 1347 or in IS: 293 as required.

8 SAMPLING

8.1 For ascertaining the conforming of the material in respect of ends and picks, mass, breaking load, and length and width, the scale of sampling and criteria for conformity as given in IS: 3919 shall be followed.

8.2 For ascertaining the conformity in respect of scouring loss, *p*H value shrinkage or elongation, and colour fastness, the scale of sampling and criteria for conformity as given in IS: 5463 shall be followed.

ANNEX A

(Clause 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 293 : 1980	Code for seaworthy packaging of cotton yarn and cloth (*Third Revision*)
IS 1347 : 1972	Specification for inland packaging of cotton cloth and yarn (*First Revision*)
IS 1383 : 2023	Methods for Determination of Scouring Loss in Grey and Finished Cotton Textile Materials (*Second Revision*)
IS 1963:1881	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 2089 : 1977	Specification for common proofed canvas/duck and paulins (tarpaulins) (*Second Revision*)
IS 2977 : 1989	Fabrics (Other Than Wool) – Method for determination of dimensional changes on soaking in water (*First Revision*)
IS 3919 : 1966	Methods for sampling cotton fabrics for determination of physical characteristics
IS 5463 : 2022	Methods for sampling of cotton fabrics for chemical tests (*First Revision*)
IS 6803 : 1972	Specification For Special Proofed Canvas And Duck
IS/ISO 105-B01 : 2014	Textiles — Tests for colour fastness part B01 colour fastness to light : daylight
IS/ISO 105-B02 : 2014	Textiles – Tests for colour fastness – part B02 colour fastness to artificial light: Xenon arc fading lamp test
IS/ISO 105-C10 : 2006	Textiles—Tests for colour fastness part C10 colour fastness to washing with soap or soap and soda
IS 1390 : 2022 ISO 3071 : 2020	Textiles — Determination of *p*H of aqueous extract (*Third Revision*)

IS 1954 : 2024	Textiles — Fabrics — Determination of Width and Length (*Third Revision*)
ISO 22198 : 2006	
IS 1969 (Part 1) : 2018	Textiles — Tensile properties of fabrics part 1 determination of maximum force and elongation at maximum force using the strip method (*Fourth Revision*)
ISO 13934-1 : 2013	

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDRADS

Draft for comments only (XXXXX)

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XXXX 2024

भारतीय मानक मसौदा

वस्त्रादि — रबर की नली को मजबूत करने के लिए सूती कपड़े — विशिष्टि

(आईएस 4388 का *दूसरा पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Cotton Fabrics for Reinforcement of Rubber Hoses — Specification

(*Second Revision* of IS 4388)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, is TXD 33 2024	last date for receipt of comments XXXX

FOREWORD

(Formal clauses will be added later)

Cotton fabrics conforming to this standard are used for the reinforcement of rubber hoses.

When this standard was originally published in 1967 assistance was derived from BS 1103 : 1957 'Cotton fabrics for the reinforcement of rubber hose'. This standard is revised on the basis of general manufacturing and trade practices being followed in the country in this field.

This second revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) Title of the standard has been modified;
ii) BIS certification clause has been incorporated;
iii) Packing and marking clause has been incorporated;
iv) Latest sampling clause has been incorporated;
v) ICS number has been incorporated in place of UDC number; and
vi) References to Indian standards have been updated.

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 — Cotton Fabrics for Reinforcement of Rubber Hoses — Specification

(*Second Revision*)

1 SCOPE

1.1 This standard prescribes the requirements of cotton fabrics used in the reinforcement of rubber hoses.

1.2 This standard also gives the constructional particulars of a few popular varieties of hose fabrics for information only.

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 MANUFACTURE

3.1 Yarn

The yarn used in the manufacture of hose fabrics shall be satisfactory in evenness and shall be reasonably free from neps, spinning and doubling defects.

3.2 Cloth

The cloth shall be evenly and firmly woven in plain weave. The cloth when visually examined shall be reasonably free from foreign matter and such defects as knots, 'umps and irregularities of twist in yarn.

4 REQUIREMENTS

4.1 The constructional particulars of hose fabrics shall be as agreed to between the buyer and the seller subject to the following telerances when tested by the methods shown against them:

Sl No.	*Parameters*	*Tolerances, Percent*	*Method of Test*
1	Ends	± 2.5	IS : 1963
2	Picks	± 5	IS : 1963
3	Mass, g/m^2	± 5	IS : 1964
4	Thickness	± 10	IS : 7702/ISO 5084 : 1996
5	Length	+1 -0.5	IS : 1954
6	Width	± 2	IS : 1954

4.1.1 The constructional particulars of a few popular varieties are given in Annex B for information only.

4.2 The breaking load of cotton hose fabrics shall conform to the requirements given in Table 1.
4.3 The hose fabrics shall be starch free when tested by the method given in Annex C.

Table 1 Requirements of Cotton Hose Fabrics

(*Clause* 4.2)

Sl No.	**Characteristics**		**Requirements**								**Method of Test**
(1)	**(2)**		**(3)**								**(4)**
1	Mass, g/m^2		151 to 250	251 to 350	351 to 450	451 to 550	551 to 650	651 to 750	751 to 850	Above 850	IS 1964
2	Breaking load, *Min*, 5.0 x 20.0 cm Ravelled Strip	Warp N	500	750	1000	1250	1500	1700	2000	2500	IS 1969 (Part 1)
		Weft N	500	750	1000	1250	1500	1750	2000	2500	IS 1969 (Part 1)

5 PACKING

The cloth shall be made into tight rolls of 200 metres or any other length as agreed to between the buyer and the seller. The rolls shall be tightly wrapped with a layer of polyethylene film and

hessian and sewn tightly all over or as agreed to between the buyer and the seller. If necessary, additional layers of packing materials may be used to avoid ingress of moisture in transit.

6 MARKING

Each roll shall be marked with the following:

a) Name of the material;

b) Length and width of the roll;

c) Name of the manufacturer, initials or trade-mark, if any;

d) Month and year of manufacture; and

e) Any other information as required by the law in force or as agreed between the buyer and the seller.

6.1 *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 product(s) may be marked with the Standard Mark.

7 SAMPLING

7.1 For ascertaining the conformity in respect of length, width, breaking load, mass, ends and picks, the number of tests and criteria for conformity as given in IS : 3919 shall be followed.

7.2 For ascertaining the conformity in respect of freedom from starch, the number of tests and criteria for conformity as given in IS : 5463 shall be followed.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS	*Title*
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 7702 : 2012/ISO 5084 : 1996	Textiles – Determination of thickness of textiles and textile products (*First Revision*)
IS 1954 : 2024/ISO 22198 : 2006	Textiles - Fabrics - Determination of width and length (*Third 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 3919 : 1966	Methods for sampling cotton fabrics for determination of physical characteristics
IS 5463 : 2022	Methods for sampling of cotton fabrics for chemical tests first revision of IS 5463

ANNEX B

(*Clause* 4.1.1)

CONSTRUCTIONAL PARTICULARS OF POPULAR VARIETIES OF COTTON HOSE FABRICS

Sl. No.	Variety No.		1	2	3	4	5	6	7	8	9	10	11	12
1	Approximate Count of Yarn	Warp	$2/14^S$	$2/10^S$	$2/7^S$	$2/10^S$	$4/10^S$	$3/7^S$	$5/10^S$	$4/7^S$	$5/7^S$	$7/10^S$	$8/10^S$	$7/7^S$
		Weft	$2/14^S$	$2/10^S$	$2/7^S$	$2/10^S$	$4/10^S$	$3/7^S$	$5/10^S$	$4/7^S$	$5/7^S$	$7/10^S$	$8/10^S$	$7/7^S$
2	Ends, dm		130	130	102	160	93	93	87	83	75	75	75	75
3	Picks, dm		130	130	102	160	93	93	87	83	75	75	75	75
4	Mass, g/m^2		235	330	380	420	480	520	580	620	680	700	800	1000

ANNEX C

(*Clause* 4.3)

METHOD FOR DETERMINATION OF FREEDOM FROM STARCH CONTENT

C-l. TEST SPECIMEN

C-l.1 Cut a piece weighing about 10 g from the test sample. Shred the piece into small bits and mix them thoroughly. Draw from the pieces so shreded a test specimen of about 5 g.

C-2. PROCEDURE

C-2.1 Boil the test specimen in about 200 ml of distilled water in a conical flask for about 45 minutes. Cool the contents in the flask. Put a drop of iodine solution on a smaller quantity taken from the flask.

C-3. REPORT

C-3.1 Observe whether there is any appearance of blue colour on adding a drop of iodine solution. Report the material to be starch-free if no blue colour is observed.

REVIEW ANALYSIS OF INDIAN STANDARD

1. **Sectional Committee No. & Title: TXD 33, Industrial Fabrics Sectional Committee**

2. **IS No: IS 4501 : 1981**

3. **Title: TEXTILES — SPECIFICATION FOR APRONS, RUBBERIZED, ACID AND ALKALI RESISTANT (First Revision)**

4. **Date of review:16/10/2024**

5. **Review Analysis**

i) Status of standard(s), if any from which assistance had been drawn in theformulation of this IS.

Standard (No. & Title)	Whether the standard hassince been revised	Major changes	Action proposed
NA			

ii) Status of standards referred in the IS

Referred standards (No. & Title)	IS No. of this standards since revised	Changes that are ofaffecting the standard under review	Action proposed
IS 5915: 1970 Specification for Single Texture Rubberized Waterproof Fabrics	Same version	**NA**	NA

IS 1720: 1978 **Specification forcotton sewing threads (firstrevision)**	Same version	**NA**	NA
IS 4084: 1978 **Specification for eyelets and washers (SAIL) (First Revision)**		**NA**	NA
IS : 4905 : 1968 **Random sampling and randomization procedures (FirstRevision)**	IS 4905 : 2015	**NIL**	Editorial Changes

iii) Any other standards available related to the subject & scope of the standardbeing reviewed (International/regional/other national/association/consortia, etc. or of new or revision of existing Indian Standard)

Standard (No. & Title)	Provisions that could be relevant while reviewing theIS	Action proposed
ISO 16602:2007 : Protective clothing for protection against chemicals — Classification ,labelling and performance requirement		

s		

EN 14605 (Protective clothing againstliquid chemicals).		

iv) **Technical comments on the standard received, if any**

Source	Clause of IS	Comment	Action proposed
NA			

v) **Information available on technical developments that have taken place (onproduct/processes/practices/use or application/testing/input materials, etc)**

Source	Development	Relevant clause of the IS under reviewthat is likely to be impacted (Clause & IS No.)	Action proposed
Nil			

vi) **Issues arising out of changes in any related IS or due to formulation of new Indian Standard**

Related IS and its Title (revised or new)	Provision in theIS under reviewthat would be impacted & the clause no. or addition of new clause/provision	Changes that may be necessary in the Standards under review	Action proposed
nil			

vii) **Any consequential changes to be considered in other IS**

Related IS to get impacted	Requirements to be impacted
nil	

6. Any other observation:

Cl 4.1

All required test is not mentioned in referred IS.

Other quality and grade can be added as per end application of consumer and site conditions. Both side rubber coated apron will be inferior in the comfort properties.

Cl 4.2

1) This IS only referring thread made up of cotton but in the present scenario, cotton swing thread is not as popular as other. The chemical resistance properties of cotton are inferior in comparison to some manmade fibres. Option for others material swing threads can be added in this clause, not limited to only cotton.
2) Scope of variety of thread can be wider so options can be available for manufacture.

Cl 4.3

Scope of variety of Eyelets can be wider so options can be available for manufacture. Material should not be limited to aluminium, other acid and alkali resistant material eyelets can be allowed.

Cl 5 REQUIREMENTS

The design of apron is limited in this IS. The scope of design can be wider as present design is only covering front and back part of body. The sleeve's part and other neck part is not entirely cover in present design. In the scope of design, more design can be added for example sleeve & sleeveless etc.

The apron sizes of different size can be added as per height and dimension of body so Classification as per size can be added for example XS, S, M, L, XL & XXL ETC. Same dimensions will not be fit to all individuals.

Tolerances on the dimensions of the vests have been modified.

Classification based on permeation time can be added because different type of site condition will require different level of permeation time. For example

Protection Index	Permeation Time (min.)
Class 1	>10
Class 2	>30
Class 3	>60
Class 4	>120
Class 5	>240
Class 6	>480

Cl 6.4 Number of Tests and Criteria for Conformity

The full sleeves and full body aprons can be tested for water vapour permeability. Determining the resistance of chemical protective clothing to penetration by liquid chemical sprays at different intensity levels can be added.

Tolerances on the dimensions of the vests have been modified.
Colour fastness to perspiration has been modified.

7. Recommendations: May consider the above suggestions while revising thestandard.

Reference:

DOI: https://doi.org/10.1039/D3RA00212H

https://abbigliamentocertificato.com/en/acid-resistant_workwear/

DOI: 10.3390/coatings13122007

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BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXXX)

XXXX 2024

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भारतीय मानक मसौदा

वस्त्रादि — अम्ल और क्षार प्रतिरोधी, रबरयुक्त, एप्रन — विशिष्टि

(आईएस 4501 का *दूसरा पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Aprons, Rubberized, Acid and Alkali Resistant — Specification

(*Second Revision* of IS 4501)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33	last date for receipt of comments is XXXX 2024

FOREWORD

(Formal clauses will be added later)

This standard was first published in 1967. The requirements for finished fabric and coating were not stipulated in the standard and reference to IS : 5915 was given which was under preparation at that time. In this revision suitable type, quality, grades covered under IS : 5915 for preparation of these aprons have been stipulated.

Acid and alkali-resistant rubberized aprons are used by workers in chemical laboratories and in industrial establishments for protection against contact of the wearing apparel and skin with acids and alkalis. In order that these aprons effectively resist the action of acid and alkali and do not allow them to corrode through the apron to affect clothing or skin, the requirements of the material has to be defined and established. The general design of these aprons should be emphasized keeping in view comfortable wear as also avoiding use of superfluous material.

This second revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) The Title of the standard has been updated;
ii) BIS certification clause has been incorporated;
iii) Packing and marking clause has been incorporated;
iv) ICS number has been incorporated in place of UDC number; and
v) References to Indian standards have been updated.

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 '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 prescribes the requirements and the methods of sampling for acid and alkali-resistant rubberized aprons.

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. DESIGN

3.1 This standard prescribes rubberized aprons of two designs depending upon the requirements of the purchaser.

Design 1 - with straps and buckles, rounded neck and sleeve portion.

Design 2 - with tying tapes, straight neck and semi-rounded sleeve portion.

4. MATERIAL

4.1 Waterproof Rubberized Double Faced Fabric - Conforming to the requirements of Type 2, Quality 2, Grade B of IS : 5915.

4.2 Sewing Cotton - Conforming to the requirements of variety No. 31-603/6 (100 d tex x 6) of IS : 1720.

4.3 Eyelets - Made of aluminium alloy size No. 24 of IS : 4084.

4.4 Buckles - Suitably nickel plated.

5. REQUIREMENTS

5.1 Colour - The finished material shall be white or of a suitable colour on two sides as agreed to between the purchaser and the supplier.

5.2 Workmanship and Construction

5.2.1 *Design I* -The make up and shape of the aprons shall conform generally to Fig. 1. The body of the apron shall be made from rubberized cloth, properly vulcanized and in accordance with 4.1. The neck and the sleeve portion shall be rounded as shown in Fig. 1 to accommodate wearer's neck and arm corner. Each apron shall have a strap at the arm and neck portions. The strap shall be folded and sewn at both sides as specified in Fig. 1. Each strap shall be provided with a buckle suitably nickel plated, with sliding jaw. The strap shall pass freely in the buckle. It shall be stitched with lock stitch having 32 stitches per dm.

5.2.2 *Design 2* - The make up and shape of the ~aprons shall conform generally to Fig. 2. The body of the apron shall be made from rubberized cloth properly vulcanized and in accordance with 4.1. The strengthening pieces at the top and arm corners of the aprons shall be of the same material as that of the body and neatly stitched to the body of the apron. Each apron shall have four eyelets, one each at both arm corner and neck corner. The eyelets shall be made of aluminium alloy of size No. 24 of IS: 4084. The eyelets shall be properly fixed on the strengthening pieces in the position shown in Fig. 2. It shall be stitched with lock stitch having 32 stitches per dm.

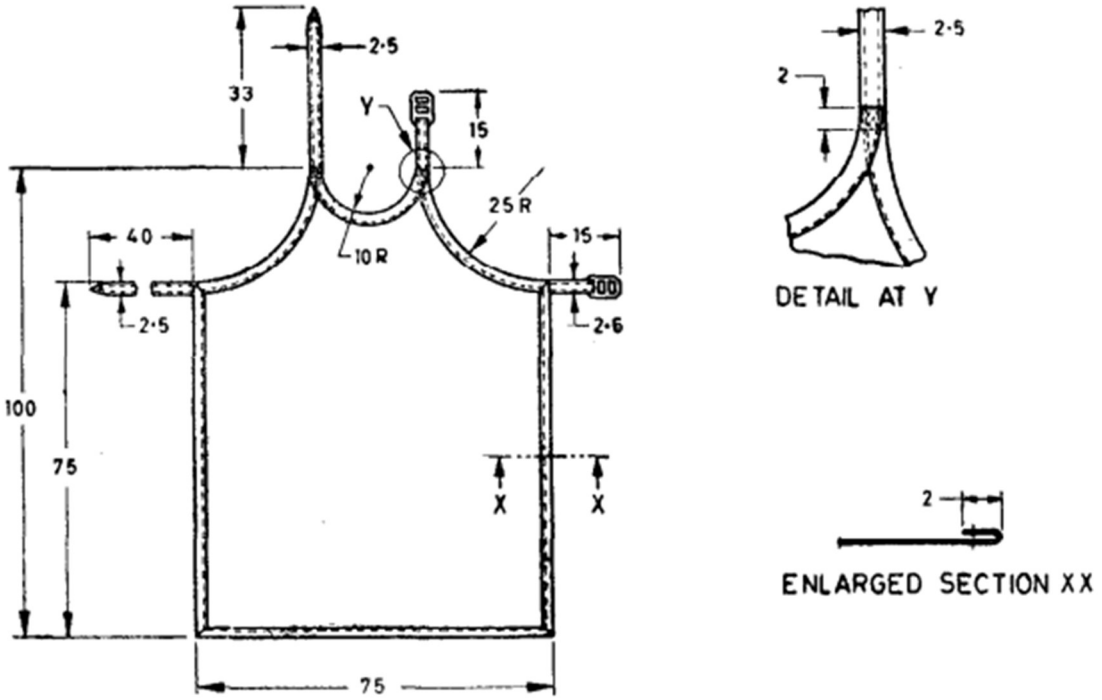

FIG 1 RUBBERIZED APRON WITH STRAPS

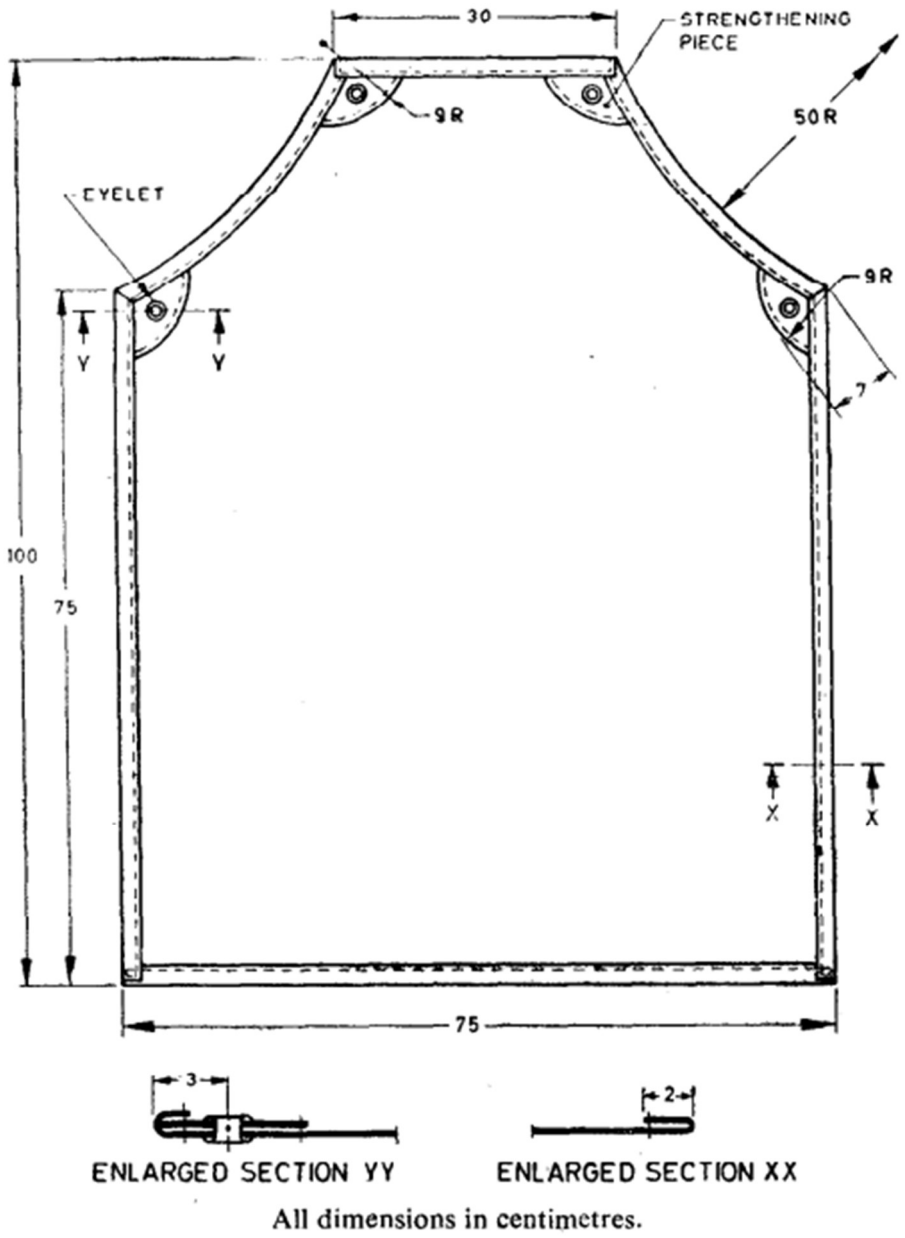

FIG 2 RUBBBERIZED APRON WITH EYELETS

6. PACKING AND MARKING

6.1 The aprons shall be dusted with talc and packed suitably as agreed to between the purchaser and the supplier.

6.2 Each apron shall be clearly marked inside with manufacturer's name or recognized trade mark, if any. The ink shall be non-irritating to skin and shall not impair the quality of aprons.

6.3 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 product(s) may be marked with the Standard Mark.

7. SAMPLING, NUMBER OF TEST AND CRITERIA FOR CONFORMITY

7.1 Lot

All the aprons of the same design and belonging to the same batch of manufacture shall be grouped together to constitute a lot.

7.2 For ascertaining conformity of the material to the requirements of this specification, samples shall be tested from-each lot separately.

7.3 The number of aprons to be selected from a lot shall depend on the size of the lot and shall be according to Table 1.

Table 1 Scale of Sampling and Permissible Number of Defectives

(*Clause* 7.3)

No. of Aprons in the lot	For colour, construction and workmanship		Number of tests to be conducted for proofing and finished fabric according to IS : 5915
	Sample Size	Acceptance Number	
(1)	(2)	(3)	(4)
Up to 50	8	0	1
51 to 100	13	1	1
101 to 300	20	2	2
301 and above	32	3	3

7.3.1 The aprons shall be selected from the lot at random. In order to ensure the randomness of selection, procedures given in IS : 4905/ISO 24153 : 2009 may be followed.

7.4 Number of Tests and Criteria for Conformity

6.4.1 Colour, Construction and Workmanship -Each apron selected according to co1 2 of Table 1 shall be examined for these requirements. An apron failing in one or more of these requirements shall be regarded as defective. The lot shall be considered as conforming to these requirements if the number of defectives found in the sample is less than or equal to the corresponding acceptance number given in co1 3 of Table 1.

7.4.2 The lot having been found satisfactory according to 7.4.1 shall be further tested for proofing compound and finished fabric according to Type 2, Quality 2 and Grade B of IS : 5915. The number of tests to be conducted for each of these requirements shall be according to co1 4 of Table 1. For this purpose, the required number of aprons shall be selected from those already examined according to 7.4.1 and found satisfactory. The lot shall be declared as conforming to the requirements of this specification, if no failure occurs in any test for both the requirements; otherwise not.

ANNEX A

(*Clause* 2)

LIST OF REFFERED STANDARDS

IS	*Tital*
IS 5915 : 1970	Specification for Single Texture Rubberized Waterproof Fabrics
IS 4084 : 1978	Specification for eyelets and washers (SAIL) (*First Revision*)
IS 1720 : 1978	Specification for cotton sewing threads (*First Revision*)
IS 4905 : 2015/ISO 24153 : 2009	Random sampling and randomization procedures (*First Revision*)

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BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33
(XXXX)

XXXX 2024

भारतीय मानक मसौदा

वस्त्रादि — रबरयुक्त धूमन शीट और कवर के लिए विशिष्टि

(आईएस 4810 का *पहला पुनरीक्षण*)

Draft *Indian Standard*

Textiles — Specification for Fumigation Sheets and Covers, Rubberized

(First Revision of IS 4810*)*

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33

last date for receipt of comments is XXXX 2024

FOREWORD

(Formal clauses will be added later)

This standard was originally published in 1968. This first revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) The Title of the standard has been updated.

ii) Amendments has been incorporated.

iii) BIS certification clause is incorporated.

iv) Packing and marking clause is incorporated.

v) Latest sampling clause is incorporate.

vi) ICS number is incorporated in place of udc number.

vii) References to Indian standards is updated.

Gas-proof covers are used to fumigate food grains, either in the open or in godowns. Even in gas-tight go downs, individual stocks may be economically treated in these covers. Fumigation of large stocks in a fumigation chamber involves too much time and labour because the stocks have to be moved to and fro. Sometimes infested stock needs to be fumigated miles away from a fumigatorium and gas-proof covers are the only economical and convenient means of getting this done. This Indian Standard prescribes requirements for sheets needed to make such covers and also includes instructions to guide manufacturers in making suitable gas-tight covers and in using them properly.

The Committee intends to incorporate a suitable requirement for permeability of the fumigation cover materials to fumigants later when a simple method for testing permeability becomes available for routine use.

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

This standard prescribes the requirements and the methods of sampling and test for rubberized fumigation sheets and covers.

2 REFERENCES

The standards listed below 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 listed below:

IS No.	*Title*
IS 1070 : 2023	Reagent Grade Water Specification (*Fourth Revision)*
IS 1720 : 1978	Specification For Cotton Sewing Threads *(First 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 2244 : 1972	Glossary Of Terms Relating To Treated Fabrics *(First Revision)*
IS 6110 : 1983	Specification For Double - Texture Rubberised Waterproof Fabrics *(Fourth 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 4) : 2012 ISO 188 : 2011	Methods Of Test For Vulcanized Rubber: Part 4 Accelerated Ageing And Heat Resistance *(Third 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)*

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 2244 shall apply.

4 CONDITIONING OF THE TEST SPECIMENS

Specimens selected for test shall be conditioned at a temperature of 27 ± 2°C and at relative humidity 65 ± 2 percent for at least 48 hours before test.

5 REQUIREMENTS

5.1 Fumigation covers shall be made from fumigation sheets fabrics and shall conform to the requirements of **5.5**. The fumigation sheets shall have a layer of rubber proofing between two plies and a layer of rubber proofing on the outer surface of one of the plies. The outer layer of rubber proofing shall have a lustrous aluminium finish. The base fabric, the rubber proofing and the rubber proofing and fumigation sheet (finished fabric) shall conform to the requirements of **5.2**, **5.3** and **5.4** respectively.

5.2 Base Fabric

5.2.1 The base fabric shall be of white cotton. It shall conform to the requirements given in Table1.

Table 1 Requirements for Base Fabric

Sl No. (1)	Characteristic (2)	Requirements For Base Fabric (3)	Method Of Test, Ref to IS No. (4)
i)	Weight of fabric, g/m^2	120	IS 1964
ii)	Ends per dm, *Min*	270	IS 1963
iii)	Picks per dm, *Min*	$120\frac{+5}{-2}$	do
iv)	Breaking strength, kg/cm width, *Min*: warp-way Weft-way	 6.8 4.5	IS 1969

5.3 Proofing

5.3.1 The proofing of both the outer layer and the intervening layer between the base fabrics shall consist of vulcanized rubber composition, prepared from high grade natural and/or synthetic rubber and shall be so compounded as to ensure good ageing properties. It shall have a rubber polymer content of not less than 40 percent by weight and shall be free from vulcanized waste, reclaimed rubber, rubber substitutes and from substances liable to cause tendering of the fabric. It shall be reasonably free from substances known to have deleterious action on rubber, such as copper and manganese compounds. It shall be non-irritant and free from objectionable odour. The proofing used in the outer layer shall be provided with a lustrous aluminium finish.

5.3.1.1 The rubber polymer content shall be determined by indirect method as prescribed in Annex B of IS 6110 'Specification for double—texture rubberized waterproof fabrics'.

5.4 Fumigation Sheet (Finished Fabric)

5.4.1 *Dimensions*

The length and width of the fumigation sheet shall be as agreed to between the purchaser and the supplier. There shall, however, be not more than one joint in the bottom layer.

5.4.2 *Weight*

The maximum weight of the fumigation sheet shall be 625 g/m^2 when tested by the method prescribed in IS 1964.

5.4.3 *Breaking Strength*

The breaking strength of the fumigation sheet in warp direction shall be not less than 13.5 kg/cm when tested in accordance with IS 1969.

5.4.4 *Workmanship and Finish*

The proofing shall be smoothly and uniformly spread between the two cloth layers and on one surface of the double-texture fabric. The cloth layers in the finished fabric shall be firmly adhered to the proofing. The selvedges of the base cloth shall coincide and be uniform throughout the length. It shall be flexible and free from blisters, wrinkles, unproofed areas and pinholes. It shall be waterproof.

5.4.5 *Proofing Content*

The proofing content shall be not less than 300 g/m^2 of which not less than 70 percent shall be in the sandwich layer. The proofing content shall be determined in accordance with the method given in Annex A.

5.4.6 *Adhesion between Fabrics Plies*

Fabric plies of a strip of the fumigation sheet fabric, 2.5 cm wide, shall not separate at a rate exceeding 2.5 cm per minute under a load of 1.8 kg, when tested in 'accordance with the method B prescribed in IS 3400 (Part V).

5.4.6.1 After being subjected to the accelerated ageing test as specified in **5.4.8** and then conditioned at a relative humidity of 65 ± 2 percent and temperature of 27 ± 2°C for 48 hours, the plies of a 2.5 cm wide strip of fumigation sheet shall not separate at a rate exceeding 2.5 cm per minute under a load of 1.4 kg.

5.4.6.2 After being immersed in the fumigant of the composition specified in **5.4.7** for 24 h at a temperature of 27 ± 2°C and then conditioned in an atmosphere maintained at a relative humidity

of 65 ± 2 percent and temperature of 27 ± 2°C for 48 h, the plies of a 2.5 cm wide strip of fumigation sheet shall not separate at a rate exceeding 2.5 cm per minute under a load of 1.1 kg

5.4.7 *Resistance to Fumigant*

The loss in weight of the sample or immersion in a fumigant consisting of three parts of ethylene dichloride and one part of carbon tetrachloride for 72 h at 27 ± 2°C shall be not more than 4 percent as calculated on the original weight of proofing. Both the weights of samples before and after immersion in the fumigant shall be determined after conditioning the sample at 65 ± 2 relative humidity and at 27 ± 2°C for at least 48 h.

5.4.8 *Accelerated Ageing Test*

The sample shall show no apparent deterioration, when tested in accordance with the method given under clause **4.3** of IS 3400 (Part IV) at a temperature of 90 ± 1°C for 120 h.

5.4.9 *Waterproofness Test*

A 20-cm diameter piece of the sample cloth when subjected to a 90-cm head of water for one hour on the aluminium finished face, shall not allow water to percolate through and not become wet on its outer surface.

5.4.10 *Fumigant Retention Test*

The lohosphine in 24 h shall be more than 15 percent when determination in accordance with the thod prescribed in Annex D.

5.5 Construction of Fumigation Covers

5.5.1 *Design and Size*

The fumigation cover shall have a mosquito netlike structure. It shall be made by stitching together pieces of fumigation sheets of appropriate dimensions, with the aluminium finish on the outside. It shall have one or more openings at the top, each fitted with a tubular funnel made from a piece of fumigation sheet and provided with tying tapes for closing. It shall also be provided with a number of handling strips at the top and bottom. The size of the cover and the number of openings at the top and other details of design shall be as agreed to between the purchaser and the supplier.

5.5.2 *Stitching*

The stitching shall be done neatly by means of 6/36s sewing cotton thread (variety No. 15 of IS 1720) or other approved thread having a breaking strength of not less than 2.25 kg. The joints shall be of the type shown in the sketch in Annex B, stitched by means of two rows of parallel stitches about 2.5 cm apart. The number of stitches shall be about 25 to 30 per decimetre.

5.5.3 *Sealing the Stitched joints*

All the stitches shall be adequately covered by means of a self—vulcanizing rubber solution or other approved sealing material or by taping with rubberized fabric by means of a self-vulcanizing rubber solution so as to ensure that the stitched portions arc leakproof.

5.5.4 Details of fabrication of a suitable fumigation cover are given in Annex B for guidance of the supplier.

6 PACKING AND MARKING

6.1 The covers and sheets shall be freely dusted with French chalk on the rubber side and shall be suitably folded or rolled. Each cover shall be tied at two places to form a bundle which shall be wrapped with one layer of kraft paper followed by a layer of waterproof packing paper and finally an outer layer of heavy jute hessian. The bundles shall be packed into bales without pressure. The seams of the bale shall be securely sewn with double jute twine with not less than 12 stitches per 10 cm, care being taken not to pierce the inner wrapping. If required by the purchaser, the covers shall be packed in suitable wooden boxes having hinge and lock arrangement.

6.2 Each bale or roll shall be legibly and indelibly marked with manufacturer's name and his trade-mark, if any, month and year of packing.

6.2.1 *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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 SAMPLING

7.1 Representative samples shall be drawn as prescribed in Annex C.

ANNEX A

(*Clause* **5.4.5**)

DETERMINATION OF PROOFING CONTENT

A-1 GENERAL

A-1.1 A solvent capable of swelling and dissolving rubber polymer, is required. The choice of suitable solvent depends on the nature of the polymer and on the properties of the textile.

A-2 REAGENT

A-2.1 Solvent— Suitable solvents are chlorinated hydrocarbons, carbon disulphide and higher ketones.

A-3 PROCEDURE

A-3.1 Cut four 10 cm square pieces roughly equally spaced across the width of the fabric with the two outer test pieces centred 15 cm from the selvedges.

A-3.1.1 Condition the test pieces and transfer to weighing bottles and determine the weights taking care to avoid loss of loose fabric. Immerse in the solvent and heat under reflux until the proofing has dissolved or swollen thoroughly (generally about an hour), taking care not to allow the temperature to exceed 160°C. Remove the test piece from the solvent, pull the two fabrics apart and scrape off as much of swollen proofing as possible. Repeat reflux and scraping using fresh solvent until the fabric is free from rubber. Squeeze the fabric to remove the solvent and rinse with light petroleum hydrocarbon solvent. Dry the fabric at 105°C to 110°C for 1 h and condition for 24 h. Transfer to a weighing bottle and determine the weight. Ash the fabric at a low temperature in a previously ignited and weighed crucible and determine the ash.

A-4 CALCULATION

A-4.1 Weight of proofing, g/m^2 = $100(a - b + c)$

where

a = weight in g of test piece,

b = weight in g of fabric after deproofing, and

c = weight in g of ash in the test piece.

ANNEX B

(*Clauses* **5.5.2, 5.5.4** *and* **C-2.3.1**)

CONSTRUCTION OF FUMIGATION COVERS

B-1 PREPARATION OF MOSQUITO NET- LIKE STRUCTURE OF THE COVER

B-1.1 The cover shall be made from three panels-One panel to form the top and the two lengthwise side walls, and two smaller panels to form the other two side walls. Make each panel by stitching width wise number of pieces of double-texture cloth of appropriate length. Pieces shall be joined by means of two rows of stitching as shown in Fig. 1. Ensure that the two rows of stitching arc parallel to each other and about 2.5 cm apart. When the panels are ready, join them appropriately edgewise, by stitching, to form the mosquito net—like structure of the cover. Then tut n in the bottom edges of the resulting cover, twice to form a hem, the first and second turns being equal to 2.5 cm and 27.5 cm respectively, each turn being secured by a row of stitching. For stitching the joints and hem, use sewing cotton thread 6/36s or other approved thread showing a breaking strength of not less than 2.25 kg. The number of stitches in all cases shall be about 25 to 30 per decimetre.

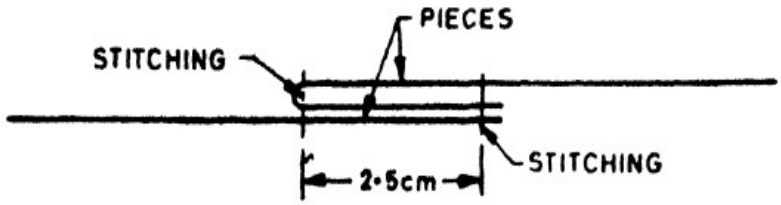


FIG.1 SECTION OF JOINT

B-1.2 The joints in the side walls of the cover shall be vertical. Care shall be taken to ensure the use of a minimum number of joints in the fabrication of the cover of required size, from fumigation sheet of available width. For example, the following procedure may be adopted for the fabrication of a fumigation cover measuring approximately 8.55 m in length, 6.65 m in width and 5.50 m in height, from rolls of 1 metre wide fumigation sheet:

a) Cut from the rolls of fumigation sheet, 9 pieces in full width of 1 metre, in lengths of 18.25 m. Join them width wise by stitching, so as to form a panel of 8.55 m width (allowing approximately 5.5 cm for the overlaps at each joint) and 18.25 m (that is, 6.65 in + 5.80 m 5.80 m) length. Likewise prepare two smaller panels of 5.80 m width and 6.65 m length, from 14 pieces of 1 m width and 5'80 in length, utilizing 7 pieces for each panel.

b) Attach lengthwise by stitching, the two smaller panels, one to each side and at a place equidistant from the ends, of the larger panel. Then join the side edges of the attached

smaller panels to the corresponding adjacent free edges of the larger panel to form the mosquito net-like structure of the cover. Make a 27.5-cm wide hem at the bottom edges of the cover as described in **B-1.1** above.

B.2 PROVISION OF OPENINGS AND FUNNELS

B-2.1 Make one or more openings on the top of the cover (as agreed to between the purchaser and the supplier) and funnels for attachment to the openings. If only one opening is required, this shall be located in the central portion of the top of the cover; if two or more openings are required, these shall be equally spaced in a row, in the top portion of the cover, along a line midway between its lengthwise edges. The funnels shall be in the form of cylindrical tubes 7.5 to 10 cm diameter and 23 to 25 cm length and shall be made of two layers of fumigation sheets. The opening or openings shall be circular in shape with a diameter slightly larger than that of the funnel tube.

B-2.1.1*Method of Fixing of Funnels*

Make three circular pieces of the fumigation sheet. Each piece shall have a diameter of 23 cm, with a central hole of a diameter corresponding to that of the funnel tube. Place two of the circular pieces one over the other, and firmly stitch one end of the funnel tube in between these pieces and in such a way that the tube protrudes through the hole of the upper circular piece. Insert the funnel tube through the opening, from the inside of the cover, bring the upper circular piece in contact with the inner surface of the cover and firmly stitch the two circular pieces to the cover. Place the third circular piece on the outer surface of the cover in such a manner that the funnel tube protrudes through its hole. Securely stitch this piece to the cover and the other two circular pieces. Secure the middle portion of a tying tape to the middle portion of the funnel tube by stitching. The tape shall be 2.5 cm in width and 60 cm in length and shall be attached to the tube in such a manner that its two free ends are equal in length and each has a length of at least 29 cm. The sewing thread used for stitching of the funnel tube, circular discs and tying tape shall conform to the requirements prescribed in **B-1** above.

B-3 FIXING OF HANDLING STRAPS

B-3.1 Secure six handling straps to each of the two lengthwise side walls of the cover by stitching one at each of the top and bottom corners and one at each of the centres of the top and bottom edges. The straps shall consist of strong webbing of 5 cm width and be of a quality that has been previously approved by the purchaser. Each strap shall have a length of 90 cm and shall be secured by stitching its middle portion to the cover so that the two free ends of the doubled up strap arc equal in length and each has a length of at least 35 cm. A brass ring of approved size and quality shall be secured to each of the two free ends of each attached strap.

B-4 SEALING OF THE HOLES FORMED BY STITCHING

B-4.1 To prevent leakage of the fumigant vapour through the holes formed by stitching, seal the scams/joints by the application of rubber adhesive or other suitable sealing material. The sealing material used shall be of approved quality. Ensure that the needle holes arc thoroughly sealed and rendered gas-proof.

ANNEX C

(*Clause* **7.1**)

SAMPLING OF FUMIGATION SHEETS AND COVERS

C.1 SAMPLING OF FUMIGATION SHEETS

C-1.1 Lot— In any consignment, all the rolls of fumigation sheets of the same type, colour and finish shall be grouped together and each such group shall constitute a lot.

C-1.1.1 The conformity of the lot to the requirements of the specification shall be ascertained for each lot separately. The number of rolls n to be selected from a lot shall depend on the size of the lot N and shall be in accordance with Table 2.

Table 2 Number of Rolls to Be Selected for Sampling

Sl No.	**Lot Size**	**Number of Rolls to be Selected**
	N	***n***
(1)	(2)	(3)
i)	Up to 50	2
ii)	51 ,, 100	3
iii)	101 ,, 200	4
iv)	201 ,, 300	5
v)	301 and above	7

C-1.1.2 The rolls shall be selected at random and to ensure the randomness of selection, random number tables shall be used. In case such tables are not available, the following procedure may be adopted subject to agreement between the purchaser and the supplier:

Arrange all the rolls in the lot in a systematic manner and starting from any roll, count them as 1, 2, 3, etc., up to r and so on, where r being the integral part of *N*/*n* (*N* being the lot size and n the sample size). Every *r*th roll thus counted shall be withdrawn till the requisite number of rolls is obtained.

C-1.2 Number of Tests

C-1.2.1 From each of the rolls selected according to **C.1.1.2**, one-metre length of fumigation sheet shall be cut, care being taken to exclude not less than 0.25 m length of fabric from either end. The test specimens necessary for the various tests specified in the standard shall be cut from the lengths of fumigation sheet thus obtained.

C-1.2.2 Tests for determination of all the characteristics specified in the standard, shall be conducted on the test specimens cut from these metre lengths as obtained in **C-1.2.1**.

C-1.3 Criteria for Conformity

C-1.3.1 The lot shall be declared as conforming to the specification if for each of the characteristics the test results on all the individual metre lengths (*see* **C-1.2.1**) are found to be within the limits of the specification.

C-1.3.2 If specimens taken from these lengths fail in one or more tests, each such test shall be repeated twice. For this purpose, two further metre lengths shall be cut from the same roll as the failing metre length and specimens shall be cut from each of them so that duplicate tests may be conducted in respect of each failure. If all the re-tests have passed, the lot shall be declared as conforming to the specification, otherwise not.

C.2 SAMPLING OF FUMIGATION COVERS

C-2.1 Lot

All the fumigation covers produced from essentially similar materials by the same manufacturer shall be grouped together to constitute a lot.

C-2.2 Each lot shall be inspected separately for the requirements of this specification. For this purpose from each lot a number of covers shall be selected at random in accordance with col 1 and 2 of Table 3.

C-2.2.1 The number of covers required in col 2 of Table 3 shall be taken equally from as many bales as possible. The covers to be taken from a bale shall be chosen at random.

Table 3 Scale of Sampling of Stitched Covers

Sl No.	**No. of Covers in the Lot**	**No. of Covers to be Inspected**	**Permissible No. Of Defectives**	**No. of Covers to be Selected**	
				(5)	(6)
(1)	(2)	(3)	(4)		
i)	Up to 50	8	0	0	1
ii)	51 to 100	13	1	1	2
iii)	101 to 200	20	2	1	2
iv)	201 to 300	32	3	1	3

C-2.3 Number of Tests and Criteria for Conformity

C-2.3.1 *Requirements of Construction*

Each one of the covers selected in **C-2.2** shall be inspected for all the requirements specified in **4.5**. A cover failing in one or more of these requirements shall be regarded as defective. The lot shall be considered as conforming to these requirements if the number of defectives in the sample does not exceed the number given in col 3 of Table 3.

C.2.3.2 *Requirements of Fumigation Sheet and Proofing*

C-2.3.2.1 *With raw material tests*

When the raw materials used had satisfied the requirements when tested in accordance with **5.2**, **5.3** and **5.4**, the number of covers to be tested for the requirements of proofing and fumigation

sheet given in **5.3** and **5.4** shall be as given in col 1 of Table 3. The lot shall be declared to be in conformity with these requirements if each of these covers satisfies the requirements.

C-2.3.2.2*Without raw material tests*

When the raw materials used have not been tested, the number of covets to be tested for the requirements of proofing and fumigation sheet given in **5.3** and **5.4** shall be as given in col 5 of Table 3. The lot shall be declared to be in conformity with these requirements if each of these covers satisfies the requirements.

C-2.3.2.3 If specimens taken from these fumigation covers fail in one or more tests, each such tests shall be repeated twice. For this purpose, two further metre lengths shall be cut from the same cover as the failing covers and specimen shall be cut from each of them so that duplicate tests may be conducted in case of each failure. If all the retests have passed, the lot shall be declared as conforming to the specification, other-wise not.

ANNEX D

(*Clause* **5**)

DETERMINATION OF FUMIGANTION PROPERTY

D-1 QUALITY OF REAGENTS

D-1.1 Unless specified otherwise, pure chemicals and distilled water IS 1070) shall be used in its.

NOTE — 'Pure chemical' shall mean ehicals that do not contain impurities which affect the results of analysis.

D-2 APPARATUS

D-2.1 Gas-Tight Syringe —100m1 capacity.

D-2.2 Aspirator Bottle — 5-litre capacity bottle fitted with three-way stopcock.

D-2.3 Petri Dish

D-2.4 Burette — 50-m1 capacity.

D-2.5 Pipette — 10-ml capacity.

D-2.6 Exposure Cell

A specially designed stainless steel cell comprising of two cylindrical chambers having cross section area 100 cm' and 10 cm height which may be coupled without leakage with the help of a silicone rubber seal (*see* Fig.1). The test fabric is sandwiched between these two chambers and tightened with nuts and bolts. Both the cells shall have in and out vents controlled through precision needle valves for introduction and withdrawal of air for analysis.

D-3 REAGENTS

D-3.1 Aluminium Phosphide Tablet

Each tablet weighing approximately 3g and containing minimum 56 percent (*m*/*m*) active ingredients.

D-3.2 Mercuric Chloride Solution

10 percent (*m*/*v*) solution of mercuric chloride in water.

D-3.3 Standard Iodine Solution

0.1 N iodine solution. Dissolve 12.7 g of iodine in water containing 30 g of potassium iodide and make up the volume to 1 litre in volumetric flask.

D-3.4 Standard Sodium Thiosulphate Solution

0.l N sodium thiosulphate solution. Dissolve 24.8 g of sodium thiosulphate crystals ($Na_2S_2O_a5H_2O$) in water and make up the volume to 1 litre in volumetric flask.

D-3.5 Starch Indicator Solution

Make a paste of 1 g of soluble starch with a little water. The paste is then added to 100 ml of boiling Water with constant stirring. The resulting solution is boiled for another minute and then cooled.

D-4 STANDARD ATMOSPHERIC CONDITIONS FOR TESTING

D-4.1 Test shall be carried out in an atmosphere of 65 ± 5 percent relative humidity and at a temperature of 27 ± 2°C.

D-5 PROCEDURE

D-5.1 Estimation of Phosphine Concentration in Aspirator Bottle

Two to three aluminium phosphide tablets are kept in aspirator bottle. The bottle is made air-tight and filled with air having relative humidity more than 60 percent. After the equilibration period of 24 h, 50 ml phosphine laden air is drawn from this bottle through a three-way stopcock into a gastight syringe and then slowly bubbled into 20 ml of 10 percent mercuric chloride solution. The precipitate formed is filtered, washed and then dissolved in 10 ml of 0.1 N iodine solution. Titrate this iodine solution against standard sodium thiosulphate solution using starch solution as indicator.

D-5.1.1 Carry out a blank by using all reagents in the same quantities except phosphine gas.

D-5.1.2*Calculation*

Calculate the concentration of phosphine in enclosed space of aspirator bottle as follows:

$$\text{Phosphine, mg/1 } (c) = \frac{0.425 \times V \times N \times 1\,000}{0.1 \times 50}$$

where

V = final volume of standard sodium thiosulphate solution in ml, used for titration of iodine solution, after correction for blank; and

N = normality of standard sodium thiosulphate solution.

D-5.1.2.1 Estimate the volume of phosphine required to produce a concentration of 3 mg/1 in the upper chamber of apparatus as follows:

Volume of phosphine required (ml) = $\frac{1\,000\times3}{C}$

where

c = concentration of phosphine in mg/1 (*see***5.1.2**).

D-5.2 Estimation of Escaped Phosphine

15 ml of 10 percent mercuric chloride solution is kept in a wide petri dish in the lower chamber. The test fabric is fitted in between the two chambers which are clamped tightly. The fabric shall be properly and uniformly stretched between the two chambers. The upper chamber is partially evacuated by the gas-tight syringe and required volume of air containing phosphine to produce 3 mg/1 concentration, as calculated in **D-5.1.2.1**, is introduced into it. After 24 h of exposure the test chambers are opened and the amount of phosphine permeated in the lower chamber (which forms precipitate with mercuric chloride solution kept in petri dish) is estimated following the procedure of dissolving precipitate in iodine solution and titrating it against standard sodium thiosulphate solution as given in **D-5.1**.

D-5.2.1 Carry out a blank by using all reagents in the same quantities except phosphine gas.

D-5.2.2 *Calculation*

Calculate the concentration of phosphine (mg) permeated in the lower chamber in 24 h as follows:

Concentration of phosphine, mg (Z) = $\frac{0.425 \times V \times N}{0.1}$

where

V= final volume of standard sodium thiosulphate solution in ml, used for titration of iodine solution after correction for blank; and

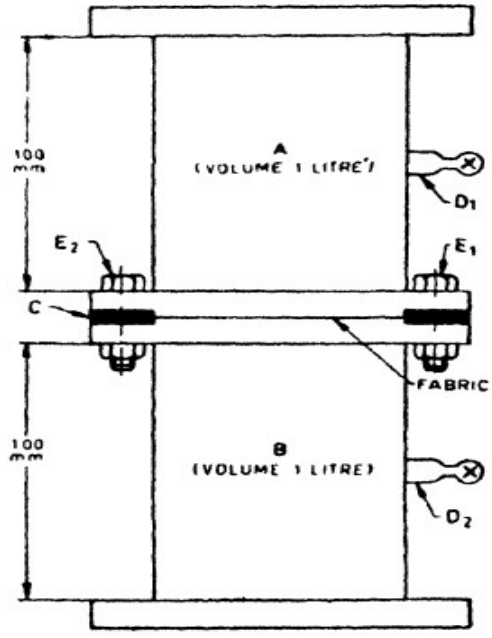
N = normality of standard sodium thiosulphate solution.

D-5.2.2.1 Calculate the percentage escaped phosphine in 24 h as follows:

Escaped phosphine, percent = $\frac{Z \times 100}{3}$

where

Z = concentration of phosphine, in mg, permeated in lower chamber (*see***5.2.2**).



A and *B* = Stainless steel chambers

C = Silicone rubber seal

D_1. $D9$= inlets for fumigants

E_1 and E_2 = Clamping nuts and bolts

FIG. 1 APPARATUS FOR CHECKING RETENTION OF FUMIGANTS

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BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXXX)

XXXX 2024

भारतीय मानक मसौदा

वस्त्रादि — एकल टेक्सचर रबरयुक्त जलरोधक कपड़े — विशिष्टि

(आईएस 5915 का *पहला पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Single Texture Rubberized Waterproof Fabrics — Specification

(*First Revision* of IS 5915)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33	last date for receipt of comments is XXXX 2024

FOREWORD

(*Formal clauses will be added later*)

Single texture rubberized fabrics coated on one or both sides are used for making a variety of articles, such as rain coats, waterproof shoes, gloves, caps and waterproof covering for infant and sick beds. Acid and alkali resistant rubberized fabrics are used for making laboratory aprons. Fabrics where two textile plies are bonded by a layer of rubber in between are being covered by another standard because of some inherent difference in characteristics and requirements.

The standard has been revised to incorporate the following changes:

i) The title of the standard has been updated;
ii) Amendments has been incorporated;
iii) BIS certification clause has been incorporated;
iv) Packing and marking clause has been incorporated;
v) Latest sampling clause has been incorporated;
vi) ICS number has been incorporated in place of UDC number; and
vii) References to Indian standards have been updated.

This standard contains clauses **5.1**, **5.2.2**, **5.3.2**, **5.3.3** and **5.3.9** which call for agreement between the purchaser and the supplier.

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 revised*)'. 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

This standard prescribes the requirements and methods of test for single texture rubberized waterproof fabrics for general purposes, and for making acid and alkali resistant aprons.

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 TERMINOLOGY

For the purpose of this standard, the definitions of terms given in IS 2244 shall apply.

4 TYPES, QUALITIES AND GRADES

4.1 Types — Rubberized waterproof fabrics shall be of two types.

4.1.1 Type 1 shall be single-faced material where the proofing shall be applied only on one side of the base fabric.

4.1.2 Type 2 shall be double-faced material where the proofing shall be applied on both sides of the base fabric.

4.2 Qualities — Each of the above types of rubberized waterproof fabrics shall be made available in two qualities based on the minimum rubber polymer content of the proofing by weight as indicated in **4.2.1** and **4.2.2**.

4.2.1 *Quality 1* — Minimum rubber polymer content of the proofing shall be 55 percent by weight, when tested according to Annex B.

4.2.2 *Quality 2* — Minimum rubber polymer content of the proofing shall be 35 percent by weight, when tested according to Annex B.

4.3 Grades — Rubberized fabrics of each quality shall be made available in two grades as described in Table 1.

5 REQUIREMENTS

5.1 Base Fabric — Base fabric for the manufacture of rubberized fabric shall be made of cotton or viscose staple or other suitable textile material as agreed to between the purchaser and the supplier. In the case of coloured single-faced rubberized fabrics, the base fabric shall be dyed to the required shade if specified by the purchaser.

5.2 Proofing

5.2.1 The proofing (coating) shall be made from natural rubber or suitable vulcanizable synthetic rubber or a combination thereof, compounded with the necessary ingredients.

5.2.2 It shall not contain substances such as copper and manganese compounds in such amounts as to have a deleterious action on rubber. Reclaimed rubber, vulcanized waste and rubber substitutes shall not be used if so required by the purchaser.

5.2.3 The proofing shall be non-irritant to the skin and shall not contain any ingredients which may be harmful to persons with whom it may come into contact.

5.2.4 The proofing after application on the base fabric shall be adequately vulcanized so as to conform to the requirements of this specification.

5.3 Finished Fabric

5.3.1 *General* — The finished material shall be soft, pliable, smooth and free from cuts, embedded foreign matter, surface irregularities and other mechanical defects. The double-faced rubberized fabrics shall have approximately equal amounts of proofing on both sides.

5.3.2 *Length* — The length of each piece of rubberized fabric shall not be less than 30 metres unless otherwise agreed to between the purchaser and the supplier. There shall be no joints in any single piece. The length shall be determined in accordance with IS 1954/ISO 22198.

5.3.3 *Width* — The usable width of the rubberized fabric shall be as agreed to between the purchaser and the supplier. The unproofed portion, if any, near either selvedge shall not be more than 10 mm in width. The width shall be determined in accordance with IS 1954/ISO 22198.

5.3.4 *Waterproofness* — The finished material shall be such that, when tested by the method prescribed in Appendix E of IS 1389, IS 392 or IS 7940, the surface in contact with the air shall show no water globules or wet patches, when a constant head of water, as indicated below, is maintained for 30 minutes:

Sl. No. **(1)**	*Type/ Quality/Grade of Fabric* **(2)**	*Head of Water, cm* **(3)**
i)	Qualities 1 and 2 and Grades A and B of Type 1	30
ii)	Quality 1, Grade A of Type 2	
iii)	Quality 1, Grade B of Type 2	60
iv)	Quality 2, Grade A of Type 2	
v)	Quality 2, Grade B of Type 2	90

5.3.5 *Accelerated Ageing Test* — When the finished material is tested at a temperature of 90 ± 1°C for 168 hours in accordance with the method described in **5.3** of IS 3400 (Part IV)/ ISO 188, the rubber proofing shall not become stiff, softened or tacky, nor shall it show appreciable discoloration or be easily detachable from the base fabric. When the aged sample is tested for waterproofness as described in **5.3.4** there shall be no leakage of water through any part of it and the surface in contact with the air shall show no water globules or wet patches.

5.3.6 *Colour*— The finished material shall be white or of a suitable colour or different colours on the two sides in case of double-faced fabric as agreed to between the purchaser and the supplier. Sulphur dyes shall not be used unless otherwise agreed to between the purchaser and the supplier. The colour fastness in respect of the coloured material shall comply with the following requirements.

5.3.6.1 *Fastness to light* — The material, when tested for colour fastness as prescribed in IS/ISO 105- B02 shall show a fastness rating of not less than No. 3 prescribed therein. In case of materials coloured on both sides, or in dual shade, the test shall be conducted with respect to each side of the material separately and the colour fastness in each case assessed for compliance with the aforesaid requirement. The test shall be applicable to coloured as well as white rubberized fabrics.

5.3.6.2 *Fastness to washing of coloured fabric* —When the rubberized fabric is tested for colour fastness to washing in accordance with IS/ISO 105-C10 the fastness rating, in respect of change in shade of the material and the degree of staining on the attached undyed pieces of cotton and woollen clothes, evaluated according to IS/ISO 105-A02 and IS/ISO 105-A03 respectively shall be not less than 5 in case of double-faced rubberized fabrics and single-faced coloured rubberized fabrics where the base fabric is not dyed. In the case of coloured single-faced rubberized fabrics where the base fabric is of dyed material, the fastness rating of the shades on the proofed and unproofed side shall be as agreed to between the purchaser and the supplier.

5.3.7 *Reaction of Aqueous Extract* — When the finished fabric is tested in accordance with the hot method of IS 1390/ISO 3071, its aqueous extract shall neither be acidic to methyl orange nor alkaline to phenolphthalein indicator.

5.3.8 *Autoclaving Test* — A sample of the finished material tested as described in Annex C shall not be stiffer or softer than the control piece of the material, shall not be tacky and shall show no other apparent deterioration likely to impair its usefulness.

5.3.9 *Resistance to Cold* — The proofing on the cloth shall withstand a bending test around a steel pin of 6 mm diameter without cracking, after an exposure of 5 hours to a temperature of minus 35 ± 1°C or as agreed to between the purchaser and the supplier. The purchaser shall specify his option for this test.

5.3.10 *Resistance to Acid and Alkali* — When piece, 2.5 × 2.5 cm cut from any portion of the finished material, is died in 20 percent hydrochloric acid or 20 percent sodium hydroxide solution for 30 minutes, there shall be no sign of corrosion or damage of the proofing. The purchaser shall specify his option for the test.

5.3.11 The finished fabric shall also comply with the requirements prescribed in Table 1.

Table 1 Requirements for Finished Fabric

(*Clause* 5.3.11)

Sl No.	Characteristic	Type 1		Type 2		Method of Test, Ref to
		Quality 1	Quality 2	Quality 1	Quality 2	

		Grade A	Grade B	Grade A	Grade B	Grade A	Grade B	Grade A	Grade B	Annex	IS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	Weight in g/m^2, *Max*	250	375	300	400	350	400	400	800	-	IS 1964
ii)	Proofing content in g/m^2, *Min*	140	175	200	250	250	275	300	500	D	-
iii)	Breaking strength N/5 cm grip, *Min*									-	IS 7016
	a) Warp	400	400	400	400	400	400	400	400		(Part 2)/ISO
	b) Weft	350	350	350	350	350	350	350	350		1421

*Method of test for coated and treated fabrics : Part 2 Determination of breaking strength and extension at break (*first revision*).

6. PACKING, MARKING AND STORAGE

6.1 Packing

The material shall be securely packed in the form of a roll so as to ensure safe transportation.

6.2 Marking

6.2.1 Each roll of coated fabric shall be supplied with a label with the following information:

a) Name and/or trade-mark, if any, of the manufacturer;
b) Type, grade and class of material;
c) Month and year of manufacture;
d) Length of coated fabric in the roll, in metres; and
e) Any other statutory requirements.

6.3 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 product(s) may be marked with the Standard Mark.

6.4 Storage

The rolls of single-texture rubberised waterproof fabrics shall be stored vertically on dry, clean, firm and level surface. The rolls shall be protected from dust, moisture, direct sunlight, corrosive and solvent fumes.

7 SAMPLING, NUMBER OF TEST AND CRITERIA FOR CONFORMITY

7.1 Scale of Sampling of Rubberized Fabrics

7.1.1 Lot

In any consignment, all the rolls of rubberized fabrics of same type, quality and grade shall be grouped together and each such group shall constitute a lot.

7.1.2 The conformity of the lot to the requirements of the specification shall be ascertained for each lot separately. The number of rolls (*n*) to be selected from a lot shall depend on the size of the lot (*N*) and shall be in accordance with Table 2.

Table 2 Number of Rolls to Be Selected for Sampling

(*clause* 7.1.2)

Sl No.	Lot Size *N*	Numbers of Rolls To be Selected *n*
(1)	(2)	(3)
i)	Up to 50	2
ii)	51 to 100	3
iii)	101 to 200	4
iv)	201 to 300	5
v)	301 and above	7

7.1.3 The rolls shall be selected at random and to ensure the randomness of selection, random number tables shall be used. In case such tables are not available, the following procedure may be adopted subject to agreement between the purchaser and the supplier:

Arrange all the rolls in the lot in a systematic manner and starting from any roll, count them as 1, 2, 3, etc 5, up to r and so on, where r is the integral part of *N*/*n* (*N* being the lot size and n the sample size). Every *r*th roll thus shall be withdrawn till the requisite number of rolls is obtained.

7.2 Number of Tests

7.2.1 From each of the rolls selected according to **7.1.3**, one metre length of rubberized fabric shall be cut, care being taken to exclude not less than 0.25 metre length of fabric from either end. The test specimens necessary for the various, tests specified in the standard shall be cut from the lengths of rubberized fabric thus obtained.

7.2.2 Tests for the determination of all the characteristics specified in the standard, shall be conducted on the test specimens cut from these metre-lengths as obtained in **7.2.1**.

7.3 Criteria for Conformity

7.3.1 The lot shall be declared as conforming to the specification if for each of the characteristics the test results on all the individual metre-lengths (*see* **7.2.1**) are found to be within the limits of the specification.

7.3.2 If specimens taken from these lengths fail in one or more tests, each such test shall be repeated twice. For this purpose, two further metre-lengths shall be cut from the same roll as the failing metre-length and specimens shall be cut from each of them so that duplicate tests may be conducted in respect of each failure. If all the retests have passed, the lot shall be declared as conforming to the specification, otherwise not.

ANNEX A

(*Clause* 2)

LIST OF REFFERED INDIAN STANDARDS

IS No.	*Title*
2 : 2022	Rules for Rounding off Numerical Values (*Second Revision*)
2244 : 1972	Glossary of terms relating to treated fabrics (*First Revision*)
1954 : 2024 / ISO 22198 : 2006	Textiles-Fabrics-Determination of Width and Length (*Third Revision*)
1389 : 1984	Methods for testing cotton fabrics for resistance to attack by micro-organisms (*First Revision*)
3400 (Part IV)-2021/ISO 188: 2011,	Methods of test for vulcanized rubber part 4 accelerated ageing and heat resistance (*Third Revision*)
IS/ISO 105- B02 : 2014	Textiles — Tests for Colour Fastness — Part B02 Colour Fastness to Artificial Light : Xenon Arc Fading Lamp Test

IS/ISO 105-C10 : 2006	:	Textiles — Tests for colour fastness Part C10 colour fastness to washing with soap or soap and soda
IS/ISO 105-A02 : 1993	:	Textiles — Tests for Colour Fastness Part A02 Grey Scale for Assessing Change in Colour
IS/ISO 105-A03 : 2019	:	Textiles — Tests for Colour Fastness Part A03 Grey Scale for Assessing Staining (*First Revision*)
1390-2022/ISO 3071 : 2020		Textiles Determination of pH of aqueous extract (*Third Revision)* of IS 1390
1964 : 2001		Textiles – Methods for determination of mass per unit length and mass per unit area of fabrics (*Second Revision*)
7016 (Part 2) : 2022/ISO 1421 : 2016		Methods of Test for Rubber or Plastics Coated Fabrics Part 2 Determination of Tensile Strength and Elongation at Break (*Third Revision*)

ANNEX B
(*Clauses* 4.2.1 *and* 4.2.2)

DETERMINATION OF RUBBER POLYMER CONTENT (INDIRECT METHOD)

B-1 GENERAL

B.0.1 The indirect method determines the non-rubber constituents of a product and the remainder is expressed as rubber polymer content. The non-rubber constituents are determined in accordance with **B-1** through **B-10** and rubber polymer content is calculated as given in **B-10.1**. The method is applicable to NR, IR, SBR and BR products and also to IIR products if they are extracted with methyl ethyl ketone rather than with acetone.

NOTE — The abbreviations NR, IR, SBR, HR, BR, CR, ABR and NBR used above and hereafter denote isoprene (natural), isoprene (synthetic), styrenebutadiene, isobutylene-isoprene, butadiene, chloroprene, acrylate-butadiene and nitrile-butadiene rubbers.

B.1 TOTAL EXTRACT

B-1.1 Apparatus

B-1.1.1 *Extraction Apparatus — see* Fig. 1.

B-1.2 Reagents

B-1.2.1 *Acetone* — distilled over potassium carbonate boiling between 56 to 57°C.

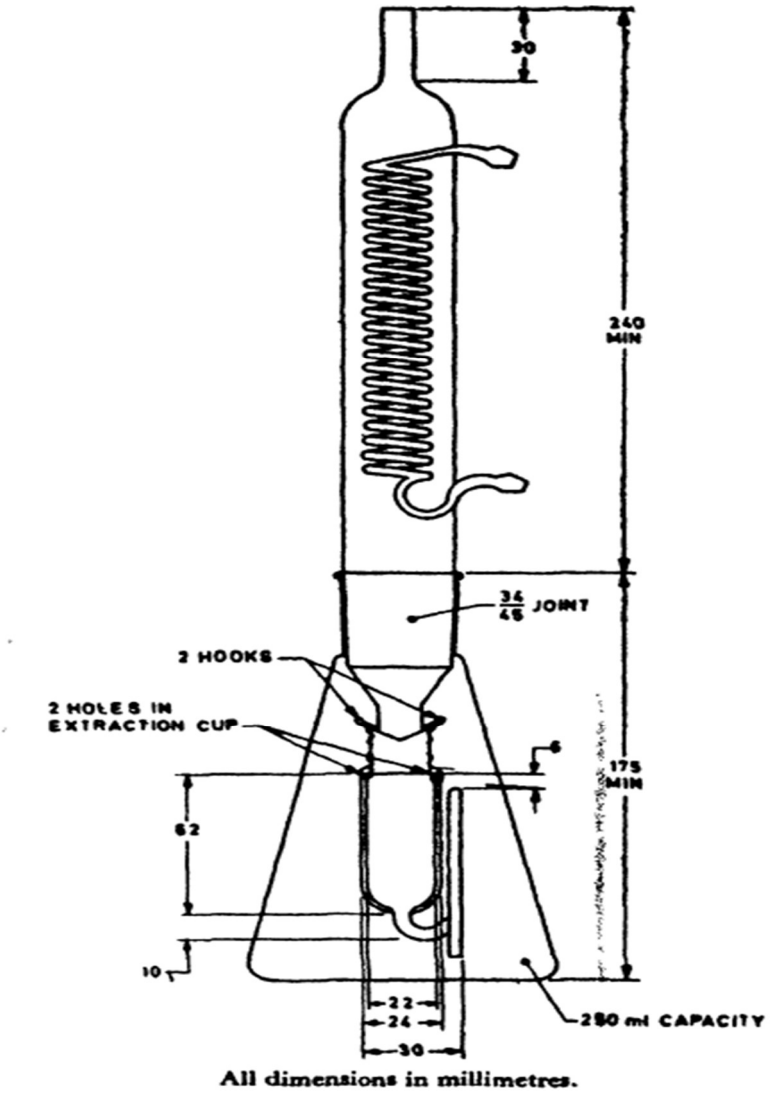
B-1.2.2 *Chloroform*

B-1.3 Procedure

B-1.3.1 Place a weighed specimen of approximately 2 g in a filter paper. If the specimen is in the form of a sheet, cut it with scissors into strips 3 to 5 mm in width. If the specimen becomes tacky during the extraction, take care that adjacent portions are separated by paper. Fold the paper so that it will fit in the extraction cup, and suspend the cup in a weighed extraction flask containing 50 to 75 ml of a mixture consisting of 32 parts of acetone and 68 parts of chloroform by volume. (Prior to the weighing of the extraction flask, it shall have been dried for 2 h at 70 ± 5°C and cooled in a desiccator to the temperature of the balance.)

B.1.3.2 Extract the specimen continuously for 16 h, heating at a rate such that the time required to fill and empty the siphon cup will be between 2.5 and 3.5 min. (Rubber products having a ratio of total sulphur to rubber polymer in excess of 10 percent shall be extracted for 72 h.) Carefully note all characteristics of the extract, both when hot .and cold. If the colour is black, make a chloroform extraction separately for 4 hours. dry the extract to constant weight and add the value to the result obtained for total extract.

B.1.3.3 Evaporate off the solvent over a steam bath, using a gentle current of filtered air to prevent boiling. Remove the flask from the steam bath just prior to the disappearance of the last traces of solvent in prevent loss of extract. Continue the passage of air through the flask for 10 min to remove the remaining solvent and dry the flask for 2 h in a 70 ± 5°C air bath.



All dimensions in millimetres.

FIG.1 EXTRACTION APPARATUS WITH GLASS CONDENSER AND GROUND JOINT

B-1.3.4 Cool in a desiccator to the temperature of the balance and weigh. Save the extracted rubber for further tests that require the use of an extracted specimen.

B-1.4 Calculation

Total extract percent = $\frac{A}{B} \times 100$

where

A weight in g of extract; and

B weight in g of specimen used.

B-2 ALCOHOLIC POTASH EXTRACT

B-2.1 Reagent

B-2.1.1 *Alcoholic Potash Solution* — Prepare a 1 N alcoholic potassium hydroxide solution by dissolving the required amount of potassium hydroxide in absolute ethanol that has been purified as follows:

Dissolve 1.5 g of silver nitrate in 3 ml of water and add it to one litre of alcohol. Dissolve 3 g of potassium hydroxide in the smallest amount of hot water, cool, add it to the silver nitrate solution, and shake thoroughly. Allow the solution to stand for at least 24 h, filter, and distil.

NOTE — Absolute ethanol denatured with 10 percent by volume of methanol may afro be wed.

B-2.1.2 *Congo Red Paper*

B-2.1.3 *Ethanol* — 95 percent,

B-2.1.4 *Ether*

B-2.2 Procedure

B-2.2.1 Remove the specimen remaining after the determination of or total extract from its wrapping material while wet with solvent and dry the rubber at 70 ± 5°C to remove the solvent.

B-2.2.2 Transfer to a 200-ml Erlenmeyer flask, add 50 ml of alcoholic potash solution, and heat under a reflux condenser for 4 h. In the case of hard rubber, continue the heating for 16 h or more.

B-2.2.3 Filter into a 250-ml beaker, wash with two 25-ml portions of boiling alcohol and then with three 25-ml portions of boiling water, and evaporate the filtrate just to dryness. Use about 75 ml of water to transfer the dried filtrate residue to a separatory funnel. Acidify the solution with hydrochloric acid (1: 3), testing with Congo red paper.

B-2.2.4 Extract with four 25-m1 portions of ether, unless the fourth portion should be coloured, when the extraction shall be continued until no further quantity can be removed. Unite the ether fractions and wash thoroughly with water until free of acid (two washings are generally sufficient).

B-2.2.5 Filter the ether solution through a plug of previously washed absorbent cotton into a weighed flask and wash the separatory funnel and the cotton plug with ether. Evaporate the ether on a steam bath, using a gentle current of Altered air to prevent boiling. Remove the flask from

the steam bath just prior to the disappearance of the last traces of solvent and continue the passage of air for 10 minutes. Dry the flask at 100 ± 5°C to constant weight, cool and weigh.

B.2.3 Calculation

Alcoholic potash extract, percent = $\frac{A}{B} \times 100$

where

A = weight in g of extract; and
B = weight in g of specimen used.

B-3 TOTAL SULPHUR (ZINC-NITRIC ACID METHOD)

B-3.0 General — This method covers the determination of all the sulphur, except that contained-in barium sulphate, in a sample of rubber product or in the fillers obtained from a rubber product. If acid-soluble barium salts, antimony sulphide, or lead compounds are present, this method will give erroneous results, in which case the fusion method (*see* **B-4**) should be used. This method may be used for the determination of organic plus inorganic sulphur on an extracted sample, total plus inorganic sulphur on an unextracted sample, or inorganic sulphur is fillers. If it is used for determination of total or organic sulphur plus inorganic sulphur, it shall also be used for determination of inorganic sulphur (*see* **B-5**). The method is applicable to NR, SBR, BR, IR and CR. products and to total plus inorganic sulphur determination of NBR Products.

B-3.1 Reagents

B-3.1.1 *Barium Chloride Solution* (100 g $BaCl_2.2H_2O$/litre) — Dissolve 100 g of barium chloride ($BaCl_2.2H_2O$) in water, add two to three drops of hydrochloric acid, and dilute to 1 litre. If there is any insoluble matter or cloudiness, heat the solution overnight on a steam bath and filter.

B-3.1.2 *Bromine, Saturated Water Solutions*

B-3.1.3 *Nitric Acid, Amine*

B-3.1.4 *Picric Acid, Saturated Solution*

B-3.1.3 *Potassium Chlorate* ($KClO_3$)

B-3.1.6 *Zinc-Nitric Acid Solution* — Add 200 g of zinc oxide (ZnO) to one litre of nitric acid slowly and with caution against spattering.

B-3.2 Procedure

B-3.2.1 Place 0.5 g of soft rubber or 0.2 g of hard rubber (extract the specimen with acetone or acetone-chloroform mixture if organic sulphur is to be determined) in a 500-ml Erlenmeyer destruction flask of chemically resistant material. Add 10 ml of zinc-nitric acid solution and moisten the sample thoroughly. Let stand at least for 1 h; overnight if convenient. By so doing the sample becomes partly decomposed; this permits the addition of fuming nitric acid with no danger of ignition of the sample. Add 15 ml of fuming nitric acid and whirl the flask rapidly to keep the sample immersed to avoid ignition. With some samples it may be necessary to cool the flask under running water.

B-3.2.2 When the dissolution of the rubber appears to be complete, add 5 ml of a saturated water solution of bromine and slowly evaporate the mixture to a foamy syrup. (For the determination of sulphur in unvulcanized mixtures, use 3 ml of bromine in place of bromine water.)

B-3.2.3 If organic matter or carbon remains at this point, add a few millilitres of fuming nitric acid and a few crystals of potassium chlorate (caution) and evaporate at a boil. Repeat this operation until all carbon is removed and the solution is clear, colourless, or light yellow.

B-3.2.4 At this point either of the following procedures may be used:

Procedure A — Place the flask on an asbestos gauze and evaporate the mixture to dryness over a burner. Then bake the mixture at the highest temperature of the burner until all nitrates are decomposed and no more nitrogen oxide fumes can be detected. The flask and its contents shall be carefully annealed after this procedure by gradually decreasing the flame or by placing the flask on successively cooler sources of heat.

Procedure B — Evaporate the mixture, cool, add- 10 ml of hydrochloric acid, and evaporate to dryness, avoiding spattering. Repeat this procedure once, or more than once if oxides of nitrogen are still evolved.

B-3.2.5 Cool the flask, add 50 ml of hydrochloric acid (1 : 6) and digest hot until dissolution is as complete as possible. Filter while hot. Wash the filter and dilute the filtrate and washings to about 300 ml. Add 10 ml of saturated picric acid solution, heat to 90°C, and precipitate the sulphate by dropwise addition of barium chloride solution while stirring vigorously. Digest the precipitate overnight, preferably at 60 to 80°C using a watch glass to cover the beaker. Filter the barium sulphate and wash with water until the filter is colourless. Dry, ash, and finally ignite the precipitate at 650 to 900°C, with free access to air, to constant weight. Cool in a desiccator and weigh.

B-3.2.6 *Calculation*

Sulphur, percent = $\frac{A \times 0.1373}{B} \times 100$

where

A = weight in g of barium sulphate; and
B = weight in g of specimen used.

B-4 TOTAL SULPHUR (FUSION METHOD)

B-4.1 General — This method covers the determination of organic, total or inorganic sulphur in rubber compounds when acid-soluble barium salts, antimony sulphide, or lead compounds are present. All of the sulphur in the sample, including that present in barium sulphate is determined when this method is used. When this method is used for determination of organic or total sulphur it shall also be used for the determination of inorganic sulphur (*see* **B-5**). Total plus inorganic sulphur shall be determined on an unextracted specimen; organic plus inorganic sulphur on an extracted, specimen. The method is applicable to NR, SBR, BR, IR and CR products and to the determination of total plus inorganic sulphur on NBR products.

B-4.2 Reagents

B-4.2.1 *Nitric Acid-Bromine Solution* — Add a considerable excess of bromine to nitric acid so that a layer of bromine is present in the reagent bottle. Shake thoroughly and allow to stand 24 h before using.

B-4.2.2 *Sodium Carbonate* (Na_2CO_3)

B-4.2.3 *Sodium Carbonate Solution* —50 litre.

B-4.3 Procedure

B-4.3.1 Place 0.5 g of rubber in a porcelain crucible of about 75-m1 capacity. The specimen shall have been extracted with acetone or acetone-chloroform mixture (*see* **B-1**) if organic plus inorganic sulphur is to be determined. Add 15 ml of the nitric acid-bromine mixture, cover the crucible with a watch glass, and let it stand for 1 h in the cold. Heat for 1 h on the steam bath, remove the cover, rinse it with a little water, and evaporate to dryness.

B-4.3.2 Add 3 ml of nitric acid, cover, warm for a short time on the steam bath and then allow to cool. Carefully add in small portions, by means of a glass spatula, 5 of sodium carbonate. Raise the watch glass only high enough to permit the introduction of the spatula. Allow the sodium carbonate to slide down the side of the crucible, as it shall not be dropped directly into the acid.

Rinse the watch glass with 2 or 3 ml of hot water and stir the mixture thoroughly with a glass rod. Digest for a few minutes, spread the mixture halfway up the side of the crucible to facilitate drying, and dry on a steam bath. Fuse the mixture by heating over a sulphur-free flame.

B-4.3.3 Place the crucible in an inclined position on a wire triangle and start the ignition over a low flame. The tendency for the organic matter to burn too briskly may be controlled by judicious use of the stirring rod with which the burning portion is scraped away from the rest. When part of the mass is burned white, work a fresh portion into it until all of the organic matter is destroyed. It is necessary to hold the edge of the crucible with tongs. Towards the last half of the operation the flame should be increased. It is unnecessary to heat the crucible to redness. With care, a crucible can be used for at least 10 to 12 fusions.

B-4.3.4 After a fusion, allow the crucible to cool. Place it in a 400-m1 beaker, add sufficient water to cover the crucible (about 125 ml), and digest on the steam bath or plate for at least 2 h.

B-4.3.5 Filter the solution into a covered 400-ml beaker containing 5 ml of hydrochloric acid and wash the residue thoroughly with hot sodium carbonate solution. A qualitative test for barium may be made on the residue, but no analysis for barium or correction because of its presence is necessary, unless a detailed ash analysis desired. Acidify the filtrate to indicator paper with hydrochloric acid and add 2 ml in excess. Precipitate barium sulphate and complete the determination as described in **B-3**.

B-4.3.6 *Calculation*

Sulphur, percent by weight = $\frac{A \times 0.1373}{B} \times 100$

where

A = weight in g of barium sulphate; and
B = weight in g of specimen used.

B-5 INORGANIC SULPHUR

B-5.1 General Type — This method covers the determination of inorganic sulphur in rubber products when no antimony is present. The sample is ached and sulphur determined in the ash by the fusion method (*see* **B-4**) if acid-soluble barium salts or lead are present, or by the zinc-nitric acid method in the absence of acid-soluble barium salts. The same method shall be used for the inorganic sulphur determination as is used for the determination of organic sulphur or total sulphur. The method is applicable to NR, SBR, BR, IR, CR, NBR and IIR products.

B-5.2 Reagents

B-5.2.1 *Nitric Acid-Bromine Solution*.

B-5.3 Procedure — Extract a 1.0g specimen with acetone or with acetone-chloroform mixture (*see* **B-1**). Dry the sample, place in a porcelain crucible of about 75 ml capacity and distil off the rubber in a muffle furnace, using a maximum temperature of 450°C. A burner may be used for ashing if the sample is not allowed to catch fire. A wire gauze under the crucible will aid in preventing combustion. The carbon need not be completely burned off in this ignition. If add soluble barium salts and lead are absent, add 3 ml of nitric acid bromine mixture to the ash, cover with a watch glass, and heat for 1 h. Transfer the contents of the crucible, with washing, into a 500-m1 Erlenmeyer destruction flask of chemically resistant material and evaporate to dryness. Proceed with the determination of sulphur as described in **B-3.2.3** to **B-3.2.5**. In the presence of acid-soluble barium salts and lead, determine the sulphur by treating the ash in accordance with **B-4**.

B-5.4 Calculation

Inorganic sulphur, percent = $\frac{A \times 0.1373}{B} \times 100$

where

A= weight in g of barium sulphate; and
B = weight in g of specimen used.

B.6 ORGANIC SULPHUR

B-6.1 Organic sulphur is calculated by subtracting inorganic sulphur as obtained in **B-5** from total sulphur as obtain ltd in **B-3** or **B-4** as applicable.

B-7 FILLERS (REFEREE ASH METHOD)

B-7.1 General — This method is intended for settling disagreements on fillers content by the ashing method. It is also useful for ashing rubber products for determination of inorganic sulphur in the absence of antimony or for ash analysis.

B-7.1.1 The method is not accurate for rubbers containing halogens when zinc compounds or other metal compounds that form volatile halides are present and shall not be used if an analysis of these metals in the ash is required.

B.7.1.2 The method may be used for preparing samples for ash analysis on rubber products not containing halogens or antimony sulphide. However, if the sample contains carbonates that

decompose at 550°C or clays or silicates that will lose water at this temperature, the ash content value will not be highly precise and will not represent the original amount of inorganic fillers present in the sample.

B-7.2 Apparatus

B-7.2.1 *Crucibles* — porcelain or silica, approximately 50-m1 capacity.

B-7.2.2 *Electric Muffle Furnace* — with controls necessary to hold the temperature at 550 ± 25°C.

B-7 .2 .3 *Calibrated Thermocouple and Temperature Recording Device*

B-7.3 Procedure

B-7.3.1 Weigh a 1-g specimen of the sample into an ignited, weighed crucible.

B-7.3.2 Adjust the temperature of the muffle furnace to 550 ± 25°C, place the crucible in the furnace, and close the door completely. When more than one crucible is to be placed in the furnace, the crucible shall be placed on a tray and put into the furnace. The door shall be closed immediately and not opened for 1 h. After 1 h, open the furnace door 3 to 5 cm and continue heating for 30 minutes or until all carbonaceous material is burned off.

NOTE — If a referee ash determination is required, the temperature shall be determined by placing the calibrated thermocouple sensing element at approximately the geometric centre of the furnace cavity. The temperature shall be adjusted to be within the specified range. No more than two crucibles shall be placed in the oven and they shall be positioned directly below the thermocouple.

B-7.3.3 Remove the crucible from the furnace, cool in a desiccator, and weigh.

B.7.4 Calculation

$$\text{Ash, percent} = \frac{A-B}{C} \times 100$$

where

A= weight in g of ash and crucible;
B = weight in g of crucible; and
C = weight in g of specimen.

B-8 CARBON BLACK

B-8.1 General

B.8.1.1 This method covers the determination of carbon black by a nitric acid digestion method. It is applicable only to the '*R*' family of rubbers containing an unsaturated carbon chain.

B.8.1.2 Application to any other rubber type may be possible if the rubber is degraded to fragments soluble in water, acetone, or chloroform. The method shall be used on such other rubbers only if adequate testing of known compounds has demonstrated the usefulness of the method.

B-8.2 Reagents

B.8.2.1 *Acetone*

B-8.2.2 *Chloroform*

B-8.2.3 *Sodium Chromate Solution* — 100 g Na_2CrO_4/litre.

B-8.2.4 *Sodium Hydroxide Solution* — 175 g NaOH/litre.

B-8.2.5 *Sodium Hydroxide Solution* — 300 g NaOH/litre.

B-8.3 Procedure

B-8.3.1 Extract a 0.5-g specimen with acetone-chloroform mixture in accordance with **B-1**.

B-8.3.2 Transfer the specimen to a 250-m1 beaker and heat on the steam bath until it no longer smells of chloroform. Add a few millilitres of nitric acid and allow to stand for about 10 m. Add 50 ml more of nitric acid, taking care to wash down the sides of e beaker, and heat on the steam bath for at least 1 h. At the end of this time there should be no more bubbles or foam on the surface. Pour the liquid, while hot, into a Gooch crucible, taking care to keep as much possible of the insoluble material in the beaker. Filter slowly with gen suction and wash well by decantation with hot nitric acid. (Caution Empty the filter flask) (*see* Note). Wash with acetone and a mixture equal parts of acetone and chloroform until the filtrate is colourless. Digest the insoluble material which has been carefully retained in the beaker for 10 min on the steam bath with 35 ml of sodium hydroxide solution (300 g/litre). This treatment with alkali may be omitted if silicates are absent. Dilute to 60 ml with hot water and heat on the steam bath. Filter the solution of alkali and wash well with hot sodium hydroxide solution (175 g/litre).

NOTE — The filtration may be materially aided, particularly with some synthetic rubber products, by partial or complete neutralization of the nitric acid solution with sodium hydroxide. Partial neutralization together with the addition of trivalent cations or anions may also aid agglomeration of the carbon black particles if they are too well dispersal to filter.

B-8.3.3 Next, wash the residue about four times with hot hydrochloric acid. Neutralize the last washing with sodium hydroxide and test for the presence of lead with sodium chromate solution. If lead is present, continue to wash with hot hydrochloric acid and, finally, wash with warm hydrochloric acid (1:7). Remove the crucible from the funnel, taking care that the outside is perfectly clean, dry it in an air bath for 14 h at 110°C, cool, and weigh; call this weight *a*. Burn off the carbon at a dull red heat (550 to 600°C) and reweigh; call this weight *b*. The difference in weight represents approximately 105 percent of the carbon originally present in the form of carbon black.

B-8.4 Calculation

Carbon black, percent = $\frac{a-b}{1.05\times c} \times 100$

where

c = weight in g of specimen used.

B-9 NITROGEN (CALCULATED AS GLUE)

B-9.1 General — This method is intended for use in the determination of glue when it is used as a filler in rubber products other than NBR products. The method may also be used to determine nitrogen from NBR polymer present in a product. The calculations in this section are designed for determination of glue in NR products. In the absence of other nitrogenous material, the method may be applied to synthetic rubber products without correction for the nitrogen content of the rubber polymer. A slight error will result from nitrogen content of antioxidants and accelerators present after extraction. When glue is found to be present in a NR product and determined, by this method by calculation from nitrogen content, a correction shall be made for the natural protein in NR as shown in the calculations. The correction shall be made by the method of approximation. The rubber as compounded is calculated on the basis of the total nitrogen as glue. The glue content is then corrected on the assumption that the rubber as compounded contains 0:4 percent protein nitrogen and this value is used to calculate a more exact figure for rubber hydrocarbon.

B-9.2 Reagent

B-9.2.1 *Copper Sulphate* ($CuSO_4$)

B-9.2.2 *Paraffin*

B-9.2.3 *Sodium Hydroxide Solution* — (750 g NaOH/litre).

B-9.2.4 *Sodium Hydroxide Standard Solution* — Prepare and standardize a 0.1 N sodium hydroxide (NaOH) solution.

B-9.2.5 *Sodium Sulphate* (Na_2SO_4)

B-9.2.6 *Sulphuric Acid, Standard Solution* — Prepare and standardize a 0.1 N sulphuric acid (H_2SO_4) solution.

B-9.2.7 *Zinc* — granulated.

B-9.3 Procedure — Extract a 2-g specimen with acetone for 8 hours. Remove the solvent from the specimen, and transfer the latter from the filter paper to a 750-ml Kjeldahl flask. Add 25 to 30 ml of sulphuric acid, 10 to 12 g of sodium hydroxide and about 1 g of copper sulphate. Heat gently until the first vigorous frothing ceases; then raise the heat gradually until the liquid boils. Continue the boiling until the solution becomes clear. Allow the flask to cool, dilute carefully with 150 ml of water, and again allow to cool. Add 10 ml of sodium hydroxide solution (750 g/litre), pouring it carefully down the side of the flask so that it does not mix immediately with the acid solution. Add about 1 g of granulated zinc to prevent bumping and a piece of paraffin the size of a pea to diminish frothing. Connect the flask quickly with a condenser, the delivery tube of which dips into a 500-m1 Erlenmeyer flask, containing 50 ml of 0.1 N sulphuric acid diluted to about 100 ml. Carefully swirl the flask to mix the contents and start to heat gently, increase the flame as the danger of foaming over diminishes, and finally boil briskly until about one-half of the liquid has passed over into the receiver. Add methyl red solution and titrate the excess acid by means of 0.1 N sodium hydroxide solution.

B-9.4 Calculation

Total nitrogen as glue,

percent $= \frac{(AN - BN`) \times 0.014 \times 6.5}{C} \times 100$

where

A = volume in ml of sulphuric acid used;
N = normality of sulphuric acid;
B = volume in ml of sodium hydroxide used;
$N`$ = normality of sodium hydroxide; and
C = weight in g of specimen used.

B-10 RUBBER POLYMER CONTENT

B-10.1 Calculation

Rubber polymer content, percent = A (100 - B)

where

factor as listed below:

A = factor as listed below:

Rubber	Factor A
NR	94/97
IR	1.00
SBR*	1.00
BR	1.00
IIR	1.00

B = sum of percentage, of total extract, alcoholic potash extract, organic sulphur, ash, carbon black and glue determined in accordance with **B-1**, **B-2**, **B-6**, **B-7**, **B-11** and **B-9** respectively.

ANNEX C

(*Clause* 5.3.8)

METHOD TOR AUTOCLAVING TEST

C-1 TEST SPECIMENS

C-1.1 Each test piece shall measure not less than 10 × 5 cm.

C-2 APPARATUS

C-2.1 The apparatus shall consist of an autoclave containing steam at 1.1 kg per square cm gauge pressure. The space in the autoclave shall not contain snore than one part of air to 1000 parts of steam.

C-3 PROCEDURE

C-3.1 Keep the test pieces inside the autoclave for 20 minutes, then remove the pieces from the autoclave and allow them to cool to room temperature. Repeat the above autoclaving process after a period of two hours, then remove the test pieces from the autoclave and allow them to cool to room, temperature and dry in the air. Examine the test pieces for any sign of softening, stiffening, tackiness, brittleness or loss of other rubber like properties of the coating.

*Containing 23.5 percent bound styrene and not oil extended.

ANNEX D

(*Table* 1)

DETERMINATION OF CONTENT PROOFING

D-1 REAGENT

D.1.1 Solvent Capable of Swelling or Dissolving Cured Polymer Present in the Sample — The choice of a suitable solvent depends upon the nature of the polymer and upon the properties of the textile base.

D-2 PROCEDURE

D-2.1 Cut 4 test pieces each approximately 10 cm square equally spared across the width of the fabric with the 2 test pieces centered 15 cm from the selvedges. After conditioning at 27 ± 2°C and 63 ± 2 percent relative humidity immerse each test piece in the solvent and heat under the reflux until the proofing is dissolved or swollen thoroughly (generally about 1 hour) taking care not to allow the temperature to exceed 160°C. Remove the test piece from the solvent and carefully scrape off any swollen proofing with a spatula. Repeat the treatment using fresh solvent on each occasion until the fabric is lice from rubber. Squeeze the fabric to remove solvent and rinse \vial light petroleum hydrocarbon solvent until free from the original solvent. Dry 1 hour at 105-110°C and then condition for 24 hours. Transfer to a Weighing bottle and determine the weight of the fabric.

D-2.2 Ash the fabric at a low temperature in previously ignited and weighed silica crucible and determine the weight of the ash.

D-3 EXPRESSION OF RESULTS

D-3.1 The proofing, content, g/m^2
(as determined on 10 cm square lest piece) $= 100\ (a - b + c)$

where

a = weight in g of original test piece;
b = weight in g of fabric after removal of woofing; and
c = weight in g of ash of fabric.

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXXX)

XXXX 2024

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भारतीय मानक मसौदा

वस्त्रादि — कॉटन बेल्टिंग डक्स — विशिष्टि

(आईएस 5996 का *तीसरा पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Cotton Belting Ducks — Specification

(*Third Revision* of IS 5996)

ICS: 59.080.30

Industrial Fabrics Sectional Committee, TXD 33	last date for receipt of comments is XXXX 2024

FOREWORD

(*Formal clauses will be added later*)

This standard was first published in 1970. In the present revision the following major changes have been carried out in the light of the experience gained since its first revision in the year 1979:

a) No. of varieties have been reduced from 12 to 10.
b) The requirements for breaking load and elongation have been modified considerably.
c) A new variety that is variety No. 7 has been added.
d) Table 1 and Annex B of the first revision have been merged.

This third revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) The title of the standard has been updated;
ii) Amendments has been incorporated;
iii) BIS certification clause has been incorporated;
iv) Packing and marking clause has been incorporated;
v) Latest sampling clause has been incorporated;
vi) ICS number has been incorporated in place of UDC number; and
vii) References to Indian standards have been updated.

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 revised*)'. 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 — Cotton Belting Ducks — Specification

(*Third Revision*)

1 SCOPE

1.1 This standard prescribes the requirements of cotton belting ducks used in the manufacture of conveyor and elevator beltings as well as transmission beltings.

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 MANUFACTURE

3.1 Yarn — The yarn used in the manufacture of belting ducks shall be satisfactory in evenness and reasonably free from neps, spinning and doubling defects.

3.2 Cloth — The belting ducks shall be evenly and firmly woven in plain weave. The ducks shall be reasonably free from foreign matter and defects, such as knots, lumps and irregularities of twist in yarn.

4. REQUIREMENTS

4.1 The cotton belting ducks shall conform to the requirements given in Table 1 except count of yarn, ends and picks/dm and ply of yarn, which are given for guidance only.

4.2 The length and width of belting ducks shall be as agreed to between the buyer and the seller subject to the tolerance of $\frac{+1}{-0.5}$ percent and ± 1 percent respectively when determined by the method prescribed in IS : 1934-1969*.

4.3 The belting ducks shall not have moisture content more than 6 percent when tested by the method given in IS : 199.

4.4 The belting ducks shall be free from starch when tested by the method given in B-3.

5 PACKING

The ducks shall be made into tight rolls of 200 metres or any other length as agreed to between the buyer and the seller. The rolls shall be tightly wrapped with a layer each of polyethylene film and hessian. The outer layer of hessian shall be sewn tightly all over taking care not to pierce the contents. If necessary, additional layer of packing materials may be used to avoid ingress of moisture in transit.

6 MARKING

Each roll shall be marked with the following:

i) Name of the manufacturer, initials or trade-mark, if any;
ii) Name of the material;
iii) Mass, g/m^2;
iv) Length and width of the roll; and
v) Month and year of manufacture.
vi) Any other information as required by the law in force or as agreed between the buyer and the seller.

6.1 *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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 SAMPLING

8.1 For ascertaining the conformity in respect of ends, picks, mass, length, width, breaking load and elongation, the number of tests and criteria for conformity as given in IS : 3919 shall be followed.

8.2 For ascertaining the conformity in respect of moisture and freedom from starch, the number of tests and criteria for conformity as given in IS : 5463 shall be followed.

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS	*Title*
IS 3919 : 1966	Methods for sampling cotton fabrics for determination of physical characteristics
IS 5463 : 2022	Methods for sampling of cotton fabrics for chemical tests (*First Revision*)
IS 1934 : 1969*	----------
IS 199 : 1989	Textiles - Estimation of moisture, total size or finish, ash and fatty matter in grey and finished cotton textile materials (*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
IS 1315 : 1977	Method for determination of linear density of yarns spun on cotton system (*First Revision*)
IS 1963 : 2023	Methods for determination of threads per unit length in woven fabrics (*Second Revision*)
IS 6359 : 2023	Method for conditioning of textiles

ANNEX B

(*Table* 1, and *Clause* 4.4)

METHODS OF TEST

B-1. CONDITIONING OF TEST SPECIMENS AND ATMOSPHERIC CONDITIONS FOR TESTING

B-1.1 The test specimens shall be conditioned for testing and tested in the standard atmosphere as given in IS : 6359.

Table 1 Requirements of Cotton Belting Ducks

(*Clause* 4.1)

Sl No. (1)	Characteristics (2)		Requirements (3)										Tolerance, Percent (4)	Method of Test (5)
1	**Variety No.**		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
						Soft Duck					**Hard Duck**			
2	**Type (*see* note 1)**		24	28	32	36	42	48	48	60	31	34		
3	**Mass,** g/m^2		700	845	950	1015	1225	1400	1325	1740	910	970		IS : 1964
4	**Breaking Load, Min ON 2.5 x 20 cm strip,** N	**Warp**	1000	1450	1620	1650	2000	2400	2400	2750	1450	1550		IS : 1969
		Weft	600	830	925	950	1140	1100	1000	1100	920	1200		
5	**Elongation Range (*see* note 2),** Percent	**Warp**		16 to 20				18 to 22			12 to 16			IS : 1969
		Weft		5 to 7				6 to 8			5 to 10		± 2.5	

6	**Ply of yarn**	**Warp**	5	6	7	8	10	12	12	16	5	10 or 5		
		Weft	4	5	6	7	8	8	8	10	5	5		
7	**Constructional particulars for guidance, approximate count of yarn**	**Warp Tex (Cotton count)**	82 (7.25^S)	84 (7^S)	84 (7^S)	84 (7^S)	84 (7^S)	84 (7^S)	84 (7^S)	100 (6^s)	82 (7.25^s)	100 (6^s) to 50 (12^s)		IS : 1315
		Weft Tex (Cotton count)	94 (6.25^S)	84 (7^S)	84 (7^S)	84 (7^S)	84 (7^S)	84 (7^S)	84 (7^S)	84 (7^S)	82 (7.25^S)	82 (7.25^S)		
		Ends/dm	94	95	95	86	86	86	86	74	122	110	± 2.5	IS : 1963
		Picks/dm	60	56	52	48	48	48	41	40	72	74	± 4	

NOTE 1 — Numbers under 'Type' in sl no. 2 indicate commercially popular ducks.
2 — The elongation shall be determined under a load of 440 N for ducks having nominal mass up to 1 015 g/m^3 and 670 N for heavier ducks.
3 — 1 N (Newton) is approximately equal to 0.102 kgf.

B-2. PREPARATION OF TEST SPECIMENS FOR DETERMINING BREAKING LOAD AND ELONGATION

B-2.1 The general practice in breaking load tests is to ravel the test specimens to a width of 2.5 cm. However, in case of belting ducks, where coarse plied yarns are used and the ends-picks density is quite low, the strips are ravelled to a constant number of threads instead of a constant width. For example, if the average number of threads per 2.5 cm is 25.5, it is customary to test three specimens having 26 threads and three specimens having 25 threads. Similarly, prorata adjustments have to be made in the number of specimens to be chosen based on the average number of threads per 2.5 cm.

B-2.2 Six warpway and six weftway specimens are cut from different portions of sample under test, at random in such a way that no two test specimens shall contain the same set of threads. In case of warpway testing, the specimen of 75 mm width shall be ravelled to the desired number of ends and in case of weftway testing, the specimen of 50 mm width shall be ravelled to the desired number of picks.

B-2.3 Recommended rate of traverse is 460 ± 15 mm/min, generally.

B-3. DETERMINATION OF STARCH CONTENT

B-3.1 Test Specimen — From the test sample, cut a piece weighing about 10 g. Shred the piece into small bits and mix them thoroughly. Draw from the pieces so shredded a test specimen of about 5 g.

B-3.2 Procedure — Boil the test specimen in about 20 ml of distilled water in a conical flask for about 45 minutes. Cool the contents in the flask. Put a drop of iodine solution on a small quantity of content taken from the flask.

B-3.3 Report — Observe whether there is any appearance of blue colour. Report the material to be free from starch if no blue colour is observed.

भारतीय मानक मसौदा

वस्त्रादि — डबल टेक्सचर रबरयुक्त वॉटरप्रूफ कपड़ों के लिए — विशिष्टि

(आईएस 6110 का *दूसरा पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Double-Texture Rubberized Waterproof Fabrics — Specification

(*Second Revision* of IS 6110)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33	last date for receipt of comments is XXXX 2024

FOREWORD

(Formal clauses will be added later)

This standard, was published in 1971 and covered only one quality of the material with not less than 55 percent rubber polymer content on the mass of the proofing. In this revision a second quality with rubber polymer content of the proofing with not less than 35 percent on the mass of the proofing has been added. Further each quality will now be in three grades depending on total mass, proofing content and the breaking strength of the rubberized fabric.

This second revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) The Title of the standard has been updated;
ii) Amendments has been incorporated;
iii) BIS certification clause has been incorporated;
iv) Packing and marking clause has been incorporated;
v) Latest sampling clause has been incorporated;
vi) ICS number has been incorporated in place of UDC number; and
vii) References to Indian standards have been updated.

Double-texture rubberized fabrics are made by sandwiching a rubber composition between two sheets of base fabric. It is a heavy-duty cloth for use in the fabrication of ground sheets, waterproof garments, travelling bags, holdalls, etc. It may also be used as waterproof cover for general purposes.

This standard contains clause **6.2.4** which calls for an agreement between the purchaser and the supplier.

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 — Double-Texture Rubberized Waterproof Fabrics — Specification

(*Second Revision*)

1 SCOPE

1.1 This standard prescribes, the requirements and the methods of test for double texture rubberized waterproof fabrics used for defence and general purposes.

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 DESCRIPTION

The double-texture rubberized waterproof fabrics shall consist of two plies of dyed and/or undyed cotton fabric in viscose as required by the purchaser and laminated longitudinally with a thin intervening layer of rubber proofing.

4 QUALITIES AND GRADES

4.1 Qualities

The double texture rubberized waterproof fabrics shall be of two qualities based on the minimum rubber polymer content of the proofing by mass as indicated in **4.1.1** and **4.1.2**.

4.1.1 *Quality 1*

Minimum rubber polymer content of the proofing shall be 55 percent by mass, when tested according to Annex B.

4.1.2 *Quality 2*

Minimum rubber polymer content of the proofing shall be 35 percent by mass, when tested according to Annex B.

NOTE — The direct method for determination of rubber polymer content given in Annex C may be used when the manufacturer has declared that he has used only natural rubber composition for proofing.

4.2 Grades — The double texture rubberized waterproof fabrics of each quality shall be of three grades as described in Table 1.

5 WORKMANSHIP AND FINISH

5.1 The double texture rubberized waterproof fabrics shall be flexible and shall have the two cloth layers firmly adhered to the proofing. It shall be free from bare places, rubber patches on the surface, oil and other stains which are liable to effect the serviceability of the finished fabric. It shall also be reasonably free from creases, wrinkles, thin places, uneven shade, pin holes and other manufacturing defects.

6 REQUIREMENTS

6.1 Base Fabric

The base fabric for the manufacture of double texture rubberized waterproof fabric shall be made of cotton or viscose staple or other suitable textile material as agreed to between the purchaser and the supplier.

6.2 Rubber Proofing

6.2.1 The proofing shall be made from natural rubber or suitable vulcanizable synthetic rubber or a combination thereof compounded with the necessary ingredients.

6.2.2 It shall not contain substances, such as copper and manganese compounds in such amounts as to have deleterious action on rubber. Reclaimed rubber may be used in quality 2.

6.2.3 The proofing shall be non-irritant and free from objectionable odour.

6.2.4 *Resistance to Cold*

The proofing within the double-texture rubberized fabric shall withstand a bending test around a steel pin of 6 mm diameter without cracking, immediately after an exposure of 5 hours to a temperature of minus 35 ± 1°C. This requirement is optional and shall be agreed to between the purchaser and the supplier.

6.2.5 *Acetone Extract and Extractable Sulphur*

The amounts of acetone extract and extractable sulphur, as determined in Annex D shall not exceed the following limits (percent by mass):

	Cotton Fabrics	*Other Fabrics*
Acetone extract	8.0	15.0
Extractable sulphur	0.5	0.5

6.3 Finished Fabrics

6.3.1 *General Requirements*

6.3.1.1 *Length*

Unless otherwise specified, the finished fabric shall be supplied in ‘minimum length of 30 m without any joints. Acceptance of the fabrics in length of less than 30 m or with joints for length over 30 m shall be as agreed between the purchaser and the supplier.

NOTE — Maximum of 5 percent of the supply may be made in short length, provided no individual length is less than 10 m.

6.3.1.2 *Width*

The minimum effective width of the finished fabrics shall be 115 cm or as agreed to between the purchaser and the supplier.

6.3.1.3 The finished fabrics shall also comply with the requirements prescribed in Table 1 when tested according to the method indicated in col 9 of Table 1.

6.3.2 *Waterproofness Test*

The finished fabrics shall hold a 90 cm head of water for one hour without allowing any percolation of water When tested in accordance with method A-1 of IS 7016 (Part 7).

6.3.3 *Accelerated Ageing*

The finished fabric, after being subjected to accelerated again at a temperature of 90 ± 1°C for 150 hours in an air-oven, shall show no sign of softening, stiffening or other apparent deterioration of rubber and shall satisfy the test specified under **6.3.2.**

Table 1 Requirements for Finished Fabric

(*Clauses* 4.2 and 6.3.1.3)

Sl No.	**Characteristic**	**Requirements**						**Test of Methods, Ref To**
		Quality 1			**Quality 2**			
		Grade A	**Grade B**	**Grade C**	**Grade A**	**Grade B**	**Grade C**	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Mass*, g/m^2, *Max*	575	475	375	625	500	400	**4.2** of IS 7016 (Part I)
ii)	Proofing content, g/m^2, *Min*	250	200	150	300	250	200	Annex E
iii)	Breaking strength ‡, kg/5 cm width, *Min* — Warp	65	45	50	65	45	50	IS 7016 (Part II)
	weft	30	30	40	30	30	40	

*The mass shall be determined after conditioning the fabric for 48 h in an atmosphere of 65 ± 5 percent relative humidity and a temperature of 27 ± 2°C.

‡1 kg = 9.8 N.

6.3.4 *Adhesion of Plies*

The average load required to strip off longitudinally either fabric ply from a test piece of the double-texture rubberized fabric 2.5 cm wide shall be not less than the following limit's when tested in accordance with IS : 3400 (Part V)/ISO 36 : 2020.

a)	Original	1.5 kg
b)	After accelerated ageing at 90 ± 1°C for 150 hours in air-oven	Not less than 70 percent of the original load

Four test pieces, two in the warp direction, and two in the weft direction shall be subjected to this test in original condition. A similar set of test pieces shall be subjected to this test after accelerated ageing.

6.3.5 *Resistance to Xylole*

When pieces of about 4 cm^2 of the finished fabric are immersed in xylole (*see* IS : 359) for a period of 2 hours and gently shaken in it for one minute, the plies shall not separate and the proofing shall not show any sign of tackiness or disintegration. The temperature of xylole, throughout the duration of test, shall be maintained at 27 ± 2°C.

NOTE — Except where otherwise specified, the ambient air, throughout the duration of the above tests and for a period of 24 hours immediately preceding such tests, shall be maintained at a temperature of 27 ± 2°C and a relative humidity of 65 ± 5 percent.

6.3.6 *Colour*

The finished material shall be of a suitable colour or different colour on the two sides as agreed to between the purchaser and the supplier, Sulphur black shall not be used. The colour fastness in respect of the coloured material shall comply with the following requirements.

6.3.6.1 *Fastness to light*

The material when tested for colour fastness as prescribed in IS/ISO 105-B02, shall show a fastness rating of not less than No. 4 prescribed therein. In case of materials coloured on both sides or in dual shade, the test shall be conducted with respect to each side of the material separately and the colour fastness in each case assessed for compliance with the aforesaid requirement. The test shall be applicable to coloured as well as white rubberized fabrics.

6.3.6.2 *Fastness to washing*

When the rubberized fabric is tested for colour fastness, to washing in accordance with IS/ISO105-C10, the fastness range, in respect of change in shade of the material and the degree of staining on 1 he attached undyed pieces of cotton and clothes, evaluated according to IS/ISO 105-A02 and IS/ISO 105-A03 respectively shall be not less than 5 in case of double texture rubberized fabrics where the base fabric is not dyed. In case of coloured fabrics where the base fabric is of dyed material, the fastness rating of the shades on each side shall be as agreed to between the purchaser and the supplier.

6.3.6.3 *Reaction of aqueous extract*

When the finished fabric is tested in accordance with the ‘ hot method ’ of IS 1390/ISO 3071 : 2020, its aqueous extract shall neither be acidic to methyl orange nor alkaline to phenolphthalein indicator.

7. PACKING AND MARKING AND STORAGE

7.1 Packing

The material shall be securely packed in the form of a roll so as to ensure safe transportation.

7.2 Marking

7.2.1 Each roll of coated fabric shall be supplied with a label with the following information:

a) Name and/or trade-mark, if any, of the manufacturer;
b) Type, grade and class of material;
c) Month and year of manufacture;
d) Length of coated fabric in the roll, in metres; and
e) Any other statutory requirements.

7.3 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 product(s) may be marked with the Standard Mark.

7.4 Storage

The rolls of double-texture rubberised waterproof fabrics shall be stored vertically on dry, clean, firm and level surface. The rolls shall be protected from dust, moisture, direct sunlight, corrosive and solvent fumes.

8 SAMPLING, NUMBER OF TEST AND CRITERIA FOR CONFORMITY

8.l Scale of Sampling

8.l.1 Lot
In a consignment, all the rolls of same quality, same grade and belonging to the same batch of manufacture shall be grouped together and each such group shall constitute a lot.

8.l.2 For ascertaining the conformity of material to the requirements of the specification, samples shall be tested from each lot separately.

8.l.3 The number of rolls to be selected from a lot shall depend upon the size of the lot and shall be according to Table 2.

Table 2 Scale of Sampling
(C*lause* 8.1.3)

Sl No.	Number of rolls in the lot	Sample size
(1)	(2)	(3)
i)	up to 50	2
ii)	51 to 100	3
iii)	101 to 150	4
iv)	151 to 300	5
v)	301 and above	7

8.1.3.1 The rolls shall be selected from the lot at random. In order to ensure the randomness of selection a random number table shall be used. For guidance and use of random number tables, IS 4905/ISO 24153: 2009 may be referred, In the absence of the random number table, the following procedure may be adopted:

'Starting from any roll in the lot, count them in order as 1, 2, 3 . . .etc., up to r and so on where *r* is the integral part of *N/n* (*N* being the number of rolls in the lot and n the number of rolls to be selected from the lot). Every *r*th roll thus counted shall be withdrawn till the requisite number of rolls is obtained."

8.2 TET SAMPLES AND REFEREE SAMPLES

8.2.1 From each of the rolls selected according to **8.1.3**, a specified length of fabric shall be cut, care being taken to exclude not less than 25 cm length of fabric from either end. The length shall be adequate to provide test specimens to be cut from this length for various tests given in the specification.

8.3 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

8.3.1 The test for all the requirements given in the specification shall be conducted on individual samples.

8.3.2 The lot shall be declared as conforming to the requirements of the specification if for each of the characteristics all the test results on individual samples are found to be meeting the corresponding specification limits.

ANNEX A
(*Clause* 2)
LIST OF REFFERED STANDARDS

IS NO.	*Title*
IS 170 : 2020	Acetone — Specification *(Fifth Revision)*
IS 359 : 1965	Xylole, Industrial Solvent Grade (Withdrawn)
IS/ISO 105-B02 : 2014	Textiles — Tests for Colour Fastness Part B02 Colour Fastness to Artificial Light : Xenon Arc Fading Lamp Test
IS/ISO 105-C10: 2006	Textiles — Tests for Colour Fastness Part C10 Colour Fastness to Washing with Soap or Soap and Soda
1S/IS0 105-A02 :1993	Textiles — Tests for Colour Fastness Part A02 Grey Scale for Assessing Change in Colour
IS/ISO 105–A03 : 2019	Textiles — Tests for Colour Fastness Part A03 Grey Scale for Assessing Staining (*First Revision*)
IS 1390 : 2022 ISO 3071 : 2020	Textiles Determination of *p*H of Aqueous Extract (*Third Revision*) of IS 1390
IS 4905 : 2015 ISO 24153: 2009	Random Sampling and Randomization Procedures *(First Revision)*

IS 7016 (Part 7) : 2023 ISO 1420:2016	Methods of Test for Rubber or Plastics Coated Fabrics Part 7 Determination of Resistance to Penetration by Water *(Third Revision)*
IS 7016 (Part 1/Sec 1) : 2022 ISO 2286-1 : 2016	Methods of Test for Rubber or Plastics Coated Fabrics Part 1 Determination of Roll Characteristics Section 1 Methods for Determination of Length, Width and Net Mass (*Third Revision*)
IS 7016 (Part 2) : 2022 ISO 1421:2016	Methods of Test for Rubber or Plastics Coated Fabrics Part 2 Determination of Tensile Strength and Elongation at Break *(Third Revision)*
IS 7016 (Part 5) : 2019 ISO 2411 : 2017	Methods of Test for Coated and Treated Fabrics: Part 5 Rubber - or Plastics - Coated Fabrics - Determination of Coating Adhesion *(Third Revision)*
IS 3400 (Part 5) ISO 36 : 2020	Methods of Test for Rubber, Vulcanized or Thermoplastic Part 5 Adhesion of Rubbers to Textile Fabrics (*Fourth Revision*)

ANNEX B
(*Clauses* 4.1.1 *and* 4.1.2)
DETERMINATION OF RUBBER POLYMER CONTENT
(INDIRECT METHOD)

B-1 GENERAL

B-1.1 The indirect method determines the non-rubber constituents of a product and the remainder is expressed as rubber polymer content. The non-rubber constituents are determined in accordance with **B-2** through **B-10** and rubber polymer content is calculated as given in **B-11**. The method is applicable to NR, IR, SBR and BR products and also to IIR products if they are extracted with methyl ethyl ketone rather than with acetone.

NOTE - The abbreviations NR, IR, SBR, IIR, BR, CR, ABR and NBR used above and hereafter denote, isoprene (natural), isoprene (synthetic), styrene-butadiene, isobutylene-isoprene, butadiene. chloroprene, acrylate-butadiene and nitrite-butadiene rubbers.

B-2 TOTAL EXTRACT

B-2.1 Apparatus

B-2.1.1 *Extraction Apparatus*

B-2.1.2 *Reagents*

B-2.1.2.1 *Acetone* — distilled over potassium carbonate and boiling between 56 to 57°C (*see* IS : 170).

B-2.1.2.2 *Chloroform*

B-2.2 Procedure

B-2.2.1 Place a weighed specimen of approximately 2 g in a filter paper. If the specimen is in the form of a sheet, cut it with scissors into strips 3 to 5 mm in width. If the specimen becomes tacky during the extraction, take care that adjacent portions are separated by paper. Fold the paper so that it will fit in the extraction cup and suspend the cup in a weighed extraction flask containing 50 to 75 ml of a mixture consisting of 32 parts of acetone and 68 parts of chloroform by volume. (Prior to the weighing of the extraction flask, it shall have been dried for 2 hours at 70 ± 5°C and cooled in a desiccator to the temperature of the balance.)

B-2.2.2 Extract the specimen continuously for 16 hours, heating at a rate such that the time required to fill and empty the siphon cup shall be between 2.5 and 3.5 minutes. (Rubber products having a ratio of total sulphur to rubber polymer in excess of 10 percent shall be extracted for 72 hours.) Carefully note all characteristics of the extract, both when hot and cold. If the colour is black, make a chloroform extraction separately for 4 hours, dry the extract to constant weight and add the value to the result obtained for total extract.

B-2.2.3 Evaporate off the solvent over a steam-bath, using a gentle current of filtered air to prevent boiling. Remove the flask from the steam-bath just prior to the disappearance of the last traces of solvent to prevent loss of extract. Continue the passage of air through the flask for 10 minutes to remove the remaining solvent and dry the flask for 2 hours in a 70 ± 5°C air-bath.

B-2.2.4 Cool in a desiccator to the temperature of the balance and weigh. Save the extracted rubber for further tests that require the use of an extracted specimen.

B-2.3 Calculation

$$\text{Total extract, percent by mass} = \frac{A}{B} \times 100$$

where

A = mass in g of extract, and

B = mass in g of specimen used.

B-3 ALCOHOLIC POTASH EXTRACT

B-3.1 Reagent

B-3.1.1 *Alcoholic Potash Solution*

Prepare 1 N alcoholic potassium hydroxide (KOH) solution by dissolving the required amount of potassium hydroxide in absolute ethyl alcohol that has been purified as follows:

Dissolve 1.5 g of silver nitrate ($AgNO_3$) in 3 ml of water and add it to 1 litre of alcohol. Dissolve 3 g of KOH in the smallest amount of hot water, cool, add it to the $AgNO_3$ solution and shake thoroughly. Allow the solution to stand for at least 24 hours, filter and distill.

NOTE - Absolute ethyl alcohol denatured with 10 percent by volume of methyl alcohol may also be used.

B-3.1.2 *Congo Red Paper*

B-3.1.3 *Ethyl Alcohol* - 95 percent.

B-3.1.4 *Ether*

B-3.2 Procedure

B-3.2.1 Remove the specimen remaining after the determination of total extract from its wrapping material while wet with solvent and dry the rubber at 70 ± 5°C to remove the solvent.

B-3.2.2 Transfer to a 200-ml Erlenmeyer flask, add 50 ml of alcoholic potash solution and heat under a reflux condenser for 4 hours. In the case of hard rubber, continue the heating for 16 hours or more.

B-3.2.3 Filter into a 250-ml beaker, wash with two 25-ml portions of boiling alcohol and then with three 25-ml portions of boiling water and evaporate the filtrate just to dryness. Use about 75 ml of water to transfer the dried filtrate residue to a separatory funnel. Acidify the solution with hydrochloric acid (1:3) testing with Congo red paper.

B-3.2.4 Extract with four 25-ml portions of other, unless the fourth portion should be coloured, when the extraction shall be continued until no further quantity can be removed. Unite the ether fractions and wash thoroughly with water until free of acid (two washings are generally sufficient).

B-3.2.5 Filter the ether solution through a plug of previously washed absorbent cotton into a weighed flask and wash the separatory funnel and the cotton plug with ether. Evaporate the ether on a steam-bath, using a gentle current of filtered air to prevent boiling. Remove the flask from

the steam-bath just prior to the disappearance of the last traces of solvent and continue the passage of air for 10 minutes. Dry the flask at 100 ± 5°C to constant weight, cool and weigh.

B-3.3 Calculation

$$\text{Alcoholic potash extract, percent} = \frac{A}{B} \times 100$$

where

A = mass in g of extract, and

B = mass in g of specimen used.

B-4 TOTAL SULPHUR (ZINC-NITRIC ACID METHOD)

B-4.1 General

This method covers the determination of all the sulphur except 'that contained in barium sulphate ($BaSO_4$), in a sample of a rubber product or in the fillers obtained from a rubber product. If acid-soluble barium salts, antimony sulphide, or lead compounds are present this method will give erroneous results, in which case the fusion method (*see* **B-5**) should be used. This method may be used for the determination of organic plus inorganic sulphur on an extracted sample, total plus inorganic sulphur on an unextracted sample, or inorganic sulphur in filler. If it is used for determination of total organic sulphur plus inorganic sulphur, it shall also be used for determination of inorganic sulphur (*see* **B-6**). The method is applicable to NR, SBR, BR, IR and CR products and to total plus inorganic sulphur determination of NBR products.

B-4.2 Reagents

B-4.2.1 *Barium Chloride Solution* ($BaCl_2.2H_2O$), *100 g/l*

Dissolve 100 g of barium chloride ($BaCl_2.2H_2O$) in water, add two to three drops of hydrochloric acid and dilute to 1 litre. If there is any insoluble matter or cloudiness, heat the solution overnight on a steam-bath and filter.

B-4.2.2 *Bromine, Saturated Water Solution*

B-4.2.3 *Nitric Acid, Fuming*

B-4.2.4 *Picric Acid, Saturated Solution*

B-4.2.5 *Potassium Chlorate* ($KClO_3$)

B-4.2.6 *Zinc-Nitric Acid Solution*

B-4.3 Procedure

B-4.3.1 Place 0.5 g of soft rubber or 0.2 g of hard rubber (extract the specimen with acetone or acetone-chloroform mixture if organic sulphur is to be determined) in a 500-ml Erlenmeyer distillation flask of chemically-resistant material. Add 10 ml of zinc-nitric acid solution and moisten the sample thoroughly. Let it stand for at least one hour, overnight if convenient. By so doing the sample becomes partly decomposed. This permits the addition of fuming nitric acid with no danger of ignition of the sample. Add 15 ml of fuming nitric acid and whirl the flask rapidly to keep the sample immersed to avoid ignition. With some sample it may be necessary to cool the flask under running water.

B-4.3.2 When the dissolution of the rubber appears to be complete, add 5 ml of a saturated water solution of bromine and slowly evaporate the mixture to a foamy syrup.

B-4.3.3 If organic matter or carbon remains at this point, add a few millilitres of fuming nitric acid and a few crystals of potassium chlorate (caution) and evaporate at a boil. Repeat this operation until all carbon is removed and the solution is clear, colourless or light yellow.

B-4.3.4 At this point either of the following procedures may be used:

Procedure A — Place the flask on an asbestos gauze and evaporate the mixture to dryness over a burner. Then bake the mixture at the highest temperature of the burner until all nitrates are

decomposed and no more nitrogen oxide fumes can be detected. The flask and its contents shall be carefully annealed after this procedure by gradually decreasing the flame or by placing the flask on successively cooler sources of heat.

Procedure B — Evaporate the mixture, cool, add 10 ml of hydrochloric acid and evaporate to dryness, avoiding spattering. Repeat this procedure once (or more) if oxides of nitrogen are still evolved.

B-4.3.5 Cool the flask, add 50 ml of hydrochloric acid (1:6) and digest hot until dissolution is as complete as possible. Filter while hot. Wash the filter and dilute the filtrate and washings to about 300 ml. Add 10 ml of saturated picric acid solution, heat to 90°C and precipitate the sulphate by dropwise addition of barium chloride solution while stirring vigorously. Digest the precipitate overnight, preferably at 60 to 80°C, using a watch glass to cover the beaker. Filter the barium chloride and wash with water until the filter is colourless. Dry, ash and finally ignite the precipitate at 650 to 900°C, with free access to air, to constant weight. Cool in a desiccator and weigh.

B-4.3.6 *Calculation*

$$\text{Sulphur, percent by mass} = \frac{A \times 0.1373}{B} \times 100$$

where

A = mass in g of barium sulphate, and

B = mass in g of specimen used.

B-5 TOTAL SULPHUR (FUSION METHOD)

B-5.1 General - This method covers the determination of organic, total or inorganic sulphur in rubber compounds when acid-soluble barium salts, antimony sulphide or lead compounds are present. All of the sulphur in the sample including that present in barium sulphate is determined when this method is used. When this method is used for determination of organic or total sulphur it shall also be used for the determination of inorganic sulphur (*see* **B-6**). Total plus inorganic sulphur shall be determined on an unextracted specimen while organic plus inorganic sulphur on an extracted specimen. The method is applicable to NR, SBR, BR, IR and CR products and to the determination of total plus inorganic sulphur on NBR products.

B-5.2 Reagents

B-5.2.1 *Nitric Acid-Bromine Solution*

Add a considerable excess of bromine to nitric acid so that a layer of bromine is present in the reagent bottle. Shake thoroughly and allow to stand for 24 hours before using.

B-5.2.2 *Sodium Carbonate* - (Na_2CO_3).

B-5.2.3 *Sodium Carbonate Solution* - 50 g/l.

B-5.3 Procedure

B-5.3.1 Place 0.5 g of soft rubber in a porcelain crucible of about 75 ml capacity. The specimen shall have been extracted with acetone chloroform mixture (*see* **B-2**) of organic plus inorganic sulphur is to be determined. Add 15 ml of the nitric acid-bromine solution mixture, cover the crucible with a watch glass and let it stand for one hour in the cold. Heat for one hour on the steam bath, remove the cover, rinse it with a little water and evaporate to dryness.

B-5.3.2 Add 3 ml of nitric acid, warm for a short time on the steam-bath, then allow to cool. Carefully add in small portions, by means of a glass spatula, 5 g of sodium carbonate. Raise the watch glass only high enough to permit the introduction of the spatula. Allow the sodium carbonate to slide down the side of the crucible as it shall not be dropped directly into the acid. Rinse the watch glass with 2 or 3 ml of hot water and stir the mixture thoroughly with a glass rod. Digest for

a few minutes, spread the mixture half way up the side of the crucible to facilitate drying and dry on a steam-bath. Fuse the mixture by heating over a sulphur-free flame.

B-5.3.3 Place the crucible in an inclined position on a wire triangle and start the ignition over a low flame. The tendency for the organic matter to burn too briskly may be controlled by judicious use of the stirring rod with which the burning portion is scraped away from the rest. When part of the mass is burned white, work a fresh portion into it until all of the organic matter is destroyed. It is necessary to hold the edge of the crucible with tongs. Towards the last half of the operation the flame should be increased. It is necessary to heat the crucible to redness.

B-5.3.4 After a fusion, allow the crucible to cool. Place it in a 400-ml beaker, add sufficient water to cover the crucible (about 125 ml) and digest on the steam-bath or plate for at least two hours.

B-5.3.5 Filter the solution into a covered 400-ml beaker containing 5 ml of hydrochloric acid and wash the residue thoroughly with hot sodium carbonate solution. A qualitative test for barium may be made on the residue, but no analysis for barium or correction because of its presence is necessary, unless a detailed ash analysis is desired. Acidify the filtrate to indicator paper with hydrochloric acid and add 2 ml in excess. Precipitate barium sulphate and ‘complete the determination as described in **B-4.**

B-5.4 Calculation

$$\text{Sulphur, percent by mass} = \frac{A \times 0.1373}{B} \text{ x } 100$$

where

A = mass in grams of barium sulphate, and

B = mass in grams of specimen used.

B-6 INORGANIC SULPHUR

B-6.1 General Type — This method covers the determination of inorganic sulphur in rubber products when no antimony is present. The sample is ashed and sulphur determined in the ash by the fusion method (*see* **B-5**) if acid-soluble barium salts or lead are present, or by the zinc nitric acid method in the absence of acid-soluble barium salts. The same method shall be used for the inorganic sulphur determination as is used for the determination of organic sulphur or total sulphur. The method is applicable to NR, SBR, BR, IR, CR, NBR and IIR products.

B-6.2 Reagents

nitric acid-bromine solution.

B-6.3 Procedure — Extract I.0 g specimen with acetone or with acetone-chloroform mixture (*see* **B-2**). Dry the sample, place in a porcelain crucible of about 75 ml capacity and distill off the rubber in a muffle furnace, using a maximum temperature of 450°C. A burner may be used for ashing if the sample is not allowed to catch fire. A wire gauze under the crucible will aid in preventing combustion. The carbon need not be completely burned off in this ignition. If acid-soluble barium salts and lead are absent, add 3 ml of nitric acid-bromine solution to the ash, cover with a watch glass and heat for one hour. Transfer the contents of the crucible, with washing, into a 500-ml Erlenmeyer destruction flask of chemically resistant material and evaporate to dryness. Proceed with the determination of sulphur as described in **B-4.3.3** to **B-4.3.6**. In the presence of acid soluble barium salts and lead, determine the sulphur by treating the ash in accordance with **B-1.5**.

B-6.4 Calculation

$$\text{Inorganic sulphur, percent by mass} = \frac{A \times 0.1373}{B} \text{ x } 100$$

where

A = mass in g of barium sulphate, and

B = mass in g of specimen used.

B-7 ORGANIC SULPHUR

B-7.1 Organic sulphur is calculated by subtracting inorganic sulphur as obtained in **B-6** from total sulphur as obtained in **B-4** or **B-5** as applicable.

B-8 FILLERS, REFEREE ASH METHOD

B-8.1 General

This method is intended for settling disagreements on fillers content by the ashing method. It is also useful for ashing rubber products for determination of inorganic sulphur in the absence of antimony or for ash analysis.

B-8.1.1 The method is not accurate for rubbers containing halogens when zinc compounds or other metal compounds that form volatile halides are present and shall not be used if an analysis of these metals in the ash is required.

B-8.1.2 The method may be used for preparing samples for ash analysis on rubber products not containing halogens or antimony sulphide. However, if the sample contains carbonates that decompose at 550°C or clays or silicates that will lose water at this temperature, the ash content value will not be highly precise and will not represent the original amount of inorganic fillers present in the sample.

B-8.2 Apparatus

B-8.2.1 *Crucible* — porcelain or silica, approximately 50 ml capacity.

B-8.2.2 *Electric Muffle Furnace* - with controls necessary to hole the temperature at 550 ± 25°C.

B-8.2.3 *Calibrated Thermocouple and Temperature Readout Device*

B-8.3 Procedure

B-8.3.1 Weigh a l-g specimen of the sample into an ignited, weighed crucible.

B-8.3.2 Adjust the temperature of the muffle furnace to 550 ± 25°C, place the crucible in the furnace and close completely. When more than one crucible is to be placed in the furnace, the crucible shall be placed on a tray and put into the furnace. and not opened for one hour. The door shall be closed immediately After one hour, open the furnace door 3 to 5 cm and continue heating for 30 minutes or until all carbonaceous material is burned off.

NOTE - If a referee ash determination is required, the temperature shall be determined by placing the calibrated thermocouple sensing element at approximately the geometric centre of the furnace cavity. within the specified range. The temperature shall be adjusted to be Not more than two crucibles shall be placed in the Oven and they shall be positioned directly below the thermocouple.

B-8.3.3 Remove the crucible from the furnace, cool in a desiccator and weigh.

B-8.4 Calculation

$$\text{Ash, percent by mass} = \frac{A-B}{C} \times 100$$

where

A = mass in g of ash and crucible,

B = mass in g of crucible, and

C = mass in g of specimen.

B-9 CARBON BLACK

B-9.1 General

B-9.1.1 This method covers the determination of carbon black by a nitric acid digestion method. It is applicable only to the 'R' family of rubbers containing an unsaturated carbon chain.

B-9.1.2 Application to any other rubber type may be possible if the rubber is degraded to fragments soluble in water, acetone, or chloroform. The method shall be used on such other rubbers only if adequate testing of known compounds has demonstrated the usefulness of the method.

B-9.2 Reagents

B-9.2.1 *Acetone*

B-9.2.2 *Chloroform*

B-9.2.3 *Sodium Chromate* (Na_2CrO_4) *Solution* - 100 g/l.

B-9.2.4 *Sodium Hydroxide* (NaOH) *Solution* - 175 g/l.

B-9.2.5 *Sodium Hydroxide* (NaOH) *Solution* - 300 g/l.

B-9.3 Procedure

B-9.3.1 Extract a 0.5 g specimen with acetone-chloroform mixture in accordance with **B-2**.

B-9.3.2 Transfer the specimen to a 250-ml beaker and heat on the steam-bath until it no longer smells of chloroform. Add a few millilitres of nitric acid and allow to stand for about 10 minutes. Add 50 ml more of nitric acid taking care to wash down the sides of the beaker and heat on the steam-bath for at least one hour. At the end of this time there should be no more bubbles or foam on the surface. Pour the liquid, while hot, into a Gooch crucible taking care to keep as much as possible. of the, insoluble material in the beaker. Filter slowly with gentle suction and wash well by decantation with hot nitric acid [*Caution* — Empty the filter flask (*see* Note)]. Wash with acetone and a mixture of equal parts of acetone and chloroform until the filtrate is colourless. Digest the insoluble material, which has been carefully retained in the beaker, for 10 minutes on the steam-bath with 35 ml of sodium hydroxide solution (300 g/l). This treatment with alkali may be omitted if silicates are absent. Dilute to 60 ml with hot water and heat on the steam bath. Filter the solution of alkali and wash well with hot sodium hydroxide solution.

NOTE - The filtration may be materially aided, particularly with some synthetic rubber products, by partial or complete neutralization of the nitric acid solution with ammonium hydroxide. Partial neutralization together with the addition of trivalent cations or anions may also aid aglomeration of the carbon black particles, if they are too well dispersed to filter.

B-9.3.3 Next, wash the residue about four times with hot hydrochloric acid. Neutralize the last washing with ammonium hydroxide and test for the presence of lead with sodium chromate solution. If lead is present, continue to wash with hot hydrochloric acid and finally wash with warm hydrochloric acid (1:7). Remove the crucible from the funnel taking care that the outside is perfectly clean, dry it in an air-bath for 90 minutes at 110°C, cool and weigh; call this weight *A*. Burn off the carbon at a dull red heat (550 to 600°C) and reweigh; call this weight *B*. The difference in weight represents approximately 105 percent of the carbon originally present in the form of carbon black.

B-9.4 Calculation

$$\text{Carbon black, percent by mass} = \frac{(A-B)\times 100}{1.05 \times C}$$

where

C = mass in grams of specimen used.

B-10 NITROGEN (CALCULATED AS GLUE)

B-10.1 General

This method is intended for use in the determination of glue when it is used as a filler in rubber products.

The calculations in this section are designed for determination of glue in NR products. In the absence of other nitrogenous material the method may be applied to synthetic rubber products without correction for the nitrogen content of the rubber polymer. A slight error will result from nitrogen content of antioxidants and accelerators present after extraction. When glue is found to be present in a NR product and determined by this method by calculation from nitrogen content, a correction shall be made for the natural protein in NR as shown in the calculations. The correction shall be made by the method of approximation. The rubber as compounded is calculated on the

basis of the total nitrogen as glue. The glue content is then corrected on the assumption that the rubber as compounded contains 0.4 percent protein nitrogen and this value is used to calculate a more exact figure for rubber hydrocarbon.

B-10.2 Reagents

B-10.2.1 *Copper Sulphate*

B-10.2.2 *Paraffin*

B-10.2.3 *Sodium Hydroxide* (NaOH) *Solution* — 750 g/l.

B-10.2.4 *Sodium Hydroxide Standard Solution* (*0.1*) — Prepare and standardize a 0.1 N sodium hydroxide (NaOH) solution.

B-10.2.5 *Sodium Sulphate*

B-10.2.6 *Sulphuric Acid, Standard Solution* (*0.1 N*) — Prepare and standardize a 0.1 N sulphuric acid (H_2SO_4) solution.

B-10.2.7 *Zinc Granulated*

B-10.3 Procedure

B-10.3.1 Extract a 2 g specimen with acetone for 8 hours. Remove the solvent from the specimen and transfer the latter from the filter paper to a 750-ml Kjeldahl flask. Add 25 to 30 ml of sulphuric acid, 10 to 12 g of sodium hydroxide and about 1 g of copper sulphate. Heat gently until the first vigorous frothing ceases, then raise the heat gradually until the liquid boils. Continue the boiling until the solution becomes clear. Allow the flask to cool, dilute carefully with 150 ml of water and again allow to cool. Add 10 ml of sodium hydroxide solution (750 gl), pouring it carefully down the side of the flask so that it does not mix immediately with the acid solution. Add about 1 g of granulated zinc to prevent bumping and a piece of paraffin in size of a pea to diminish frothing. Connect the flask quickly with a condenser, the delivery tube of which dips into a 500-ml Erlenmeyer flask containing 50 ml of 0.1 N sulphuric acid diluted to about 100 ml. Carefully swirl the flask to mix the contents and start to heat gently, increase the flame as the danger of foaming over diminishes and finally boil briskly until about one half of the liquid has passed over into the receiver. Add methyl red solution and titrate the excess acid by means of 0.1 N sodium hydroxide solution.

B-10.4 Calculation

$$\text{Total nitrogen as glue, percent} = \frac{(AN - BN1) \times 0.014 \times 6.5}{C} \text{ x } 100$$

where

A = volume in millilitres of sulphuric acid used,

N = normality of sulphuric acid,

B = volume in millilitres of sodium hydroxide used,

N_1 = normality of sodium hydroxide, and

C = mass in grams of specimen used.

B-11 RUBBER POLYMER CONTENT

B-11.1 Calculation

Rubber polymer content, percent = A (100 - B)

where

A= factor as listed below:

Sl No. (1)	*Rubber* (2)	*Factor A* (3)
i)	NR	94/97
ii)	IR	1.00

iii)	SBR*	1.00
iv)	BR	1.00
v)	IIR	1.00

B = sum of percentage of total extract, alcohols potash extract, organic sulphur, ash, carbon black and glue determined in accordance with **B-2, B-3, B-7, B-9,** and **B-10** respectively.

ANNEX C

(*Clause* 4.1.2)

DETERMINATION OF RUBBER POLYMER CONTENT

(Direct Method for Natural Rubber Composition Only)

C-1 OUTLINE OF THE METHOD

C-1.1 A weighed quantity of the material is extracted with acetone and alcohol and dried. It is then oxidized with oxidizing mixture and steam distilled. The distillate is titrated with standard sodium hydroxide.

C-2 APPARATUS

C-2.1 All connections to the flask containing the oxidizing mixture shall be through glass joints; a suitable form of apparatus as shown in Fig. 1. The apparatus shall also include a steam generator or other source of clean steam at atmospheric pressure or at not more than 15 kPa. An aeration assembly is also required consisting of a cork or bung carrying two glass tubes. This shall be fitted to the receiver after completion of the steam distillation, with the glass tubes of such length that air is removed from the top of the receiver by connecting one tube to a vacuum line, the other tube dipping well below the surface of the distillate, thus drawing air through the liquid.

C-3 REAGENTS

C-3.1 Chromic Acid Oxidation Mixture — Dissolve 200 g of chromic anhydride in 50 ml of water, add 150 ml of sulphuric acid (r.d. 1.84) and mix well.

C-3.2 Phenolphthalein — Dissolve 0.2 g of phenolphthalein in 100 ml of methylated spirit.

C-3.3 Sodium Hydroxide — 0.1 N.

C-4 PROCEDURE

C-4.1 Weigh accurately a sufficient amount of the sample to contain approximately 0.3 g of the rubber hydrocarbon. Extract the test portion with acetone and alcohol. Dry the extracted rubber in an oven at a temperature of 70 to 100°C for one hour.

C-4.2 Place sufficient water in the receiver to cover the end of the entry tube. Mark the outside of the distillation flask to indicate the liquid level when the flask contains 75 ml of the chromic acid oxidation mixture f in the flask, lift the steam entry tube and insert the extracted sample. Replace the steam tube, surround the distillation flask by a boiling water

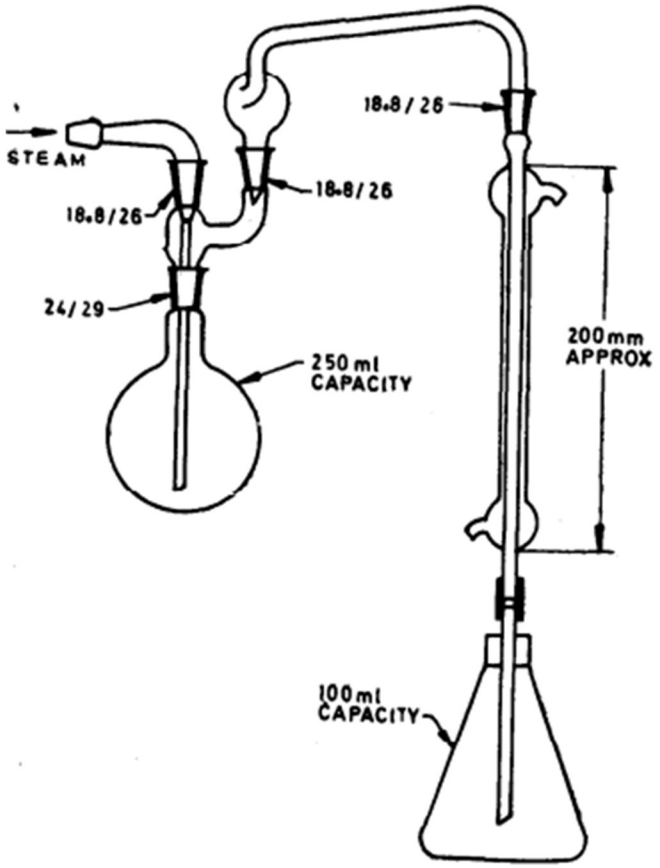


FIG. 1 APPARATUS FOR DETERMINATION OF NATURAL RUBBER HYDROCARBON

bath and maintain boiling for one hour. At the end of this period remove the water bath and start the flow of steam, heating the distillation flask when the volume of liquid has increased to 75 ml. Adjust the heat to maintain the liquid at this level. Continue distillation until about 500 ml of liquid are in the receiver; this takes about 30 minutes. At the conclusion of the distillation remove the steam entry and stop heating. Wash the delivery tube with water into the receiver and ensure that the temperature of the liquid in the receiver is below 30°C. Connect the aeration assembly to the receiver and draw air through the liquid by means of a water pump or other vacuum line. Maintain this stream of air for 30 minutes at approximately 2 litres per minute. At the conclusion of this time rinse the aeration assembly with water, collect the washings in the receiver and titrate the contents with 0.1 N sodium hydroxide using phenolphthalein as the indicator.

C-4.3 If chlorine-containing materials are present, add neutral potassium iodide to the distillate after aeration and titrate any iodine liberated with neutral sodium thiosulphate before continuing with the sodium hydroxide solution.

C-4.4 Make a blank determination using the same quantities of reagents and conditions of test. The sodium hydroxide titration blank should not exceed 0.3 ml.

C-5 CALCULATION

C-5.1 Rubber hydrocarbon, percent by mass = $\frac{0.908 \times V}{M}$

where

V = volume in ml of sodium hydroxide less volume in ml for blank determination, and

M = mass in g of the test portion.

C-6 INTERFERENCE BY OTHER ORGANIC SUBSTANCES

C-6.1 Mineral rubber (bitumen) is sometimes not completely removed by acetone and alcohol extraction and any residue will give some acetic acid on oxidation. The hydrocarbon in gutta percha and balata is chemically identical with that in natural rubber and returns the same values. Other polymers yield varying amounts of acetic acid on oxidation and the use of the method for a mixture of polymers should be followed by a correction for the other component, the correction being determined by oxidation of the corresponding pure material. Current samples of butadiene-styrene copolymers are equivalent to 3 percent natural rubber in the acetic acid they produce. Cellulose may. be considered as equivalent to 2 percent natural rubber. Polyisobutene interferes by protecting the rubber from attack by the ‘oxidizing mixture and for this reason the method is unreliable for determining a small amount of natural rubber mixed with a larger quantity of butyl rubber. The protein of natural rubber is not normally present in sufficient quantities markedly to interfere but in the case of a latex rubber a correction may become necessary. Four percent of protein is equivalent to 1 percent of rubber.

C-7 CORRECTION FOR COMBINED SULPHUR

C-7.1 Sulphur combined with rubber interferes in proportion to the unsaturation lost. An empirical correction is:

$$RHC = A\ (\ 1 + 0.015\ S\ )$$

where

RHC = rubber hydrocarbon,
A = apparent rubber hydrocarbon, and
S = combined sulphur as a percentage of *A*.

ANNEX D

(*Clause* 6.2.5)

METHOD FOR THE DETERMINATION OF PERCENTAGE OF ACETONE EXTRACT AND EXTRACTABLE SULPHUR

D-l ACETONE EXTRACT

D-l.1 Apparatus

D-1.1.1 *Extraction Apparatus* — The extraction apparatus is of the reflux type with the condenser placed immediately above the cup which holds the rubber. The cup is situated in the vapour of the boiling solvent and is emptied ‘by a siphon. The apparatus is of glass except in patterns where an extraction cup is suspended from the end of the condenser, in which case platinum wire is used for the suspension. The apparatus fit together without the use of cork, rubber or metal and in such a manner that loss of vapour during extraction does not exceed 20 percent of the extracting liquid.

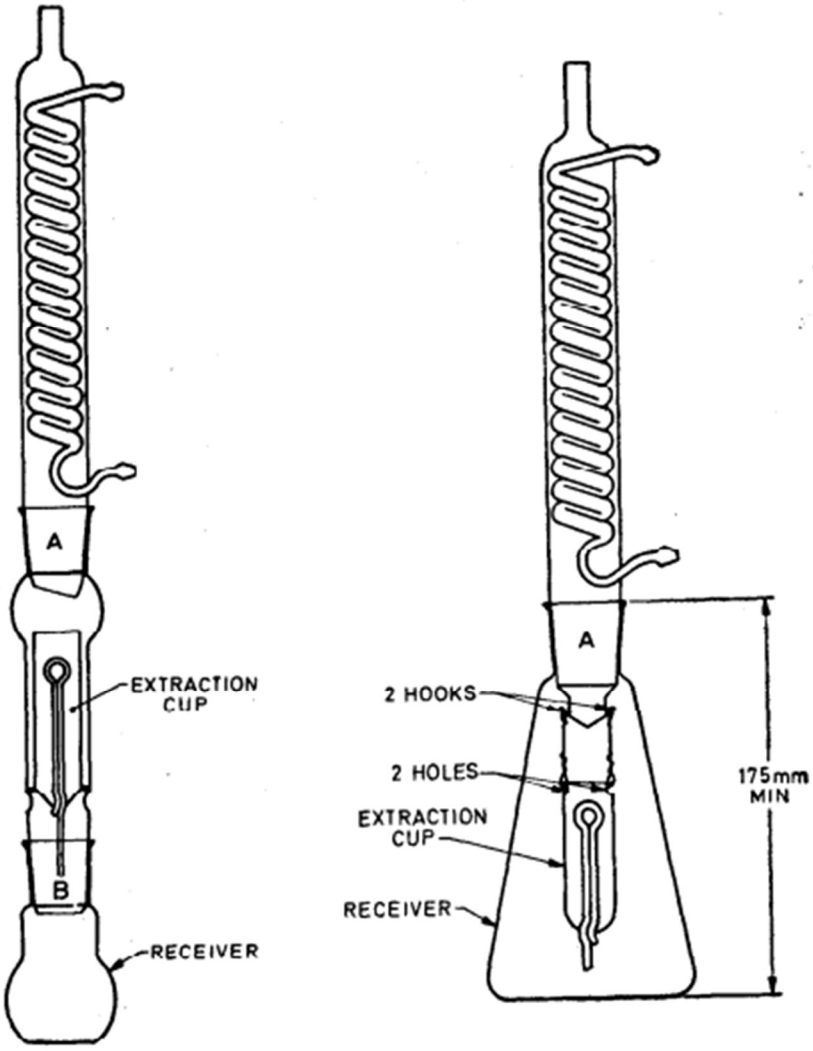
D-1.1.1.1 Two types of apparatus are shown in Fig. 2.

D-1.1.2 *Filter Paper* — acid washed hardened filament.

D-1.1.3 *Nylon Cloth*—open weave, continuous filament.

D-1.2 Reagent

D-1.2.1 *Acetone* — conforming to IS : 170.



Type 1

Extraction cup	*Joints*		*Receiver*
	A	*B*	
ml			ml
20-30	34/35	34/35	150
50-60	45/50	34/35	250

FIG .2 EXTRACTION APPARATUS

D-l.3 Procedure

Weighed portion of the proofing (about 3 g) wrapped in a filter paper, which has previously been extracted with acetone, shall be inserted in the extraction cup and acetone poured into the extraction vessel to fill the cup about twice times. The proofing material shall then be subjected to at least 80 hot extractions during a continuous period of not less than 8 but nor more than 16 hours. After extraction, the acetone shall be distilled off from the soluble matter in a weighed vessel or preferably in the previously weighed extraction vessel itself. After the acetone has been removed, the extract shall be dried at a temperature of 70 to 75°C for one hour, cooled in a desiccator and

weighed. Continue the process of drying, cooling and weighing until the change in weight between successive weighings is less than 2 mg.

D-l.4 Calculation — Calculate the weight of the extract as percentage of the proofing content as follows:

$$\text{Acetone extract, percent by mass of the proofing content} = \frac{M1}{M2} \times 100$$

where

M_1 = mass in grams of the extracted residue, and

M_2 = mass in grams of the proofing material taken for extraction.

D-2 EXTRACTABLE SULPHUR

D-2.1 The acetone extract of the sample, obtained as described in **B-1.3**, shall be oxidized by bromine in the presence of water. From the resulting sulphuric acid, the amount of sulphur shall be estimated, gravimetrically as barium sulphate and expressed as a percentage of the weight of proofing content.

ANNEX E

(*Table* 1)

DETERMINATION OF PROOFING CONTENT

E-1 OUTLINE OF THE METHOD

E-1.1 Test pieces of known area and mass after conditioning are refluxed in a suitable solvent to remove polymer from the fabric.

E-2 REAGENT

E-2.1 Solvent Capable of Swelling or Dissolving Cured Polymer Present in the Sample — The choice of a suitable solvent depends upon the nature of the polymer and upon the properties of the textile base.

E-3 PROCEDURE

E-3.1 Cut 4 test pieces each approximately 10 x 10 cm equally spaced across the width of the fabric with the 2 test pieces centered 15 cm from the selvedges. After conditioning at 27 ± 2°C and 65 ± 2 percent relative humidity immerse each test piece in the solvent and heat under the reflux until the proofing is dissolved or swollen thoroughly (generally about one hour) taking care not to allow the temperature to exceed 160°C. Remove the test piece from the solvent and carefully scrape off any swollen proofing with a spatula. Repeat the treatment using fresh solvent on each occasion until the fabric is free from rubber. Squeeze the fabric to remove solvent and rinse with light petroleum hydrocarbon solvent until free from the original solvent. Dry for one hour at 105 to 110°C and then condition for 24 hours. Transfer to a weighing bottle and determine the weight of the fabric.

E-3.2 Ash the fabric at a low temperature in a previously ignited weighed silica crucible and determine the weight of the ash.

E-4 EXPRESSION OF RESULTS

E-4.1 The mass of proofing, grams per square metre (as determined on 10 x 10 cm test piece) = l00 (a - b + c)

where

a = mass in g of the original test piece,

b = mass in g of the fabric after removal of proofing, and

c = mass in g of ash of the fabric.

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXXX)

XXXX 2024

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भारतीय मानक मसौदा

वस्त्रादि — विशेष प्रमाणित/रोधी कैनवास और डक — विशिष्टि

(आईएस 6803 का *पहला पुनरीक्षण)*

Draft *Indian Standard*

TEXTILES — SPECIAL PROOFED CANVAS AND DUCK — SPECIFICATION

(*First Revision* of IS 6803)

ICS: 59.080.30

Industrial Fabrics Sectional Committee, last date for receipt of comments is

TXD 33 XXXX 2024

FOREWORD

(Formal clauses will be added later)

Special proofed canvas and duck are used for manufacture of tarpaulins and other special coverings mostly needed for defence use. In this standard, requirements for base material, special proofing and other performance tests have been specified leaving composition of proofing material to the choice of the manufacturer.

This standard contains clauses **4.1**, **4.2.7.1, 4.2.9, 6.1** and **6.2** which call for agreement between the purchaser and the supplier.

This revision has been made in the light of experience gained since its publication and to incorporate the following changes:

vii) The title of the standard has been updated;

viii) BIS certification clause has been incorporated;

ix) Packing and marking clause has been incorporated;

x) Latest sampling clause has been incorporated;

xi) ICS number has been incorporated in place of UDC number; and

xii) References to Indian standards have been updated.

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 — SPECIAL PROOFED CANVAS AND DUCK — SPECIFICATION

(*First Revision*)

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and tests for special proofed canvas and duck.

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 TERMINOLOGY

3.1 For the purpose of this standard, definitions given in IS 2244 shall apply.

4 REQUIREMENTS

4.1 Base Fabric — Special proofed duck and canvas shall be made from scoured and/ or dyed cotton duck and cotton canvas conforming to IS 1422 and IS 1424 respectively, as agreed to between the purchaser and the supplier.

4.2 Special Proofed Canvas and Duck

4.2.1 The special proofing shall be imported by treating the fabric with a suitable composition, the proofing content not exceeding 15 percent by mass when tested by method as prescribed in **B-1**.

NOTE — The proofing mixture shall not contain any ingredient which is liable to damage the proofed canvas or duck.

4.2.2 *Resistance to Microbial Attack* — The material shall be rendered resistant to microbial attack by treating with suitable rot-proofing agent.

4.2.2.1 The proofed material when tested by the pure culture, mixed culture, asperigillus niger and soil burial method prescribed in IS 1389 shall conform to requirements stipulated against each method.

NOTE — If it is known that copper or zinc naphthenate has been used as a rotproofing agent, biological appreciation by the method prescribed in this clause need not be made. The purpose of this-clause will be adequately served if copper or zinc content is determined by the method prescribed in **B-3** and the copper content is found to be between 0.5 to 0.8 percent and zinc content between 0.8 to 1.0 percent, when calculated on the mass of the proofed fabric.

4.2.3 *p*H *Value* — The *p*H value of the aqueous extract of the proofed canvas or duck, when determined according to the method prescribed in IS 1390/ISO 3071 : 2020, shall be between 6.0 and 8.5.

4.2.4 *Pliability* — Special proofed canvas on duck shall be pliable when the sample is kept for 2 hours at 0°C and examined immediately thereafter. The proofing shall show no tendency to crack when folded double and pressed by hand on a flat surface.

4.2.5 *Breaking Strength* —The special proofed canvas and duck shall have an average breaking strength not less than 90 percent of the specified value prescribed for the base fabric (*see* IS 1422 and IS 1424) when tested according to IS 1969(Part 1)/ ISO 13934-1 : 2013.

4.2.6.1 *Pressure head test for special proofed canvas* — A circular piece of special proofed canvas, 200 mm in diameter, when subjected to a constant head of water prescribed in Table 1 for one hour according to the method prescribed in Appendix E of IS 1389 shall not show any leakage.

NOTE — In case small water drops (maximum 10) are found but these leakages stop during the test period, such defects should not be considered for rejection.

Table 1 Height of Water Column for Pressure Head Test

Sl No.	Material for Basic Fabric Conforming to IS 1424, Variety No.	Water Column Height mm
(1)	(2)	(3)
i)	1	300
ii)	2	230
iii)	3	150
iv)	4	150

4.2.6.2 *Bundesmann water repellency test for special proofed duck* — when tested as described in IS 392, there shall be no penetration of water through the fabric and its inner side shall not be wetted. The water absorption shall not exceed 60 percent by mass.

4.2.6.3 *Cone test* — There shall be no leakage of water either through the apex of the cone or through the outer surface of the special proofed canvas or duck which is exposed to air in a conditioned room at 27 ± 2°C and 65 ± 2 percent relative humidity and outer exposed surface shall not wet when tested as given below:

Form a cone by folding, pressing and creasing a 300 × 300 mm piece of special proofed canvas or duck. Suspend it by means of a metal ring and fill the cone with 400 ml of water and allow it to stand as such in a conditioned room at 27 ± 2°C and 65 ± 2 percent relative humidity for 18 hours. Examine for leakage and wetness.

NOTE — Water drops due to condensation inside the fold of the cone or along the contact line with the metal ring should not be considered for rejection.

4.2.7 *Colour Fastness*

4.2.7.1 *Colour fastness to daylight* — The material, when tested as prescribed in IS 2454 IS/ISO B02 : 2014, shall show a fastness rating of not less than 5, unless otherwise agreed to between the purchaser and the supplier.

4.2.7.2 *Colour fastness to washing* — When tested as prescribed in IS 764, the change in colour and the degree of staining of the material shall be of rating 3 or better.

4.2.8 *Shrinkage* — The material shall not have more than 3 percent shrinkage in warp or weft direction when determined as prescribed in B-4.

4.2.9 *Dimension* — The size, colour and other dimension of the finished fabric shall be as agreed to between the purchaser and the supplier.

5 PACKING AND MARKING

5.1 Packing

Unless otherwise agreed to between the purchaser and the supplier the special proofed canvas or duck shall be packed with hessian. The four corners of the packing shall be tied to leave at least 15 cm ears for easy handling.

5.2 Marking

5.2.1 Each special proofed canvas or duck shall be legibly and indelibly marked at one corner on one side with the following information:

a) Name and/or trade-mark, if any, of the manufacturer;

b) Type, grade and class of material;

c) Month and year of manufacture;

d) Length of proofed canvas and duck, in meters;

e) Any other statutory requirements; and

f) Unless otherwise agreed to between the purchaser and the supplier, the length of the letters used for marking shall be at least 80 mm.

5.3 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 product(s) may be marked with the Standard Mark.

6 SAMPLING, NUMBER OF TEST AND CRITERIA FOR CONFORMITY

6.1 Scale of Sampling

6.1.1 Lot

All special proofed canvas or duck in a single consignment and drawn from a single batch of manufacture shall constitute a lot. If the consignment is declared or known to consist of different batches of manufacture, the batches shall be marked separately and the group of special proofed canvas or duck in each batch shall constitute a separate lot.

6.1.2 All pieces of special proofed canvas or duck shall be examined for visual and tactile requirements. Samples shall be tested from each lot for ascertaining the conformity of the special proofed canvas or duck in the lot to the other requirements of the specification. Number of samples to be tested from a lot shall be as given in co1 1 and 2 of Table 2. The sample shall be drawn at random (*see* IS 4905/ISO 24153 : 2009) from the lot.

Table 2 Scale of Sampling and Permissible Number of Defectives

(*Clause* 6.1.2)

Lot Size ***N***	**Number of Samples to be selected** ***n***	**Permissible Number of Defectives**
(1)	(2)	(3)

5 to 25	5	0
26 – 100	15	1
101 – 300	30	2
301 – 500	40	3
501 – 800	55	3
801 – 1300	75	4
1301 and above	115	6

6.2 Number of Tests

6.2.1 All the samples drawn under **6.1.2** shall be tested for requirements other than visual dimensional and tactile characteristics as given under **3**. If the number of special proofed canvas or duck failing to satisfy the requirements for these characteristics is not more than the number given in col 3 of Table 2, the lot shall be declared to have satisfied the requirements for these characteristics. If, however, the number of special proofed material not satisfying the requirements is greater than the number given in col 3 of the table, the, lot shall be rejected as not conforming to the requirements for these characteristics.

6.2.2 The lot shall be considered to have satisfied the requirements given in the standard, if the test results (or the average of test results, as the case may be) of the specimens taken from each of the special proofed canvas or duck in the sample satisfy the specified requirements given in this standard.

6.3 Criteria for Conformity — A lot shall be declared as conforming to the requirements of the specification, if all the test results for the different characteristics given in **6.2.1** to **6.2.2** are found satisfactory.

ANNEX A

(*Clause* 2)

LIST OF REFFERED STANDARDS

IS NO.	*Title*
IS 2244 : 1972	Glossary of terms relating to treated fabrics (*First Revision*)
IS 1422 : 1983	Specification for cotton duck (*Third Revision*)
IS 1424 : 1983	Specification for cotton canvas (*Third Revision*)
IS 1389 : 1984	Methods for testing cotton fabrics for resistance to attack by micro-organisms (*First Revision*)
IS 1390 : 2022/ISO 3071 : 2020	Textiles — Determination of pH of aqueous extract (*Third 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 1389 : 1984	Method for testing cotton fabrics for resistance to attack by micro-organisms (*First Revision*)
IS 392 : 1989	Textiles — determination of water absorption and penetration of fabrics using bundesmann type apparatus (*Third Revision*)
IS/ISO B02 : 2014	Textiles — Tests for colour fastness Part B02 Colour Fastness to artificial light : xenon arc fading lamp test
IS/ISO 105-C10 : 2006	Textiles — Tests for colour fastness Part C10 colour fastness to washing with soap or soap and soda
IS 1070 : 2023	Reagent grade water — Specification (*Fourth Revision*)
IS 718 : 2023	Carbon tetrachloride — Specification (*Third Revision*)
IS 323 : 2009	Rectified spirit for industrial use - Specification (*Second Revision*)
IS 1039 : 2020	Textiles - Estimation of small quantities of copper, iron, manganese, chromium and zinc (*First Revision*)
IS 4905 : 2015/ISO 24153 : 2009	Random sampling and randomization procedures (*First Revision*)

ANNEX B

(*Clauses* 4.2.1, 4.2.2.1 and 4.2.8)

TEST METHODS FOR SPECIAL PROOFED CANVAS AND DUCK

B-1 GENERAL

B-1.1 Quality of Reagents — Unless otherwise specified, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

B-1.2 Conditioning for Testing — All tests shall be made on material which has been conditioned in an atmosphere of 65 ± 2 percent relative humidity and at a temperature of 27 ± 2°C for not less than 48 hours.

B-2 DETERMINATION OF PROOFING CONTENT

B-2.1 Procedure — Cut four pieces of the material 80 × 80 mm accurately from different places in a sample of special proofed canvas or duck and condition them for 24 hours under standard atmospheric conditions. Weigh the conditioned pieces accurately and subject them to successive extractions in a Soxhlet apparatus with (a) carbon tetrachloride (*see* IS 718) for 3 hours, (b) ractified spirit (conforming to IS 323) for two hours, and (c) water for 2 hours. After the above treatment, the material may contain pigments in the interstices of the fabric. To remove these, separate individual threads from the pieces, collect together and give light treatment with soap. Wash the threads thoroughly with water to remove last traces of soap. Dry and condition the sample in an atmosphere of 65 ± 2 percent relative humidity and at a temperature of 27 ± 2°C and weigh.

NOTE — Other solvents may be used in case the proofing material is not extracted by solvents (carbon tetrachloride and rectified sprit) prescribed in **B-2.1**.

B-2.2 Calculation — Calculate the mass of the proofing from the difference between the initial mass of the test pieces and the mass of the threads after deproofing, and express as a percentage of the deproofed fabric.

B-3 DETERMINATION OF COPPER AND ZINC CONTENT

B-3.1 Procedure — Weigh accurately about 5 g of the sample and extract thoroughly with bezene in a Soxhlet extraction apparatus. Transfer the extract to a silica dish and evaporate by heating the dish on a water-bath. Then estimate copper and zinc content in the extracted residue after removing the solvent (benzene) and ashing the residue by applying gentle heat and then following procedure given in IS 1039 for determination of cooper and zinc.

NOTE — A suitable Soxhlet thimble should be used so that any solid matter detached from the fabric does not enter in extraction flask.

B-4 DETERMINATION OF SHRINKAGE

B-4.1 Principle — Shrinkage, if any, is determined by measuring the diminution in dimension after treatment with water containing wetting agent.

B-4.2 Procedure — Prepare a specimen with lines marked parallel and perpendicular to warp direction so as to form a 250 mm square. Condition the specimens in the standard atmosphere (*see* **A-0.2**). Place each specimen in turn on the flat surface and measure the distances between the marks accurately to the nearest of 0.5 mm. Immerse the specimen in water containing 0.5 percent of a-suitable wetting agent, at a temperature between 25 and 30°C, using suitable means, such as small weights, to keep it submerged. Leave the specimen to soak for 24 hours, then rinse it in water and leave it to dry on a flat surface at a temperature of 30°C. If necessary, remove superfluous water with an absorbent cloth. Condition the specimen in a standard atmosphere and measure its dimensions by the method used before soaking.

B-4.3 Calculation

B-4.3.1 Calculate the percentage of shrinkage between each pair of datum marks as given below:

$$\text{Shrinkage, percent} = \frac{L_1 - L_2}{L_1} \times 100$$

Where

L_1 = the distance in millimetres before shrinkage treatment, and

L_2 = the distance in millimetres after shrinkage treatment.

B-4.3.2 Report the mean shrinkage for the warp and weft directions to the nearest of 0.1 percent.

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भारतीय मानक मसौदा

वस्त्रादि — फुटवियर उद्योग के लिए पी वी सी लेपित कपड़े — विशिष्टि

(आईएस 8699 का *पहला पुनरीक्षण*)

Draft *Indian Standard*

Textiles — PVC Coated Fabrics for Footwear Industry — Specification

(*First Revision* of IS 8699)

ICS: 59.080.40

Industrial Fabrics last date for receipt of comments is

Sectional Committee, TXD 33 XXXX 2024

FOREWORD

(*Formal clauses will be added later*)

In pre-war days, nitrocellulose and linseed oil coatings on woven fabrics were used for shoe upper but they were not so satisfactory because of poor flex-resistance. Then by stages came solid PVC coatings; expanded vinyl coated fabrics and polyurethanes; microporous vinyl fabrics; synthetic fabrics and laminates. At present in India, only PVC coated fabrics (either solid or expanded coating) are being used in footwear industries. These materials are being used for

upper and lining for certain type of shoes and chappals, for socks or cover materials for insoles, etc.

This present revision has been made in the light of experience gained since its publication and to incorporate the following changes:

vii) The title of this standard has been updated;

viii) BIS certification clause has been incorporated;

ix) Packing and marking clause has been incorporated;

x) Latest sampling clause has been incorporated;

xi) ICS number is incorporated in place of udc number; and

xii) References to Indian standards have been updated.

PVC coated fabrics consist of PVC polymer/co-polymer composition which is either calendered and then laminated or is spread on to dyed/ undyed textile material.

- Non-expanded PVC coated fabrics are manufactured by applying to one side of a woven cloth a substantially continuous solid coating of suitably plasticized, stabilized and pigmented polymer of vinyl chloride or a copolymer the major constituent of which is vinyl chloride or a combination of both.
- Expanded PVC coated fabrics are manufactured similar to that of non-expanded PVC, but part of the coating is foamed so that it forms a continuous expanded layer between the top skin and the base fabric.

This standard does not at present include requirements for PVC coated fabrics based on non-woven materials, knitted fabric backing and the coating without a continuous skin. It is recognized, however, that such materials may be used in future and it is proposed to make suitable additions in due course.

This standard contains clauses **5.3, 5.4.1, 55.4.2, 5.5.1** and **5.6.1** which call for an agreement between the purchaser and the supplier.

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 ‘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 prescribes the requirements, methods of sampling and test for PVC coated fabrics for footwear industry coated on woven (grey or dyed) fabrics. These coated fabrics may be in plain, embossed, printed or in any other surface finish.

2 REFERENCE

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 encourage to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS : 2244 and the following shall apply.

3.2 Printed PVC Coated Fabrics — PVC coated fabrics with a continuous or discontinuous, transparent or coloured surface coating including all multitone effects and lacquer finished fabrics.

3.3 Standard Atmospheric Conditions for Testing — An atmosphere with a relative humidity of' 65 ± 5 percent and a temperature of 27 ± 2°C.

4 TYPES AND GRADES

4.1 The material shall be of two types:

a) *Type A* — Expanded PVC coated fabric, nominal thickness in range of 0.8 to 1.9 mm.

b) *Type B* — Non-expanded PVC coated fabric.

4.1.1 Type A fabrics are manufactured in the following four grades, which are distinguished according to requirements set out in Table 1. The main uses of these grades are given below:

a) *Grade 1* — mainly used as upper material for gents and ladies shoes.

b) *Grade 2* — used as upper material for children shoes.

c) *Grade 3* — mainly used as a lining or a cover material for insole.

d) *Grade 4* — mainly used for socks or lining material or cover for insole in ordinary footwear.

4.1.2 Type B fabrics are manufactured in following four grades and is distinguished according to requirements set out in Table 2. The main uses of these grades are given below:

a) *Grade 1* — For shoe uppers, sandals and chappal straps.

b) *Grade 2* — For upper and straps for chappals and also lining materials for shoes.

c) *Grade 3* — For socks or insole cover in medium quality footwear. It is also used in shoe uppers of ordinary usage.

d) *Grade 4* — For ordinary socks or as a binding material. This is also used as insole cover for ordinary footwear.

5 REQUIREMENTS

5.1 The finished material of Type A and Type B shall comply with the requirements given in Table 1 and Table 2 respectively.

5.2 Appearance — The material shall be of uniform surface finish and shall contain no bubbles, blisters, and shall be substantially free from foreign matter when a test piece one metre long and having the width of the material is cut from the sample and placed on a flat illuminated surface suitable for showing up defects. Edges shall be smooth and free from cuts.

5.3 Colour, Grain, Embossing and Finish — The colour, grain and finish of the material whether in single colour or multi-colour affects, shall be as agreed between the purchaser and the supplier. Details regarding the procedure and the standard conditions for comparing colours are described in Annex A of IS : 1259 which is recommendatory.

5.4 Coating — The compound used for coating shall be made from suitably compounded vinyl chloride polymer or co-polymer. It shall be pigmented to meet specified colour requirements. The coating shall be uniformly applied on one side of the base fabric and shall be substantially free from pinholes, cracks and other flaws. It shall be on the back side of cotton base fabric in case of Grades 1 and 2. The coating shall satisfy the requirements given in **5.4.1** to **5.4.5**.

5.4.1 *Resistance to Cold* — The coating shall withstand a bending test around 6 mm diameter steel pin without cracking after an exposure of one hour at 0 ± 2°C or lower temperature as agreed between the purchaser and the supplier. The steel pin shall also be kept at test temperature and the test shall be done as quickly as possible.

Table 1 Requirements for Expanded PVC Coated Fabrics for Footwear Industry (Type A)

(*Clause* 4.1.1 and 5.1)

Sl No.	**Characteristic**	**Requirements**				**Method of Test, Ref to IS**
		Grade 1	Grade 2	Grade 3	Grade 4	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Usable width, cm, *Min*	90	90	122	122	IS 7016 (Part I/Sec I) : 2022 / ISO 2286-1 : 2016

ii)	Total mass, *Min*, g/m^2	1250	1000	750	550	IS 7016 (Part I/Sec I) : 2022 / ISO 2286-1 : 2016
iii)	Breaking strength, *Min*, kg/5-cm width:					IS 7016 (Part II) : 2022/ISO 1421 : 2016
	Warp direction	80	60	37.5	25	
	Weft direction	65	35	25	20	
iv)	Resistance to damage by flexing (No. of flexing cycle in thousand), *Min*:					IS 7016 (Part IV)
	Stage I	100	100	20	20	
	Stage II	150	150	40	40	
v)	Thickness, *mm*	1.7 to 1.9	1.4 to 1.6	1.2 to 1.4	0.80 to 1.10	IS 7016 (Part I/Sec I) : 2022 / ISO 2286-1 : 2016

Table 2 Requirements for Non-Expanded PVC Coated Fabric for Footwear Industry (Type B)

(*Clause* 4.1.2 and 5.1)

Sl No.	**Characteristic**	**Requirements**				**Method of Test, Ref to IS**
		Grade 1	Grade 2	Grade 3	Grade 4	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Usable width, cm, *Min*	125	125	122	122	IS 7016 (Part I/Sec I) : 2022/ISO 2286-1 : 2016
ii)	Total mass, *Min*, g/m^2	900	500	700	400	IS 7016 (Part I/Sec I) : 2022/ISO 2286-1 : 2016

iii)	Breaking strength, *Min*, kg/5 cm width:					IS 7016 (Part II) : 2022/ISO 1421 : 2016
	Warp direction	80	60	37.5	25	
	Weft direction	65	35	25	20	
iv)	Resistance to damage by flexing (No. of flexing cycle in thousand), *Min*:					IS 7016 (Part IV)
	Stage I	100	100	20	20	
	Stage II	150	150	40	40	

5.4.2 *Colour Fastness to Dry and Wet Rubbing* — The coating shall not stain an undyed cotton fabric of specified count when tested as prescribed in Annex C of IS : 1259.

NOTE - Metallic shades and printed material are not likely to withstand this test. However, when this test is required for metallic shades, the number of abrading cycles shall be as agreed to between the purchaser and the supplier.

5.4.3 *Colour Fastness to Light* — The test pieces shall be subjected to colour fastness to daylight according to Annex D of IS : 1259. However, in case of any dispute the test specimens shall be subjected to accelerated fading test as stipulated in Annex E of IS : 1259. For this standard, the material shall be considered satisfactory when colour fastness of any test piece shall be rated not less than No. 4 of standard pattern of plain dyed woollen fabrics as prescribed in IS : 686 / ISO 105-B01 : 2014. The effect on printing may be observed in case of printed material.

5.4.4 *Resistance to Heat and Loss of Mass of Coating on Heating* — The coating shall withstand an exposure of 24 hours in an air-oven at 100 ± 2°C without showing signs of exudation or stickiness when tested as prescribed in Annex B of IS : 1259 The loss of mass shall be not greater than 3 percent.

5.4.5 *Stability at Vulcanization Temperature* — A specimen 100 cm^2 is kept in an air circulating oven, coated side facing upwards on a wire mesh. After exposure for 45 minutes at 140°C, the specimen shall be removed from the oven alongwith the wire mesh, taking care not to disturb the coating. It shall be cooled in the standard atmosphere for 30 minutes and examined. The coating surface shall not show any tackiness or any deterioration in shade.

5.5 Resistance to Gelling — A test specimen of convenient size shall be double folded (coated surface outer most) and dipped in acetone for 30 seconds. The specimen shall then be removed from acetone and laid on a flat rigid surface with coated side upper most for drying in standard

atmosphere. After drying the coating shall be examined for appearance of cracks due to immersion in acetone. No crack shall be evident.

5.5.1 *Embossing and Grain* — The finished material shall be uniformly embossed or grained as agreed to between the purchaser and the supplier.

5.6 Adhesion of Print (for Printed PVC Coated Fabrics) — When examined as described in Annex F of IS : 1259, the number of cycles to remove either the printed pattern or any area of printed material shall be greater than five (10 strokes of abrading member).

5.6.1 In case of metallic and white printing inks, adhesion of print shall be subject to the agreement between the purchaser and the supplier.

5.7 Adhesion of Coating — The plies shall not separate more than 10 mm in a load of 27.5 N (2.75 kgf) in any of the test pieces taken when tested as prescribed in IS 7016 (Part 5) / ISO 2411 : 2017.

6. PACKING, MARKING, NUMBER OF CUTS IN THE ROLL AND STORAGE

6.1 Packing

The material shall be securely packed in the form of a roll so as to ensure safe transportation.

6.2 The material shall be in rolls of minimum of 15 metres lengths. Short lengths shall be not more than one per roll. Further, no short length shall be less than 5 metres in length. In any consignment not more than 10 percent shall contain short lengths.

6.3 Marking

The material shall be marked at the outer end of each roll with the manufacturers' name or trade mark, if any; month and year of manufacture; length of material in metres and the grade and type.

6.3.1 *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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6.4 Storage

PVC coated fabrics shall be stored vertically on dry, clean, firm and level surface in a ventilated place not exposed to direct sunlight and protected from dust, moisture, corrosive and solvent fumes.

7 SAMPLING, NUMBER OF TEST AND CRITERIA FOR CONFORMITY

7.1 Scale of Sampling

7.1.1 *Lot*

In any consignment, all the rolls of PVC coated fabric of the same grade, type, colour and finish shall be grouped together and each such group shall constitute a lot (a roll is normally about 15 m minimum in length for Type A and 20 m minimum in length for Type B).

7.1.2 The conformity of the lot to the requirements of this specification shall be ascertained for each lot separately. The number of rolls to be selected at random shall be in accordance with Table 3.

Table 3 Scale of Sampling

(*Clause* 7.1.2)

Sl No.	Lot Size	No. of rolls to be selected
	N	*n*
(1)	(2)	(3)
1	Up to 100	2
2	101 to 200	3
3	201 to 300	4
4	301 and above	5

7.1.3 The rolls shall be selected at random and to ensure randomness of selection, the procedure recommended in IS 4905 /ISO 24153 : 2009 shall be followed.

7.2 Number of Tests

7.2.1 From each of the rolls selected according to **7.1.3** one metre length (measured between two weft threads) of PVC coated fabric shall be cut, care being taken to exclude not less than 0.25 m length of fabric from either end. The specimens necessary for various tests, specified in the standard shall be cut from the lengths of PVC coated fabric thus obtained. All the samples shall be kept out of contact from each other or any other material that may cause contamination. Scheme of selection of test specimens from the sample length is given in Fig. 1.

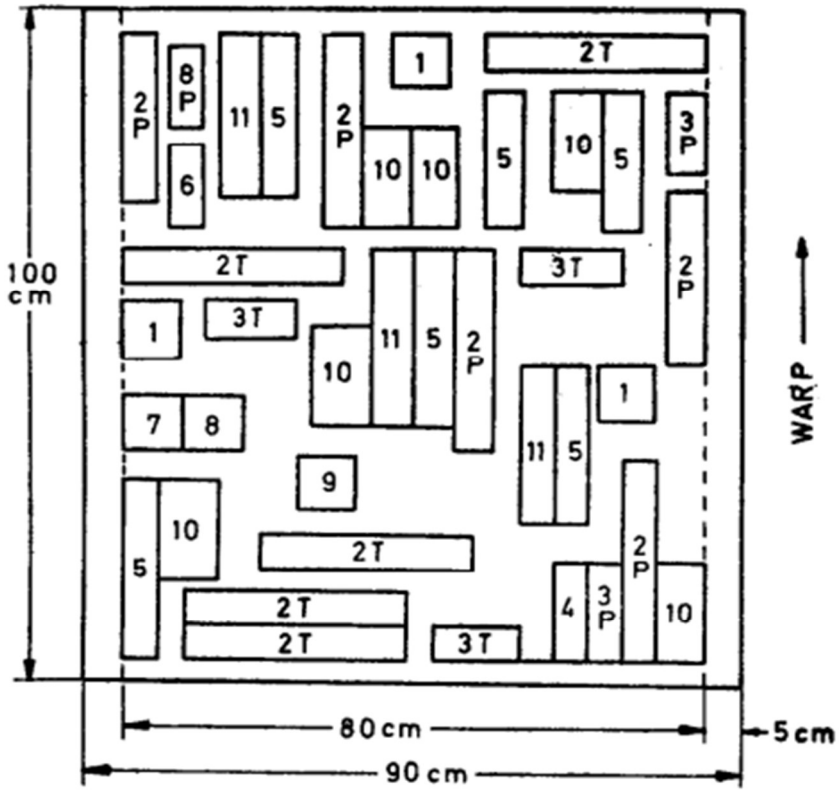
7.2.2 Each of the lengths obtained from a lot shall be examined for visual defects and coating and if found satisfactory, further tests as specified shall be carried out.

7.2.3 Tests for determination of all other characteristics specified in this standard shall be conducted on each of the test specimen cut from these lengths as obtained in **7.2.1.**

7.2.4 For levels of control for colour fastness to light (*see* **5.4.3**) the frequency of sample selection shall be each shade every month and also at the time of changes of composition for various shades.

7.3 Criteria for Conformity

7.3.1 The lot shall be declared as conforming to specification for various characteristics, if for each of the characteristics, the test results on all individual specimens are found to be within limit of the specification.



P = Specimen in the warp direction
T = Specimen in the weft direction

1 = Total mass and loss in mass on heating

2 = Breaking strength

3 = Resistance to damage by flexing

4 = Resistance to cold

5 = Colour fastness to dry and wet rubbing

6 = Colour fastness to light

7 = Resistance to heating

8 = Stability at vulcanization temperature

9 = Resistance to gelling

10 = Adhesion of coating

11 = Adhesion of print

FIG. 1 SCHEME FOR SELECTION OF TEST SPECIMEN

7.3.2 If the specimen, taken from a one metre length, fails in one or more tests, each such tests shall be repeated twice. For this purpose two more one metre lengths shall be taken from the roll, and these specimen shall be cut from each of them so that duplicate tests may be conducted in respect of each failure. If all the specimens pass the duplicate tests, the lot shall be declared conforming to the specification, otherwise not.

ANNNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS	*Title*
IS 2244 : 2022	Glossary of terms relating to treated fabrics (*First Revision*)
IS 1259 : 2022	Specification for Vinyl Coated Fabrics (*Fourth Revision*)
IS 7016 (Part I/Sec I) : 2022/ISO 2286-1 : 2016	Methods of Test for Rubber or Plastics Coated Fabrics Part 1 Determination of Roll Characteristics Section 1 Methods for Determination of Length, Width and Net Mass (*Third Revision*)
IS 7016 (Part II) : 2022/ISO 1421 : 2016	Methods of Test for Rubber or Plastics Coated Fabrics Part 2 Determination of Tensile Strength and Elongation at Break (*Third Revision*)
IS 7016 (Part IV) : 2003/ISO 7854 : 1995	Methods of Test for Coated and Treated Fabrics Part 4 Rubber-Or Plastics-Coated Fabrics — Determination of Resistance to Damage by Flexing (*Second Revision*)
IS 686 : 1985 / ISO 105-B01 : 2014	Method for determination of colour fastness of textile materials to daylight

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXXX)

XXXX 2024

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***भारतीय मानक* मसौदा**

वस्त्रादि — कॉटन लाइनर फैब्रिक के लिए विशिष्टि

(आईएस 9998 का *पहला पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Specification for Cotton Liner Fabrics

(*First Revision* of IS 9998)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33

last date for receipt of comments is XXXX 2024

FORWARD

(Formal clauses will be added later)

This standard was first published in 1981. This first revision has been made in the light of experience gained since its last publication and to incorporate the following changes:

i) The title of this standard has been updated.

ii) BIS certification clause is incorporated.

iii) Packing and marking clause is incorporated.

iv) Latest sampling clause is in corporate.

v) ICS number is incorporated in place of udc number.

vi) References to Indian standards is updated.

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 prescribes the requirements of cotton liner fabrics used in the rubber industry.

1.2 This standard also gives the constructional particulars of a few popular varieties of cotton liner fabrics for information only.

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 MANUFACTURE

3.1 Yarn — The yarn used in the manufacture of liner fabrics shall be satisfactory in evenness and shall be reasonably free from neps, spinning and doubling defects.

3.2 Cloth — The cloth shall be evenly and firmly woven in plain weave. The cloth when visually examined shall be reasonably free from foreign matter and such defects as knots, lumps and irregularities of twist in yarn.

4 REQUIREMENTS

4.1 The cotton liner fabrics shall conform to the requirements as given in Table 1.

Table 1 Requirements of Cotton Liner Fabrics

(Clause **4.1***)*

Mass	**Breaking Strength, Min**	
(1)	Warp kN/m (2)	Weft kN/m (3)
up to 250	8	6
251 - 350	11	6
Method of Test	IS : 1964	IS : 1969

4.2 The various constructional particulars of liner fabrics shall be as agreed to between the buyer and the seller subject to the following tolerances when tested by the method shown against them:

Sl No.	**Parameter**	**Tolerance**	**Method of Test**
i)	Ends	± 2.0 percent	IS 1963
ii)	Picks	± 5.0 percent	IS 1963
iii)	Mass, g/m2	± 5.0 percent	IS 1964
iv)	Length	± 2.0 percent	IS 1954

		- 0.5	
v)	Width	± 1.0 percent	IS 1954

4.2.1 The constructional particulars of a few popular varieties are given in **ANNEX B** for information only.

4.3 The liner fabrics shall be starch free when tested by the method given in **ANNEX C**.

5 PACKAGING

5.1 The cloth shall be made into tight rolls of suitable length as agreed to between the buyer and the seller.

6 MARKING

6.1 Each roll shall be marked with the following:

a) Name of the material;

b) Roll number;

c) Length and width of roll;

d) Net mass and gross mass;

e) Name of the manufacturer, initials or trade-mark, if any;

f) Month and year of manufacture; and

g) Material code as agreed to between the buyer and the seller.

6.1.1 *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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 PACKING

7.1 The rolls shall be tightly wrapped with a layer each of polyethylene film and hessian and sewn tightly all over as agreed to between the buyer and the seller. If necessary, additional layers of packing materials may be used to avoid ingress of moisture in transit. In case the length of the roll is more than 500 m, wooden discs on both sides should also be placed inside the packing.

8 SAMPLING

8.1 For ascertaining the conformity in respect of length, width, breaking strength, mass, ends and picks, the number of tests and criteria for conformity as given in IS: 3919 shall be followed.

8.2 For ascertaining the conformity in respect of freedom from starch, the number of tests and criteria for conformity as given in IS: 5463 shall be followed.

ANNEX A

*(Clause **2**)*

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
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 3919 : 1966	Methods for sampling cotton fabrics for determination of physical characteristics.
IS 5463 : 2022	Methods for sampling of cotton fabrics for chemical tests.
IS 1954 : 2024 ISO 22198 : 2006	Textiles — Fabrics — Determination of Width and Length (*Third 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*)

ANNEX B

(*Clause* 4.2.1)

CONSTRUCTIONAL PARTICULARS OF POPULAR VARIETIES OF COTTON LINER FABRICS

Variety No.	**Approximate Count of Yarn**		**Yarn Ply**		**Ends dm**	**Picks dm**	**Mass g/m^2**
	Warp	Weft	Warp	Weft			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	30 tex	30 tex	Singles	Singles	280	340	200
2	—	—	Singles	Singles	200	180	260
3	—	—	2- Ply	2- Ply	230	150	270
4	—	—	Singles	Singles	310	110	275
5	30s (45 tex)	13s/2 (45 tex ×2)	Singles	2- Ply	330	110	285
6	—	—	2- Ply	Singles	230	110	300
NOTE — Count of yarn is for guidance only.							

ANNEX C

(*Clause* **4.3**)

METHOD FOR DETERMINATION OF STARCH CONTENT

B-l TEST SPECIMEN

B-l.1 Cut a piece weighing about 10 g from the test sample. Shred the piece into small bits and mix them thoroughly. Draw shredded a test specimen of about 5 g.

B-2 PROCEDURE

B-2.1 Boil the test specimen in about 200 ml of distilled water in a conical flask for about 45 minutes. Cool the contents in the flask. Put a drop of iodine solution on a smaller quantity taken from the flask.

B-3 REPORT

B-3.1 Observe whether there is any appearance of blue colour on adding a drop of iodine solution. Report the material to be free from starch if no blue colour is observed.

BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXXX)
xxxx 2023

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भारतीय मानक मसौदा
वस्त्रादि — पॉलियामाइड फिल्टर कपड़े के लिए विशिष्टि

(IS 11574 का *पहला पुनरीक्षण*)

Draft *Indian Standard*

Textiles — Specification for polyamide filter cloth

(*First Revision* of IS 11574)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33

last date for receipt of comments is xxxx 2024

FOREWORD

(Formal clauses will be added later)

Polyamide filter cloths are being increasingly used by various industries like ceramic, oil, petroleum, chemicals, etc, in the country. Standardization of these filter fabrics will give impetus to this industry.

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 prescribes the requirements of ten varieties of polyamide filter cloth.

2 REFERENCE

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 encourage to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 MANUFACTURE

3.1 Yarn — The polyamide yarn shall be light and heat resistant, and shall be made from nylon-6 or nylon-66 filament yarn.

3.2 Cloth — The filter cloth, when visually examined, shall be reasonably free from weaving and other processing defects.

3.2.1 The cloth shall be heat set to obtain dimensional stability if the yarn used is not already heat stabilized.

4 REQUIREMENTS

4.1 The filter cloth shall comply with the requirements of Table 1.

Table 1 Requirements of Polyamide Filter Cloth
(Clause **4.1***)*

Variety No.	Ends per dm	Picks per dm	Mass	Breaking Load On 58 x 20 cm Strip, Min		Air Permeability	Dimensional changes washing (to be tested at boiling water)	Weave
				Warp	Weft			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	770	430	120	1275	575	20.5	shall not exceed ± 2 percent in both length and width	5 end satin
ii)	250	185	220	2980	2140	5		plain
iii)	224	168	240	2745	3040	5		do
iv)	480	115	240	2550	2205	2.5		do
v)	280	132	300	3095	3530	2.5		do
vi)	232	112	390	5000	3500	2.5		do
vii)	264	144	475	6000	5000	2.5		2/2 Twill
viii)	164	112	520	7000	4000	10		do
ix)	204	144	580	7000	6000	10		do
x)	200	148	600	7000	6500	10		do
Tolerance	± 2.5 percent	± 5 percent	+5/-2.5 percent	—	—	±1.5	—	—
Method of Test	IS : 1963	IS : 1964	IS : 1969PART 1	IS : 11056			IS : 1299	Visual

4.2 The length and width of filter cloth shall be as agreed to between the buyer and the seller subject to following tolerances when tested by the method shown against these:

Characteristic	Tolerance	Method of Test

Length	+2.0 percent -1.0 percent	IS : 1954
Width	± 1.0 percent subject to minimum of 1 cm in each direction	do

5 MARKING

5.1 The filter cloth shall be marked with the following:

a) Name of the material;
b) Variety No;
c) Width and length of the piece;
d) Manufacturer's name, initials or trade-mark, if any; and
e) Month and year of manufacture.

5.1.1 The filter cloth 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 there under. The ISI 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 which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. 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.

5.2 At both the ends of the piece, the filter cloth shall be marked with an identification mark.

5.3 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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 PACKING

6.1 The filter cloth shall be packed in bales or cases, in conformity with the procedures laid down in IS: 1347 or IS: 293 as required.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 For ends/dm, picks/dm, mass in g/m^2 and breaking load tests the scale of sampling and criteria for conformity as laid down in IS : 3919 shall be followed.

7.2 For dimensional shrinkage tests, the scale of sampling and criteria for conformity as laid down in IS: 5463 shall be followed.

7.3 For air permeability tests, the scale of sampling and criteria for conformity as laid down for breaking load test in IS: 3919 shall be followed.

ANNEX A
(Clause **2***)*
LIST OF REFERRED INDIAN STANDARDS

IS NO.	*TITLE*
1963:1881	Methods For Determination Of Threads Per Unit Length In Woven Fabrics *(Second Revision)*
1964 : 2001	Textiles — Methods For Determination Of Mass Per Unit Length And Mass Per Unit Area Of Fabrics *(Second Revision)*
1969 (Part 1) : 2018	Textiles — Tensile Properties Of Fabrics Part 1 Determination Of Maximum Force And Elongation At Maximum Force Using The Strip Method *(Fourth Revision)*
11056 : 2013	Textiles — Determination Of The Permeability Of Fabrics To Air *(First Revision)*
1299 : 1984	Method For Determination Of Dimensional Changes On Washing Of Fabrics Woven From Rayon And Synthetic Fibres *(Second Revision)*
1954 : 1990	Determination Of Length And Width Of Woven Fabrics - Methods *(Second Revision)*
1347 : 1972	Specification For Inland Packaging Of Cotton Cloth And Yarn *(First Revision)*
293 : 1980	Code For Seaworthy Packaging Of Cotton Yarn And Cloth *(Third Revision)*
3919 : 1966	Methods For Sampling Cotton Fabrics For Determination Of Physical Characteristics
5463 : 2022	Methods For Sampling Of Cotton Fabrics For Chemical Tests *(First Revision)*

Textiles — Specification for Polyester Filter Cloth
(*First Revision* of IS 11575)

ICS: 59.080.40

Industrial Fabrics Sectional Committee, TXD 33	last date for receipt of comments is xxxx 2024

FOREWORD

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(Formal clauses will be added later)

Filter fabrics made from polyester are being increasingly used by chemical industries, smelters and for wet filtration in the country. Standardization of these filter fabrics is expected to provide impetus to the industry.

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 prescribes the requirements of six varieties of polyester filter cloth.

2 REFERENCE

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 encourage to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 MANUFACTURE

3.1 Yarn — Continuous multifilament or monofilament or spun polyester yarn and made from virgin polyester filament only. The identification of polyester filament may be done according to IS: 667.

3.2 Cloth — The polyester filter cloth, when visually examined, shall be reasonably free from weaving and other processing defects.

3.2.1 The polyester filter cloth shall be heat set to obtain dimensional stability.

4 REQUIREMENT

4.1 The polyester filter cloth shall comply with the requirements given in Table 1.

Table 1 Requirements of Polyester Filter Cloth

Variety No.	**Ends per dm**	**Picks per dm**	**Mass**	**Breaking Load On 58 x 20 cm Strip, Min**		**Air Permeability**	**Dimensional changes washing (to be tested at boiling water)**	**Weave**
				Warp	Weft			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			g/m^2	N	N	$Cm^3/cm^2/s$		
i)	392	208	145	1050	650	7.0	shall not exceed ± 2 percent in both length and width	2/2 Twill
ii)	472	412	155	1275	975	20.5		5-end satin
iii)	252	104	575	4000	2000	2.5		do
iv)	240	108	615	4550	2500	2.5		do
v)	256	104	620	4500	2500	2.5		do
vi)	276	148	675	5000	3000	2.5		do
Tolerance	± 2.5 percent	± 5 percent	+5/-2.5 percent	—	—	±1.5	—	—
Method of Test	IS : 1963	IS : 1964	IS : 1969	IS : 11056			IS : 1299	Visual

3.2 The length and width of filter cloth shall be as agreed to between the buyer and the seller subject to following tolerances when tested by the method shown against it.

Characteristic	Tolerance	Method of Test
Length	+2.0 percent	IS : 1954
	-1.0 percent	
Width	± 1.0 percent subject to minimum of 1 cm in each direction	do

5 MARKING

5.1 The filter cloth shall be marked with the following:

a) Manufacturer's name, initials or trade-mark;

b) Name of the material;
c) Variety number;
d) Identification mark at both ends;
e) Year of manufacture;
f) Width and length of the piece; and
g) Any other particulars required by the buyer or by the law or regulation in force

5.1.1 The filter cloth 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 there under. The ISI 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 which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. 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.

5.2 At both the ends of the piece, the filter cloth shall be marked with an identification mark.

5.3 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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 PACKING

6.1 The filter cloth shall be packed in bales or cases in conformity with the procedures laid down in IS: 1347 or IS: 293 as required.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 For ends per dm, picks per dm, mass in g/m^2 and breaking load tests, the scale of sampling and criteria for conformity procedures as laid down in IS : 3919 shall be followed.

7.2 For dimensional changes on washing test, the scale of sampling and criteria for conformity as laid down in IS: 5463 for shrinkage test shall be followed.

7.3 For air permeability test the scale for sampling and criteria for conformity shall be same as that of the breaking load test specified in IS: 3919.

ANNEX A
(Clause **2***)*
LIST OF REFERRED INDIAN STANDARDS

IS NO.	*TITLE*
667 : 1981	Methods For Identification Of Textile Fibres (*First Revision*)

1963:1881	Methods For Determination Of Threads Per Unit Length In Woven Fabrics *(Second Revision)*
1964 : 2001	Textiles — Methods For Determination Of Mass Per Unit Length And Mass Per Unit Area Of Fabrics *(Second Revision)*
1969 (Part 1) : 2018	Textiles — Tensile Properties Of Fabrics Part 1 Determination Of Maximum Force And Elongation At Maximum Force Using The Strip Method *(Fourth Revision)*
11056 : 2013	Determination Of The Permeability Of Fabrics To Air (*First Revision*)
1299 : 1984	Method For Determination Of Dimensional Changes On Washing Of Fabrics Woven From Rayon And Synthetic Fibres (*Second Revision*)
1954 : 1990	Determination Of Length And Width Of Woven Fabrics - Methods *(Second Revision)*
1347 : 1972	Specification For Inland Packaging Of Cotton Cloth And Yarn *(First Revision)*
293 : 1980	Code For Seaworthy Packaging Of Cotton Yarn And Cloth *(Third Revision)*
3919 : 1966	Methods For Sampling Cotton Fabrics For Determination Of Physical Characteristics
5463 : 2022	Methods For Sampling Of Cotton Fabrics For Chemical Tests *(First Revision)*

भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDRADS

Draft for comments only Doc No.: TXD 33 (XXXX)

XXXX 2024

भारतीय मानक मसौदा

वस्त्रादि — पॉलिएस्टर/कपास मिश्रित रिप—स्टॉप डक — विशिष्टि

(आईएस 13510 का *दूसरा पुनरीक्षण)*

Draft *Indian Standard*

Textiles — Duck, Polyester/cotton Blended, Rip-Stop — Specification

(Second Revision of IS 13510*)*

ICS: 59.080.30

Industrial Fabrics Sectional Committee, TXD 33

last date for receipt of comments is XXXX 2024

FOREWORD

(*Formal clauses will be added later*)

This standard was originally published in 1992 and has been first revised in 2000 to incorporate the following changes:

a) To include three additional varieties of duck made from ring spun yam, and

b) To incorporate provision for manufacture of two varieties of duck made from core spun yam having polyester content of 45 percent. There is no International Standard on the subject.

This second revision has been made in the light of experience gained since its last revision and to incorporate the following changes:

i) The title of the standard has been updated.

ii) Amendment has been incorporated.

iii) Clause 1.1 has been updated.

iv) Clause 3.2.1 has been updated.

v) In Table 1 A-1 of IS 6489 part 1 is incorporated in place of existing.

vi) In Table 2 A-1 of IS 6489 part 1 is incorporated in place of existing.

vii) Clause 5.2 has been updated.

viii) In Table 3 Sl No. (vii) The requirement of flame resistance test should be updated as ‘flame 2 secs, after glow 120 secs is incorporated in place of Existing.

ix) Latest BIS certification clause has been incorporated.

x) Latest Packing and marking clause have been incorporated.

xi) Latest sampling clause has been incorporated.

xii) References to Indian standards have been updated.

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 — Duck, Polyester/Cotton Blended, Rip-Stop — Specification

(*Second Revision*)

1 SCOPE

1.1 This Indian Standard prescribes physical and chemical requirements of polyester/cotton rip-stop in grey or dyed, untreated or treated for water and/or, rot and/or flame resistance duck.

1.2 This standard does not specify the general appearance, feel, finish, etc., of the duck.

2 REFERENCES

The Indian Standards given 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 given in Annex A.

3 MANUFACTURE

3.1 Yarn

The ducks shall be manufactured from polyester cotton blended ring spun yarn and/or polyester cotton core spun yarn. In case of later the polyester multifilament yarn shall form the core while the cotton shall form the sheath. The yarn used in the manufacture of duck shall be evenly spun and reasonably free from neps and spinning and doubling defects. The yarn shall have a blend composition of polyester and cotton fibres as given in Table 3 (*see* IS 7866).

3.2 Duck

The duck shall be woven in rip-stop weave (see Fig. 1) and the selvedges shall be firm and straight. If woven on shuttleless looms, the selvedges shall be open and with tension in line with the body. The duck when visually examined, shall be reasonably free from spinning, weaving and processing defects.

3.2.1 If agreed to between the buyer and the seller, the duck shall be rendered water resistant by treating with suitable composition. The treated duck shall be free from streakiness and objectionable flaws. The amount of water proofing shall be as agreed to between the buyer and the seller.

If agreed to between the buyer and the seller, the duck shall be supplied in untreated (Grey) form also.

3.2.2 Additionally, if required by the buyer, the duck may be rendered rot resistant and/or flame resistant by treating with suitable chemicals in both undyed and dyed varieties.

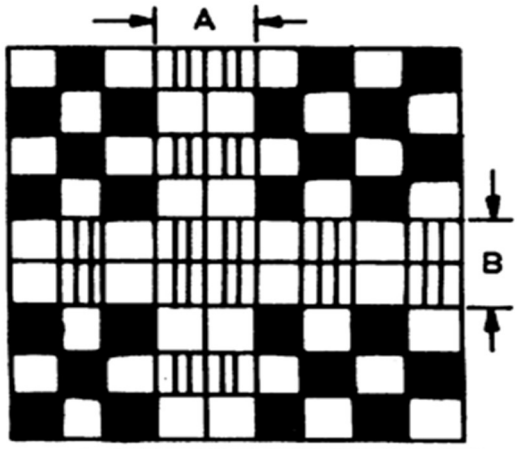

FIG. 1 RIP-STOP WEAVE

4 TYPES OF TREATED DUCK

a) Undyed and Water Resistant (UD/W);

b) Undyed and Water and Rot Resistant (UD/W/R);

c) Undyed and Water, Rot and Flame Resistant (UD/w/R/F);

d) Dyed and Flame Resistant (D/F);

e) Dyed and Water Resistant (DAV);

f) Dyed and Water and Rot Resistant (D/W/R); and

g) Dyed and Water, Rot and Flame Resistant (D/W/R/F).

5 REQUIREMENTS

5.1 Physical Requirements

The physical requirements of untreated duck shall conform to those specified in Table 1 and Table 2 except the count of warp and weft yarns which are given only for guidance of the manufacturers.

5.1.1 In case of treated duck, the breaking strength and tear strength requirements shall be at least 90 percent of the values specified in Table 1 and Table 2.

5.1.2 The length and width of duck shall be as agreed to between the buyer and seller. However, a tolerance of –1 cm on the declared width shall be applicable when tested as per IS 1954.

Table 1 Physical Requirements of Ducks Made from PC Blended Ring Spun Yarn

(*Clause* 5.1)

Variety No.	**Nominal Count Tex (Ne)**		**Ends/ dm**	**Picks/ dm**	**Mass (untreated) g/m²**	**Breaking strength on 5cm×20cm Strips[1] (N)**		**Tear strength N**	
	Warp	Weft				Warp	Weft	Warp	Weft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	51 × 2 (11.5^S ×2)	51 × 2 (11.5^S ×2)	200	142	380	2400	1860	310	250
ii)	51 × 3 (11.5^S ×3)	51 × 3 (11.5^S ×3)	181	110	480	2750	2000	590	390
iii)	51 × 3 (11.5^S ×3)	51 × 3 (11.5^S ×3)	180	119	520	2785	2115	590	400
iv)	51 × 4 (11.5^S × 4)	51 × 4 (11.5^S × 4)	145	105	580	3200	2550	690	490
v)	51 × 6 (11.5^S× 6)	51 × 6 (11.5^S× 6)	120	75	680	3800	2750	840	600
Tolerance	—	—	*Min*						

Method of Test	—	—	IS 1963	IS 1963	IS 1964	IS 1969 part 1	A-1 of IS 6489 (Part 1)

[1)] The rate of traverse shall be 450 ±15 mm/min only when a CRT machine is available.

Table 2 Physical Requirements of Ducks Made from Core Spun Yarn

(*Clause* 5.1)

Variety No.	**Nominal Count Tex (Ne)**		**Ends/dm**	**Picks/dm**	**Mass (untreated) g/m²**	**Breaking strength on ~~5cm×20cm~~ Strips[1] (N)**		**Tear strength N**	
	Warp	Weft				Warp	Weft	Warp	Weft
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	31 × 2 (19^S × 2)	31 × 2 (19^S × 2)	284	185	310	2525	1825	300	250
ii)	31 × 4 (19^S × 4)	31 × 4 (19^S × 4)	197	130	460	3000	2200	370	270
Tolerance	—	—	*Min*						
Method of Test	—	—	IS 1963	IS 1963	IS 1964	IS 1969 part 1		A-1 of IS 6489 (Part 1)	

5.2 Chemical Requirements

The treated duck shall conform to the chemical requirements as given in Table 3. However, if the duck is supplied in untreated (Grey) form it shall conform to the requirements given at Sl No. (i) of Table 3.

5.3 Rot Resistance

The duck, if required, shall be rendered rot proof by using copper naphthenate or zinc naphthenate. The metal deposition shall not be less than 0.5 percent in case of copper naphthenate and not less than 0.8 percent in case of zinc naphthenate process when tested by the method given in IS 3522 (Part 1). However, any other rot proofing agent may also be used if agreed to between the buyer and the seller.

6 MARKING

The duck shall be marked with following:

a) Name of the material and type (*see* 4);

b) Blend composition;

c) Whether trade from ring spun or core spun yam and variety number;

d) Indication of the source of manufacture;

e) Identification mark at both ends; and

f) Any other information as required by the buyer or by the law/regulation in force.

6.1. 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 there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 3 Chemical Requirements of Duck

(*Clause* 5.2)

Sl No.	Characteristic	Requirement	Method of Test

(1)	(2)	(3)	(4)
i)	Blend composition, percent, (*see* Note 1)		IS 3416
	a) For ducks made from ring spun yarn:		
	Polyester	52 ± 2	
	Cotton	Remaining	
	b) For ducks made from core spun yarn:		
	Polyester	45 ± 2	
	Cotton	Remaining	
ii)	*p*H value of aqueous extract	6.0 to 8.5	IS 1390 (Cold Method)
iii)	Relaxation or shrinkage, percent, *Max*		IS 2977
	Warp way	2.5	
	Weft way	2.5	
iv)	Colour fastness ratings to :		
	a) Weathering (*see* Note 2)	4 or better	IS/ISO 105-B03 or IS/ISO 105-B04
	b) Washing: Test 3		
	Change in colour	4 or better	IS/ISO 105-C10
	Staining of adjacent fabrics	4 or better	
	c) Rubbing, wet and dry	4 or better	
	d) Water	4 or better	IS/ISO 105 Part X12
			IS/ISO 105-E01
v)	Bundesmann test (for water resistant duck only):		IS 392
	a) Water absorption, percent, *Max*	60	
	b) Water penetration through test specimen	Nil	
	c) Amount of wetting of outer surface	No wetting	
vi)	Cone test (for water resistant duck only):		IS 7941

	a) Amount of penetration	No leakage	
	b) Amount of wetting of outer surface	No wetting (sweating inside the folds permissible)	
vii)	Flammability test before and after pre-treatment (*see* Note 3), (for flame resistant duck only):		Method A of IS l1871
	a) Char length, mm	*Min* 85 *Max* 114	
	b) Duration of flame, s (After-flame time)	2 secs	
	c) Duration of after-glow, s (After-glow time)	120 secs	
	d) Behaviour under influence of flame	No dripping or sticking	Visual

NOTES

1 In case of ducks made from polyester cotton blended ring spun yam, polyester content shall be within from 50 to 54 percent and the remaining shall be cotton. In case of ducks made from polyester cotton blended core spun yam the polyester content shall be within 43 to 47 percent and the remaining shall be cotton.

2 In case of dispute, the referee method specified in IS/ISO 105-B03 shall be followed.

3 If agreed to between the buyer and the seller, the durability of flame retardant, especially for treated fabrics, shall be determined by subjecting the specimen to leaching as given in **A-1** of IS 11871.

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7 PACKING

7.1 Unless otherwise agreed to between the buyer and the seller, the duck shall be securely packed in bales or cases (see IS 2194 or IS 2195).

8 SAMPLING AND CRITERIA FOR CONFORMITY

The sampling procedure detailed in **8.1** to **8.3** shall give desired protection to the buyer and the seller, provided that the lot submitted for inspection is homogeneous. To achieve this, the manufacturer shall maintain a system of process control at all stages of manufacture ensuring the rolls tendered by him for inspection comply with the requirements of this standard in all respects.

NOTE — For effective process control the use of statistical quality control technique is recommended and helpful guidance maybe obtained in this respect from IS 397 (Part 1) and IS 397 (Part 2).

8.1 Lot

In any consignment all rolls of the same variety and type delivered to a buyer against one dispatch note shall constitute a lot.

8.1.1 The conformity of a lot to the requirements of this specification shall be determined on the basis of the tests carried out on the samples selected from the lot.

8.2 Unless otherwise agreed to between the buyer and the seller, the number of rolls to be selected at random from a lot for inspection shall be according to COI 1 and 2 of Table 4. To ensure randomness of selection, procedure given in IS 4905 shall be followed (see *also* IS 3919 and IS 5463).

8.3 The number of rolls to be tested and criteria for conformity for each of the characteristics shall be as follows:

Table 4 Sample Size and Permissible Number of Non-conforming Rolls

(*Clauses* 8.2 *and* 8.3)

Sl No.	No of roll in the lot	Physical characteristics	Other requirement

		No. of Roll to be inspected	Permissible No of Non-conforming Roll	Number of Roll to be tested
(1)	(2)	(3)	(4)	(5)
i)	Up to 100	5	0	3
ii)	101 to 150	8	0	3
iii)	151 to 300	13	1	5
iv)	301 to 500	20	1	5
v)	501 to 1000	32	2	8
vi)	1001 to above	50	3	13

Characteristic	*Number of Roll to be tested*	*Criterion for Conformity*
a) *Physical*		
Visual inspection, construction and dimensions	*see* col 2 of Table 4	Non-conforming rolls not to exceed the corresponding number given in Col 3 of Table 4
b) *Other Requirements*		
Mass, blend composition, relaxation or shrinkage, breaking strength, tear strength , cone test and Bundesmann test	*see* col 4 of Table 4	All the rolls satisfy the relevant requirements
Colour fastness, *p*H, flame resistance, rot proofing and water proofing (if specified by the buyer)	1 specimen for lot size up to150 and 2 for lot size above that	All the test specimens satisfy the relevant requirement

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 392:1989	Textiles — Determination of water absorption and penetration of fabrics using bundesmann type apparatus (*Third Revision*)
IS 397 (Part 1) : 2003	Methods for statistical quality control during production Part 1 Control charts for variables (*Second Revision*)
(Part 2) : 2003	Methods for statistical quality control during production Part 2 Control charts for attributes (*Third Revision*)
IS/ISO 105-C10 : 2006	Textiles — Tests for colour fastness Part C10 Colour fastness to washing with soap or soap and soda
IS/ISO 105-X12 : 2016	Textiles — Tests for colour fastness Part X12 Colour fastness to rubbing (*First Revision*)
IS/ISO 105-E01 : 2013	Textiles — Tests for colour fastness Part E01 Colour fastness to water (*First Revision*)
IS 1390 : 2022	Textiles — Determination of *p*H of aqueous extract (*Third Revision*)
ISO 3071 : 2020	
IS 1954 : 2024 ISO 22198 : 2006	Textiles — Fabrics — Determination of width and length (*Third Revision*)
IS 1963 : 1981	Method 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 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 2194 : 1963	Code for seaworthy packaging of man-made fibre fabrics
IS 2195 : 1964	Code for inland packaging of man- made fibre Fabrics and man-made fibre yams

IS 2977 : 1989	Fabrics (Other than wool) – Method for determination of dimensional changes on soaking in water (*First Revision*)
IS 3416 : 2024 ISO 1833-11 : 2017	Textiles — Quantitative chemical analysis — Mixtures of certain cellulose fibres with certain other fibres (Method using sulphuric acid) (*Third Revision*)
IS 3522 (Part 1) : 1989	Methods for estimation of common preservatives on textiles - Part 1 (*First Revision*)
IS 3919 : 1966	Methods for sampling cotton fabrics for determination of physical characteristics.
IS 4905 : 2015 ISO 24153 : 2009	Random sampling and randomization procedures (*First Revision*)
IS 5463 : 2022	Methods for sampling of cotton fabrics for chemical tests (*First Revision*)
IS/ISO 105-B03 : 2017	Textiles — Tests for colour fastness Part B03 Colour fastness to weathering: outdoor exposure (*First Revision*)
IS/ISO 105-B04 : 1994	Textiles — Tests for colour fastness Part B04 Colour fastness to artificial weathering: xenon arc fading lamp test
IS 6489 (Part 1) : 2011 ISO 13937-1 : 2000	Textiles — Tear properties of fabrics Part 1 Determination of tear force using ballistic pendulum method (Elmendorf) (*Second Revision*)
IS 7866 : 1993	Textiles — Ring spun polyester blended grey yarn — specification (*First Revision*)
IS 7941 : 1976	Method for determining the water repellency of fabrics by cone test
IS 11871 : 1986	Methods for determination of flammability and flame resistance of textile fabrics