



sartorius stedim  
biotech

## Filter Papers for the Laboratory and Industry



turning science **into solutions**



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# Filter Papers – An Introduction

Nowadays, high-grade filter papers are indispensable for routine work in laboratory and industrial applications. Sartorius Stedim Biotech supplies you with a broad range of filter papers for myriad filtration tasks and supports you in solving all your filtration challenges.

**Everything you Need to Know about Sartorius Stedim Biotech Filter Papers**  
Sartorius Stedim Biotech filter papers are manufactured at the Munktell & Filtrak paper factory, a joint venture between Munktell and Sartorius Stedim Biotech.

Back in the middle of the 18th century, a paper factory in the Saxony Erzgebirge, (Ore Mountains) formerly called Filtrak | Gessner & Kreuzig, started manufacturing filter paper for famous breweries in the Bohemian city of Pilsen, among others. Since then, skilled experts have been continually improving these products and adapting them to the latest technical and scientific standards. In the period that followed, we have developed one of the widest varieties of filter papers available today.

With this catalog, we invite you to familiarize yourself with our broad product range. Here, you will find typical examples intended to help you quickly select the filter paper that is right for your application.

**Our product range covers:**

- Quantitative, qualitative, qualitative-technical filter papers
- Technical filter papers and boards
- Extraction thimbles
- Blotting and chromatography papers
- Glass and quartz microfiber filters
- And many other paper grades for special applications

## **Quality Assurance and Quality Control**

Sartorius Stedim Biotech pays particular attention to continuous in-process quality control; additionally, regular checks and exact analyses of raw material and of each individual finished product assure constant high quality and product uniformity.

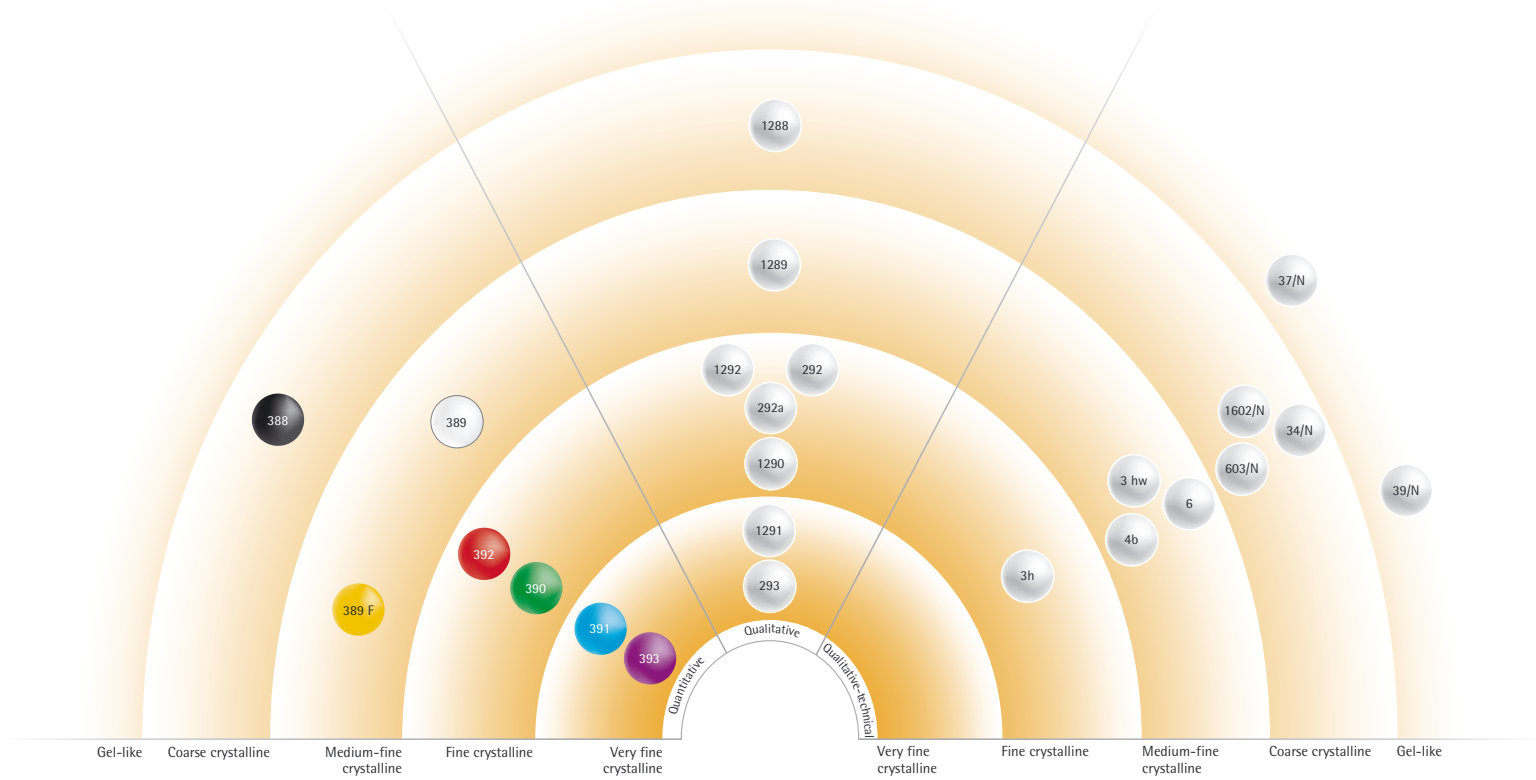
The paper factory meets the requirements set by the ISO 9001 quality management system and the ISO 14001 environmental management system.

## **How Do Filter Papers Work?**

Filter papers are actually depth filters. Various parameters influence their effectiveness: Mechanical particulate retention, adsorption, pH, surface properties, thickness and strength of the filter paper as well as the shape, density and quantity of particles to be retained.

The precipitates deposited on the filter form a "cake layer," which – depending on its density – increasingly affects the progress of a filtration run and decisively affects the retention capability. For this reason, it is essential to select the right filter paper to ensure effective filtration. This choice also depends on the filtration method to be used, among other factors. In addition, the amount and properties of the medium to be filtered, the size of the particulate solids to be removed and the required degree of clarification are all decisive in making the right choice.

# Product Overview



## Quantitative Filter Papers



### Black dot

Fast filtering, wide-pore, loose structure, ash-free, wet-strengthened



### White dot

Medium fast filtering, medium- to wide-pore, ash-free, wet-strengthened



### Yellow dot

Medium fast filtering, medium- to wide-pore, low-fat content, ash-free, wet-strengthened



### Red dot

Medium fast filtering, medium density ash-free, wet-strengthened



### Green dot

Slow filtering, narrow-pore, dense, ash-free, wet-strengthened



### Blue dot

Very slow filtering, fine-pore, very dense, ash-free, wet-strengthened



### Purple dot

Very slow filtering, very fine-pore, very dense, ash-free, wet-strengthened

# Ash-free Filter Papers for Quantitative and Gravimetric Analyses

These filter papers are used for quantitative and gravimetric analyses as well as for pressure or vacuum filtration. They are made out of 100% cotton linters with an  $\alpha$ -cellulose content of > 98% and are washed out with acid to make the papers ashless and achieve high purity.

In gravimetric applications, the cake layer is calcined and the residue quantified. For quantitative analysis of the filtrate, the filter paper must not give off any foreign substances. This guarantees that no test results are falsified. That is why it is important that the filters are ash-free.

For some quantitative analyses, the cake layer has to be mechanically removed from the filter (for example, with a water jet or a spatula). The filter must be wet-strengthened so that it doesn't break when the cake layer is removed.



## Application Examples

Application	Grade
Determination of ash content	388
Gravimetric analysis of metals	388
Testing of coarse-flocculent and voluminous precipitates	388
Analysis of alkaline earth carbonates	389
Determining the fat content in natural raw materials	389 F
Gravimetric analyses in power plants	392
Filtration of fine precipitates	390
Filtration of fine-grained precipitates	391, 393

- Made of 100% cotton linters
- Ash-free (Ash content  $\leq 0.01\%$  according to DIN 54370)
- Wet-strengthened
- Color-coded box for easy selection
- Supplied in rolls, sheets, discs and folded filters

### Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Particle retention (µm)	Filtration (s)*	Precipitates	Properties
● 388	84	0.21	12–15	10	Coarse crystalline	Wide-pore, loose structure, fast filtering
○ 389	84	0.19	8–12	20	Medium-fine crystalline	Medium- to wide-pore, medium fast filtering
● 389 F	84	0.19	8–12	20	Medium-fine crystalline	Medium- to wide-pore, medium fast filtering
● 392	84	0.17	5–8	50	Fine crystalline	Medium dense, medium fast filtering
● 390	84	0.16	3–5	100	Fine crystalline	Narrow-pore, dense, slow filtering
● 391	84	0.15	2–3	180	Very fine crystalline	Fine-pore, very dense very slow filtering
● 393	100	0.18	1–2	300	Very fine crystalline	Very fine-pore, very dense, very slow filtering

\* See test methods, page 29



# Wet-strengthened Filter Papers for Qualitative Analyses

These qualitative filter papers are essentially used for analytical purposes and routine analyses, whenever no gravimetric analyses are required. They are wet-strengthened and can be used for pressure and vacuum filtration. In addition, the cake layer can be removed effortlessly from the filter as needed using a water jet or spatula.

## Application Examples

Application	Grade
Must analysis	1288
Routine filtration for malt analysis	1289
Rapid filtration of fine precipitates	1292
Analysis of coffee extracts	1290
Tannin solutions	1291
Clarification of wine	293



- Made of refined pulp and linters with an > 95%  $\alpha$ -cellulose content
- Ash content  $\leq 0.1\%$  according to DIN 54370
- Wet-strengthened
- Supplied in rolls, sheets, discs and folded filters

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Particle retention ( $\mu\text{m}$ )	Filtration (s)*	Precipitates	Properties
1288	84	0.21	12–15	10	Coarse crystalline	Wide-pore, loose structure, fast filtering
1289	84	0.21	8–12	20	Medium-fine crystalline	Medium- to wide-pore, medium fast filtering
1292	84	0.17	5–8	50	Fine crystalline	Medium dense, medium fast filtering
1290	84	0.21	3–5	100	Fine crystalline	Narrow-pore, dense, slow filtering
1291	84	0.16	2–3	180	Very fine crystalline	Fine-pore, very dense very slow filtering
293	80	0.15	1–2	300	Very fine crystalline	Very fine-pore, very dense very slow filtering

\* See test methods, page 29

# High-purity Filter Papers for Qualitative Analyses

These paper grades are used for analytical purposes that require a low ash content. Grades 292 and 292a are especially suitable for soil analyses because they are low in nitrogen. For phosphate or sodium determination, we recommend grades 131 and 132.



- Pure cotton linters or cotton linters with refined pulp
- No additives, such as wet-strengthening agents
- Supplied in rolls, sheets, discs and folded filters

## Application Examples

Application	Grade
Malt filtration according to EBC standards	292
Soil tests (determination of nitrogen)	292, 292a
Soil test (determination of phosphate and sodium)	131, 132

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Particle retention (µm)	Filtration (s)*	Material
292	87	0.18	5-8	45	Cotton linters, low-nitrogen and nitrates, ash content ≤0.06% according to DIN 54370
292a	97	0.19	4-7	60	Cotton linters, low-nitrogen and nitrates, ash content ≤0.06% according to DIN 54370
131	80	0.16	3-5	100	Cotton linters and refined pulp, low-phosphate and low sodium, ash content ≤0,02% according to DIN 54370
132	80	0.17	5-7	55	Cotton linters and refined pulp, low-phosphate and low sodium, ash content ≤0.02% according to DIN 54370

\* See test methods, page 29

# Smooth Filter Paper for Qualitative-Technical Analyses

These filter papers are used for routine analyses like clarification, determination of substances, but also as discs with a center hole for technical applications. Grades with a wet burst resistance > 30 kPa are referred to as wet-strengthened and are therefore suitable for pressure or vacuum filtration.



## Application Examples

Application	Grade
Routine work in the lab	3 hw
Filtration of essential oils; essences	3 hw
Degassing beer before analysis	6
Clarification of spirits	6
Determination of the sugar content	100/N
Clarification of clear or dyed liquids	69 K
Vacuum or pressure filtration	3 m/N
Rapid filtration of coarse precipitates	4 b

- Made of refined pulp and linters with an >95%  $\alpha$ -cellulose content
- Ash content between 0.1–0.15% (grade 100/N <0.1%)
- Supplied in rolls, sheets, discs and folded filters as well as customer-specific cuts

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Filtration (s)*	Wet burst resistance (kPa)*	Properties
3 h	65	0.13	35	> 15	Medium fast to slow filtering
3 hw	65	0.14	20	> 40	Medium fast filtering
3 m/N	65	0.14	30	> 30	Medium fast filtering
3 w	65	0.14	15	> 15	Medium fast filtering
4 b	75	0.15	22	> 15	Medium fast filtering
6	80	0.17	15	> 30	Fast filtering
100/N	85	0.18	30	> 80	Medium fast filtering, low potassium and sodium content
460/N	90	0.18	50	> 30	Medium fast to slow filtering
10	120	0.33	7.5	> 30	Fast filtering, wide-pore
10/N	120	0.33	7.5	> 100	Fast filtering, wide-pore
C 140	140	0.30	20	> 50	Medium fast filtering
3 S/h	200	0.36	55	> 15	Medium fast to slow filtering, narrow-pore
69 K	155	0.38	65	> 20	Slow filtering, narrow-pore, black activated carbon paper

\* See test methods, page 29

# Crêped Filter Papers

## for Qualitative-Technical Analyses

Crêped filter papers are mostly used for the rapid filtration of relatively coarse precipitates; because of their crêped structure they provide a larger filtration area than smooth filter paper. Grades with a wet burst resistance > 30 kPa are referred to as wet-strengthened and are therefore suitable for pressure or vacuum filtration. Below you will find an overview of the most commonly used grades.



- Made of refined pulp and linters with an > 95%  $\alpha$ -cellulose content
- Ash content between 0.1–0.15%
- Supplied in rolls, sheets, discs and folded filters as well as customer-specific cuts

### Application Examples

Application	Grade
Cooking oils	39/N
Vinegar filtration	39/N
Fine filtration of tar	17/N
Galvanic baths	34/N
Prefilters for transformer oil	6 S/N
Filtration of sugar solutions	603/N
Filtration of essential oils	5 H/N
Juice filtration	67/N

### Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Filtration (s)*	Wet burst resistance (kPa)*	Properties
FT 55	55	0.15	5	> 20	Very fast filtering
34/N	60	0.20	4	> 40	Very fast filtering
601/N	65	0.19	13	> 30	Medium fast filtering
1602/N	70	0.23	5	> 30	Very fast filtering
603	75	0.25	8	> 15	Fast filtering
603/N	75	0.25	8	> 50	Fast filtering
5 H/N	85	0.28	3	> 40	Very fast filtering, wide-pore
17/N	90	0.30	20	> 30	Medium to fast filtering
37/N	135	0.50	4	> 70	Very fast filtering, wide-pore
6 S/N	145	0.55	12	90	Medium to fast filtering
67/N	160	0.65	13	> 60	Fast filtering
39/N	180	0.65	5	> 90	Very fast filtering, wide-pore
39/N	300	0.95	5	> 120	Very fast filtering, wide-pore

\* See test methods, page 29

# Boards

## for the Filtration and Absorption of Liquids

Among other applications, these boards are used for the filtration of cooking and transformer oils, galvanic baths and as base paper for further impregnation with certain reagents. Grades with a wet burst resistance > 30 kPa are referred to as wet-strengthened and are therefore suitable for pressure or vacuum filtration.



- Made of refined pulp
- Smooth
- Supplied in rolls, sheets, discs as well as customer-specific cuts

### Application Examples

Application	Grade
Cytocards	151
Air cleaning (dust extraction in power plants)	LF 1
Turbine oils	C 250
Clarification of galvanic baths	C 350
Blotting paper for determination of water absorptiveness according to COBB (EN 20535)	A 250
Cooking oil	C 251
Paper air fresheners	157
Fragrance test cards	C 160

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Air resistance (mbar)*	Capillary rise (mm/10 min)*	Burst resistance (kPa)*	Wet burst resistance (kPa)*
C 160	160	0.30	25	80		> 50
A 250	250			70		
C 250	250	0.43	25	110		> 80
1600	250	0.50	22	75		
C 251	250	> 0.55	3.5	180	> 200	> 80
C 300	300	0.55	25	110		> 80
152 A	340	1.00	1.8	> 150	> 80	> 5
C 350	350	0.63	25	110		> 80
LF 1	360	0.90	5.5		> 160	
152	380	1.00	2.5	180	> 150	> 120
167	420	1.30	2.3	210	> 130	
C 450	450	0.95	25	100		> 80
151	460	0.90	19	120	> 400	
K12	520	1.50	2.5		> 250	> 50
M 600	600	1.60	3.5	165		
157	700	1.80	8	150		

\* See test methods, page 29



# Seed Testing Papers

These papers satisfy the requirements for the determination of germination capability according to ISTA (International Seed Test Association) and are ideal for ensuring an optimal moisture content for the most diverse types of seeds and germination forms. Their pH ranges between 6.0 and 7.5, they are wet-strengthened and their special structure prevents fine seed roots from growing through the paper. These filter papers can be supplied in a variety of formats. Customized shapes and sizes are also available.



## Application Examples

This method is chiefly applied with corn, sugar beets, wheat, barley and various grasses, but can also be used for all other seed types.

## PP ("Pleated Paper") Method

The pleated paper is placed in a box, the seeds are distributed among the folds of the pleated paper and covered with a wrapping strip to keep the seeds moist. Typically, the pleated papers have 50 double folds that are 20 mm in depth; usually, 2 seeds are placed in each fold. Both white and gray papers are available. Colored paper makes it easier to count white seed species.

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Properties
20	115	0.26	Pleated strips, white, 2000 × 110 mm
20 grey	110	0.22	Pleated strips, gray, 2000 × 110 mm
4 b	75	0.15	Wrapping strips, 110 × 580 mm

\* See test methods, page 29

### BP ("Between paper") Method

One wetted paper sheet is laid on top of a second, the seeds are placed on the double sheet which is then rolled up.

#### Application Examples

The method is used for peas and oats, among others.

#### Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Properties
1750	90	0.20	Sheets, white, 220 × 400 mm
1755	82		PE-coated sheets, 190 × 400 mm
39/N	180	0.65	Crêped white paper

\* See test methods, page 29

### TP ("Top of Paper") Method

The seeds are placed on the paper (discs or sheets) and then transferred either to Petri dishes or plastic boxes. By supplying the filter with water, wick papers are used for constant moistening during the Jacobsen method. They are also supplied as blue and yellow papers to make it easier to count white seed species.

#### Application Examples

The method is applied to small seeds like clover species, for example.

#### Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Properties
4 b	75	0.15	Smooth, white paper, also suitable as wick paper
6	80	0.17	Smooth white paper, also suitable as wick paper
94/N	100	0.22	Smooth white paper, also suitable as wick paper
50 S	120	0.22	Smooth white paper
C 140	140	0.30	Smooth white paper
6 S/N	145	0.55	Crêped white paper
190	300	0.65	Smooth blue paper
191	700	1.35	Smooth blue paper
193	160	0.32	Smooth yellow paper, e.g. sheets of 110 × 170 mm

\* See test methods, page 29

# Filter Papers for the Sugar Industry

In the sugar industry, filter papers are used in laboratories to assay sugar beet or cane sugar. The sugar beets are mashed and further analyzed according to the aluminum sulfate method. Potassium, nitrogen, sodium and saccharose content are measured using a spectrophotometer or the likes. These papers are wet-strengthened and either smooth or crêped; they are made of cellulose or a mixture of cellulose and diatomaceous earth.

Grade 100/N is not only supplied as discs or folded filters, but also on rolls for VENEMA systems.



## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Filtration (s)*	Wet burst resistance (kPa)*	Properties
100/N	85	0.18	30	> 80	Smooth paper, medium fast filtering, low-phosphate and low sodium
3 hw	65	0.14	20	> 40	Smooth paper, medium fast filtering
470	140	0.32	80		Diatomaceous earth filter paper, slow filtering
601/N	65	0.19	13	> 30	Crêped paper, fast filtering
6 S/N	145	0.55	12	90	Crêped paper, very fast filtering

\* See test methods, page 29

# Surface Protection Paper

LabSorb and LabSorb Ultra are highly absorptive grades of paper coated on one side with polyethylene. Used with the cellulose side up, the paper absorbs liquids, which are stopped by the polyethylene layer and thus prevented from soaking through. Used with the polyethylene side up, the papers are highly useful for recovery of valuable or toxic liquids.



## Technical Specifications

- LabSorb - 140 g/m<sup>2</sup> - absorption: 150%
- LabSorb Ultra - 187 g/m<sup>2</sup> - absorption: 350%
- Both grades supplied on rolls and as sheets.  
Special sizes available on request.

## Application Examples

- Preventing radioactive contamination of work surfaces in radiochemical laboratories
- Recovering spilled solutions containing expensive reagents
- Protecting laboratory bench surfaces from spillage or splashes of liquids by preventing absorption and seepage of these liquids into work surfaces
- Lining animal cages for protection and hygiene
- Reducing the risk of objects breaking after falling on hard surfaces because the carrier material reduces impact

# Phase Separating Paper

Grade 480 is impregnated with a stabilized silicon, thus rendering it hydrophobic: It retains water, but allows solvents to flow through. The flow stops automatically when the entire solvent has passed through. In many applications, this phase separator paper eliminates the need to use separating funnels.

- Hydrophobic
- Supplied as discs, folded filters or sheets



## Application Examples

Filtration of organic solvents that have been contaminated with water to separate the aqueous from the organic phase

Filtration of extracting solvents in clinical or medical labs

Separation of emulsions that are formed during the extraction of aqueous plant or drug solutions

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*
480	85	0.19

\* See test methods, page 29

# Diatomaceous Earth Filter Paper

Grade 470 papers are made of cellulose and diatomaceous earth and offer a much better separating capability than pure cellulose papers at the same rate of filtration. This grade quickly retains the finest particles at high flow rates.



- Made of cellulose and diatomaceous earth
- Supplied as discs, folded filters or sheets

## Application Examples

Clarification of beer, wine, urine or sugar solutions during spectrophotometric or refractometric tests

Filtration of the finest, semi-colloidal precipitates, e.g. those consisting of proteins, clay or cold-precipitated barium sulfate, milk serum, fertilizer extracts

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Filtration (s)*	Properties
470	140	0.32	80	Smooth paper, slow filtering

\* See test methods, page 29

# Sample Carrier Paper

Grade TFN is made from pure cotton linters without any additives. This sample carrier material is intended for absorbing and transporting human bodily fluids and/or as a carrier for in-vitro diagnostic tests. For example, it is used to perform screening tests for hereditary diseases and metabolic disorders such as phenylketonuria (Guthrie test). Grade TFN papers comply with the requirements of EC Directive 98/79/EC, Annex I and III (other IVD) and is recommended for applications in accordance with the CLSI-LA4-A5:2007 standard.



## Application Examples

Transporting human bodily fluids  
(blood, urine, saliva)

Guthrie test (phenylketonuria screening |  
newborn screening)

TSH test (congenital hypothyroidism)

HIV testing

- Made of 100% cotton linters
- No wet-strengthening agents or other additives
- Supplied printed or unprinted
- CE-certified
- Supplied in customer-specific special sizes

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Capillary rise, lengthwise (mm/10 min)*
TFN	179	0.47	> 170

\* See test methods, page 29

# Nonwovens

These nonwoven grades are made of rayon or polyester and are available in different weights. They are usually sold on rolls – as nonwoven rayon (viscose), but can also be supplied on request as discs or sheets.



## Application Examples

Nonwoven grades serve to filter liquids such as coolants or lubricants. They are commonly employed on band filter systems, for example, to recover cooling lubricants from tooling machines and for the filtration of grinding and drilling oil emulsions. In the food-processing industry, these grades are also used to filter baby food.

## Technical Specifications

Grade	Material	
2601	Rayon (viscose)	Supplied in pore sizes from 75 to 115 $\mu\text{m}$
2701	Polyester	Supplied in pore sizes from 60 to 140 $\mu\text{m}$
2602	Rayon (viscose)   polyester	Testing baby food on textile fibers (Ref. FT-3-01324-032)

\* See test methods, page 29

# Weighing Paper

Grade 605 weighing paper is made of transparent smooth parchment that is ideal for the weighing of viscous, semi-crystalline or solid substances.



- Keeps the balance pan clean
- Allows easy transfer of weighed substances
- Nitrogen-free, smooth, transparent and soluble
- Supplied in sheets, discs as well as weighing boats

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Material
605	20	0.02	Nitrogen-free parchment paper

\* See test methods, page 29

# Lens Cleaning Paper

Grade 2113 lens cleaning paper is a thin, non-linting silk tissue paper used for cleaning very sensitive surfaces, such as optical glasses or lenses without scratching them.



- Prevents scratching of surfaces
- Supplied in sheets as well as customer-specific cuts

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Material
2113	13	Non-linting silk paper

\* See test methods, page 29

# Extraction Thimbles

Sartorius Stedim Biotech thimbles are supplied in three different thimble designs to cover the majority of application areas. These cellulose or glass microfiber thimbles are primarily used in Soxhlet extraction units to extract defined substances from solids for further analyses. Quartz microfiber thimbles are preferred for emission control due to their high temperature resistance.

They are supplied in a large variety of diameters and lengths.



## Application Examples

Application	Grade
Soxhlet extraction for determination of fats, lipids, additives or pesticides in the food industry	30
Soxhlet extraction of oil and softeners	30
Separation of specific dusts or aerosols from gas or other airstreams	40
Analysis of hot and acidic gases	MK 360
Air sampling	MK 360
Monitoring of exhaust fumes	MK 360

## Technical Specifications

	Grade 30	Grade 40	Grade MK 360
Material	100% Cotton linters	100% Borosilicate glass	100% Quartz microfiber (SiO <sub>2</sub> )
Inner diameter in mm*	+0   -3	+1   -3	+0   -3
Outer length in mm*	± 1	± 1	± 1
Wall thickness in mm*	1.5 ± 0.5	2 ± 0.5	2 ± 0.5
Penetration % (0.3 µm)		<0.002	<0.002
Max. temperature resistance	120 °C	500 °C	900 °C

\* According to the German DIN standard 12449, the tolerances of the inner diameter, the length and the wall thickness depend on the size of the extraction thimble. The tolerances above are for thimbles with an inner diameter <48mm.

# Blotting Papers

These blotting papers are made from the purest raw materials with the maximum degree of absorptiveness and cellulose content. Their functions include:

- Absorption and improvement of the transport of transfer buffers after capillary and semidry blotting
- Double-sided cover of gel and transfer membrane in the blotting tank after conventional electroblotting
- To prevent direct contact between blotting membrane and porous cover plate of the vacuum chamber for dot| slot blotting of DNA | RNA



## Application Examples

Application	Grade
To cover the gel membrane sandwich in the buffer tank	BF 1
For gel wicking and drying, capillary blotting using Western, Southern or semidry techniques	BF 2
To increase and maintain the transport of liquid from the buffer and as buffer reservoir in capillary and semidry blotting methods	BF 3
To transfer DNA or RNA according to the Southern technique or semidry blotting of proteins	BF 4

- BF 2, BF 3 are made of cotton linters with an  $\alpha$ -cellulose content of >98%.
- BF1, BF4 are made of refined pulp and cotton linters with an  $\alpha$ -cellulose content of >95%.
- Highly absorbent
- Supplied in sheets, strips or on rolls

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Capillary rise (mm/10 min)*	Capillary rise (mm/30 min)*
BF 1	90	0.16	80	140
BF 2	195	0.35	70	115
BF 3	330	0.76	130	
BF 4	550	1.30	160	

\* See test methods, page 29

# Chromatography Papers

Chromatography papers are made of 100% cotton linters. These highly pure papers are not only ideal for chromatography, but also for a wide range of absorption applications like those common in the life sciences and diagnostics.

- Made of 100% cotton linters with an  $\alpha$ -cellulose content of > 98%.
- Ash content: < 0.04% according to DIN 54370
- Fiber orientation for better absorptive capacity
- Supplied in sheets, strips, discs or on rolls

## Application Examples

Application	Grade
The most commonly used chromatography paper	FN 100
Analytical paper for routine and repetitive separations	FN 1
Routine analysis of proteins in serum (e.g. human albumin)	FN 3
Circular and horizontal chromatography	FN 5
Blotting paper in analysis sets	FN 8
Antibiotic test strips	FN 30

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Capillary rise (mm/30 min)*
FN 1	90	0.19	145
FN 2	125	0.25	145
FN 3	90	0.19	95
FN 4	125	0.24	95
FN 5	90	0.18	60
FN 6	125	0.22	60
FN 7	150	0.32	145
FN 7a	200	0.41	145
FN 8	280	0.55	170
FN 30	320	0.90	240
FN 100	195	0.35	115

\* See test methods, page 29

# Glass Microfiber Filters Without Binder

Binder-free glass microfiber filters are recommended for analytical and gravimetric analyses and also as prefilters. These filters combine fast flow rates with high load capacity and the retention of very fine particles; they are biologically inert and resistant to most chemicals.



## Application Examples

Application	Grade
Prefilters for routine analyses	MGD
Analysis of suspended solids in wastewater according to DIN EN 872	MGC
Analysis of suspended solids in wastewater according to 2540D	MG 550-HA
Clarification of buffer and reagent solutions	MGA
Clarification of protein solutions	MGF
Air monitoring	MG 160

- Manufactured from 100% borosilicate glass
- Completely binder free
- pH stable
- Withstand temperatures up to 500 °C (Grade MG 550-HA up to 550 °C)
- Supplied as discs or sheets

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Air resistance (mbar)*	Particle retention (µm)	Filtration (s)*
MGA	52	0.25	36.0	1.6	40
MG 160	75	0.37		1.2	
MGB	143	0.70	95.0	1.0	100
MGC	52	0.25	51.0	1.2	66
MGD	120	0.53	18.5	2.7	18
MGF	75	0.40	145.0	0.7	185
MGG	64	0.28	32.0	1.5	38
MG 550-HA	65	0.30		1.5	

\* See test methods, page 29

# Glass Microfiber Filters With Binder

These filters are mostly used for monitoring air and gas. They are manufactured with synthetic binding agents to ensure that the filter has a defined strength. They are mechanically and chemically stable and – depending on the binding agent used – are either hydrophobic or hydrophilic.



- Manufactured from 100% borosilicate glass
- Mechanically and chemically stable
- Temperature resistant up to 180 °C
- Supplied as discs or sheets

## Application Examples

Application	Grade
Prefiltration	MG 1387/1
Gas monitoring	MG 1387/1
Air monitoring including chemical analysis	MG 227/1/60
Emission testing	MG 464
Smoke number measurement	MG 1336/2

## Technical Specifications

Grade	Weight (g/m <sup>2</sup> )*	Thickness (mm)*	Air resistance (mbar)*	Retention rating 0.3 µm particulate matter (%)**	Binding agent
MG 227/1/60	60	0.27	21.0	99.96	Hydrophobic
MG 1336/2	73	0.40	28.0	> 99.97	Hydrophobic
MG 464	107	0.70	31.0	97.97	Hydrophobic
MG 1387/1	90	0.40	31.0	99.97	Hydrophilic

\* See test methods, page 29

\*\* Tested with di-ethyl-hexyl-sebacate (DEHS) test aerosol

# Quartz Microfiber Filters

These quartz microfiber filters are free of glass fibers and binding agents. They are especially suited for emission monitoring at temperatures of up to 900 °C and wherever filters of the highest purity are needed.

They are available in two grades:

- Grade T 293, quartz microfiber filters unconditioned
- Grade MK 360, quartz microfiber filters conditioned (heat pre-treated); certificate on trace elements available for every batch.



## Application Examples

- Emission monitoring at high temperatures (air pollution)
- Air monitoring (US EPA PM 10\*)
- Analysis of hot and acidic gases
- Trace element analysis
- Analytical and gravimetric analyses
- Analysis of dust levels according to DIN EN 13284 1:2001 (MK 360)

- Made of 100% high purity quartz
- Manufactured without glass fibers
- Completely binder free
- Withstand temperatures up to 900 °C +/- 10%
- Stable weight and dimensions (for the MK 360 conditioned version)

## Technical Specifications

Grade	Material	Weight (g/m <sup>2</sup> )**	Thickness (mm)**	Retention 0.3 µm particulate matter (%)***	Penetration 0.3 µm particulate matter (%)***
T 293   MK 360	100% Quartz microfiber silicium dioxide (SiO <sub>2</sub> )	85	0.43	99.998	<0.002

## Typical trace element values (mg/kg)

Al	Ba	Co	Cr	Cu	Fe	Mg	Mn	Na	Ni	Sr	Ti	V	Zn	As	Cd	Pb
275	34	<0.1	3.3	0.5	40	5.0	1.5	25.5	1.4	1.3	7.5	<0.1	12	<0.1	<0.01	0.2

\* US EPA PM 10: United States Environmental Protection Agency - Particulate Matter, level 10  
 \*\* See test methods, page 29  
 \*\*\* Tested according to DIN 24184

# Quality Control

## Test Methods

### **Basis Weight According to DIN EN ISO 536**

Is determined by weighing a paper sheet that is between 500 cm<sup>2</sup> and 1000 cm<sup>2</sup> in size on a calibrated paper scale showing an accuracy of +/- 0.5%.

The basis weight is expressed in grams per square meter (g/m<sup>2</sup>).

### **Thickness According to DIN EN ISO 20534**

The thickness is measured using a thickness meter or gauge readings and is expressed in millimeters.

### **Filtration Rate**

The time required to filter 10 ml of distilled water at 20 °C through a free-hanging, fully-wetted filter disc with a diameter of 110 mm folded in quarters.

The filtration rate is expressed in seconds (per mm).

### **Ash Content According to DIN 54370**

The ash content is the residue determined after ignition of 10 g of filter paper at 800 °C in a platinum crucible.

The ash content is expressed in percent.

### **Tensile Strength According to DIN EN ISO 1924-2**

A continually increasing load is applied vertically to a paper strip measuring 15 mm in width and 180 mm in length. The tensile strength is defined as the stretching force necessary to break the piece and measured lengthwise and in the transverse direction.

The tensile strength is expressed in N/15 mm.

### **Bursting Strength According to DIN ISO 2758**

A paper with a surface area of 10 cm<sup>2</sup> is clamped over and subjected to increasing pressure from a rubber diaphragm. The bursting strength is the pressure reading at the time of rupture.

The bursting strength is expressed in kilopascal (kPa).

### **Wet Burst Resistance According to DIN ISO 3689**

A paper with surface area of 10 cm<sup>2</sup> is immersed in water and then clamped over a rubber diaphragm. The paper is subjected to evenly increasing pressure from the rubber diaphragm. The bursting strength is the pressure reading at the time of rupture.

The wet bursting strength is expressed in kilopascal (kPa).

### **Air Resistance**

Air resistance is the pressure drop that occurs after filtration of a defined air stream (270 l/h and/or 75 cm/s at 10 cm<sup>2</sup>) through a filter paper.

The air resistance is expressed in mbar.

### **Capillary Rise According to DIN ISO 8787**

The capillary rise is defined as the height to which a paper strip measuring 15 mm in width and 250 mm in length, whose narrow side is immersed in prefiltered distilled water (20C), is wetted after 10 or 30 min. After this test period of 10 and 30 min., the wetted part of the strip is measured in mm.

The capillary rise is expressed in mm per 10 min and | or 30 min.

# Ordering Information

Given the wide variety of paper grades, formats and dimensions, the list of order numbers is very extensive. Below you will find a guide that explains to you how to decipher the order numbers for standard products. In the case of customer-specific cuts, e.g. filter discs with center hole or printed paper, please ask us for the exact order number.



▼ =  
 1 Rolls  
 2 Sheets  
 3 Filter discs  
 4 Folded filters  
  
 Not applicable for extraction thimbles

◆ =  
 1-- Quantitative filter papers  
 2-- Qualitative filter papers  
 3--, 4-- Qualitative-technical filter papers  
 5-- Chromatography, blotting papers  
 1101-1109, 011-- Glass and quartz microfiber filters  
 1201 Thimbles, cellulose  
 1204 Thimbles, glass  
 01208 Thimbles, quartz

● =  
 Rolls Width in mm × length in m  
 Sheets Width in mm × length in mm  
 Filter discs Diameter in mm  
 Folded filters Diameter in mm  
 Extraction thimbles Inner diameter in mm × outer length in mm

\* The middle number is determined by the paper grade – See Index of Grades, page 31

## Examples



**Rolls**  
 FT-1-328-2401000  
 FT-1 = Rolls  
 328 = Grade 100/N  
 2401000 = 240 mm width × 1000 m length

**Sheets**  
 FT-2-303-580580  
 FT-2 = Sheets  
 303 = Grade 3 hw  
 580580 = 580 mm × 580 mm

**Filter discs**  
 FT-3-101-055  
 FT-3 = Filter discs  
 101 = Grade 388  
 055 = 55 mm diameter

**Folded filters**  
 FT-4-207-150  
 FT-4 = Folded filters  
 207 = Grade 1289  
 150 = 150 mm diameter

**Thimbles**  
 FT-1204-022080  
 FT- = Thimbles  
 1204 = Glass microfiber  
 022080 = 22 mm inner diameter × 80 mm length

# Index of Grades

Grade	Middle number	Description
10	352	Qualitative-technical paper, smooth
100/N	328	Qualitative-technical paper, smooth
10/N	372	Qualitative-technical paper, smooth
1288	206	Qualitative filter paper, wet-strengthened
1289	207	Qualitative filter paper, wet-strengthened
1290	208	Qualitative filter paper, wet-strengthened
1291	209	Qualitative filter paper, wet-strengthened
1292	210	Qualitative filter paper, wet-strengthened
131	351	Qualitative filter paper, high purity
132	329	Qualitative filter paper, high purity
151	449	Boards
152	447	Boards
152 A	440	Boards
157	437	Boards
1600	10378	Boards
1602/N	342	Qualitative-technical paper, crêped
167, 420 g/m <sup>2</sup>	410	Boards
1750	10607	Seed testing paper
1755	10608	Seed testing paper
17/N	321	Qualitative-technical paper, crêped
190	378	Seed testing paper
191	379	Seed testing paper
193	381	Seed testing paper
20	00353	Seed testing paper
20 gray	00366	Seed testing paper
2113	1111	Lens cleaning paper
2601, 20 g/m <sup>2</sup>	01308	Nonwoven, rayon (viscose)
2601, 60 g/m <sup>2</sup>	01304	Nonwoven, rayon (viscose)
2602, 150 g/m <sup>2</sup>	01324	Nonwoven, rayon (viscose)   polyester
2701, 20 g/m <sup>2</sup>	01319	Nonwoven, polyester
2701, 60 g/m <sup>2</sup>	01323	Nonwoven, polyester
292	205	Qualitative filter paper, high purity
292a	215	Qualitative filter paper, high purity
293	211	Qualitative filter paper, wet-strengthened
30	1201	Extraction thimble, cellulose
34/N, 60 g/m <sup>2</sup>	478	Qualitative-technical paper, crêped
37/N	480	Qualitative-technical paper, crêped
● 388	101	Quantitative filter paper
○ 389	102	Quantitative filter paper
● 389 F	112	Quantitative filter paper
● 390	103	Quantitative filter paper
● 391	104	Quantitative filter paper
● 392	105	Quantitative filter paper
● 393	127	Quantitative filter paper
39/N, 180 g/m <sup>2</sup>	483	Qualitative-technical paper, crêped
39/N, 300 g/m <sup>2</sup>	487	Qualitative-technical paper, crêped
3 h	302	Qualitative-technical paper, smooth
3 hw	303	Qualitative-technical paper, smooth
3 m/N	305	Qualitative-technical paper, smooth
3 S/h	307	Qualitative-technical paper, smooth
3 w	308	Qualitative-technical paper, smooth
40	1204	Thimble, borosilicate glass
460/N	332	Qualitative-technical paper, smooth
470	606	Diatomaceous earth filter paper
480	602	Phase separating paper
4 b	309	Qualitative-technical paper, smooth
5 H/N	423	Qualitative-technical paper, crêped

Grade	Middle number	Description
50 S	353	Seed testing paper
54	10210	Qualitative-technical paper, smooth
55/N	470	Qualitative-technical paper, crêped
6	312	Qualitative-technical paper, smooth
601/N	354	Qualitative-technical paper, crêped
603	334	Qualitative-technical paper, crêped
603/N	335	Qualitative-technical paper, crêped
605	605	Weighing paper
67/N, 160 g/m <sup>2</sup>	477	Qualitative-technical paper, crêped
69 K	326	Qualitative-technical paper, smooth
6 S/N	314	Qualitative-technical paper, crêped
A 250	412	Boards
BF 1	518	Blotting paper
BF 2	519	Blotting paper
BF 3	520	Blotting paper
BF 4	521	Blotting paper
C 140	356	Qualitative-technical paper, smooth
C 160	343	Boards
C 250	344	Boards
C 251	355	Boards
C 300	345	Boards
C 350	346	Boards
C 450	347	Boards
FN 1	501	Chromatography paper
FN 100	527	Chromatography paper
FN 2	502	Chromatography paper
FN 3	503	Chromatography paper
FN 30	526	Chromatography paper
FN 4	504	Chromatography paper
FN 5	505	Chromatography paper
FN 6	506	Chromatography paper
FN 7	507	Chromatography paper
FN 7a	508	Chromatography paper
FN 8	509	Chromatography paper
FT 55	348	Qualitative-technical paper, crêped
K 12	438	Boards
LabSorb	601	Surface protection paper
LabSorb Ultra	10601	Surface protection paper
LF 1	413	Boards
M 600	416	Boards
MG 1336/2	01120	Glass microfiber filters with binder
MG 1387/1	01125	Glass microfiber filters with binder
MG 160	01110	Glass microfiber filters without binder
MG 227/1/60	01124	Glass microfiber filters with binder
MG 464	01121	Glass microfiber filters with binder
MG 550-HA	01147	Glass microfiber filters without binder
MG 972	01122	Glass microfiber filters with binder
MGA	1101	Glass microfiber filters without binder
MGB	1102	Glass microfiber filters without binder
MGC	1103	Glass microfiber filters without binder
MGD	1104	Glass microfiber filters without binder
MGF	1105	Glass microfiber filters without binder
MGG	1106	Glass microfiber filters without binder
MK 360	01108	Quartz microfiber filters, conditioned
MK 360, thimbles	01208	Thimbles, quartz
T 293	1109	Quartz microfiber filters, unconditioned
TFN	460	Sample carrier paper

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