

PLM FILTER SOLUTION GROUP

# *PLM* ***FILTER PAPER***



# Filter Paper Catalogue

## Contents

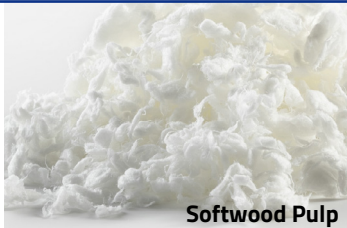
- 3 Automotive Filter Paper Raw Materials
- 4 Filter Paper Structure
- 5 Filter Paper Production Process
- 6 Classified by Impregnated Resin
- 7 Classified by Application
- 7 Air Filter Paper
- 8 Oil Filter Paper
- 9 Fuel Filter Paper

## Automotive Filter Paper Raw Materials

The base materials for manufacturing automotive filter paper generally consist of three types: natural fibers, chemical fibers, and glass fibers.

### Natural fiber

It includes softwood pulp, hardwood pulp, and esparto grass pulp. Filter paper typically uses mixed pulp with a small addition of cotton pulp. The fiber diameter of natural fibers ranges from 25  $\mu\text{m}$  to 40  $\mu\text{m}$ .



Softwood Pulp



Hardwood Pulp



Esparto Grass Pulp



Cotton Pulp

### Chemical fiber

Also known as synthetic fiber, it is fibers with textile properties made from natural polymer compounds or artificially synthesized polymer compounds as raw materials, through processes such as preparing spinning solutions, spinning, and post-treatment. For example, polyester (PET) fibers have high strength, good wear resistance, and acid and alkali resistance, with diameters ranging from 5  $\mu\text{m}$  to 18  $\mu\text{m}$ .



### Glass fiber

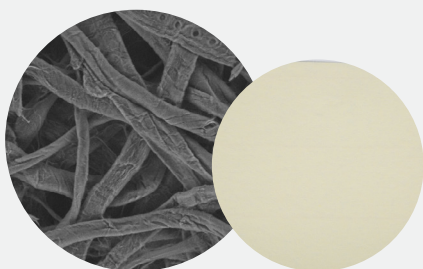
It is an inorganic non-metallic material with excellent performance, available in various types. Its advantages include good insulation, strong heat resistance, good corrosion resistance, and high mechanical strength, but its disadvantages are brittleness and relatively poor wear resistance. Its diameter ranges from 0.1  $\mu\text{m}$  to 3  $\mu\text{m}$ .





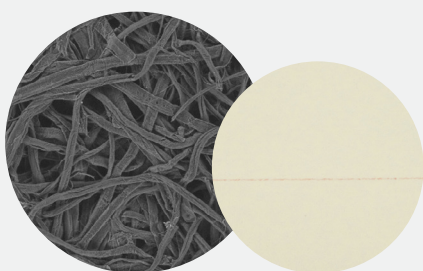
## Filter Paper Structure

Filter paper has directionality: the front side of the filter paper has looser fibers, while the mesh side has denser fibers.



### Front Side of Filter Paper

The front side of the filter paper has looser fibers



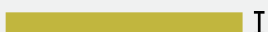
### Mesh Side of Filter Paper

While the mesh side has denser fibers.



### Front and Side of Filter Paper

- Front of the filter paper: the pores are trumpet-shaped, and the pore size decreases along the thickness of the filter paper; side of the filter paper: magnified view shows that the filter paper has a multi-layer structure.
- The front of the filter paper should face the airflow direction; the mesh side of the filter paper should be the gas outlet direction.
- Draw colored lines on the mesh side of the filter paper to facilitate user identification and prevent mistakes. If the front and back directions are mistaken, the dust holding capacity of the filter element is reduced by 30% during use.

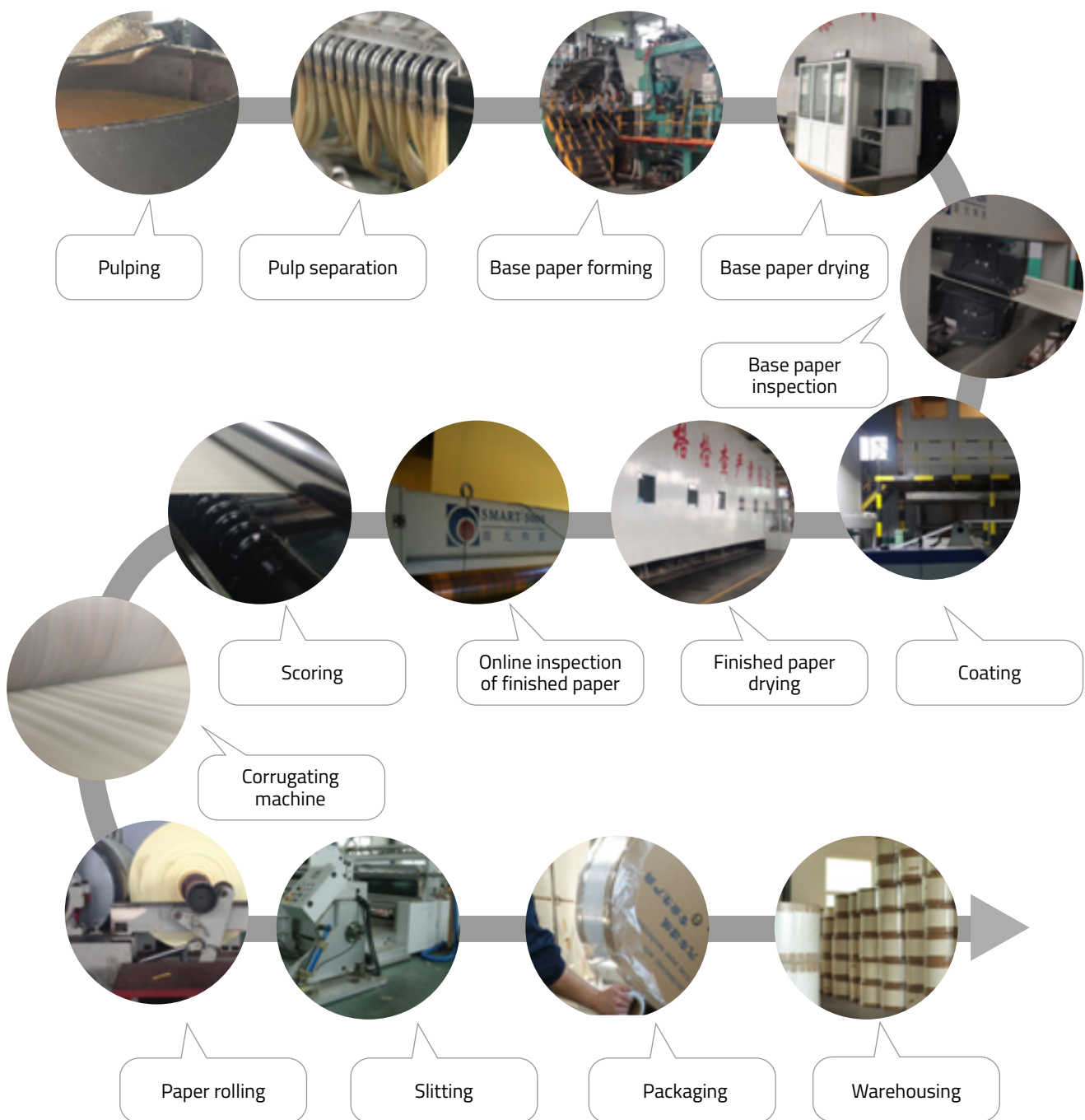


### Filter paper thickness

approximately 0.35–0.5 mm, while dust particle sizes vary from a few microns to several tens of microns.

## Filter Paper Production Process

The production process of filter paper is divided into pulping, pulp separation, base paper forming, base paper drying, base paper inspection, coating, and finished paper drying, online inspection of finished paper, scoring, corrugating machine, paper rolling, slitting, packaging, and warehousing.



## Classified by Impregnated Resin

Filter paper can be classified into cured filter paper and non-cured filter paper based on the type of impregnated resin used.

### Cured Filter Paper

- Cured filter paper uses thermosetting resin impregnation technology, typically phenolic resin, among others.
- After impregnation with phenolic resin, the filter paper has not yet hardened. After being pleated on the production line, it must be heated at a temperature of 150 °C for 10 to 15 minutes to cure the resin and increase the stiffness of the filter paper.
- The curing temperature of phenolic varnish is 160–180 °C, with a duration of more than 10 minutes.
- The disadvantages of curing include the release of harmful gases such as formaldehyde, free phenol, phenol derivatives, and amines.
- This type of filter paper is usually used to make oil filters and fuel filters.

### Non-Cured Filter Paper

- Non-cured filter paper uses thermoplastic resin impregnation technology. Generally, ethylene polymers are used, such as polyvinyl acetate resin, acrylic resin, polyvinyl chloride, styrene-butadiene latex, and polyvinyl acetate.
- In the processing of non-cured resin, only a little heat or no heat is required. These resins have a certain flexibility at room temperature, making them suitable for manufacturing air filters using air as the medium.

### Comparison of Curing and Non-curing Filter Paper

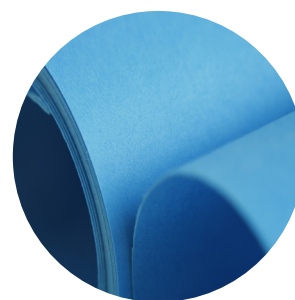
Item	Cured Filter Paper	Non-Cured Filter Paper
Filter element manufacturing process	Requires high-temperature curing	Only requires short preheating, no high-temperature curing needed
Energy consumption	High energy consumption	Low energy consumption
Environmental performance	Thermosetting resin, cannot be recycled or cracked; production line releases harmful gases	Thermoplastic resin, can be recycled; production line does not release harmful gases
Filter element production cost	High	Relatively low
Physical properties of filter paper	Almost identical physical properties	Slightly lower tensile strength under wet conditions, almost identical physical properties (still lacking in stiffness and water resistance compared to alcohol-soluble phenolic resin)
Filter element appearance	After curing, the color turns yellow, but the color does not affect stiffness and other properties.	Non-cured filter element, white, does not affect stiffness and other properties.
Application range	Oil filters, diesel filters, hydraulic system filters, used in small quantities for air filters.	Most air filters domestically and internationally
Usage of filter element products	In cases of severe water absorption and moisture exposure, the paper pleats of the filter element deform slightly.	In cases of severe water absorption and moisture exposure, the paper pleats of the filter element deform slightly. This deformation is only a short-term phenomenon; as moisture is released, the paper pleats quickly return to normal, having no impact on performance.
Filter element performance	The original resistance, filtration efficiency, dust holding capacity, and resistance recovery of the filter element are the same.	

## Classified by Application

According to the application of filter paper, it can be divided into air filter paper, oil filter paper, and fuel filter paper.

### Air Filter Paper

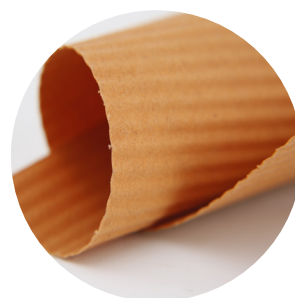
Automotive air filter paper is a type of filter material specifically used for automotive air filters, primarily used to filter dust, particles, and other impurities from the air entering the engine combustion chamber. It ensures that the engine can intake clean air and prevent impurities from causing wear or damage. It is usually made of cellulose, synthetic fibers, or a blend of these materials, and has good permeability and filtration performance.



Code Number	Basic Weight g/m <sup>2</sup>	Thickness mm	Air Permeability L/m <sup>2</sup> /s	Max Pore μm	Mean Pore Size μm	Dry Burst Strength kPa
LMHAWK-6405N-301	115±5	0.72±0.05	250±30	≤ 65	≤ 50	> 200
LMAMS13513CW	135±5	0.65±0.03	130±20	≤ 50	≤ 35	> 300
LMAMS12024CW	120±5	0.6±0.03	245±30	≤ 65	≤ 50	> 200
LMNAMS-F9	120±5	0.55±0.05	280±30	≤ 70	≤ 60	> 250
LMHAWK-822	125±5	0.65±0.05	330±30	≤ 75	≤ 60	> 250
LMAWHK-106	130±5	0.58±0.05	260±30	≤ 70	≤ 55	> 280
LMAWK-124T	135±5	0.71±0.03	180±20	≤ 54	≤ 45	> 270
LMAPHK-12838-428G	128±5	0.5±0.03	280±30	< 80	< 65	> 280
LMAPK-13038-428	130±5	0.44±0.03	380±50	–	–	> 200
LMAPZR-428	135±5	0.45±0.03	350±30	< 85	< 60	> 250
LMHGPK-363	135±5	0.52±0.03	450±3	< 90	< 70	> 350
LMAPHK-14555-211	145±5	0.55±0.05	550±50	< 85	< 70	> 300
LMAPHK-605	95±5	0.35±0.05	130±30	< 60	< 45	> 270
LMAWHJ-19535-5071	195±7	0.75±0.05	350±30	< 80	< 60	> 400
LMAGMS-024	123±5	0.5±0.05	230±30	< 70	< 60	> 200

## Oil Filter Paper

Oil filter paper is a type of filter material specifically used for oil filters, primarily used for filtering impurities and particulates in the engine lubrication system to ensure the purity of the engine oil, thereby protecting the normal operation of the engine. Oil filter paper is typically made from high-strength, oil-resistant, and heat-resistant fiber materials, offering excellent filtration performance and high flow characteristics.



Code Number	Basic Weight g/m <sup>2</sup>	Thickness mm	Corrugating Depth mm	Air Permeability L/m <sup>2</sup> /s	Max Pore μm	Mean Pore Size μm	Dry Burst strength kPa	Dry Stiffness mN.m
LM-1860	180±20	0.8±0.1	–	350±50	< 50	< 40	> 1000	> 7
LM-14045G-002	140±5	0.75±0.03	0.37±0.03	450±30	< 80	< 65	> 200	> 4
	135±5						> 300	> 6
LMM-12580G-002	125±5	0.75±0.03	0.38±0.03	850±50	< 110	< 80	> 180	> 3
	119±5						> 350	> 4
LM-2066G-002	135±5	0.75±0.05	0.38±0.03	600±30	< 80	< 60	> 150	> 3
	130±5						> 280	> 4
LM-1201300G-001	120±5	0.73±0.03	0.28±0.03	1300±100	< 118	< 90	> 140	> 2
	115±5						> 300	> 2.5
LM-17557G-054	175±8	0.77±0.05	–	570±30	< 95	< 80	> 190	> 5
	169±8						> 500	> 8
LM-18045G-002	180±8	0.85±0.05	0.38±0.03	450±50	< 85	< 65	> 200	> 6
	174±8						> 400	> 8
LM-20045G-002	200±10	0.95±0.05	0.38±0.03	450±30	< 85	< 65	> 240	> 10
	191±10						> 400	> 11
LMM-20530G-002	210±10	1.0±0.05	0.3±0.05	300±30	< 70	< 60	> 280	> 12
	200±10						> 550	> 15
LM-21080RG-002	205±10	1.05±0.05	0.43±0.03	450±30	< 80	< 65	> 450	> 12
LM-19030G-002	190±8	0.8±0.05	–	300±30	< 68	< 55	> 260	> 8
	185±8						> 400	> 11
LM-14682G-055	146±5	0.73±0.05	–	820±50	< 95	< 80	> 200	> 3
	141±5						> 400	> 5



## Fuel Filter Paper

Fuel filter paper is a type of filter material used in fuel filters, specifically designed to filter impurities and moisture from gasoline or diesel, to protect the normal operation of the fuel system and ensure the combustion efficiency and performance of the engine. Fuel filter paper typically uses special fiber materials with good oil resistance, temperature resistance, and corrosion resistance, while ensuring efficient filtration and fuel flow. Depending on different vehicles or equipment, the design and specifications of fuel filter paper may vary to accommodate different fuel types and working environments.



Code Number	Basic Weight g/m <sup>2</sup>	Thickness mm	Air Permeability L/m <sup>2</sup> /s	Max Pore μm	Mean Pore Size μm	Burst Strength kPa	Corrugating Depth mm
LM-001	90±5	0.4±0.03	33±10	< 40	< 30	> 150	–
LM-2009Y	90±5	0.23±0.03	25±10	< 40	< 25	> 230	–
LM-120T	135±5	0.45±0.03	170±30	< 65	< 50	> 230	–
LMPT-001	270±10	0.07±0.05	20±5	< 35	< 25	> 500	–
LM-1465	140±5	0.6±0.05	200±30	< 45	–	> 350	–
LM-2180	210±20	1±0.1	150±30	< 40	–	> 400	–
LM-280	280±20	1.2±0.1	520±50	< 110	< 85	> 1000	–
LM-235J	235±20	1.05±0.1	210±50	< 45	< 35	> 1000	–
LM-3203	310±20	1.0±0.1	20±5	< 25	–	> 300	≥ 0.3
LMO3-001	220±10	0.5±0.05	100±10	< 55	< 45	> 500	–
LM-3202	300±20	1.0±0.1	25±10	< 25	–	> 400	≥ 0.3
LM-3201	260±20	1.0±0.1	120±30	< 40	–	> 400	≥ 0.3
LM-205	260±20	0.8±0.1	20±10	< 25	–	> 300	≥ 0.3
LM-204	260±20	0.8±0.1	20±10	< 30	–	> 400	≥ 0.3
LM-18045	240±20	0.75±0.1	> 50	< 45	–	> 400	–
LM-203	315±20	0.95±0.1	25±10	< 30	–	> 400	≥ 0.3
LM-201	240±20	0.9±0.1	150±30	< 45	–	> 400	≥ 0.3
LM-102	220±20	0.75±0.05	50±30	< 35	–	> 400	–
LMPT-4613	460±15	1.02±0.05	13±5	< 35	< 25	> 900	–
LM18010G-001	180±8	0.75±0.05	110±10	< 50	< 40	> 260	0.33±0.03
	175±8					> 350	
LM21002G-001	210±10	0.65±0.05	18±3	< 23	< 19	> 230	0.24±0.02
	195±10					> 460	
LM10033G-002	125±5	0.55±0.03	150±30	< 53	< 43	> 220	0.33±0.03
	120±5					> 450	
LM17070G-001	170±8	0.62±0.03	70±15	< 37	< 30	> 300	0.28±0.03
	165±8					> 400	
LM21010G-001	210±10	0.75±0.05	100±20	< 50	< 40	> 200	0.28±0.03
	205±10					> 600	
LM13206G-054	132±5	0.35±0.05	60±20	< 40	< 30	> 300	–
	127±5					> 500	
LM20530G-001	205±10	0.66±0.03	32±5	< 30	< 25	> 450	0.23±0.03
	200±10					> 700	
LMHX-1	170±8	0.68±0.03	80±10	< 46	< 36	> 240	0.28±0.03
	165±8					> 600	



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## **PLM Filter Solution Group**

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