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BUREAU OF INDIAN STANDARDS

AGENDA

Working group meeting for Non-Woven Industrial Filter Fabric under Industrial Fabrics Sectional Committee, TXD 33

Date	Time	Venue
18 December, 2024 (Thursday)	1100 h	Video Conference through CISCO Webex

CONVENOR: Dr. Deepali Plawat, Convenor, ATIRA, Ahmedabad

MEMBER SECRETARY, TXD 33 : Shri Dharmbeer, Scientist D/Joint Director, Textiles, BIS New Delhi

Item 0 WELCOME & INTRODUCTORY REMARKS

Item 1 NEW SUBJECTS FOR FORMULATION OF INDIAN STANDARD

1.1 NON-WOVEN INDUSTRIAL FILTER FABRIC

In the 22nd meeting of TXD 33, the committee decided to constitute a panel to prepare the preliminary draft on Industrial Filter Fabric. The composition of the working group is provided as follows: -

i) Dr. Deepali Plawat (Convener), ATIRA, Ahmedabad
ii) Shri V. Muthukumar, PSG College of Technology, Coimbatore
iii) Shri G. Sambasiva Rao, ACB India Limited, Gurugram
iv) Shri Shreyas Gangane, Vedanta Limited, Mansa
v) Shri Rajiv Sharma, Welspun India Pvt. Ltd. Gujarat
vi) Shri Bishnu Pal, Arvind Advance Material Ltd., Gandhinagar
vii) Shri Punit Gupta, Supreme Nonwoven Industries, Mumbai
viii) Shri Pramod Khosla, Khosla Profil Pvt. Ltd., Mumbai
ix) Shri Sanjeev Shrivastava, Ultratech Cement, Mumbai
x) Shri Aditya Agarwal, M/s Jeevan Ecotex Pvt Ltd, Mumbai
xi) Prof A. Mukhopadhyay, National Institute of Technology, Jalandhar
xii) Dr. Dharmendra Bihola, L.D. College of Engineering, Ahmedabad
xiii) The convenor may co-opt/invite users/experts/manufacturers as required.
xiv) Shri Dharmbeer, Scientist D & Member Secretary TXD 33

The working draft considered during 22nd meeting of TXD 33 is given at **Annex 1 Pages (3 to 14).**

The updated draft is given at **Annex 2 Pages (14 to 22).**

The comments/inputs received from Dr. A. Mukhopadhyay, NIT Jalandhar on non-woven Industrial Filter Fabric is attached in **Annex 3.**

The comments received from M/s Arvind Advance Material Ltd., Gandhinagar is attached in **Annex 4.**

The following points are to be discussed in the working group meeting: -

i) Emission limit/emission norms of particulate matter as per the guidelines of central pollution control board and method of test.
ii) Dust holding capacity, shelf life of the product
iii) The requirement and test method for filtration efficiency if the testing infrastructure is available in country.
iv) The technical information received from NIT Jalandhar, Arvind Advance Material Ltd.
v) Any other technical inputs/comments.

1.1.1 The working group may **DELIBERATE** and **DECIDE.**

ANNEX 1

(*Item* **1.1**)

WORKING DRAFT STANDARD ON

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 2

(*Item* **1.1**)

UPDATED DRAFT STANDARD ON

NON-WOVEN INDUSTRIAL FILTER FABRIC

TEXTILES — NON-WOVEN INDUSTRIAL FILTER FABRIC FOR DRY DUST AND HOT GASES APPLICATION — SPECIFICATION

FOREWORD

Non-woven industrial filter fabrics are specialised fabrics designed to capture and retain particulate matter from hot gas streams, thus ensuring compliance with environmental regulations and protecting equipment from particulate damage. The efficiency of non-woven filter fabrics is measured by their ability to filter out fine particles while maintaining adequate air permeability and mechanical strength under high-temperature conditions. Advanced bonding techniques and multi-layer constructions are employed to provide superior filtration performance, durability, and resistance to high temperatures and harsh environments. Industries such as cement production, metal processing, power generation, and chemical manufacturing heavily rely on these filter fabrics.

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 specifies the performance requirement of non -woven filter fabric for dry dust and hot gases application in industrial filter bags.

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 Scrim — It is a reinforcing fabric or mesh that is incorporated into the filter fabric to enhance its strength and durability.

3.2 Shrinkage — It refers to the reduction in the dimensions of a fabric after it has been subjected to certain conditions, such as washing, drying, or exposure to heat.

3.3 Bursting Strength — It refers to the maximum pressure a fabric can withstand before it ruptures or bursts.

3.4 Singeing — It is a finishing process in which the fabric is passed over a flame or heated surface to burn off these unwanted fibres for creating a smoother and more uniform surface.

3.5 Felting needles — They are specialised tools used in the process of needle punching to create non-woven fabrics.

3.6 Heat setting — It is a finishing process used to stabilise and set the shape, dimensions, and properties of a textile material through controlled application of heat.

3.7 Calendering — It is a finishing process in which the fabric is passed between a series of rollers of cylinders which apply pressure and heat to achieve the desired finish.

4 CONSTRUCTION

4.1 Non-woven industrial filter fabrics are manufactured with the use of felting needles, followed by Fabric processing technologies including sienging, heat setting, speciality coating etc

4.2 The non-woven construction of these fabrics allows for a high degree of customization in terms of fibre composition, layering, and bonding techniques, enabling the production of filter media tailored to specific industrial applications.

4.3 Nonwoven industrial filter fabrics are either self-supporting, felted or manufactured using woven scrim. Fabric may be coated with Oil and Water Repellent (OWR) finish and laminated with Polytetrafluoroethylene (PTFE) as per application specific air permeability requirements.

4.4 Nonwoven industrial filter fabrics are manufactured from high-performance synthetic fibres namely Polyester, Poly Phenylene Sulphide (PPS), Meta Aramid (MA), Copolymer Acrylic, Homopolymer Acrylic, P-84 (Polyimide) and PTFE Fibres for their excellent thermal stability, chemical resistance, and mechanical strength.

5 REQUIREMENTS

5.1 Nonwoven industrial filter fabrics can be classified according to the code letters given in Table 1, depending on the composition:

- *Type I*- PPS + PPS scrim (Polyphenylene Sulphide with Polyphenylene Sulphide Scrim Supported Filter Media)
- *Type II*- CPA + CPA scrim (Copolymer Acrylic with Copolymer Acrylic scrim supported filter media)
- *Type III*- HPA + HPA scrim (Homopolymer Acrylic with Homopolymer Acrylic scrim supported filter media)
- *Type IV*- MA + MA scrim (Meta Aramid with Meta Aramid scrim supported filter media)
- *Type V*- PET+ PET Scrim (Polyester with Polyester scrim supported filter media)
- *Type VI*- (50% PTFE + 50% P84) + PTFE scrim (PTFE- Polytetrafluoroethylene, P84- Polyimide)

Table 1 Physical Requirements of Nonwoven industrial filter fabrics

(Clause 5.1)

Sl. No.	Characteristic	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI	Method of Test, Ref to
1.	**Weight (GSM)**	550 ± 7%	550 ± 7%	550 ± 7%	550 ± 7%	550 ± 7%	550 ± 7 %	IS 15891 (Part 1)/ ISO 9073-1
2.	**Thickness (mm)**	2.00 ± 10%	2.30 ± 10%	2.40 ± 10%	2.40 ± 10%	2.00 ± 10%	1.70 ± 10%	IS 15891 (Part 2)/ ISO 9073-2
3.	**Tensile strength- Machine Direction (N/5 cm)**	>1000	>700	>700	>1000	>1000	>600	IS 15891 (Part 4)/ ISO 9073-3
4.	**Tensile strength- Cross Direction (N/5 cm)**	>1000	>750	>750	>1000	>1100	>650	IS 15891 (Part 4)/ ISO 9073-3
5.	**Elongation at Break- Machine Direction (%)**	< 60	< 60	< 60	< 60	< 60	< 60	IS 15891 (Part 4)/ ISO 9073-3
6.	**Elongation at Break- Cross Direction (%)**	< 60	< 60	< 60	< 60	< 60	< 60	IS 15891 (Part 4)/ ISO 9073-3
7.	**Shrinkage- Machine 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	IS 17493: 2016

8.	**Shrinkage- 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	IS 17493: 2016
9.	**Pore Size (micron)**	20 ± 5	20 ± 5	20 ± 5	20 ± 5	20 ± 5	25 ± 5	IS 11437: 1985 ISO 2942 : 2004
10.	**Air Permeability (l/dm^2/min @ 200 Pa)**	120 ± 20%	120 ± 20%	120 ± 20%	120 ± 20%	120 ± 20%	150 ± 20%	IS 11056: 2017 ISO 9073-15
11.	**Bursting Strength (PSI)**	>500	>400	>400	>500	>500	>420	IS 1968:2002 ISO 9073-5
12.	**Working Temperature-Continuous Service (°C)**	180	130	130	200	130	260	ISO 17493
13.	**Working Temperature-Surge (°C)**	190	140	140	210	140	270	ISO 17493
14.	**Antistatic Property (Ohm)**	< 2.5x 10 ^{9}	< 2.5x 10 ^{9}	< 2.5X 10 ^{9}	< 2.5X 10 ^{9}	< 2.5X 10 ^{9}	< 2.5X 10 ^{9}	Annex B
15.	**Peel Strength/ Delamination (N)-** *Min*	0.75 N	0.75 N	0.75 N	0.75 N	0.75 N	0.75 N	IS 2101 (Part 14): 1988 ISO 11339 : 2010
	***** For PTFE laminated fabrics, air permeability of 20-50 ltr/ dm2/ min @ 200 Pa will be achieved.							

The general application matrix guidelines of non-woven industrial filter fabrics are given in Annex C.

6 MARKING

6.1 The non-woven industrial filter fabrics shall be marked as follows:

a) Name of the material
b) Variety Number
c) Width and length of the roll
d) Net Weight
e) Manufacturer's name, initials or trade-mark
f) Month and year of manufacture.
g) Any other statutory requirement as required by the law in force or as agreed between buyer and purchase

At both ends of the piece, the filter cloth shall be marked with an identification mark.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 Non-woven Industrial filter fabrics shall be suitably packed as rolls as mutually agreed to between purchaser and the supplier. The product shall be stored in ambient condition and care shall be taken while handling the product to avoid any physical damage.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Lot

All the rolls of non-woven industrial filter fabric with same material, construction, dimensions and produced under similar conditions of manufacture shall constitute a lot.

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

8.1.2 Unless otherwise agreed, the number of rolls 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 2.

Table 2 Number of Rolls of Nonwoven Industrial Filter Fabric to be Selected
(Clauses 8.1.2, 8.2.1, 8.2.1.1, 8.2.2 and 8.2.3)

Sl.No	**Number of Rolls in Lot**	**Sample Size (No. of Rolls)**	**Permissible Number of Non-conforming rolls**	**Sub-sample size (No:of Rolls)**	**Permissible Number of Non conforming Rolls**
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 50	5	0	3	0

ii)	51 to 150	8	0	5	0
iii)	151 to 280	13	1	8	0
iv)	281 to 500	20	2	8	0
v)	501 and above	32	3	13	1

8.1.3 These rolls 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 rolls of non-woven fabric selected as per column 3 of Table 2 shall be examined for workmanship and finish (see **5**).

9.2.1.1 Any roll 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.

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 2 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 2.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

ANNEX B

[Table 1, Sl No.14]

A-1 OBJECTIVE

This test method is intended for use in determining the surface resistivity attained by the specimen.

A-2 APPARATUS

A-2.1 A source of very steady direct voltage is required - Batteries or other stable direct voltage.

A-2.2 The electrodes for insulating materials should be of a material that is readily applied, allows intimate contact with the specimen surface and introduces no appreciable error because of electrode resistance or contamination of the specimen. The electrode material should be corrosion-resistant under the conditions of the test.

A-3 TEST SPECIMENS AND CONDITIONING

A-3.1 The 5 samples should be tested and the test specimens prior to testing, shall be kept for at least 20 h at 27 ± 2 °C and relative humidity of 65 ± 5 percent.

A-4 PROCEDURE

A-4.1 The test specimen is placed on insulating Base plate and then the group of electrodes are placed on sample. Apply a continuous Stream of Voltage and measure the resistance of the sample. During this procedure, the surface resistivity attained by the specimen is measured

A-4.2 Test is performed by inductive method. Immediately below the test sample, which is placed horizontally, the Electrode is placed in the field. The Field Electrode is subjected to applying the voltage (100+5 V) . If the sample is conductive or contains the conductive elements, a charge opposite to Field Electrode is induced. The Electrode Field incident on conductive elements does not cross the sample and resulting field is reduced in a manner according to the nature of material tested. The Resistance is measured after 15+1 sec.

A-5 CALCULATION

A-5.1 Surface Resistivity, p in Ohm= k x R where, k = Geometric Factor of Electrode (Type A, Stainless Steel- 19.8 , Type B, Brass- 5.7) & R = Resistance measured

A-6 REPORTING

A-6.1 Average value shall be reported. At least one surface should comply below:

A-6.1.1 For Homogeneous material, Surface Resistivity < 5×10^{10} Ohm

A-6.1.2 For Inhomogeneous material like Coated and Laminated material, Resistance < 5×10^{10} Ohm

A-6.1.3 For Inhomogeneous material containing thread, Surface Resistivity should be < 2.5×10^{9} Ohm, Space between the Conductive Thread = 10 mm max and Grid Pattern

ANNEX C

The general application matrix guidelines of non-woven industrial filter fabrics are given 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 Filtration		Woven / Non woven PP with or without water application
		Non woven PP with both side Sienged