AGICO CEMENT INTERNATIONAL ENGINEERING CO., LTD

Address: FL 9, BUILDING 2, HUAQIANG NEW-TIMES, PINGYUAN RD, ANYANG, HENAN, CHINA

Tel: 0086 371 66112991

Fax: 0086 371 66112991

Mobile: +86-(0)18002183170

Email: info@cement-plants.com

Website: www.cement-plants.com

AGICO CEMENT

Process and Selection of Filter Media for Cement Dust Removal



AGICO CEMENT INTERNATIONAL ENGINEERING CO., LTD

www.cement-plants.com

Working condition characteristics and recommended filter media

▶ Cement production process flow

Working condition characteristics: In the cement production line, from material extraction to finished product packaging and shipment, there are 30 to 40 dust emission points and exhaust points. For every ton of cement produced, 2.8 to 3.0 tons of materials need to be processed, generating 13,000 to 15,000 m^3 (standard state) of flue gas. The main types of dust removal points in the cement industry are divided into three categories.

1.Dust removal for raw material preparation (raw material)

2.Dust removal during calcination and product preparation

3.Dust removal for packaging (clinker)

Specifically including: dust removal for pulverized coal mill, dust removal for dryer, dust removal during calcination (dust removal for grate cooler of kiln outlet, dust removal for kiln inlet), dust removal for cement mill, dust collection for slag powder grinding station, and dust collection for material storage, transportation and packaging.

▶ Low-temperature dust removal points

Dust Removal Points	Coal Mill	Silo Roof	Slag Powder Grinding Station	Cement Mill
Photos				
Characteristics of the flue gas	1.High dust concentration 2.Requirement for oxygen content: ＜12% Temperature: 70-90℃	For the dust collection at the top of the clinker silo, attention should be paid to the occurrence of overheating, while there are no specific precautions for dust collection at the tops of other silos.	1.Smoke concentration: approximately 900g/Nm^3 2.Fine dust, with a specific surface area greater than 400m^2/kg High moisture content in the flue gas, prone to condensation and adhesion, large pressure difference, with less than 2000Pa considered normal.	1.Smoke concentration: 900-1300g/m^3 2.Fine dust, with a specific surface area of 280-650m2/kg Humidity of flue gas: <20%
Recommended filter media	Polyester three-proof needle-punched felt (★★★★) Polyester three-proof film-coated needle-punched felt (★★★★★)	Polyester film-coated needle-punched felt (★★★★★)	Polyester film-coated needle-punched felt (★★★★) Acrylic film-coated needle-punched felt (★★★★★)	Polyester film-coated needle-punched felt (★★★★★)

www.cement-plants.com

▶ High-temperature dust removal points

Dust Removal Points	Dust Collector at Kiln Outlet	Dust Collector at Kiln Inlet
Photos		
Characteristics of the flue gas	1.The dust particles are relatively large, coarse, and hard, with strong abrasiveness. 2.Smoke concentration: 3-20g/m^3, maximum 100g/m^3 Flue gas temperature: Continuous temperature 200-250℃, instantaneous temperature 450-500℃	1.High smoke dust content and strong abrasiveness, prone to increase operational resistance. 2.Small dust particle size and high viscosity, prone to bag clogging. 3.Strong corrosiveness because of corrosive gases caused by coal combustion. 4.High moisture content in the smoke. 5.Flue gas temperature: 350-400℃, with significant fluctuations ranging from 100 to 260℃.
Recommended filter media	Texturized fiberglass (film coated)（★★★★★） Aramid needle-punched felt（★★★★） P84 composite needle-punched felt（★★★★）	

Four advantages



Long service life

High temperature resistance, corrosion resistance, compatibility with star-type skeleton, flame resistance, oxidation resistance, and high strength.

Small pressure difference

Easy ash cleaning;
Low ash cleaning resistance.

Low emission

5mg ultra-clean emission, near zero emission.

Recyclability

Circular development, recycling and reusing waste filter bags.

www.cement-plants.com

Introduction of recommended filter media

▶ High-temperature filter media--Texturized fiberglass (film coated)

Characteristics	Description
High filtration precision	The microporous film has small and uniform micropores, which can capture 100% of PM10 and PM2.5 dust. It has high filtration precision and can achieve emission standards of less than 10mg/m^3.
High temperature resistance	Long-term temperature resistance is up to 260℃, while momentary temperature resistance is up to 280℃
Easy ash cleaning	It is easy to clean dust, with low ash cleaning pressure, fewer cleaning times, and extended cleaning cycle.
High strength and low elongation	It has high strength in both warp and weft directions without needle-punching damage, suitable for making long filter bags (over 6 meters), and it does not shrink under high temperature, ensuring effective ash cleaning, with an elongation rate of less than 3%.
Oxidation and corrosion resistance	It has good corrosion resistance without being oxidized by oxygen or nitrides, and it has a protective film on its surface after overall PTFE impregnation treatment, enhancing excellent corrosion resistance.
Water and oil repellency	Fiberglass belongs to a first-class hydrolysis-resistant fiber, and it has a high waterproof rating after PTFE coating treatment.



DCE (Dust Control Expert) - Texturized fiberglass (film coated) filter media

Basic parameters

Material		Alkali free fiberglass	Weave pattern		Double twill weave
Process		PTFE impregnation, film-coated	Thickness（mm）		1.0±10%
Weight of finished product（g/m^2）		760±20	Air permeability（L/dm^2·min）@200Pa		15-40
Temperature（℃）	Operating	≤260	Strength (N/25mm)	Warp	≥2000
	Instantaneous	＜280		Weft	≥2000
Thermal shrinkage 260℃ 2h	Warp	0%	Elongation rate @50N/20cmx5cm	Warp	≤1%
	Weft	0%		Weft	≤1%
Bursting strength (psi)		≥800			

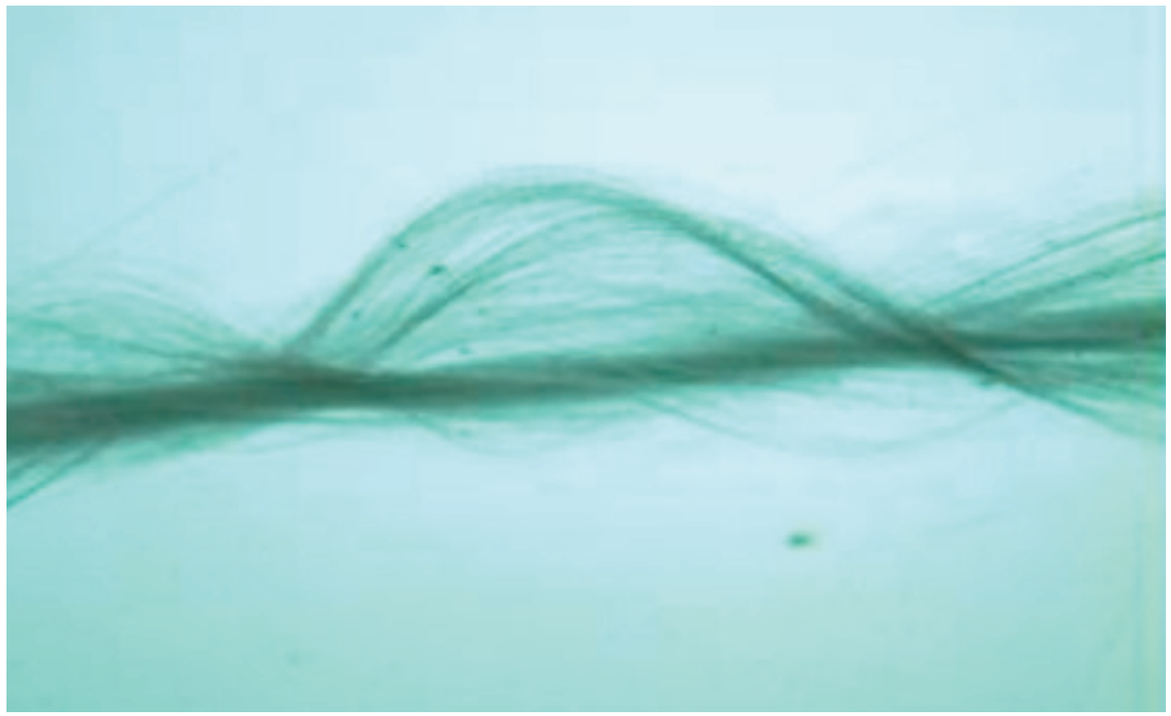
www.cement-plants.com

▶ High-temperature filter media--Texturized fiberglass (film coated)

The weft yarns produced with the expanding technology have the following characteristics compared to conventional fiberglass filter materials:

- Under the same weight, the expanded yarn filter cloth is thicker.
- The air permeability of the expanded yarn filter cloth is superior to that of ordinary filter cloth, and it has a good uniformity.
- The filtering performance is good, the yarn is fluffy, and the surface area is large, which is conducive to the occurrence of interception, diffusion, electrostatic, gravity, and inertia effects, and capturing dust.
- After post-treatment, the expanded yarn filter cloth is easy for the wetting agent to "wrap" around the surface of individual fibers to form a protective film.
- The expanded yarn filter cloth is conducive to the bonding of the substrate and the film, improving the adhesion of the film.

Fiber state after expansion



Expansion machine



The warp yarn of texturized fiberglass film-coated filter media undergoes a special expansion process, which results in a more fluffy fiber structure, a thicker fabric structure, and denser fiber gaps, increases the surface area and extends the dust collection time, promoting the aggregation of fine dust, and creates a loose powder layer structure with a large void ratio and more uniform pores, leading to improved dust removal efficiency and reduced resistance. Our company has mature expansion technology and enjoys high reputation internationally and domestically through OEM orders from the group and other channels.

www.cement-plants.com

▶ High-temperature filter media--Aramid needle-punched felt

Characteristics	Description
High temperature resistance	Continuous operating temperature: ≤204℃, instantaneous temperature: ≤230℃
High flame retardancy	With Limiting Oxygen Index (LOI ≥ 28), it belongs to inherently flame-retardant fiber, it does not spontaneously ignite or promote combustion, even if it is ignited, it will self-extinguish once the flame is removed.
High filtration precision	It is coated with PTFE microporous film, with reduced aperture and high porosity, resulting in high filtration precision.
Low energy consumption	Low energy consumption and low maintenance cost.
Easy ash cleaning	The surface of the filter media is smooth, easy to clean, and dust is easy to remove.



Aramid needle-punched felt filter media

Basic parameters					
Base cloth		Aramid	Surface layer		Aramid
Process		PTFE impregnation	Thickness（mm）		2.5±10%
Weight of finished product（g/m²）		500±5%	Air permeability（L/dm2·min）@200Pa		150-230
Temperature	Operating	≤204	Strength (N/25mm)	Warp	≥800
	Instantaneous	≤230		Weft	≥1100
Thermal shrinkage 230℃2h	Warp	≤1.0%	Elongation rate @50N/20cmx5cm	Warp	≤2%
	Weft	≤1.0%		Weft	≤2%
Bursting strength (psi)		≥400			

www.cement-plants.com

▶ Recommended product: P84 film-coated needle-punched felt

Characteristics	Description
Good temperature resistance	Continuous operating temperature: ≤260℃, instantaneous temperature: ≤260℃
Corrosion resistance	P84 fiber exhibits excellent corrosion resistance, and when the filter bag undergoes overall corrosion resistance treatment and PTFE processing, PTFE forms a dense protective film on the fiber surface, enhancing the filter bag's oxidation and corrosion resistance.
Stable strength	Made of high-performance P84 base cloth, it has stable strength, and after pretreatment processing, its physicochemical properties are significantly improved.
Easy ash cleaning	The filter media is impregnated with PTFE, and undergoes high-temperature film penetration, resulting in a smooth surface, high dust removal rate, and easy ash cleaning.
Water and oil repellency, and condensation resistance	After PTFE impregnation, the filter bag's hydrophobicity is enhanced, and through high-temperature film penetration processing, it exhibits excellent functions of water and oil repellency as well as condensation resistance.
High filtration precision	Through high-temperature PTFE film penetration processing, the filter bag's filtration precision is improved, which facilitates the rapid formation of dust layer and achieves efficient filtration.



Polyimide needle-punched felt filter bag

Basic parameters					
Base cloth		PTFE	Surface layer		Polyimide fiber
Process		PTFE impregnation	Thickness（mm）		2.0±10%
Weight of finished product（g/m²）		500±5%	Air permeability（L/dm²·min）@200Pa		120-200
Temperature（℃）	Operating	≤240	Strength (N/25mm)	Warp	≥800
	Instantaneous	≤260		Weft	≥1000
Thermal shrinkage 260℃ 2h	Warp	≤3.0%	Elongation rate @50N/20cmx5cm	Warp	≤2%
	Weft	≤1.0%		Weft	≤2%
Bursting strength (psi)		≥400			

www.cement-plants.com

High-temperature filter media--Polyimide composite needle-punched felt filter bag

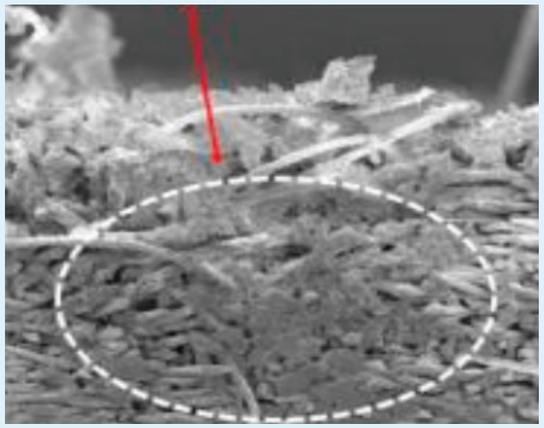
Characteristics	Description
High temperature resistance	Continuous operating temperature:≤260℃, instantaneous temperature: ≤260℃
Stable strength	Made of high-performance fiberglass base cloth, it has stable strength and high physicochemical properties.
High filtration precision	It is coated with PTFE microporous film, with reduced aperture and high porosity, resulting in high filtration precision.
Water and oil repellency	By using high-quality fiberglass + P84 fiber, treated with PTFE impregnation and other post-treatments, it has excellent acid and alkali resistance, hydrolysis resistance, and abrasion resistance.
Low energy consumption	Low energy consumption and low maintenance cost.
Easy ash cleaning	The surface is smooth, easy to clean, and dust is easy to remove.



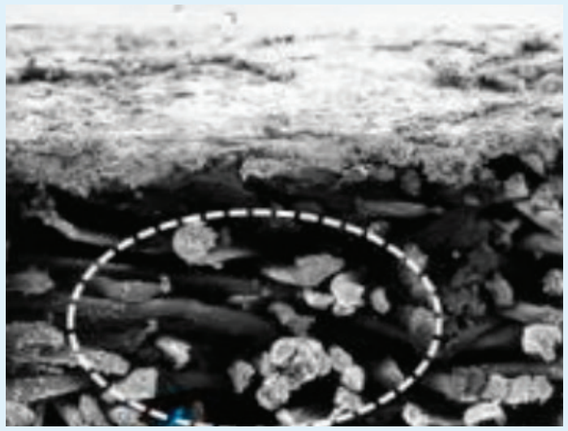
Polyimide composite needle-punched felt filter media					
Basic parameters					
Base cloth		High-strength fiberglass	Surface layer		P84+fiberglass
Processing technology		PTFE impregnation	Thickness（mm）		3.0±10%
Weight of finished product（g/m²）		900±5%	Air permeability（L/dm²·min）@200Pa		120-200
Temperature（℃）	Operating	≤260	Strength (N/25mm)	Warp	≥2000
	Instantaneous	≤280		Weft	≥2000
Thermal shrinkage 260℃ 2h	Warp	0%	@50N/20cmx5cm Elongation rate	Warp	≤2%
	Weft	0%		Weft	≤2%
Bursting strength (psi)		≥600			

www.cement-plants.com

The difference between ordinary filter media and film-coated filter media lies in the filtration method: the filtration method of ordinary filter media is depth filtration, while the filtration method of film-coated filter media is surface filtration. Depth filtration relies on the initial dust layer formed on the surface of the filter media for filtration. Before forming the initial dust layer, the filtration efficiency is low, and during the filtration process, the resistance increases significantly. Surface filtration means that the filter media directly removes dust from the flue gas through the dense PTFE film on its surface. Because PTFE is smooth, non-adhesive, and hydrophobic, dust is difficult to adhere to the surface of the filter bag, resulting in stable resistance and filtration efficiency. (See Figure 1)



Dust enters into the interior of filter media

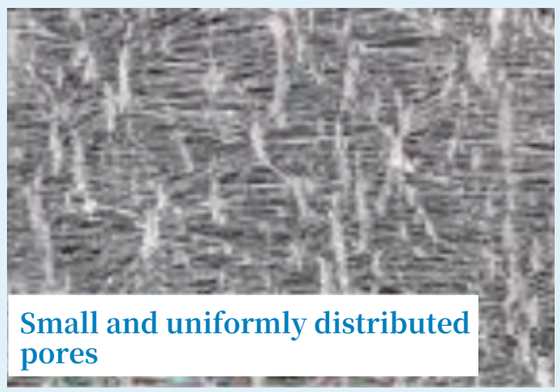


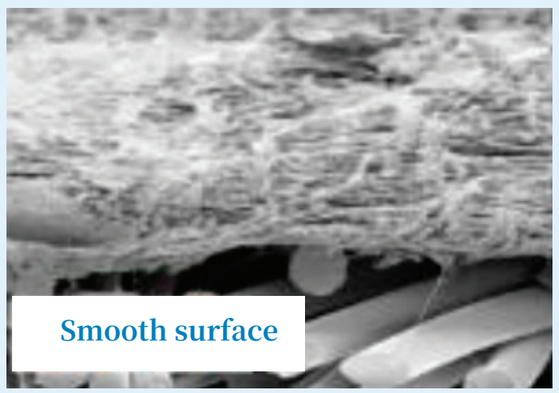
The interior of the substrate remains clean without dust entering basically

Figure 1

Comparison with filter media treated with PTFE impregnation (before and after filtration)

Ordinary filter media (treated with PTFE impregnation)





DCE (Dust Control Expert) filter media

Reduced operating resistance

Ordinary filter media tends to accumulate dust on its surface during use, resulting in a gradual increase in operating resistance. In contrast, filter media with PTFE film coated has smooth surface, making it difficult for dust to accumulate, so it exhibits lower operating resistance and more stable operation (see Figure 2).

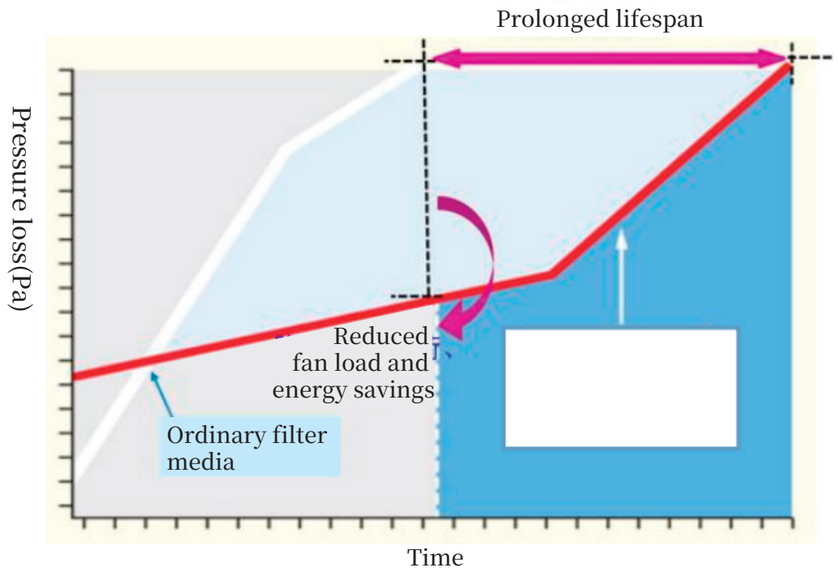


Figure 2

www.cement-plants.com

Lower dust emission

Due to the extremely dense fiber structure of the PTFE film and its certain three-dimensional structure, the majority of dust is trapped on the surface of the film, resulting in emissions close to zero (see Figure 3). It can effectively meet emission requirements of as low as 10mg.

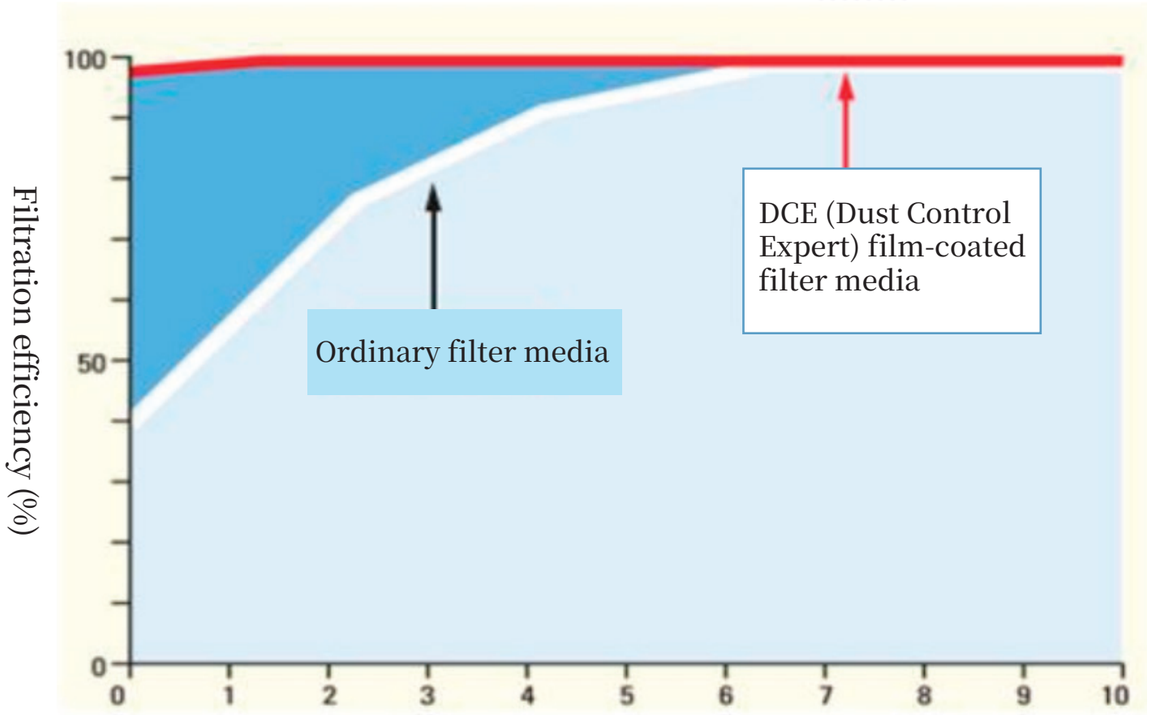


Figure 3

Longer lifespan of filter bag

The slow increase in resistance reduces the frequency of ash cleaning, lowering the mechanical damage caused by pulse air to the filter media and extending its lifespan. Additionally, the PTFE film's characteristics of being non-sticky, hydrophobic, and chemically stable prevent dust from adhering and agglomerating on the surface of the filter media, further extending its lifespan. (See Figure 2)

Decreased system energy consumption

Considering the advantages mentioned above, the energy consumption of the fan decreases, and the usage of compressed air reduces. (See Figure 2)

Reduced risk of "bagging" due to condensation

In the event of condensation, due to the rough surface of ordinary filter media, make it difficult to remove dust agglomerates adhered to its surface through pulse cleaning, resulting in high pressure differential and rendering the filter media unusable. However, the film-coated filter media still exhibits a good ash cleaning effect even for dust containing hygroscopic salts and a certain viscosity due to its smooth surface and the hydrophobic and non-sticky properties of the PTFE film.

www.cement-plants.com

Low-temperature filter media--Acrylic film-coated needle-punched felt

Characteristics	Description
Low energy consumption	Made of acrylic fibers and acrylic base cloth, the texture of the filter media is soft. It features good dust cleaning performance with dust easy to remove, low dust cleaning pressure, fewer cleaning times, and low energy consumption.
High filtration precision	The micro-porous film on the surface of the filter media is small and uniform (0.10-2.0μm), capable of capturing 100% of PM10 and PM2.5 dust. It has a high and stable smoke purification efficiency, easily meeting emission standards.
Good corrosion resistance	After overall PTFE impregnation, a dense protective film is formed on the surface of the fibers, providing oxidation and corrosion resistance.
Water and oil repellency, and condensation resistance	After overall PTFE impregnation and PTFE film coating treatment, its hydrophobicity is enhanced, and after high-temperature film penetration processing, its functions of water and oil repellency, and condensation resistance are strengthened.

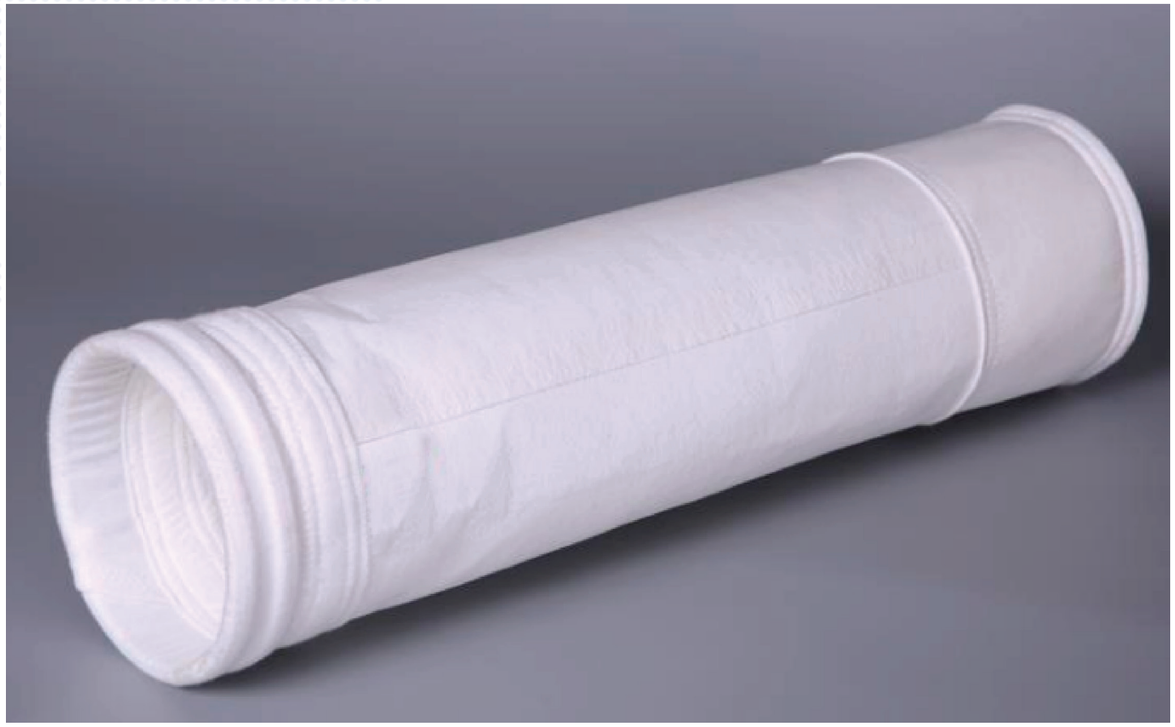


Acrylic needle-punched felt filter media

Basic parameters					
Base cloth		Acrylic	Surface layer		Acrylic
Processing technology		Singeing + calendering	Thickness（mm）		2.2±10%
Weight of finished product（g/m²）		500±5%	Air permeability（L/dm²·min）@200Pa		120-200
Temperature（℃）	Operating	≤125	Strength (N/50mm)	Warp	≥700
	Instantaneous	≤140		Weft	≥800
Thermal shrinkage 140℃2h	Warp	≤1.5%	Elongation rate @50N/20cmx5cm	Warp	≤2%
	Weft	≤1.0%		Weft	≤2%
Bursting strength (psi)		≥350			

Low-temperature filter media -- Polyester film-coated needle-punched felt

Characteristics	Description
Easy ash cleaning	The filter bag is made of high-quality polyester fibers, featuring easy ash cleaning and dust removal, as well as resistance to acid, alkali, hydrolysis, and abrasion.
High strength	It has a high strength, with high strength and low-elongation industrial silk as its base cloth.
Water and oil repellency	The filter media is treated with PTFE impregnation and film coating on its surface, so it exhibits good water and oil repellency, high porosity and high filtration precision.
Low energy consumption	It is suitable for conditions with high humidity, and it features low energy consumption and low maintenance costs.



Polyester film-coated needle-punched felt filter media

Basic parameters					
Base cloth		None	Surface layer		Polyester
Processing technology		PTFE film coating	Thickness（mm）		2.2±10%
Weight of finished product（g/m²）		550±5%	Air permeability（L/dm²·min）@200Pa		15-40
Temperature（℃）	Operating	≤130	Strength (N/50mm)	Warp	≥1000
	Instantaneous	<150		Weft	≥1250
Thermal shrinkage 130℃2h	Warp	≤3%	Elongation rate @50N/20cmx5cm	Warp	≤1.5%
	Weft	≤2.0%		Weft	≤1.5%
Bursting strength (psi)		≥500			

Recommended product -- Polyester film-coated anti-static needle-punched felt filter bag

Characteristics	Description
Easy ash cleaning	The filter bag is made of high-quality polyester fibers, featuring good shaking during dust cleaning and easy removal of dust.
High filtration precision	With PTFE film coating, the pore size is reduced, so the porosity is high and the filtration precision is high.
Acid and alkali resistance, hydrolysis resistance and abrasion resistance	Selected premium polyester fiber enhances its acid and alkali resistance, hydrolysis resistance, and abrasion resistance;
Good water and oil repellency	Due to the inherent properties of PTFE materials, its smooth surface and low friction coefficient eliminate the adsorption of moisture by the filter bag, effectively reducing the phenomenon of agglomeration after condensation.
Low energy consumption	It is suitable for conditions with high humidity, and it features low energy consumption and low maintenance costs.
Anti-static property	The base cloth of the filter media incorporates conductive fibers, making the filter media anti-static.



Polyester-coated anti-static needle-punched felt filter media

Basic parameters					
Base cloth		None	Surface layer		Polyester + conductive yarn
Processing technology		PTFE film coating	Thickness（mm）		2.1±10%
Weight of finished product（g/m²）		550±5%	Air permeability（L/dm²·min）@200Pa		110-180
Temperature（℃）	Operating	≤130	Strength (N/50mm)	Warp	≥1000
	Instantaneous	＜150		Weft	≥1250
Thermal shrinkage 130℃2h	Warp	≤3%	Elongation rate @50N/20cmx5cm	Warp	≤1.5%
	Weft	≤2.0%		Weft	≤1.5%
Bursting strength (psi)		≥500			

www.cement-plants.com

Low-temperature filter media -- Polyester three-proof needle-punched felt

Update

Characteristics	Description
High filtration precision	Selected fine denier fiber reduces its pore size and increases its porosity.
Excellent chemical properties	Selected premium polyester fiber enhances its acid and alkali resistance, hydrolysis resistance, and abrasion resistance;
Waterproof, oil-resistant, and anti-static properties	It has anti-static function, and its surface is water-repellent and oil-proof, of which the waterproof level is grade 5. Due to the waterproof and oil-proof agent on the surface of the filter bag, dust is not easy to adhere to the surface of the filter media.
Low energy consumption	It is suitable for conditions with high humidity, and it features low maintenance costs.
High strength	The strength is significantly increased by using high-strength and low-elongation industrial silk as the base cloth.



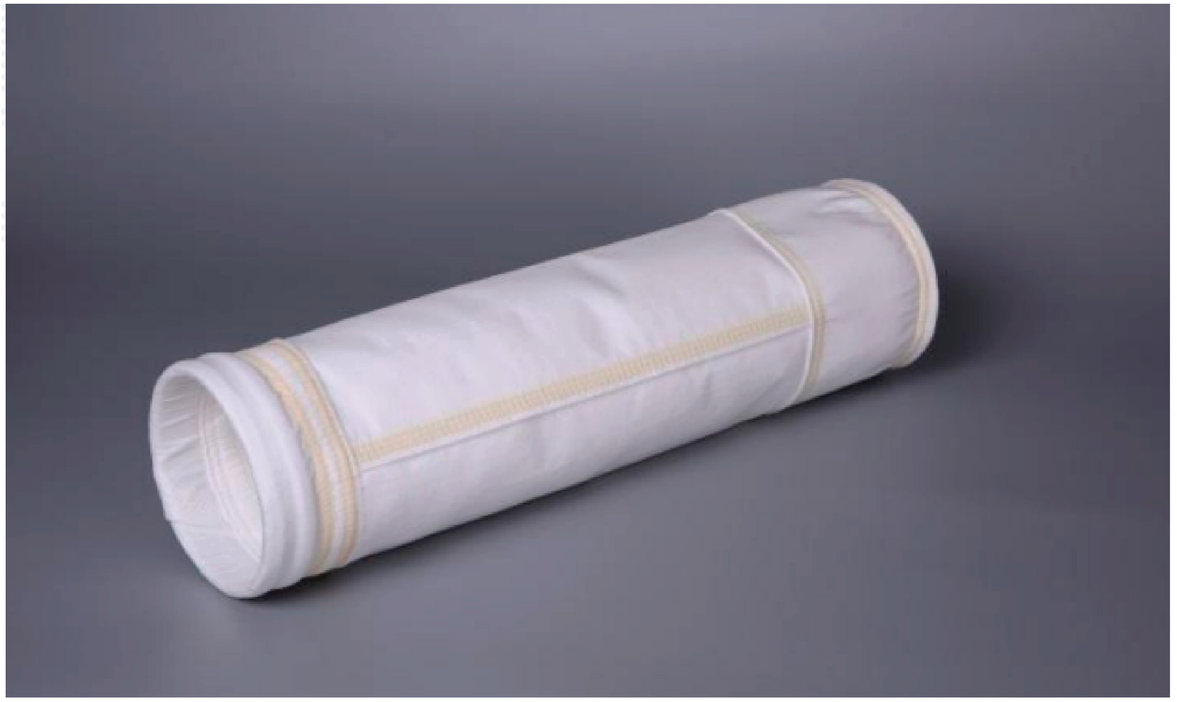
Polyester three-proof (waterproof, oil-resistant, and anti-static) needle-punched felt filter media

Basic parameters					
Base cloth		Anti-static Polyester	Surface layer		Polyester
Processing technology		waterproof, oil-resistant, and anti-static treatment	Thickness（mm）		2.1±10%
Weight of finished product（g/m²）		550±5%	Air permeability（L/dm²·min） @200Pa		110-180
Temperature（℃）	Operating	≤130	Strength (N/50mm)	Warp	≥1000
	Instantaneous	＜150		Weft	≥1250
Thermal shrinkage 130℃2h	Warp	≤2.5%	Elongation rate @50N/20cmx5cm	Warp	≤1.5%
	Weft	≤2.0%		Weft	≤1.5%
Bursting strength (psi)		≥500			
Surface resistance (ohms/sq)		$\leqslant 10^8$			

www.cement-plants.com

Recommended product -- Polyester two-proof needle-punched felt filter bag

Characteristics	Description
Easy ash cleaning	The filter bag is made of high-quality polyester fibers, featuring good shaking during dust cleaning and easy removal of dust.
High filtration precision	With PTFE film coating, the pore size is reduced, so the porosity is high and the filtration precision is high.
Stable tensile strength	The strength is significantly increased by using high-strength and low-elongation industrial silk as the base cloth.
Acid and alkali resistance, hydrolysis resistance and abrasion resistance	Selected premium polyester fiber enhances its acid and alkali resistance, hydrolysis resistance, and abrasion resistance;
Good water and oil repellency	Due to the inherent properties of PTFE materials, its smooth surface and low friction coefficient eliminate the adsorption of moisture by the filter bag, effectively reducing the phenomenon of agglomeration after condensation.
Low energy consumption	It is suitable for conditions with high humidity, and it features low energy consumption and low maintenance costs.
Anti-static property	The base cloth of the filter media incorporates conductive fibers, making the filter media anti-static.



Polyester two-proof needle-punched felt filter media

Basic parameters

Base cloth		None	Surface layer		Polyester
Processing technology		PTFE impregnation	Thickness（mm）		2.2±10%
Weight of finished product（g/m²）		550±5%	Air permeability（L/dm²·min）@200Pa		80-180
Temperature（℃）	Operating	⩽130	Strength (N/50mm)	Warp	⩾1000
	Instantaneous	＜150		Weft	⩾1250
Thermal shrinkage 130℃2h	Warp	⩽3%	Elongation rate @50N/20cmx5cm	Warp	⩽1.5%
	Weft	⩽2.0%		Weft	⩽1.5%
Bursting strength (psi)		⩾500			