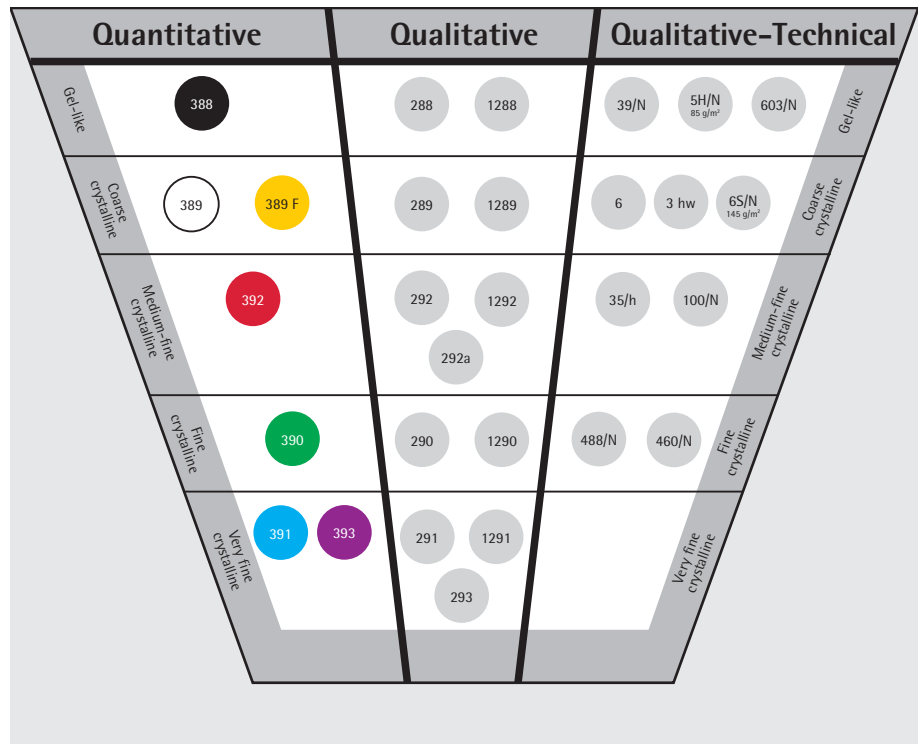












**Filter Papers**  
for the Laboratory  
and Industry



# Product Overview of Frequently Used Analytical Filter Papers



- 
**Purple spot**  
 Lowest rate of filtration amongst the quantitative filter papers, extra fine-pored and dense, most efficient collection of smallest particles, ash-free
- 
**Blue spot**  
 Very low rate of filtration, fine-pored, very dense, ash-free
- 
**Green spot**  
 Low rate of filtration, narrow-pored, dense, ash-free
- 
**Red spot**  
 Moderate rate of filtration, medium density, ash-free
- 
**Yellow spot**  
 High rate of filtration, medium wide-pored, ash-free, low-fat content, especially for fat determination in natural raw materials
- 
**White spot**  
 High rate of filtration, medium wide-pored, ash-free
- 
**Black spot**  
 Very high rate of filtration, wide-pored, spongy structure, ash-free
- 
**Grey spot**  
 Various technical specifications

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# Sartorius Offers a Broad Range of Filter Papers

## Special Products for Your Filtration Needs

We are pleased to present you with our updated catalogue featuring a large assortment of filter paper products.

The goal of our company is to supply you with high-grade filter papers to cover your laboratory needs and help you accomplish all your filtration tasks and solve any problems you may encounter.

Already in the mid 1800s, Sartorius – formerly Filtrak | Gessner & Kreuzig – began to produce filter papers in the Saxon Erzgebirge (Erz Ore Mountains), the mountain range located between the eastern part of Germany and what is now the Czech Republic. The company made these filters for the famous Bohemian brewery in Pilsen, among others. Since then, experienced specialists have continuously enhanced our products and adapted them to meet the latest technical and scientific standards. As a result, we have developed one of the widest varieties of filter papers available today, and invite you to discover their capabilities.

In the future as well, Sartorius will continue to incorporate the latest scientific advances and cutting-edge technology into its products and address environmental concerns in ongoing product development projects. As part of this effort, Sartorius has considerably expanded its product array.

**Beyond this, we are ready to assist you in finding the best product solutions for your specific filtration applications, and will be happy to provide you with technical advice and comprehensive support.**

## Our product range include

- Ashless filter papers
- Qualitative filter papers
- Qualitative and technical filter papers
- Absorptive filter papers and boards
- Glass and quartz micro fibre filters
- Blotting and chromatography papers
- Indicator papers
- Extraction thimbles

## About Sartorius Filter Papers and the Raw Materials Used

Generally, filter papers are used for separating the solid particles from liquids and gases.

They are absorbent, porous non-woven fiber materials. Their fibrous structure forms inter-capillary spaces within the capillary system; the size and number of these spaces depends on the type of raw materials used and on the action of the beater rolls in the paper-making machine or on the machine's operating characteristics.

We use natural and synthetic as well as organic and inorganic fibrous materials to manufacture our filter papers. To give them special properties, we chemically treat some of these materials or impregnate them with synthetic resins.

Sartorius filter papers are primarily made of cellulose pulp obtained from pine or spruce; however, we also use pulp made of birch, beech and eucalyptus wood, or cotton linters and viscose pulp. These raw materials are refined to obtain various grades of filter papers by a process called "wet beating" in hollanders – beater rolls – and by sheet formation on specially modified paper machines.

## Quality Assurance and Control

Particular attention is paid 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.

## What Is Filtration and for What Purposes Is It Used?

Filtration is a process for separating two substances of two different physical states. It is used to remove solids from liquids or gases.

## How Do Filter Papers Work?

Filter papers are so-called 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 particles deposited on the filter form a "filter cake," which depending on its density increasingly governs the progress of a filtration run. This 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 filter paper grade, the 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. In this catalogue you will find typical examples intended to help you select the filter paper that is right for your application.



# Sartorius Filter Paper Types

## Ashless Filter Papers for Quantitative Analyses

These filter papers are used for quantitative analysis. They are made of refined pulp and linters with over 95% alpha-cellulose content. Moreover, these filter papers are guaranteed to be free of any residual acids that are used in a few production methods. Another advantage is their extremely low percentage of ash content. As a result, these filters are virtually ash-free.

Sartorius Ashless Filter Papers, with the grade Numbers 388, 389, 389F, 390, 391, 392 and 393, are characterized by high wet strength and high purity, classified according to their separating capacity.

These papers are especially suitable for quantitative analysis, Buechner funnels, pressure or vacuum filtration and are available in different formats as in rolls, sheets, discs, and folded filters.

To make it easy for you to select the product best for your needs, the boxes are identified with color-coded dots as follows:

- **388: black dot**
- **389: white dot**
- **389F: yellow dot**
- **390: green dot**
- **391: blue dot**
- **392: red dot**
- **393: purple dot**

In the list on pages 8 of this catalogue, you will find information on the key filtration properties of our filter papers for quantitative analyses, including application examples, to help guide your selection.

## Qualitative Filter Papers

Like our ashless filter papers, these filter papers are made of refined pulp and linters with more than 95% alpha-cellulose content. This gives them a variety of filter properties to meet the needs of different applications. The ash content of these filter papers is approx. <math><0.1\%</math>, and they are essentially used for qualitative analyses. Sartorius offers two categories of qualitative filter paper: standard strength and various grades of wet strength. These filter papers are likewise available as rolls, sheets, disks and folded filters.

**288 and 1288**  
**289 and 1289**  
**290 and 1290**  
**291 and 1291**  
**292 and 1292**  
**292a | 293**

On pages 9 and 10 of this catalogue, you will find a list of properties and application examples.

## Qualitative and Technical Filter Papers

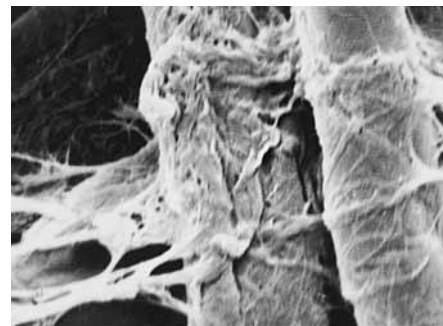
We offer a selection of filter papers for analytical and technical purposes.

For guidance on selecting the right grade, please refer to pages 15 and 16, which describe the properties of each grade and provide application examples.

## Absorptive Filter Papers and Boards

These papers are used for filtration of cooking and transformer oils, galvanic baths, as absorptives of human serum, of water for germination tests, as base paper for further impregnation with certain reagents or to protect laboratory surfaces. They are available as reels sheets or discs, also of large diameters with a centre hole, special cuts and shapes, e.g. for use in filter presses. Find more details on pages 17 and 18.

Microscopic view of cellulose fibers bound in a filter paper



Non-bound cellulose fibers under a microscope



Cross section of a filter paper under a microscope

### Glass and Quartz Microfiber Filters

Glass microfiber filters are made of 100% borosilicate. No binders are used in their production, which makes them ideal for critical analyses in which impurities can be washed out of the filter. They continue to perform over long periods unlike cellulose filters whose rate of filtration drops off rapidly as the particulate load increases. Moreover, glass microfiber filters are temperature resistant up to 500°C.

The properties of quartz microfiber filters are similar to those of glass microfiber filters. The differences are that quartz microfiber filters are resistant to even higher temperatures of up to 900–950°C, have only a minimum of trace metal impurities, feature excellent weight and dimensional stability, and can be used for analysis of hot, acidic gases (except HF), especially for emission and immission test methods.

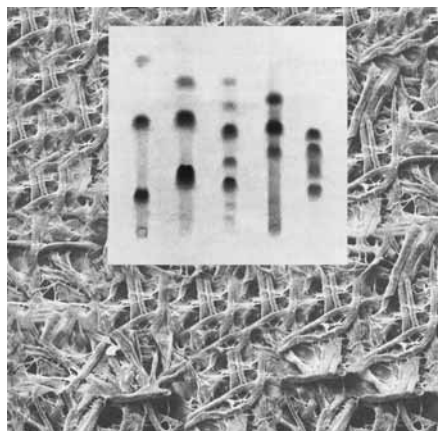
Glass and quartz microfiber filters are suitable as general-purpose membrane prefilters for measurement and analysis of air and water pollutants and for clarification of buffers and reagents, especially for spectrophotometry. The filters are available as discs, sheets or thimbles.

Different densities and thicknesses of the materials define the specific filtration characteristics of each of the following grades:

**MGA, MGB, MGC, MGD, MGF, T293, 40, 50**

See pages 29 to 34 for more information.

### Blotting and Chromatography Papers



These filter products are made of high-purity cotton linters with an alpha-cellulose content of over 97%. We offer these filters in 16 grades, which are differentiated by their base weight and their migration rate. Choose from eleven grades with normal ash content and eight grades with reduced ash content.

Chromatography papers with a reduced ash content are available in grades FN 1 to FN8, FN 30 and FN 100. For these papers, the long side is the direction of motion. They can also be supplied in disc formats for circular technology and as strips or sheets for special techniques.

Moreover, we offer papers for absorption and transport of buffers or to cover gel and transfer membranes on both sides in a blotting tank to accommodate various transfer blotting techniques.

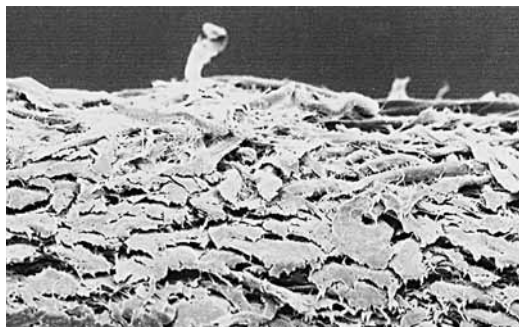
**BF 1, BF 2, BF 3, BF 4, FN 100**

for use as blotting or chromatography papers; see page 26 to 28.

### Indicator Papers

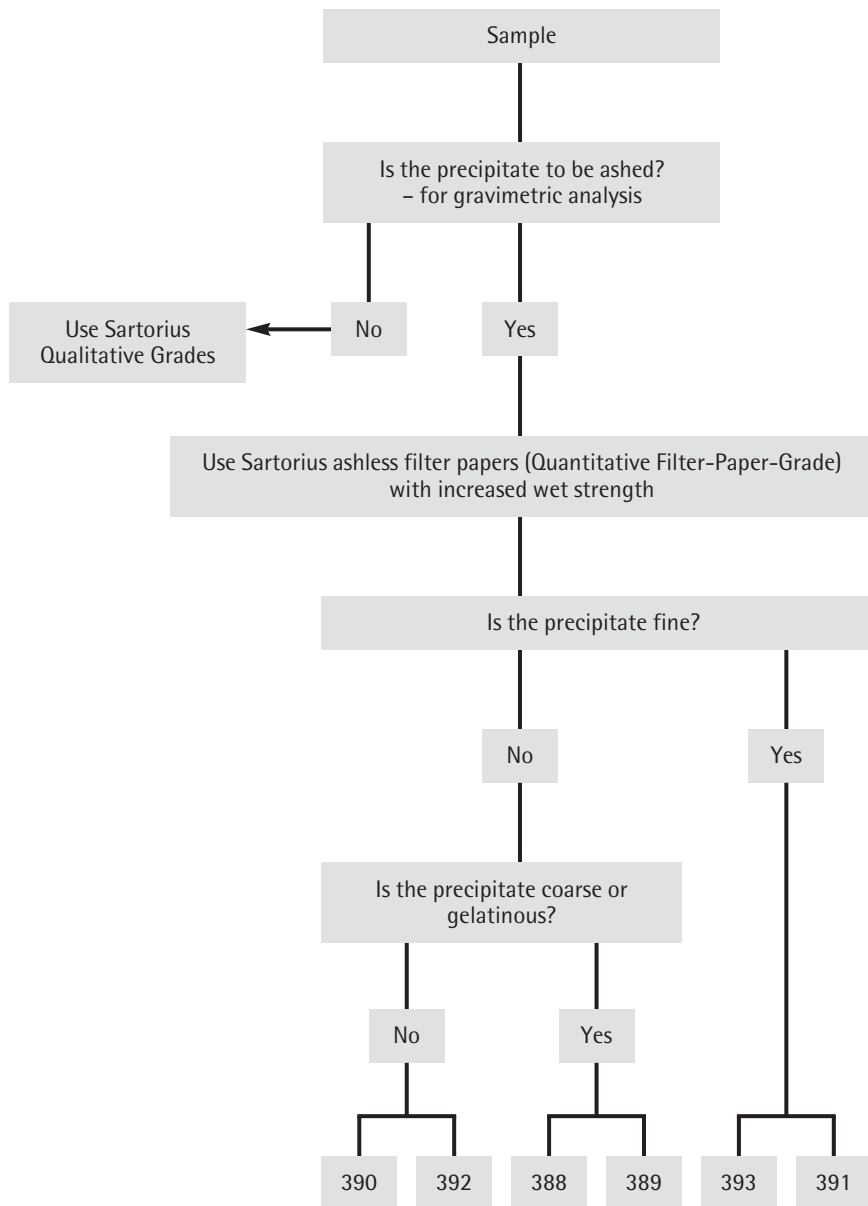
Sartorius offers a comprehensive assortment of ready-to-use indicator pH and test papers available as strips or on roller dispensers. They are used for quick and accurate determination of colored, turbid, clear or aqueous solutions within the entire pH range.

Beyond this category, we also supply exceptionally pure special papers designed for coating with pH indicators or test reagents. We will be happy to provide customized roll or sheet dimensions. For more information, please refer to pages 24 and 25.

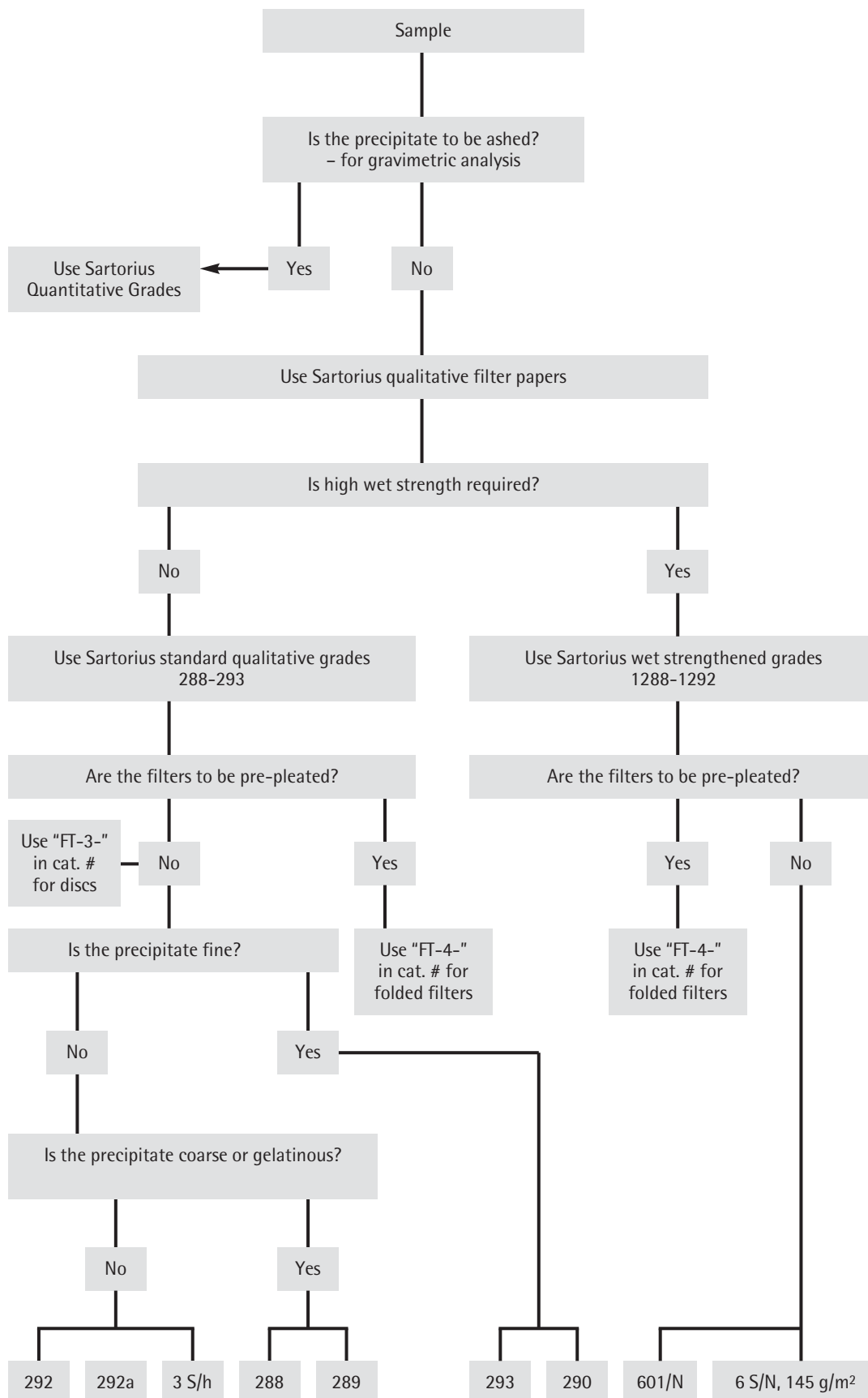


Surface of a filter paper under a microscope

# Selection of Quantitative Filter Paper Grade



# Selection of Qualitative Filter Paper Grade



# Ashless Filter Papers for Quantitative Analyses with Increased Wet Strength



Filtration using a folded filter in an analytical funnel



Vacuum filtration using a filter disc in a Buechner funnel (right side). Courtesy of Phywe Systeme GmbH

Grade	Serial no.	g/m <sup>2</sup>	Particle retention (µm)	Fv (s)*	Properties	Preferable application areas
388 ●	101	84	12–15	10	Wide-pored, soft and spongy structure, fast rate of filtration, wet strength, ash-free**	Coarse-flocculent and voluminous precipitates, especially iron, aluminum and chromium hydroxides; copper, bismuth, cobalt and iron sulfides; various organic, colored metal deposits; determination of silicon in analysis of steel and pig iron; for acidic and slightly alkaline solutions; pressure filtration
389 ○	102	84	8–12	20	Medium-wide-pored, medium-fast rate of filtration, wet strength, ash-free*	The most commonly used grade for analyses; for relatively coarse precipitates such as silver, arsenic, antimony, cadmium, lead, iron and manganese sulfides; lead chromate; ammonium phosphorous molybdate; alkaline earth carbonates, etc.; for acidic and slightly alkaline solutions; pressure filtration
389 F ●	112	84	8–12	20	Medium-wide-pored, medium rate of filtration, ash-free**	Relatively coarse precipitates; ideal for determining the fat content in natural raw materials
390 ●	103	84	3–5	100	Narrow-pored, dense, slow rate of filtration, wet strength, ash-free**	Filtration of fine precipitates; barium sulfate; lead molybdate; lead dioxide; calcium hydroxide; calcium fluoride; nickel sulfide; zinc sulfide; stannic sulfide, etc.; for acidic and slightly alkaline solutions; pressure filtration
391 ●	104	84	2–3	180	Fine-pored, highly dense, very slow rate of filtration, wet strength, ash-free**	Ideal for particularly difficult filtration conditions and especially fine-grained precipitates; cold-precipitated barium sulfate; meta-stannic acid; copper oxide, etc.; for acidic and slightly alkaline solutions; pressure filtration
392 ●	105	84	5–8	50	Medium density, moderately fast rate of filtration, wet strength, ash-free**	Rapid filtration of fine precipitates; magnesium ammonium phosphate; magnesium ammonium arsenate; relatively coarse forms of barium sulfate; for acidic and slightly alkaline solutions; pressure filtration
393 ●	127	100	1–2	250	Especially fine-pored, lowest rate of filtration among all filter paper grades, dense, highly efficient filtration of the most minute particles, ash-free**	Ideal for particularly difficult filtration conditions and especially fine-grained precipitates; barium sulfate, etc.; copper oxide

\* Filtration rate in seconds: see page 37

\*\* Ash content ≤ 0.01% according to DIN 54370: see page 37

# Analytical Filter Papers for Qualitative Analyses



Disc filter, folded by one quarter



Completely folded filter  
Courtesy of Phywe Systeme GmbH

Grade	Serial no.	g/m <sup>2</sup>	Particle retention (µm)	Fv (s)*	Properties	Preferable application areas
288	201	80	12–15	10	Wide-pored, soft and spongy structure, fast rate of filtration	Coarse-flocculent and voluminous precipitates, especially iron, aluminum and chromium hydroxides; copper, bismuth, cobalt and iron sulfides; various organic colored metal deposits; determination of silicon in analysis of steel and pig iron, etc.
289	202	80	8–12	20	Medium-wide-pored, medium rate of filtration	The most commonly used grade for many analyses; for relatively coarse precipitates such as silver, arsenic, antimony, cadmium, lead, iron and manganese sulfides; lead chromate; ammonium phosphorous molybdate; alkaline earth carbonates, etc.
290	203	80	3–5	100	Narrow-pored, dense, slow rate of filtration	Filtration of fine precipitates; barium sulfate; lead molybdate; lead dioxide; calcium hydroxide; calcium fluoride; nickel sulfide; zinc sulfide; stannic sulfide, etc.
291	204	80	2–3	180	Fine-pored, highly dense, very slow rate of filtration	Fine-grained precipitates; cold-precipitated barium sulfate; meta-stannic acid
292	205	87	5–8	45	Medium density, moderately fast rate of filtration	Routine laboratory work; rapid filtration of fine precipitates; magnesium ammonium phosphate; magnesium ammonium arsenate; relatively coarse forms of barium sulfate, etc.
292 a	215	97	4–7	60	Slightly denser and thicker than 292, medium- to narrow-pored, moderately fast rate of filtration	Filtration of fine precipitates; magnesium ammonium phosphate; magnesium ammonium arsenate; relatively coarse forms of barium sulfate, etc.
293	211	80	1–2	300	Especially fine-pored, lowest rate of filtration among all filter paper grades, dense, highly efficient filtration of the most minute particles	Ideal for particularly difficult filtration conditions and especially fine-grained precipitates; barium sulfate; copper oxide; common, often specified grade for clarification of wine

\* Filtration rate in seconds: see page 37

# Analytical Filter Papers with Increased Wet Strength for Vacuum or Pressure Filtration and for Quantitative Analyses

Grade	Serial no.	g/m <sup>2</sup>	Particle retention (µm)	Fv (s)*	Properties	Preferable application areas
1288	206	84	12–15	10	Wide-pored, soft and spongy structure, fast rate of filtration, wet strength	Coarse-flocculent and voluminous precipitates, especially iron, aluminum and chromium hydroxides; copper, bismuth, cobalt and iron sulfides; various organic, colored metal deposits; determination of silicon in analysis of steel and pig iron; for acidic and slightly alkaline solutions; pressure filtration
1289	207	84	8–12	20	Medium-wide-pored, medium-fast rate of filtration, wet strength	The most commonly used grade for analyses; for relatively coarse precipitates such as silver, arsenic, antimony, cadmium, lead, iron and manganese sulfides; lead chromate; ammonium phosphorous molybdate; alkaline earth carbonates; for acidic and slightly alkaline solutions; pressure filtration
1290	208	84	3–5	100	Narrow-pored, dense, slow rate of filtration, wet strength	Filtration of fine precipitates; barium sulfate; lead molybdate; lead dioxide; calcium hydroxide; calcium fluoride; nickel sulfide; zinc sulfide; stannic sulfide; for acidic and slightly alkaline solutions; pressure filtration
1291	209	84	2–3	180	Fine-pored, highly dense, very slow rate of filtration, wet strength	Ideal for particularly difficult filtration conditions and especially fine-grained precipitates; cold-precipitated barium sulfate; meta-stannic acid; copper oxide; for acidic and slightly alkaline solutions; pressure filtration
1292	210	84	5–8	50	Medium density, moderately fast rate of filtration, wet strength	Rapid filtration of fine precipitates; magnesium ammonium phosphate; magnesium ammonium arsenate; relatively coarse forms of barium sulfate; for acidic and slightly alkaline solutions; pressure filtration

\* Filtration rate in seconds: see page 37

# Filter Papers for Use in Breweries

We recommend filter paper grades 6, 41b and 292 for malt filtration and analysis according to EBC standards and for degassing beer before analysis. Grade 470 is made of cellulose and diatomaceous earth. As it is thicker and denser than the other paper grades designed for use in breweries, grade 470 is often used to retain finer precipitates in malt.



Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Properties	Preferable application areas
41b	462	75	22	Medium-fast rate of filtration, smooth	All-purpose filter; preferably recommended for malt and beer analysis or degassing in brewery laboratories according to EBC standards; primarily used as folded filters with a diameter of 185, 240 or 320 mm
6	312	80	15	Thicker and faster rate of filtration, stronger wet burst resistance than grade 41b, smooth	All-purpose filter; also recommended for malt and beer analysis or degassing like grade 41b; beyond these applications, also suitable for relatively coarse or gelatinous precipitates; primarily used as folded filters with a diameter of 185, 240 or 320 mm
292	205	87	45	Medium density, medium-fast rate of filtration	Routine laboratory applications; rapid filtration of fine precipitates in malt before further analysis according to EBC standards; primarily used as folded filters with a diameter of 185, 240 or 320 mm
289	202	80	20	Medium-wide-pored, medium-fast rate of filtration	For routine filtration in analysis of malt
470	606	140	80	Made of cellulose and diatomaceous earth, slow rate of filtration, thick, smooth	Filtration of the finest precipitates in malt or beer before analysis; ideal for spectrophotometric analyses

\* Filtration rate in seconds: see page 37

# Filter Papers for Use in Winery Laboratories

The following filter papers are ideal for clarifying wine before further analysis. They retain the finest precipitates before determination of the alcohol, acid and glucose content or color using spectrophotometry. These filters are used in folded formats with relatively large diameters.



Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Properties	Preferable application areas
293	211	80	300	Especially fine-pored, dense, slow rate of filtration, highly efficient filtration of the most minute particles	Ideal for particularly difficult filtration conditions and especially fine-grained precipitates; standard filter papers for wine clarification. Often used as folded filters with diameters >150 mm.
470	606	140	80	Made of cellulose and diatomaceous earth, thick, slow rate of filtration	The standard grade for clarification of wine with a relatively high sugar content; filters very fine precipitates faster than 293 and 191/N. Often used as folded filters with a diameter of 125, 150 or 185 mm.
3 hw	303	65	20	Medium-fast filtration rate; increased wet strength, smooth	Standard filter paper for clarification of wine. Frequently used as a folded filter.
37/N	480	135	4	Soft, extra-large pores; filtration rate and wet strength same as for S/N; 175 g/m <sup>2</sup> , but thinner; crêped	Standard filter paper for wine clarification. Frequently used as a folded filter.
39/N	483	180	4	Soft, extra-large pores; filtration rate as for 5 H/N, but extra-thick and with higher wet strength; crêped	For fast removal of highly coarse contaminants under vacuum/pressure; for liquids of higher viscosity, such as syrup, fruit juices, emulsions.

\* Filtration rate in seconds: see page 37

# Filter Papers for Use in Sugar Laboratories

Filter papers are used in laboratories to assay sugar beet or cane sugar. These are mashed and further analyzed according to the aluminum sulfate method. Potassium, nitrogen, sodium and saccharose content are measured using a spectrophotometer.

Sugar beets



Sugar cones, sugar cubes



Sugar cane

Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Properties	Preferable application areas
100/N	328	85	30	Medium-fast rate of filtration, medium thickness, but low potassium and sodium content, extremely high wet burst resistance	Specially suitable for saccharose; potassium, nitrogen and sodium assays in beet or cane sugar according to the aluminum sulfate method using a VENEMA system. Available as discs, quarter-folded or completely folded filters in standard diameters of 240 mm; can also be supplied on rolls.
3 hw	303	65	20	Medium-fast rate of filtration, increased wet strength, smooth	Sugar juices, sugar solutions; clarifying filtration of clarified extracts, dried sugar beet shreds or juices with a low viscosity. Available as discs, quarter-folded or completely folded filters in standard diameters of 240 mm.
6 S/N	314	145	12	Fast rate of filtration, extra thick, creped, high wet burst resistance	Filtration of syrup and sugar solutions with a relatively high viscosity. Available as discs, quarter-folded or completely folded filters in standard diameters of 240 mm.
601/N	354	65	13	Thin, fast rate of filtration, creped, normal wet strength	All-purpose filtration of solutions with a relatively low viscosity; standard grade for assay of the saccharose content in sugar cane. Available as discs, quarter-folded or completely folded filters in standard diameters of 240 mm.
470	606	140	80	Made of cellulose and diatomaceous earth, slow rate of filtration, thick, smooth	Used for enhanced clarification of highly turbid sugar solutions before further analysis. Available as discs, quarter-folded or completely folded filters in standard diameters of 240 mm.

\* Filtration rate in seconds: see page 37

# Filter Papers for Determining the Germination Capability of Seeds

These paper grades are ideal for ensuring an optimal moisture content for the most diverse types of seeds and germination forms. They feature excellent wet strength, and their special structure prevents fine seed roots from growing through. These filter papers can be supplied in customized shapes and sizes for testing seeds according to ISTA (International Seed Test Association). We offer you the following formats: paper strip formats with a predefined number of pleats according to NEEB and the Copenhagen tank system (Jacobsen), for instance, for testing beet seeds; filter discs or rectangles for testing seeds in petri dishes (osmosis test) or on top of paper, such as for testing grass or other types of small seeds; unpleated strips to form rolls from either a creped, plain or polyethylene-coated paper for testing the germination capability according to the "Vienna roll method," e.g., grain or pea seeds.



Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Absorptive height** mm/10 min.	Properties	Preferable application areas	Size in mm	Quantity/package
50 S	353	120	30	100	Relatively thick paper, absorbent, increased wet strength, smooth, white	Ideal for use as germination test paper for testing seeds according to NEEB and the Copenhagen tank method; available as pre-pleated strips that fit in a plastic cup, e.g., for beet seeds	2,000 × 110 50 pleats	350
51 S	366	120	30	100	Relatively thick paper, absorbent, increased wet strength, smooth, gray	Ideal for use as germination test paper for testing seeds according to NEEB and the Copenhagen tank method; colored for easier identification of white seeds; available as pre-pleated strips that fit in a plastic cup, e.g., for beet seeds	2,000 × 110 50 pleats	350
6	312	80	15		Relatively thick and faster rate of filtration, increased wet strength, white, smooth	All-purpose filter paper, used as a substrate or as wicking paper for irrigation in a Copenhagen tank system	580 × 110	350
6 S/N	314	145	12		Very high rate of filtration, extra thick, increased wet strength, white, creped	Interleaving filters for "between papers" method for relatively large seeds, e.g., grain or pea seeds, "Vienna roll method"	150 × 180 85 × 145	250 250
601/PE	601	140			Polyethylene-coated on one side, impermeable, highly absorbent	For testing the germination capability of relatively large seeds, e.g., grain seeds, "rolled towel" and "between papers" methods	185 × 400	250

\* Filtration rate in seconds: see page 37

\*\* Capillary rise in mm/10 min or mm/30 min acc. to KLEMM and DIN ISO 8787: see page 37

# Clarification of Liquids using Qualitative and Technical Filter Papers for Less Critical Routine Analyses – Filters Sorted According to Basis Weight

Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Properties	Preferable application areas
FT 55	348	55	5	Fast rate of filtration, extra thin, creped	Rapid clarification of coarse contaminants or impurities; galvanic baths; for use as articulation paper for dental impression trays
3 h	302	65	35	Slow to moderately fast rate of filtration, thin, smooth	Extract solutions; sera; spices; general laboratory filtration
3 hw	303	65	20	Moderately fast rate of filtration, thin, smooth	Essential oils; essences; salt solutions; tinctures; spirits; standard grade for routine laboratory analyses
3 m/N	305	65	30	Moderately fast rate of filtration, thin, smooth, increased wet strength	Acids; for general vacuum or pressure filtration applications and for less critical analyses; also used to assay the sucrose content in cane sugar solutions with a relatively low viscosity
3 w	308	65	15	Medium-fast rate of filtration, thin, smooth	Boric acid solution; essences; hair tonics; eau de cologne; tinctures
488/N	333	65	60	Thinner, but denser and with a slower rate of filtration than 460/N, wet strength	Slower filtration of tannin solutions, potash (potassium carbonate), acids, cloudy protein solutions, galvanic baths; pressure and vacuum filtration
601/N	354	65	13	Thin, medium-fast rate of filtration, creped, wet strength	General laboratory filtration and less critical analyses; also suitable for assaying the sucrose content in cane sugar
1602/N	342	70	5	Medium-fast rate of filtration, creped	All-purpose filter papers for even faster clarification than with grade 603 before performing less critical analyses of highly viscous solutions
4 b	309	75	22	Moderately fast rate of filtration, but somewhat thicker than 3 hw, smooth	General laboratory filtration; essential oils; emulsions; essences; vinegar; extracts; yeasts; salt solutions; spirits; tinctures; water
41 b	462	75	22	Filtration properties as for 4 b, but manufactured as cellulose folded filters for use in breweries	All-purpose filter papers; primarily recommended for malt and beer analysis or for degassing according to EBC standards in brewery laboratories
603	334	75	8	Medium-fast rate of filtration, thin, creped	Fast and easy clarification before less critical analysis of highly viscous liquids
603/N	335	75	8	Medium-fast rate of filtration as for 603, thin, but higher wet strength, creped	Sugar juices; sugar solutions; clarifying filtration of clarified dried sugar beet shred and of beet sugar extracts
6	312	80	15	Faster rate of filtration and thicker than grade 41 b, high wet strength	All-purpose filter papers; also recommended for malt and beer analysis or degassing like grade 41 b; also suitable for coarser or gelatinous precipitates; for clarification of dried sugar beet shreds in sugar factories; essences; spirits
131	351	80	100	Slow rate of filtration, dense, low content of phosphate and potassium	Soil analysis according to Egnér, Riehm and Lederle to determine the phosphate or potassium content using calcium lactate elutions
132	329	80	55	Faster rate of filtration than grade 131, medium density, low content of phosphate and potassium	Soil analyses as for grade 131; for rapid retention of relatively coarse precipitates
480	602	85	N/A	Moderately fast rate of filtration, smooth, impregnated with a stabilized silicon to render it hydrophobic	Separation of aqueous and non-aqueous phases; e.g., organic solutions that are lighter or heavier than water, such as extraction liquids in chemical or clinical laboratories

\* Filtration rate in seconds: see page 37

Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Properties	Preferable application areas
5 H/N	423	85	3	The fastest rate of filtration of all grades of filter papers, soft, extra wide-pored, creped, wet strength	Alginates; essential oils; extracts; agar-agar
100/N	328	85	30	Moderately fast rate of filtration and medium thick, low content of potassium and sodium, increased wet strength, smooth	Especially suitable for assaying saccharose, potassium and sodium in sugar beets or cane sugar according to the aluminum sulfate method for the VENEMA system
17	319	90	7	Fast rate of filtration as with grade 10, with an increased filtration area due to creped structure	Extracts; tinctures; body fluids; salty solutions with relatively high viscosity
17/N	321	90	20	Moderately fast rate of filtration, same basis weight as grade 70, but denser and thicker, increased wet strength, creped	Filtration of must, juices, wine and exceptionally viscous liquids
22/NS	358	90	10	Medium-fast rate of filtration, increased wet strength as C 251, but thinner and creped	Clarification of galvanic baths
460/N	332	90	50	Slow to moderately fast rate of filtration, increased wet strength	Tannin solutions; potash (potassium carbonate); acids; cloudy protein solutions; galvanic baths; vacuum or pressure filtration
10	352	120	7	Fast rate of filtration, thick, wide-pored	Juices; spirits; essences; used for marking dyes in the textile industry
37/N	480	135	4	Rate of filtration and wet burst resistance as for 6 S/N, 175 g/m <sup>2</sup> , but thinner and creped; soft, extra wide-pored	Anthracites; dye emulsions; Canada balsam; gum arabic; paint or lacquer solutions; resins and pigments; exceptionally viscous solutions; agar-agar; collodion; gelatin
470	606	140	80	Slow rate of filtration, made of cellulose and diatomaceous earth, thick, smooth	Filtration of the finest, semi-colloidal precipitates, e.g., those consisting of proteins or clay or cold-precipitated barium sulfate; milk serum; fertilizer extracts; standard grade for clarification of urine or sugar solutions; not suitable for lightening colored solutions for which activated carbon paper can be used
C 140	356	140	70	Moderately fast rate of filtration, thick paper, retention of coarse particles and increased wet strength	Rapid filtration of relatively coarse precipitates
6 S/N	314	145	12	Medium-fast rate of filtration, extra thick, creped, high wet burst resistance	Filtration of gelatin, resin solutions; specified for testing the germination capability of seeds in rolled paper strips ("Vienna roll method" for relatively large seeds)
69 K	326	155	65	Slow rate of filtration, black, analytical-grade activated carbon paper, narrow-pored, dense	Clarification and lightening of cloudy liquids, e.g., turbid, dark urine before polarimetric glucose assay; detection of fine traces of white precipitates and mycelia of molds; determination of impurities in gases; determination of the antiseptic effect of wood impregnating agents
39/N	483	180	4	Rate of filtration as for grade 5 H/N, but extra thick and with higher wet burst resistance; soft, extra wide-pored, creped	For rapid removal of highly coarse impurities by vacuum or pressure filtration; for highly viscous solutions, such as syrup, fruit juices, emulsions
3 S/h	307	200	55	Slow to moderately fast rate of filtration, thick, narrow-pored; retains fine particles; smooth	Ideal for difficult-to-clarify liquids, such as oils, tinctures, essences; particularly suitable for use as flat disc filters in Buechner funnels

\* Filtration rate in seconds: see page 37

# Liquid Absorption Using Filter Papers and Boards – Sorted According to Basis Weight

Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Capillary rise*** mm/10 min.	Properties	Preferable application areas
64	403	100		80	Highly absorbent, pure cotton linter paper of a highly homogeneous structure	Raw paper for the manufacture of pH indicator and special test papers
50 S	353	120	30	100	Relatively thick paper, absorbent, increased wet strength	Ideal for use as germination test paper for testing sugar beet seeds according to NEEB; pre-pleated strips to fit in a plastic cup
51 S	366	120	30	100	Relatively thick paper, absorbent, increased wet strength	Ideal for use as germination test paper according to NEEB; gray colored for easier identification of white seeds; available pre-pleated
64 a	405	135		80	Like 64, but thicker	The same application as for 64
A 140	411	140		35	Thin board, absorbent	Suitable as absorptive material for the paper and printing industries
601/PE	601	140			Polyethylene-coated on one side, highly absorbent, impermeable	For protection of laboratory surfaces from aggressive substances; for preventing contamination in radiochemical laboratories; ideal for lining experimental animal cages; for recovery of spillage of expensive substances when the PE side faces upward; for reduction of the risk of glass breakage on hard lab surfaces
SB 2	350	155		20	Moderately fast rate of filtration	Mineral oils; relatively large volumes of liquids; used as absorptive material in special formats
C 160	343	160	40		Slow to moderately fast rate of filtration, thin board, increased wet strength	For filtration of slightly acidic and alkaline solutions; galvanic baths; cooking and transformer oils; used as absorptive material for bench cyto-centrifuges
S 165	417	165		80	Absorbent, gray	Adsorption and transportation of human body fluids (usually capillary blood, and also urine or saliva) for subsequent newborn screening for detecting hereditary diseases and metabolic illnesses, such as phenylketonuria (Guthrie prick test) and congenital hypothyroidism (TSH test)
A 250	412	250		75	Medium thick board with medium absorbency	Relatively high volumes of easy-to-clarify liquids; determination of the water absorptiveness according to COBB (EN 20535) as used in the pulp and paper industries
C 250	344	250	40		Slow to moderately fast rate of filtration and increased wet strength; like C 160, but thicker	Cooking and transformer oils; galvanic baths
C 251	355	250	8		Fast rate of filtration, increased wet strength	Clarification of galvanic baths

\* Filtration rate in seconds: see page 37

\*\*\* Capillary rise in mm/10 min or mm/30 min acc. to KLEMM and DIN ISO 8787: see page 37

\*\*\*\* National Committee for Clinical Laboratory Standards, Villanova, Pennsylvania, USA, Document LA4-A3 1997

Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Capillary rise*** mm/10 min.	Properties	Preferable application areas
M 270	415	270		105	Highly absorbent, bulky, impregnated against fungal growth in the presence of water	Absorption of water to increase humidity in rooms
C 300	345	300	40		Slow to moderately fast rate of filtration and increased wet strength, medium thick	Clarification of galvanic baths
C 350	346	350	40		Slow to moderately fast rate of filtration and increased wet strength, thick board	Clarification of galvanic baths; carbon hydroxides; oils; special cuts; for use as absorptive material for bench cyto-centrifuges
LF 1	413	360			Thick, bulky	Removal of dust from air in nuclear power plants
C 450	347	450	40		Slow to moderately fast rate of filtration and increased wet strength	Used as absorptive material in special formats for bench cyto-centrifuges; filtration of boiler water
S 500	421	500	>40		Absorbent, gray	Absorption and protection of surfaces
431 ZY	431	500		95	Slow to moderately fast rate of filtration, exceptional wet strength, extra thick board	Used as absorptive material in special formats for bench cyto-centrifuges; filtration of boiler water
M 600	416	600			Highly absorbent, very bulky, extra thick	For use in filter presses, e.g., as disc filters; also with a center hole

\* Filtration rate in seconds: see page 37

\*\*\* Capillary rise in mm/10 min or mm/30 min acc. to KLEMM and DIN ISO 8787: see page 37

# Separation of Aqueous and Organic Phases using Grade 480 Phase Separator Papers



This high-quality, special paper separates aqueous from organic phases. Grade 480 is impregnated with a stabilized silicon, thus rendering it hydrophobic. It retains water and allows solvents to flow through. In many applications, this phase separator paper eliminates the need to use separating funnels.

A unique benefit of using phase separator papers is that no special skills are required to achieve a clean separation. Flow ceases automatically once the entire solvent has passed through the filter paper. Phase separator paper is particularly useful when you need to carry out several separation runs.

## Ordering Information

Diameter	Quantity per pkg.	Order no. for filter discs	Order no. for folded filters
70 mm	100 sheets	FT-3-602-070	FT-4-602-070
90 mm	100 sheets	FT-3-602-090	FT-4-602-090
110 mm	100 sheets	FT-3-602-110	FT-4-602-110
125 mm	100 sheets	FT-3-602-125	FT-4-602-125
150 mm	100 sheets	FT-3-602-150	FT-4-602-150
185 mm	100 sheets	FT-3-602-185	FT-4-602-185
240 mm	100 sheets	FT-3-602-240	FT-4-602-240
270 mm	100 sheets	FT-3-602-270	FT-4-602-270

Other diameters and sheet sizes are available on request.

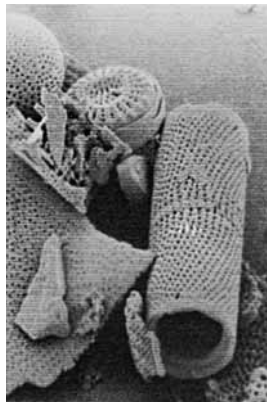
Grade	Serial no.	g/m <sup>2</sup>	Fv (s)*	Properties	Preferable application areas
480	602	85	N/A	Moderately fast rate of filtration, thin, smooth, impregnated with silicon and therefore water-retentive, hydrophobic	Organic solvents (e.g., ether, petrolether) that are lighter or heavier than water (e.g., chloroform); filtration of extraction solvents in clinical or medical laboratories; decomposition of emulsions that are formed during the extraction of aqueous plant or drug solutions

\* Filtration rate in seconds: see page 37

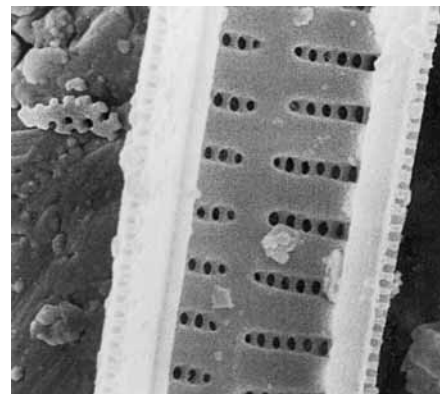
# Rapid Filtration of the Finest Precipitates using Grade 470 Diatomaceous Earth Filter Papers

Diatomaceous earth is obtained by open-cast mining of the exceptionally tiny siliceous skeletons of diatoms. These are dried to remove any residual moisture and heated red-hot to remove all organic residues. Then the skeletons are ground to a particulate size between one and ten micrometers to make fine diatomaceous earth grades. The grinding process simply breaks apart the skeletons, while the very fine pores of the skeleton structure that are smaller than 0.5  $\mu\text{m}$  remain intact. This porous structure is what constitutes the desired filtration effect. The refined diatomaceous earth, or kieselguhr, product is mixed with cellulose pulp in a ratio of approx. 1:10.

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



Siliceous skeletons of diatomaceous algae (diatoms) and their microporous structure magnified under the microscope



## Ordering Information

Diameter	Quantity per pkg.	Order no. for filter discs	Order no. for folded filters
090	100	FT-3-606-090	
110	100	FT-3-606-110	FT-4-606-110
125	100	FT-3-606-125	FT-4-606-125
150	100	FT-3-606-150	FT-4-606-150
185	100	FT-3-606-185	FT-4-606-185
240	100	FT-3-606-240	FT-4-606-240
270	100	FT-3-606-270	FT-4-606-270
320	100	FT-3-606-320	FT-4-606-320
385	100	FT-3-606-385	FT-4-606-385
400	100	FT-3-606-400	FT-4-606-400
450	100	FT-3-606-450	FT-4-606-450
500	100	FT-3-606-500	FT-4-606-500

Other diameters and sheet sizes are available on request.

Grade	Serial no.	$\text{g}/\text{m}^2$	Fv (s)*	Properties	Preferable application areas
470	606	140	80	Slow rate of filtration, made of cellulose and diatomaceous earth, thick, smooth	Filtration of the finest, semi-colloidal precipitates, e.g., those consisting of proteins or clay or cold-precipitated barium sulfate; milk serum; fertilizer extracts; standard grade for clarification of urine or sugar solutions for spectrophotometry or refractometry; not suitable for lightening colored solutions for which activated carbon paper (grade 66 K) can be used

\* Filtration rate in seconds: see page 37

# Surface Protection using Polyethylene-Coated Papers

601/PE is a highly absorptive paper coated on one side with polyethylene that can be used in a wide range of applications.

## Typical Applications

In radiochemical laboratories, 601/PE absorbs spilled reagents and prevents radioactive contamination of work surfaces.

601/PE is suitable for recovering spilled solutions containing valuable reagents.

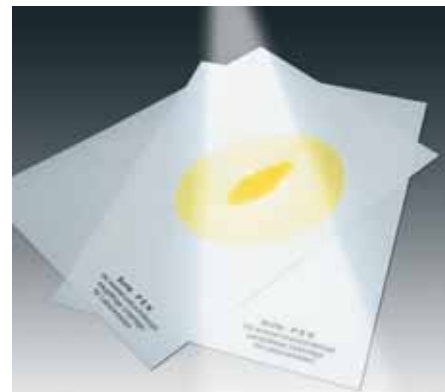
601/PE is an impermeable protective paper, ideal for lining experimental animal cages.

601/PE helps reduce the risk of glass breakage on hard or tiled surfaces, etc.

601/PE protects laboratory surfaces.

The paper side quickly absorbs liquids and the polyethylene prevents them from seeping through to the working surface.

**Basis weight:** 140 g/m<sup>2</sup>



## Ordering Information for Standard Sizes

Size	Order no.
<b>Rolls</b>	400 mm × 50 m FT-1-601-400050
	400 mm × 100 m FT-1-601-400100
	600 mm × 50 m FT-1-601-600050
	600 mm × 100 m FT-1-601-600100
<b>Sheets</b>	48 cm × 60 cm FT-2-601-480600 K

Other sizes are available on request.

Grade	Serial no.	g/m <sup>2</sup>	Water absorption (g/m <sup>2</sup> )	Properties	Preferable application areas
601/PE	601	140	280	Polyethylene coated on one side, highly absorbent impermeable	Used to protect surfaces and benchtops in the laboratory against aggressive reagents and chemicals, to prevent contamination in radiochemical laboratories. Is the ideal lining for experimental animal cages. Can be used to recover valuable reagents after spillage. When used with the PE side up, reduces the risk of glass breakage on hard surfaces and benchtops in the laboratory

# Newborn Screening using Grade TFN Sample Carrier Papers

Grade TFN sample carrier material is made from high-purity cotton linter pulp. This guarantees that no test results are falsified. The TFN properties that are indispensable for their intended use are subject to constant quality controls. For the production of test cards, TFN paper can be printed with the texts required by the individual German Federal states.

## Typical Applications

TFN is used to absorb and transport human bodily fluids (usually capillary blood, but also urine or saliva) that are to be screened for hereditary diseases and metabolic disorders such as phenylketonuria (using the Guthrie test, also called the heel prick test) and congenital hypothyroidism (using the TSH test).

## Guthrie Test Cards

Sartorius supplies the test cards for required the blood tests. The print and quality of the individual Guthrie test cards comply with the specific regulations of each of the German Federal states.

## Area of Use

Guthrie test (phenylalanine screening)

## Properties

- Highly absorbent
- Evenly absorbent over the entire test card
- No impurities or thin spots
- High purity, no leachable components



Grade	Serial no.	g/m <sup>2</sup>	Thickness <sup>*****</sup> (mm)	Capillary rise <sup>***</sup> mm/10 min.	Properties	Preferable application areas
TFN	460	180	0.44	120	Highly absorbent, high-purity paper; evenly absorbent over the entire test card, approved by the NCCLS <sup>****</sup>	For the absorption and transport human bodily fluids (usually capillary blood, but also urine or saliva) for subsequent neonatal screening to detect hereditary diseases and metabolic disorders such as phenylketonuria (using the Guthrie test, also called the heel prick test) and congenital hypothyroidism (using the TSH test)

## Technical Test Data

Basis weight:	180 g/m <sup>2</sup>
Thickness <sup>*****</sup> :	0.44 mm
Blood drop, mean diameter:	16 mm/100 µl
Mean serum volume	1.30 µl/3 mm hole

These data are typical test results. They do not represent product specifications of any kind.

## Ordering Information

Dimensions	Number of circles	Quantity per pkg.	Order number
67 × 120 mm Paper test cards	9, printed on the front and reverse sides	100	FT-2-460-0671209
460 × 570 mm unprinted paper		100	FT-2-460-460570N
210 × 297 mm (A4) unprinted paper			FT-2-460-210297N

\*\*\* Capillary rise in mm/10 min or mm/30 min according to the KLEMM method and DIN ISO 8787: see page 37

\*\*\*\* National Committee for Clinical Laboratory Standards, Villanova, Pa. U.S.A., document LA4-A3 1997

\*\*\*\*\* Thickness according to DIN EN ISO20534: see page 37

# Fragrance Test Cards

Benefit from our 120 years of experience in manufacturing paper that preserves the genuine fragrance!

We supply fragrance test cards in any pre-fabricated shape or size, either plain or printed with company logos etc.

In addition to our standard grade DK 280ws, all other paper qualities from our assortment are also suitable for this purpose.

Advantages of Sartorius fragrance test cards:

- You can preserve the fragrance-specific properties of your product because our papers are manufactured exclusively with high-purity raw materials;
- The fragrance is released immediately after wetting and lasts a long time because Sartorius fragrance test cards possess an extremely high absorptive capacity;
- Provides you with an effective advertising medium. We can design the shape, size and logo to be printed to your specifications;
- You can write the name of the perfume or aerosol or specification for documentation purposes directly on the fragrance test card.



We will be happy to provide you with further information and or free samples on request.

<b>Grade</b>	<b>Serial no.</b>	<b>Properties</b>	<b>Preferable application areas</b>
C 160	343	Natural white paper with a rougher surface,	For absorption of aerosols or perfumes and for comparing different fragrances in perfume laboratories printable perfume shops, drug stores, for the customers in-shop and to take home. Printable with the company stamp and logo

# Indicator and Test Papers for Reagents

## Unitest pH Paper

For easy and fast pH determination with an accuracy sufficient for nearly all routine pH tests

- Available within narrow pH ranges of 1–5, 5–9 and 9–13.
- Available within the complete pH range of either of 1–11 or 1–14
- Rolls: 10 mm × 5 m in length, individually packaged in plastic dispensers



Description	pH range	Quantity per pkg.	Order number
Unitest I paper	1–11	1 roll	FT-6-603-0111
Unitest II paper	1– 5	1 roll	FT-6-603-0105
Unitest III paper	5– 9	1 roll	FT-6-603-0509
Unitest IV	9–13	1 roll	FT-6-603-0913
Unitest V	1–14	1 roll	FT-6-603-0114

## Stuphan Indicator Strips

For accurate determination of the pH in water samples and for adjusting the pH of a sample during analysis.

- Significantly superior to other pH papers when it is important to prevent analytical errors during the testing of highly buffered solutions

- Weakly buffered solutions can be tested by immersing the strips in them until the final color of the reaction is attained
- The indicator dyes do not contaminate the sample to be tested so it can be used for further analyses
- Supplied in standard packages of 250 test strips in different 10 types and dimensions (10 × 74 mm)



Description	pH range	Quantity per pkg.	Order number
Stuphan no. 1	0.4–1.4	250 strips	FT-2-603-0001
Stuphan no. 2	1.2–2.7	250 strips	FT-2-603-0102
Stuphan no. 3	2.7–4.2	250 strips	FT-2-603-0204
Stuphan no. 4	3.9–5.4	250 strips	FT-2-603-0305
Stuphan No. 5	5.1–6.6	250 strips	FT-2-603-0506
Stuphan No. 6	6.0–7.5	250 strips	FT-2-603-0607
Stuphan No. 7	7.5–8.7	250 strips	FT-2-603-0708
Stuphan No. 8	8.1–9.6	250 strips	FT-2-603-0809
Stuphan No. 9	6.6–8.1	250 strips	FT-2-603-0608
Stuphan No. 10	9.5–10.7	250 strips	FT-2-603-0910

## Biophan G and E

For determining the concentration of glucose or protein in urine

Description	Quantity per pkg.	Order number
Biophan G	10 strips	FT-2-603-9997
Biophan E	10 strips	FT-2-603-9998

**Litmus Papers**

For identification of acids and bases

- Blue litmus paper: The color changes from blue to red to indicate a shift from basic to acidic
- Neutral litmus paper: The color changes from purple to red (acidic) or blue (basic)

- Red litmus paper: The color changes red to blue to indicate a shift from basic to acidic

Description	Quantity per pkg.	Order number
Litmus paper (blue)	1 roll	FT-6-603-9991
Litmus paper (neutral)	1 roll	FT-6-603-9992
Litmus paper (red)	1 roll	FT-6-603-9993

**Potassium Iodide Starch Paper**

For the detection of nitrite and for testing the final product for diazotization (diazo paper)

- Color changes from gray to dark purple
- Rolls: 10 mm × 5 m in length, packaged separately in plastic dispenser

- Generally suitable for detecting organic substances that release iodine

Description	Quantity per pkg.	Order number
Potassium iodide starch paper	1 roll	FT-6-603-9994

**Lead Acetate Paper**

For the detection of sulfur containing compounds

- Sulfur is present if the paper turns black or brown if the concentration is low

- Rolls: 10 mm × 5 m in length, packaged separately in plastic dispenser

Description	Quantity per pkg.	Order number
Lead acetate paper	1 roll	FT-6-603-9995

**Phosphate Test Paper**

For the detection of alkaline phosphatase in milk.

- When about one-third of the strip including the sheath is dipped into milk, the paper turns yellow after a few seconds if the milk contains alkaline phosphatase.

- When raw, i.e. non-pasteurized milk or pasteurized milk is used as a control, the sample will turn yellow if the milk was not heated sufficiently. If the color does not change, this is positive proof that the milk was subjected to short-term heating.

- Supplied in packages of 10 test strips
- 5 m in length, packaged separately in plastic dispenser

Description	Quantity per pkg.	Order number
Phosphate test paper	10 strips	FT-6-603-9996

**Base Paper for Coating with Reagents**

Grade	Serial no.	g/m <sup>2</sup>	Capillary rise*** mm/10 min.	Properties	Preferable application areas
64	403	100	80	Highly absorbent, pure cotton linter paper with superior uniformity	Base paper for the production of pH indicator paper or special reagent paper
64 a	405	135	80	Same as 64, but thicker	Same as grade 64

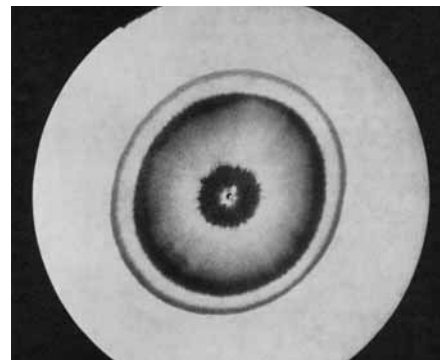
\*\*\* Capillary rise in mm/10 min or mm/30 min according to the KLEMM method and DIN ISO 8787: see page 37

# Chromatography paper for routine and repetitive separations

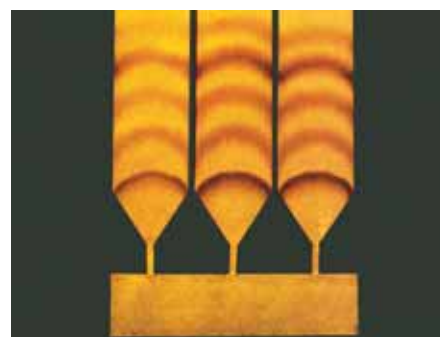
One of the fundamental methods employed in paper chromatography and paper electrophoresis is to use paper for separating compounds out of mixtures. Although separation in paper chromatography is essentially based on the principle of partition chromatography, additional adsorption and ion exchange processes may also take place. That is why these methods are almost exclusively limited to the separation and assaying of low-molecular-weight compounds, such as amino acids, sugars, fatty acids, steroid hormones, pigments, etc. By contrast, the separation of proteins by paper chromatography does not produce satisfactory results because the proteins undergo strong adsorption and denaturation. Paper chromatography mainly involves the distribution of substances to be separated between the stationary phase (with paper as the carrier and water) and the mobile phase (developing solvent).

The substances to be separated migrate at different rates – a property determined by their different distribution coefficients, molecule sizes (molecular weights) and electronic charges.

The choice of developing solvent is important to prevent adsorption, while the paper quality (manufacturing and storing conditions) can minimize exchange processes that would otherwise interfere with the separation process. The careful selection of raw materials used in Sartorius chromatography papers and our exceptional expertise in their manufacture are guarantees that no exchange processes will take place with the substance to be separated when the Sartorius "FN" product family is used.



Chromatographic separation of inorganic cations (circular technique) on paper strips grade FN 6



Chromatographic separation of amino acids on paper strips grade FN 4

Grade	Serial no.	g/m <sup>2</sup>	Thickness mm**	Capillary rise* mm/30 min.	Properties   Applications
FN 1	501	90	0.20	145	Lusterless surface, fastest running of papers, thin, analytical paper for routine and repetitive chromatographic separations and lower loadings, some loss in resolution must be accepted
FN 2	502	120	0.25	145	As fast running as grade FN 1, but thicker and for heavier loadings, with a smooth surface
FN 3	503	90	0.19	93	Soft surface, moderately fast running standard paper for routine analysis of proteins in serum (e.g. human albumin)
FN 4	504	120	0.24	93	Same capillary rise as FN 3, but with a smoother surface, for heavier loadings because thicker
FN 5	505	90	0.17	60	The slowest running analytical chromatography paper with the highest resolution, for circular and horizontal techniques, soft surface
FN 6	506	120	0.22	60	Runs as slowly as grade FN 5 with maximum resolution, but is thicker and therefore preferable for heavier loadings, smooth surface

\* Capillary rise in mm/10 min or mm/30 min according to the KLEMM method and DIN ISO 8787: see page 37

\*\* Thickness in mm according to DIN EN ISO 20537: see page 37

Grade	Serial no.	g/m <sup>2</sup>	Thickness mm*	Capillary rise* mm/30 min.	Properties   Applications
FN 7	507	150	0.32	145	Fast running, soft surface, for less critical analytical work when some loss in resolution is acceptable; suitable for heavier loadings or semi-preparative purposes
FN 7a	508	200	0.32	145	Same flow rate and thickness as grade FN 7 but higher basis weight for heavier loadings, analytical and semi-preparative purposes
FN 8	509	280	0.55	170	Very fast running, soft surface for separation of larger molecules with electrophoresis and for preparative purposes
FN 30	526	390	0.90	235	Fastest running and thickest chromatography paper, for preparative purposes with very high loadings
FN 100	527	195	0.35	130	Medium thickness, fast running, ideal combination of a chromatography and gel blotting paper. Widely used for gel wicking and drying, capillary blotting using Western, Southern or semidry techniques; available as sheets, strips, or on small reels of various widths and lengths

Grades FN 11 to FN 18 have the same properties as grades FN 1 to FN 8 but with a lower ash content\*\*.

This can help prevent background interference from trace inorganic impurities (e.g. cations) that paper can contain in order to quantify these elements in the substance after chromatography.

\* Thickness in mm according to DIN EN ISO 20537: see page 37

\*\* Ash content [0.02% according to DIN 54370], see page 37

\*\*\* Capillary rise in mm/10 min or mm/30 min according to the KLEMM method and DIN ISO 8787: see page 37

# Identification of Individual Components in Nucleic Acid or Protein Specimens using Gel Blotting Papers

Sartorius supplies four grades of blotting papers. Their extremely smooth surface and relatively high thickness provide them with absorption properties and most superior uniformity across the entire contact area in the blotting transfer system (see picture).

The blotting papers are made from the purest naturally occurring raw materials with the maximum degree of absorptiveness and  $\alpha$  cellulose contents.

Their functions include:

- Absorption and improvement of the transport of transfer buffer after capillary and semidry blotting

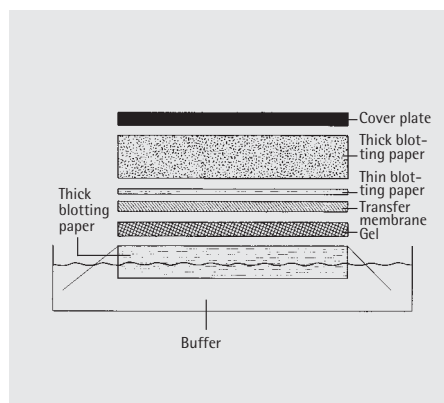
- Double-sided cover of gel and transfer membrane in the blotting tank after conventional electroblotting

- To prevent direct contact between blotting membrane and porous cover plate of the vacuum chamber for dot | slot blotting of DNA/RNA.

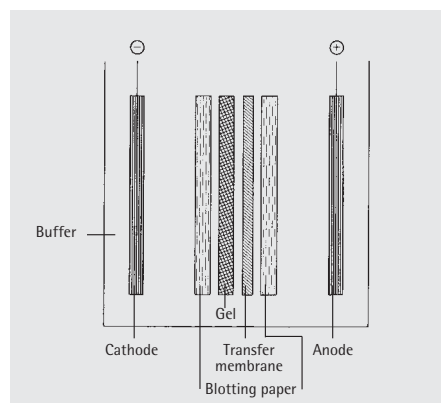
Grade	Serial no.	g/m <sup>2</sup>	Thickness mm**	Capillary rise* mm/30 min.	Properties   Applications
BF 1	518	90	0.16	80	Thinnest grade of all blotting papers, moderately fast absorbing, used to cover the gel-membrane sandwich in the buffer tank (conventional electro-transfer method)
BF 2	519	190	0.36	70	Thicker and slightly slower absorbing, BF 2 can be used to cover the gel membrane sandwich in the buffer tank as BF 1, but also as a protective layer for the membrane placed on a porous plate for the vacuum or dot/slot blotting processes
BF 3	520	330	0.76	130	Twice as thick as BF 2, high absorption rate and capability, preferably used to increase and maintain the transport of liquid from the buffer and as buffer reservoir according to the capillary and semidry blotting methods
BF 4	521	550	1.3	160	Thickest and fastest absorbing blotting paper in the range with the highest absorptiveness, preferably used when few paper layers must provide high buffering capacity. The reduction in the number of layers also helps to minimize the risk of air bubbles in a blotting sandwich pack. Used to transfer DNA or RNA according to the Southern technique or semidry blotting of proteins
FN 100	527	195	0.35	130 mm/30 min	Medium thickness, fast running, ideal combination of chromatography and gel blotting paper. Same thickness as grade BF 2, same speed and absorption capability as BF 3; the ideal general-purpose blotting paper for Southern, Northern and Western blotting, gel lifting, sequencing, buffer wicking and semidry blotting; available as sheets, strips and small rolls in varying widths and lengths

\*\* Thickness in mm according to DIN EN ISO 20537: see page 37

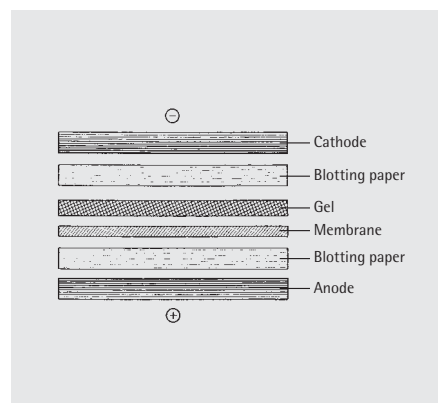
\*\*\* Capillary rise in mm/10 min or mm/30 min according to the KLEMM method and DIN ISO 8787: see page 37



Capillary blotting sandwich



Electroblotting sandwich according to Towbin ("buffer tank")



Semidry Electroblotting sandwich according to Kyhse-Andersen

# Quantification of Individual Components in Foods, Plastic Materials, Pesticides, Dust or Air using Extraction Thimbles

Sartorius extraction thimbles are renowned for their purity and consistently high quality. The standard grades are manufactured from cotton linters with a high alpha-cellulose content which makes them high-purity thimbles that possess mechanical strength and outstanding retention capacity.

We supply two different thimble designs:

1. With a defined outer diameter × outer length, flat bottom, grade 35 (cellulose)
2. With a defined inner diameter × outer length, round bottom, wall thickness accord. to DIN 12449, grade 30 (cellulose), 40 (glass microfiber), 50 (quartz microfiber)

Both thimble designs fit perfectly into their size-matched extractors.

The outer diameter is used to calculate the right size for flat bottom thimbles, which is directly proportional to the extractor size.

To calculate the outer diameter of round bottom thimbles, double the inner diameter and the wall thickness both have to be considered.

The external diameter of a thimble should always be at least 2 mm (up to a maximum of 4 mm) smaller than the extractor diameter.

The catalogue sizes indicate the inner diameter for all grade 30 cellulose round bottom thimbles (order numbers "FT-1201-... ..") and the outer diameter for all grade 35, cellulose flat bottom thimbles (order numbers "FT-1210-... ..").

The table below lists flat bottom thimbles in the same line as their respective round bottom thimble to allow easy conversion between the two designs. This way it is always possible to replace a round bottom with a flat bottom thimble. The last six digits of each reference number show the thimble dimension (inner or outer diameter × outer length) in mm.

Inner diameter (mm)	Tolerance (mm)	Thimble height (mm)	Tolerance (mm)	Wall thickness (mm)	Outer diameter of	Fits extractors according to DIN 12602 and 12604 with a nominal volume of (ml)
22	+0 -3	80	+10 -0	1.5	25	30
33	+0 -3	94	+10 -0	1.5	36	100
33	+0 -3	205	+10 -0	1.5	36	250
48	+0 -5	230	+20 -0	2.0	52	500
57	+0 -5	315	+20 -0	2.5	62	1000

Grade	Serial no.	Material	Properties	Preferable application areas
30	1201	Cellulose	Cellulose Inner diameter × outer length according to DIN 12449, Round bottom	All routine fat extractions, e.g. fat, components in foodstuff (sweets, frozen cakes, pastries, margarine or baking ingredients), extraction of lipids from eggs and egg-containing products, softeners, additives, monomer components in plastics and rubber
35	1210	Cellulose	Outer diameter × outer length, flat bottom, standard retention capacity, thermally stable up to approx. 100°C	
40	1204	Glass microfiber	Same increased retention capacity as glass microfiber (penetration DOP <0.002%–0.3 µm, thermally stable up to 500°C	Separation of minutest particulate matter from dust, aerosols, gas or air streams
50	1207	Quartz microfiber	Same increased retention capacity as glass microfiber thimbles (penetration DOP <0.002%–0.3 µm), thermally stable to 900–950 °C max., low concentration of trace impurities (see table below)	Emission   immission testing at high temperatures, also for the analysis of hot and acidic gases, trace element analysis

## Typical trace element values in grade 50 quartz thimbles (mg/g)

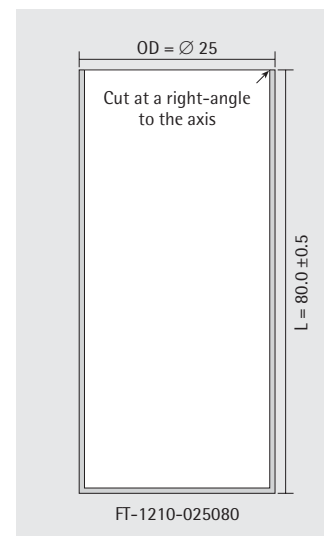
Al	Ba	Ca	Cd	Co	Cr	Cu	Fe	Mg
300	10	250	0.002	< 0.5	2	2	250	25
Mn	Na	Ni	Pb	Sr	Ti	V	Zn	
2	100	2	< 1	3	< 1	< 5	6	

## Ordering Information

Outer diameter × outer length (mm) Flat bottom	Quantity per pkg.	Order number	Inner diameter × outer length (mm) Round bottom	Quantity per pkg.	Order number
<b>Cellulose, Grade 35</b>			<b>Grade 30</b>		
			9 × 50	25	FT-1201-009050
20 × 90	25	FT-1210-020090			
22 × 70	25	FT-1210-022070			
22 × 80	25	FT-1210-022080	20 × 80	25	FT-1201-020080
22 × 100	25	FT-1210-022100			
25 × 60	25	FT-1210-025060			
25 × 80	25	FT-1210-025080	22 × 80	25	FT-1201-022080
25 × 90	25	FT-1210-025090	23 × 90	25	FT-1201-023090
25 × 100	25	FT-1210-025100	23 × 100	25	FT-1201-023100
			27 × 60	25	FT-1201-027060
30 × 80	25	FT-1210-030080	27 × 80	25	FT-1201-027080
			28 × 80	25	FT-1201-028080
30 × 90	25	FT-1210-030090			
30 × 100	25	FT-1210-030100	28 × 100	25	FT-1201-028100
30 × 120	25	FT-1210-030120	28 × 120	25	FT-1201-028120
33 × 80	25	FT-1210-033080	30 × 80	25	FT-1201-030080
			33 × 80	25	FT-1201-033080
33 × 94	25	FT-1210-033094	33 × 94	25	FT-1201-033094
33 × 95	25	FT-1210-033095			
33 × 100	25	FT-1210-033100	30 × 100	25	FT-1201-030100
			33 × 100	25	FT-1201-033100
33 × 118	25	FT-1210-033118	33 × 118	25	FT-1201-033118
33 × 145	25	FT-1210-033145			
33 × 150	25	FT-1210-033150			
			33 × 205	25	FT-1201-033205
37 × 90	25	FT-1210-037090			
37 × 95	25	FT-1210-037095			
37 × 100	25	FT-1210-037100			
37 × 210	25	FT-1210-037210			
43 × 123	25	FT-1210-043123	43 × 123	25	FT-1201-043123
43 × 150	25	FT-1210-043150	40 × 150	25	FT-1201-040150
48 × 145	25	FT-1210-048145			
48 × 200	25	FT-1210-048200			
53 × 145	25	FT-1210-053145			
57 × 280	25	FT-1210-057280			
60 × 120	25	FT-1210-060120			
60 × 180		FT-1210-060180	60 × 180	25	FT-1201-060180
60 × 275		FT-1210-060275			
70 × 200		FT-1210-070200			
70 × 250		FT-1210-070250			

**Conversion example:** Outer diameter of a grade 35 thimble = inner diameter of a grade 30 thimble + 2 × wall thickness  
 $OD(\text{grade 35}) = ID(\text{grade 30}) + 2s$

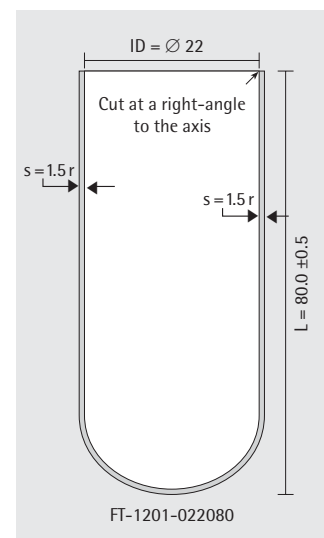
OD +0 mm/-3...5 mm, See table on page 31



Dimensions of a grade 35 extraction thimble

OD = Outer diameter in mm

L = Length in mm



Dimensions of a grade 30 extraction thimble

ID = Inner diameter in mm

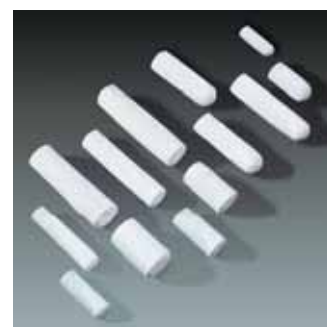
L = Length in mm

s = Wall thickness in mm

## Ordering Information

Inner diameter × outer length (mm) Flat bottom	Quantity per pkg.	Order number
<b>Glass Microfiber, grade 40</b>		
10×50	25	FT-1204-010050
19×90	25	FT-1204-019090
22×80	25	FT-1204-022080
25×50	25	FT-1204-025050
26×60	25	FT-1204-026060
30×80	25	FT-1204-030080
30×100	25	FT-1204-030100
30×110	25	FT-1204-030110
33×80	25	FT-1204-033080
33×94	25	FT-1204-033094
33×150	25	FT-1204-033150
40×150	25	FT-1204-040150
43×123	25	FT-1204-043123
53×145	25	FT-1204-053145
<b>Quartz Microfiber, grade 50</b>		
22×62	25	FT-1207-022062
25×90	25	FT-1207-025090
25×100	25	FT-1207-025100
26×60	25	FT-1207-026060
30×77	25	FT-1207-030077
34×150	25	FT-1207-034150
35×150	25	FT-1207-035150
43×123	25	FT-1207-043123

Soxhlet attachment  
incl. round bottom flask,  
extractor with thimble,  
reflux condenser  
(Dimroth cooler) heating  
mantle, current regulator  
Source: Phywe Systeme  
GmbH



Flat and round bottom  
extraction thimbles  
(Grades 35 and 30)

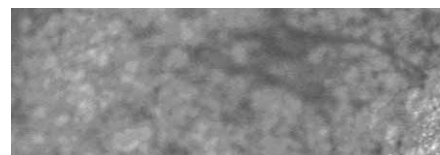
# Rapid Filtration of Relatively Fine Precipitates for Further Quantitative or Qualitative Analyses using MG Glass Microfiber Filters

## Glass Microfiber Filters

- Manufactured from 100% borosilicate glass, are highly pure and extremely white;
- Combine fast flow rates with high load capacity and the retention of very fine particles extending into the sub-micron range;
- Completely binder free;
- Withstand temperatures up to 500°C
- Biologically inert, non-hygroscopic, resistant to most reagents and solvents, except for highly concentrated acids and bases.



Loose glass microfibers under a microscope



Glass microfiber filter matrix under a microscope

## Applications

### General Laboratory Filtration

- Clarification of buffer and reagent solutions, especially in techniques involving spectrophotometry (MGA)
- Filtration of eluent and samples for HPLC (MGF)
- Removal of finely suspended carbonaceous material from test liquids (MGA, MGF)
- Carbohydrate analysis where cellulose fibers would interfere after hydrolysis (MGC)
- Filtration of electrolyte used for particle size analysis (MGF)
- Removal of precipitates in ion-pair reagents (MGA)
- Gravimetric analysis of fillers and pigments (MGF)

- Clarification of protein solutions prior to freeze-drying (MGC, MGF)
- Determination of sediment in petroleum products (MGA)
- Quantification of oil and fat content in food by dripping solvent onto samples supported on the filter (MGA)

### Biochemical Precipitates and Cells

- Collection of macromolecular precipitates (DNA, RNA, proteins, polysaccharides), especially for end-group analysis, followed by scintillation counting on the filter (MGC)
- Cell harvesting, for example during inclusion studies (MGC)
- Collection of membrane fragments in receptor binding assays (MGC)

### Process Control

- Assessment of cleanliness of machined parts by washing in hydrocarbon solvent, filtering and viewing stain on filter (MGA)
- Control testing for industrial filters; downstream samples are filtered through a 150 mm glass microfiber disc which is examined for particulate (MGA)

Grade	Serial no.	g/m <sup>2</sup>	Air resistance 40 cm/s (10 cm <sup>2</sup> ) mbar	Thickness mm/ 10 min <sup>*****</sup>	Particle retention µm	Preferable application areas
MGA	1101	55	33	0.25	1.6	High-efficiency, general laboratory filtration; also suitable for air pollution monitoring in compliance with many international standards
MGB	1102	140	95	0.70	1.0	Filtration of suspensions in water, wastewater analysis, can be used as pre-filters to protect membranes, general filtration of larger volumes of liquid
MGC	1103	52	54	0.26	1.2	Analysis of suspended solids in wastewater, water clarification and monitoring purpose pre-filter for membranes
MGD	1104	120	16	0.53	2.7	All-purpose membrane prefilter
MGF	1105	75	120	0.45	0.7	Better retention of smaller particles than other glass microfiber filters, e.g. clarification of protein solutions and filtration of samples and solvents before HPLC

\*\*\*\*\* Thickness in mm acc. to DIN EN ISO20534, see page 37

**Ordering Information**

<b>Grade</b>	<b>Diameter (mm)</b>	<b>Quantity per pkg.</b>	<b>Order number</b>	<b>Grade</b>	<b>Diameter (mm)</b>	<b>Quantity per pkg.</b>	<b>Order number</b>
MGA	25	100	FT-3-1101-025	MGD	25	50	FT-3-1104-025
MGA	47	100	FT-3-1101-047	MGD	47	50	FT-3-1104-047
MGA	50	100	FT-3-1101-050	MGD	50	50	FT-3-1104-050
MGA	55	100	FT-3-1101-055	MGD	55	50	FT-3-1104-055
MGA	70	100	FT-3-1101-070	MGD	70	50	FT-3-1104-070
MGA	90	100	FT-3-1101-090	MGD	90	50	FT-3-1104-090
MGA	100	100	FT-3-1101-100	MGD	100	50	FT-3-1104-100
MGA	110	100	FT-3-1101-110	MGD	110	50	FT-3-1104-110
MGA	125	100	FT-3-1101-125	MGD	125	50	FT-3-1104-125
MGA	150	100	FT-3-1101-150	MGD	150	50	FT-3-1104-150
MGA	185	100	FT-3-1101-185	MGD	185	50	FT-3-1104-185
MGA	240	50	FT-3-1101-240	MGD	240	25	FT-3-1104-240
MGB	25	50	FT-3-1102-025	MGF	25	100	FT-3-1105-025
MGB	47	50	FT-3-1102-047	MGF	47	100	FT-3-1105-047
MGB	50	50	FT-3-1102-050	MGF	50	100	FT-3-1105-050
MGB	55	50	FT-3-1102-055	MGF	55	100	FT-3-1105-055
MGB	90	50	FT-3-1102-090	MGF	70	100	FT-3-1105-070
MGB	70	50	FT-3-1102-070	MGF	90	100	FT-3-1105-090
MGB	100	50	FT-3-1102-100	MGF	100	100	FT-3-1105-100
MGB	110	50	FT-3-1102-110	MGF	110	100	FT-3-1105-110
MGB	125	50	FT-3-1102-125	MGF	125	100	FT-3-1105-125
MGB	150	50	FT-3-1102-150	MGF	150	100	FT-3-1105-150
MGB	185	50	FT-3-1102-185	MGF	185	100	FT-3-1105-185
MGB	240	25	FT-3-1102-240	MGF	240	50	FT-3-1105-240
MGC	25	100	FT-3-1103-025				
MGC	47	100	FT-3-1103-047				
MGC	50	100	FT-3-1103-050				
MGC	55	100	FT-3-1103-055				
MGC	70	100	FT-3-1103-070				
MGC	90	100	FT-3-1103-090				
MGC	100	100	FT-3-1103-100				
MGC	110	100	FT-3-1103-110				
MGC	125	100	FT-3-1103-125				
MGC	150	100	FT-3-1103-150				
MGC	185	100	FT-3-1103-185				
MGC	240	50	FT-3-1103-240				

# Monitoring Trace Levels at High Temperatures using T293 Microfiber Filters

Quartz microfiber filters are free of glass fibers and binding agents. They are especially suited for emission monitoring at temperatures of up to 950°C and wherever filters of the highest purity are needed. Grade T293 is distinguished by a minimum level of trace impurities (see table below) and excellent weight and dimensional stability.

Grade	Grade no.	g/m <sup>2</sup>	Air resistance 40 cm/s (10 cm <sup>2</sup> ) mbar	Retention (%) 0.3 mm	Penetration DOP (%) 0.3 mm	Preferable application areas
T293	1109	85	51.5	99.999	< 0.002	Monitoring trace levels of pollutants in air, removal of trace organic impurities and to ensure minimal loss upon further heating, sampling (max. 950°C) of stacks, flue outlets and aerosols (emission/immission monitoring) at both ambient and high temperatures, sampling in the presence of acid gases (except HF) is also possible

## Typical trace element values in grade T293 quartz (ppm)

Al	Ba	Ca	Cd	Co	Cr	Cu	Fe	K
110	<100	100	<1	<5	<10	5,2	50	10
Mg	Mn	Na	Ni	Pb	Sr	Ti	V	Zn
20	<10	90	<10	<10	-	-	<10	11

## Ordering Information

Grade	Diameter (mm)	Quantity per pkg.	Order number
T293	25	25	FT-3-1109-025
T293	37	25	FT-3-1109-037
T293	47	25	FT-3-1109-047
T293	50	25	FT-3-1109-050
T293	55	25	FT-3-1109-055
T293	70	25	FT-3-1109-070
T293	90	25	FT-3-1109-090
T293	95	25	FT-3-1109-095
T293	100	25	FT-3-1109-100
T293	110	25	FT-3-1109-110
T293	120	25	FT-3-1109-120
T293	125	25	FT-3-1109-125
T293	150	25	FT-3-1109-150
T293	185	25	FT-3-1109-185
T293	240	25	FT-3-1109-240

# Application Charts

Medium	Grade	Pages
Acids	3m/N, 460/N, 488/N	15, 16
Agar-agar	5H/N, 39/N	16
Air cleaning	LF 1	18
Alcohols	6S/N, 3m/N, 3S/h, 6, SB	13, 14, 15, 16, 17
Alginates	5H/N, 39/N	16
Alkaline solutions	460/N, 488/N	15, 16
Anthracene	37/N, 39/N	16
Beer analysis	41b, 6, 292, 470	9, 11, 12, 13, 15, 16, 20
Beer wort	6, 17	11, 14, 15, 16
Beet juice	288, 3w, 4b	9, 15
Berry juice	39/N, 37/N, 6S/N	12, 13, 14, 16
Birch sap	SB 2, 388	8, 17
Blood sugar, determination	3hw, 4b	13, 15
Boric acid solution	3hw, 3w	13, 15
Cacao butter	17/N, C 160	16, 17, 23
Canada balsam	3w, 39/N	12, 15, 16
Coffee	FT 55	15
Colloidal solutions	5H/N, 37/N, 6S/N, 39/N	12, 13, 14, 16
Condiments	3h	15
Culture media	37/N, 39/N	12, 16
Diesel oil	SB 2	17
Dye solutions	3S/h, 6S/N, 10, 37/N, 39/N	12, 13, 14, 15, 16
Eau de cologne	3w, 4b, 6, 6S/N	11, 13, 14, 15, 16
Emulsions	288, 4b, 5H/N, 6S/N, 6, 37/N, 39/N	9, 11, 12, 13, 14, 15, 16
Essences	3hw, 3w, 4b, 6, 10	11, 13, 14, 15, 16
Essential oils	288, 3hw, 4b, 6, 6S/N, 37/N, 39/N	9, 11, 12, 13, 14, 15, 16
Etheric absorption of liquids	3w, 4b, 6, 601/PE, S165, S500	14, 15, 17, 18, 21
Extract solutions	6 S/N, 4b, 6, 17, 488/N, C 160, 37/N, 39/N	11, 12, 13, 14, 15, 16, 17, 23
Fat content quantification	389 F, MGA, 30, 35	8, 29, 30, 32, 33
Filter presses, board	C 160, C 250, C 300	17, 18, 23
Filter presses, paper	17/N, 603/N	15, 16
Fruit juices	5H/N, 6, 6S/N, 10, 37/N, 39/N	11, 12, 13, 14, 15, 16
Fuel	SB 2	17
Galvanic baths	460/N, 603, C 350, C 251, 22/NS	15, 16, 17, 18
Gelatinous precipitates	5H/N, 6S/N, 10, 37/N, 39/N	12, 13, 14, 16
Gelatin	5H/N, 6S/N, 39/N	12, 13, 14, 16
Germinating test	3m/N, 6, 6S/N, 10, C 250, 50S, 51 S, 601/PE, 37/N, 39/N	11, 12, 13, 14, 15, 16, 17, 21
Glycerin	5H/N, 6S/N, 37/N, 39/N	12, 13, 14, 16
Greases, technical	603	15
Gum arabic	6, 37/N, 39/N	11, 12, 14, 15, 16
Hair tonic	3w, 6, 6S/N, 37/N, 39/N, 10	11, 12, 13, 14, 15, 16
Herb extracts	3m/N, 6S/N, 4b, 6, 10	11, 13, 14, 15, 16
Herbal extracts	3m/N, 3S/h, 4b, 6, 10	11, 14, 15, 16
Hydrocarbons	C 350, C 450	18
Indicator raw papers	64, 64a	17, 25
Indicator raw papers	64, 64a	17, 25
Injections, solutions	1291, 460/N, 488/N	10, 15, 16

Medium	Grade	Pages
Juices	3S/h, 5H/N, 6S/N, 17/N, 37/N, 39/N	12, 13, 14, 16
Lacquers	3S/h, 5H/N, 6S/N, 17, 10, 39/N	12, 13, 14, 16
Lining of cupboards etc.	3m/N, 3h, 4b, 6	11, 14, 15
Liqueurs	5H/N, 6S/N, 37/N, 39/N	12, 13, 14, 16
Liquid extracts	3m/N, 4b, 6, 6S/N	11, 13, 14, 15, 16
Malt analysis	41b, 6, 292, 470	9, 11, 12, 13, 14, 15, 16, 20
Mashes	41b, 6, 292, 470	9, 11, 12, 13, 14, 15, 16, 20
Mineral oils	3 S/h, 6, C 350, SB 2, C 251, MGA	11, 14, 15, 16, 17, 18, 32, 33
Mucilaginous substances	5H/N, 6S/N, 17, 17/N, MGA, MGC, 37/N, 39/N	12, 13, 14, 16, 32, 33
Must	288, 6, 6S/N, 17/N	9, 11, 13, 14, 15, 16
Oils	C 350, C 450, MGA, 39/N	12, 16, 18, 32, 33
Pepsin wine	6S/N, 6, 10, SB 2	11, 13, 14, 15, 16, 17
Perfumes	6S/N, 3w, 4b, C 160, SB 2	13, 14, 15, 16, 17, 18, 23
Plant extracts	3S/h, 4b, 6, C 160	11, 14, 15, 16, 17, 23
Plastic flongs	M 600	18
Polarimetry	69 K	16
Potash	3m/N, 460/N	15, 16
Pressure filtration	460/N, 488/N	15, 16
Protein turbidities	460/N, 488/N, MGC, MGF	15, 16, 32, 33
Rennet	3m/N, 39/N	12, 15, 16
Resin milk	3S/h, 5H/N, 6S/N, C 350, 39/N	12, 13, 14, 16, 18
Rubber, dissolved	6S/N, 37/N, 39/N	12, 13, 14, 16
Rum	6S/N, 3w, 4b, 6, 10, C 160	11, 13, 14, 15, 16, 17, 23
Salad oils	603, C 160, 17/N	15, 16, 17, 23
Salt solutions	3hw, 4b, 17, 100/N, 1602/N	13, 15, 16
Seed germs, drying of	4b, 6, 601/PE, 50 S, 51 S, 6 S/N	11, 13, 14, 15, 16, 17, 21
Sera	3h, 4b	15
Soap	3m/N, C 160, SB 2	15, 17, 23
Soil tests	131, 132	15
Spirits	3hw, 4b, 6, 100/N, 10, SB 2	11, 13, 14, 15, 16, 17
Sugar juices	3hw, 6, 6S/N, MGC, 100/N, 37/N, 39/N	11, 12, 13, 14, 15, 16, 32, 33
Syrup	5H/N, 6S/N, 37/N, 39/N	12, 13, 14, 16
Tanning agents, solution of	1291, 460/N, 488/N	10, 15, 16
Tar oils	6, 17/N, 30, 35	11, 14, 15, 16, 29, 30
Tar, fine filtration of	17/N	16
Tea	1602/N	15
Technical oils	288, 6, 17/N, C 160, C 350, C 450, 22/NS, MGA	9, 11, 14, 15, 16, 17, 18, 23, 32, 33
Tinctures	3hw, 3m/N, 3w, 3S/h, 4b, 6, 17, 100/N	11, 13, 14, 15, 16
Transformer oils	6, 488/N, C 160, C 250, C 251, C 300, C 450, MGA	11, 14, 15, 16, 17, 32, 33
Turbine oils	6, C 250, C 251, C 300	11, 14, 15, 17, 18
Tylose	5H/N, 6S/N, 37/N, 39/N	12, 13, 14, 16, 17
Urine	69 K, Biophan E, Biophan G	16, 24
Vacuum filtration	3m/N, 460/N, 488/N	15, 16
Vinegar	4b, 6	11, 14, 15
Viscous solutions	5H/N, 6S/N, 37/N, 39/N	12, 13, 14, 16
Water	3w, 4b, 6, MGC	11, 14, 15, 32, 33
Wines	293, 470	9, 11, 12, 13, 16, 20
Yeast	3w, 4b, 6	11, 14, 15

# Quality Assurance and Control

Sartorius pays particular attention to ongoing in-process quality controls. Regular tests and accurate analyses of raw materials and of each end product additionally guarantee consistently high quality and product uniformity.

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

The basis weight as defined by DIN EN ISO 536 is determined by weighing a paper sheet that is 100×100 mm or has a diameter of 113 mm on a special paper balance. The balance is calibrated and shows weight per square meter with an error limit of ±0.5%.

Expressed in grams per square meter.

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

The paper strength or thickness is measured using thickness meter or gauge readings.

Expressed in millimeters.

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

A continually increasing load is applied vertically to a paper strip 15 mm × 180 mm. The tensile strength is defined as the stretching force necessary to break the piece. Usually measured by placing a standard test piece in a tensile machine.

Expressed in kilograms-force per 15 millimeter width (kgf/15 mm) or kN/m.

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

A test specimen is held between two circular clamps and subjected to an increasing pressure from a rubber diaphragm. The rubber diaphragm is expanded by a controlled hydraulic pressure until the test specimen ruptures. The bursting strength of the specimen is the pressure reading at the time of rupture. This term is referred to in this catalogue as "burst strength."

Expressed in kilopascal (kPa)

## **Filtration Rate**

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

Expressed in seconds (per mm)

## **Air Resistance**

Air resistance is the pressure drop that occurs after filtration of a defined air stream (270 l/h, 10 m<sup>2</sup>) through a filter paper

Expressed in mbar.

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

When measured according to the Klemm method, the capillary rise defined as height to which a 15 x 250 mm paper strip, whose narrow side is immersed in prefiltered distilled water (20° C), is wetted after 10 or 30 min.

Stated in mm pro 10 min and 30 min.

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

The ash content is the residue determined after ignition of 10 g of filter paper at 900°C in a platinum crucible.

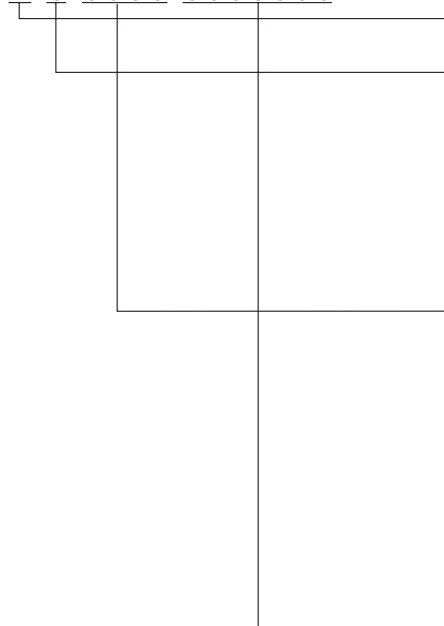
Expressed in percent.

## **Separation Capacity**

The tested capacity of a filter paper to retain precipitates of ferric hydroxide, lead sulfate, barium sulfate and calcium oxalate.

# Nomenclature of Order Numbers for Filter Papers

FT-●-●●●●-●●●●●●●●



**FT** = Filter Paper

## Filter Paper Type:

(One digit)

- 1 = Rolls
- 2 = Sheets
- 3 = Discs
- 4 = Folded

Not applicable for extraction thimbles

## Filter Paper Serial no.:

(Three to four digits)

- 1\_\_ Ashless papers
- 2\_\_ Qualitative papers
- 3\_\_, 4\_\_, 6\_\_ Qualitative and technical, indicator and reagent papers
- 5\_\_ Chromatography and blotting papers
- 11\_\_, 12\_\_ Thimbles and glass/quartz microfibre flat filters

## Filter Paper Format:

(Three to seven digits)

- Sheets:** Length × Width (mm × mm)
- Discs:** Diameter (mm)
- Folded:** Diameter (mm)
- Rolls:** Width × Length (mm × m)
- Thimbles:** Diameter × Length (mm × mm)

## Paper specimen collection card:

- Width × Length × no. of circles printed

## Examples:

### Order No. = FT-1-601-400050

FT-1 = Filter Paper Roll  
601 = Serial no. (Conversion from grade 601/PE to serial no. 601)  
400050 = Width 400 mm × Length 50 m

### Order No. = FT-2-334-580580

FT-2 = Filter Paper Sheet  
334 = Serial no. (Conversion from grade 603 to serial no. 334)  
580580 = Length 580 mm × Width 580 mm

### Order No. = FT-3-101-125

FT-3 = Disc Filter,  
101 = Serial no. (Conversion from grade 388 to serial no. 101)  
125 = Diameter 125 mm

### Order No. = FT-4-101-090

FT-4 = Folded Filter,  
101 = Serial no. (Conversion from grade 388 to serial no. 101)  
090 = Diameter 90 mm

### Order No. = FT-1210-030100

FT-Serial no. = Extraction Thimbles  
1210 = Serial no. (Conversion from grade 35 to serial no. 1210)  
030100 = Outer diameter 30 mm × Inner diameter 100 mm

# Index of Grades, Sorted According to Product Groups

## Ashless Filter Papers for Quantitative Analysis

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
● 388	84	8	101
○ 389	84	8	102
● 389F	84	8	112
● 390	84	8	103
● 391	84	8	104
● 392	84	8	105
● 393	100	8	127

## Analytical Filter Papers for Qualitative Analysis

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
288	80	9	201
289	80	9, 11	202
290	80	9	203
291	80	9	204
292	87	9, 11	205
292 a	97	9	215
293	80	9, 12	211
1288	84	10	206
1289	84	10	207
1290	84	10	208
1291	84	10	209
1292	84	10	210

## Qualitative and Technical Filter Papers – Sorted According to Basis Weight

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
FT 55	55	15	348
3 h	65	15	302
3 hw	65	13, 15	303
3 m/N	65	15	305
3 w	65	15	308
488/N	65	15	333
601/N	65	13, 15	354
1602/N	70	15	342
4 b	75	15	309
41 b	75	11, 15	462
603	75	15	334
603/N	75	15	335
6	80	11, 14, 15	312
131	80	15	351
132	80	15	329
480	85	15, 19	602
5 H/N	85	16	423
100/N	85	13, 16	328
17	90	16	319
17/N	90	16	321
22/NS	90	16	339
460/N	90	16	332
10	120	16	352
37/N	135	12, 16	480
470	140	11, 12, 13, 16, 20	606
C 140	140	16	356
6 S/N	145	13, 14, 16	314
69 K	155	16	326
39/N	175	12, 16	483
3 S/h	200	16	307

## Absorptive Filter Papers and Boards – Sorted According to Basis Weight

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
64	100	17, 25	403
50 S	120	14, 17	353
51 S	120	14, 17	366
64 a	135	17, 25	405
A 140	140	17	411
601/PE	140	14, 17, 21	601
SB 2	155	17	350
C 160	160	17, 23	343
S 165	165	17	417
TFN	180	22	460
A 250	250	17	412
C 250	250	17	344
C 251	250	17	355
M 270	270	18	415
C 300	300	18	345
C 350	350	18	346
LF 1	360	18	413
C 450	450	18	347
S 500	500	18	421
431 ZY	500	18	431
M 600	600	18	416

**Indicator and reagent papers**

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
64	100	17, 25	403
64 a	135	17, 25	405
Biophan strips (glucose   protein)		24	603
Lead acetate paper		25	603
Litmus paper		25	603
Phosphate test paper		25	603
Potassium iodide starch paper		25	603
Stuphan test strips		24	603
Unitest		24	603

**Chromatography and Gel Blotting Papers**

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
FN 1	90	26	501
FN 2	120	26	502
FN 3	90	26	503
FN 4	120	26	504
FN 5	90	26	505
FN 6	120	26	506
FN 7	150	27	507
FN 7a	200	27	508
FN 8	280	27	509
FN 30	390	27	526
FN 100	195	27, 28	527

**Gel Blotting Papers**

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
BF 1	90	28	518
BF 2	190	28	519
BF 3	330	28	520
BF 4	550	28	521
FN100	195	27, 28	527

**Extraction Thimbles**

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
30 (Cellulose)	Disc	29, 30	1201
35 (Cellulose)	Flat	29, 30	1210
40 (Glass microfiber)		29, 31	1204
50 (Quartz microfiber)		29, 31	1207

**Glass Microfiber Filters**

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
MGA	55	32, 33	1101
MGB	140	32, 33	1102
MGC	52	32, 33	1103
MGD	120	32, 33	1104
MGF	75	32, 33	1105

**Quartz Microfiber Filters**

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
T293	85	34	1109

# Index of Grades, Alphanumerically Sorted According to Grade Name

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number	Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number	Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
4 b	75	15	309	3 h	65	15	302	FN 1	90	26	501
6	80	11, 14, 15	312	3 hw	65	13, 15	303	FN 100	195	27, 28	527
10	120	16	352	3 m/N	65	15	305	FN 2	120	26	502
17	90	16	319	3 S/h	200	16	307	FN 3	90	26	503
30		29, 30	1201	3 w	65	15	308	FN 30	390	27	526
35		29, 30	1210	● 389 F	84	8	112	FN 4	120	26	504
40		29, 31	1204	41 b	75	11, 15	462	FN 5	90	26	505
50		29, 31	1207	460/N	90	16	332	FN 6	120	26	506
131	80	15	351	488/N	65	15	333	FN 7	150	27	507
132	80	15	329	5 H/N	85	16	423	FN 7a	200	27	508
288	80	9	201	50 S	120	14, 17	353	FN 8	280	27	509
289	80	9, 11	202	51 S	120	14, 17	366	FT 55	55	15	348
290	80	9	203	37/N	135	16	315	MGA	55	32, 33	1101
291	80	9	204	6 S/N	145	13, 14, 16	314	MGB	140	32, 33	1102
292	87	9, 11	205	39/N	175	12, 16	313	MGC	52	32, 33	1103
293	80	9, 12	211	601/N	65	13, 15	354	MGD	120	32, 33	1104
● 388	84	8	101	603/N	75	15	335	MGF	75	32, 33	1105
○ 389	84	8	102	64	100	17, 25	403	Potassium iodide starch paper		25	603
● 390	84	8	103	64 a	135	17, 25	405	Litmus paper		25	603
● 391	84	8	104	69 K	155	16	326	LF 1	360	18	413
● 392	84	8	105	A 140	140	17	411	M 270	270	18	415
● 393	100	8	127	A 250	250	17	412	M 600	600	18	416
470	140	11, 12, 13, 16, 20	606	BF 1	90	28	518	601/PE	140	14, 17, 21	601
480	85	15, 19	602	BF 2	190	28	519	Phosphate test paper		25	603
603	75	15	334	BF 3	330	28	520	T293	85	34	1109
1288	84	10	206	BF 4	550	28	521	S 165	165	17	417
1289	84	10	207	Biophan		24	603	S 500	500	18	421
1290	84	10	208	C 140	140	16	356	SB 2	155	17	350
1291	84	10	209	C 160	160	17, 23	343	Stuphan		24	603
1292	84	10	210	C 250	250	17	344	TFN	180	22	460
100/N	85	13, 16	328	C 251	250	17	355	Unitest		24	603
1602/N	70	15	342	C 300	300	18	345	431 ZY	500	18	431
17/N	90	16	321	C 350	350	18	346				
22/NS	90	16	339	C 450	450	18	347				
292 a	97	9	215								

# Index of Grades, Numerically Sorted According to Serial Number

Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number	Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number	Grade name	Basis weight (g/m <sup>2</sup> )	Pages	Serial number
● 388	84	8	101	603	75	15	334	BF 1	90	28	518
○ 389	84	8	102	603/N	75	15	335	BF 2	190	28	519
● 390	84	8	103	22/NS	90	16	339	BF 3	330	28	520
● 391	84	8	104	1602/N	70	15	342	BF 4	550	28	521
● 392	84	8	105	C 160	160	17, 23	343	FN 30	390	27	526
● 389 F	84	8	112	C 250	250	17	344	FN 100	195	27, 28	527
● 393	100	8	127	C 300	300	18	345	601/PE	140	14, 17, 21	601
288	80	9	201	C 350	350	18	346	480	85	15, 19	602
289	80	9, 11	202	C 450	450	18	347	Biophan		24	603
290	80	9	203	FT55	55	15	348	Lead acetate		25	603
291	80	9	204	SB 2	155	17	350	Litmus paper		25	603
292	87	9, 11	205	131	80	15	351	Phosphate test paper		25	603
1288	84	10	206	10	120	16	352	Potassium iodide starch paper		25	603
1289	84	10	207	50 S	120	14, 17	353	Stuphan		24	603
1290	84	10	208	601/N	65	13, 15	354	Unitest		24	603
1291	84	10	209	C 251	250	17	355	470	140	11, 12, 13, 16, 20	606
1292	84	10	210	C 140	140	16	356	MGA	55	32, 33	1101
293	80	9, 12	211	51 S	120	14, 17	366	MGB	140	32, 33	1102
292 a	97	9	215	S 165	165	17	368	MGC	52	32, 33	1103
3 h	65	15	302	64	100	17, 25	403	MGD	120	32, 33	1104
3 hw	65	13, 15	303	64 a	135	17, 25	405	MGF	75	32, 33	1105
3 m/N	65	15	305	A 140	140	17	411	T293	85	34	1109
3 S/h	200	16	307	A 250	250	17	412	30		29, 30	1201
3 w	65	15	308	LF 1	360	18	413	40		29, 31	1204
4 b	75	15	309	M 270	270	18	415	50		29, 31	1207
6	80	11, 14, 15	312	M 600	600	18	416	35		29, 30	1210
39/N	175	12, 16	383	S 500	500	18	421				
6 S/N	145	14, 16	314	5 H/N	85	16	423				
37/N	135	12, 16	380	431 ZY	500	18	431				
17	90	16	319	TFN	180	22	460				
17/N	90	16	321	41 b	75	11, 15	462				
69 K	155	16	326	FN 1	90	26	501				
100/N	85	13, 16	328	FN 2	120	26	502				
132	80	15	329	FN 3	90	26	503				
460/N	90	16	332	FN 4	120	26	504				
488/N	65	15	333	FN 5	90	26	505				
				FN 6	120	26	506				
				FN 7	150	27	507				
				FN 7a	200	27	508				
				FN 8	280	27	509				

# Sales and Service Contacts

For further contacts, visit [www.sartorius.com](http://www.sartorius.com)

## Europe

### Germany

Sartorius AG  
Weender Landstrasse 94-108  
37075 Goettingen

Phone +49.551.308.0  
Fax +49.551.308.3289

[www.sartorius.com](http://www.sartorius.com)

Sartorius BBI Systems GmbH  
Schwarzenberger Weg 73-79  
34212 Melsungen

Phone +49.5661.71.3400  
Fax +49.5661.71.3702

[www.sartorius-bbi-systems.com](http://www.sartorius-bbi-systems.com)

### Austria

Sartorius Ges.m.b.H. Wien  
Franzosengraben 12  
A-1030 Wien

Phone +43.1.7965763.18  
Fax +43.1.796576344

### Belgium

Sartorius Technologies N.V.  
Luchthavenlaan 1-3  
1800 Vilvoorde

Phone +32.2.756.0670  
Fax +32.2.756.0681

### Denmark

Sartorius A/S  
Himmelev Bygade 49  
4000 Roskilde

Phone +45.70.23.4400  
Fax +45.46.30.4030

### France

Sartorius S.A.S.  
4, rue Emile Baudot  
91127 Palaiseau Cedex

Phone +33.1.6919.2100  
Fax +33.1.6920.0922

### Italy

Sartorius S.p.A.  
Via dell'Antella, 76/A  
50011 Antella-Bagno a Ripoli (FI)

Phone +39.055.63.40.41  
Fax +39.055.63.40.526

### Netherlands

Sartorius Filtratatie B.V.  
Edisonbaan 24  
3439 MN Nieuwegein

Phone +31.30.6025080  
Fax +31.30.6025099

### Spain

Sartorius, S.A.  
C/Isabel Colbrand 10 -12,  
Planta 4, Oficina 121  
Poligono Industrial de Fuencarral  
28050 Madrid

Phone +34.91.3586102  
Fax +34.91.3588804

### Switzerland

Sartorius Schweiz AG  
Lerzenstrasse 21  
8953 Dietikon

Phone +41.1.746.50.00  
Fax +41.1.746.50.50

### U.K.

Sartorius Ltd.  
Longmead Business Park  
Blenheim Road, Epsom  
Surrey KT19 9 QQ

Phone +44.1372.737100  
Fax +44.1372.720799

## America

### USA

Sartorius North America Inc.  
131 Heartland Blvd.  
Edgewood, New York 11717

Phone +1.631.254.4249  
Toll-Free +1.800.3687178  
Fax +1.631.254.4253

Sartorius BBI Systems, Inc.  
2800 Baglyos Circle  
Bethlehem, PA 18020

Phone +1.610.866.4800  
Fax +1.610.866.4890

### Argentinien

Sartorius Argentina S.A.  
Calle Avalos 4251 (B1605ECS) Munro  
Buenos Aires

Phone: +54.11.4721.0506  
Fax: +54.11.4762.2333

### Brazil

Sartorius do Brasil Ltda.  
Rua Santo André, 331  
09020-230 Santo André  
São Paulo

Phone: +55.11.4438.3833  
Fax: +55.11.4438.2355

### Mexico

Sartorius de Mexico S.A. de C.V.  
Circuito Arquitectos No. 11  
Despacho 201  
Ciudad Satelite  
53100 Naucalpan, Estado de Mexico

Phone: +52.55.62.1102  
Fax: +52.55.62.2942

## Asia | Pacific

### China

Beijing Sartorius Instrument Et System  
Engineering Co., Ltd.

- Beijing Rep. Office -  
Dong Hu Qu, Wang Jing  
Industrial Zone  
Chao Yang District  
100102 Beijing, P.R.C.  
P.O. Box 8516

Phone +86.10.6439.2552  
Fax +86.10.6439.2726

Sartorius Ltd.  
Unit 1110-12, Lu Plaza,  
2 Wing Yip Street  
Kwun Tong, Kowloon, Hong Kong

Phone +852.2774.2678  
Fax +852.2766.3526

### India

Sartorius India Private Ltd.  
10, 6th Main, 3rd Phase Peenya  
KIADB Industrial Area  
Bangalore - 560 058

Phone +91.80.2839.1963 | 0461  
Fax +91.80.2839.8262

### Japan

Sartorius K.K.  
KY Building., 8-11  
Kita Shinagawa 1-chome  
Shinagawa-ku  
Tokyo 140-0001

Phone +81.3.3740.5407  
Fax +81.3.3740.5406

### Korea

Sartorius Korea  
17-2 Jungja-Dong, Bundang-Gu  
Sungnam, Gyunggi-Do  
B-1023, Paragon  
463-811, Korea

Phone +82.31.782.7011  
Fax +82.31.782.7090

### Malaysia

Sartorius (Malaysia) Sdn. Bhd.  
Lot L3-E-3B, Enterprise 4  
Technology Park Malaysia  
Bukit Jalil  
57000 Kuala Lumpur

Phone +60.3.8996.0622  
Fax +60.3.8996.0755

### Singapore

Sartorius Singapore Pte. Ltd.  
10, Science Park Road, The Alpha  
#02-25, Singapore Science Park 2  
Singapore 117684

Phone +65.6872.3966  
Fax +65.6778.2494

### Australia

Sartorius Australia Pty. Ltd.  
Unit 17/104 Ferntree Gully Road  
Waverley Business Park  
East Oakleigh, Victoria 3166

Phone +61.3.9590.8800  
Fax +61.3.9590.8828