Filter Papers and Membranes

Whatman filter papers are world-renowned as the standard for laboratory filtration and are associated with quality, reliability, and customer service. The familiar Whatman Blue Box is the laboratory benchmark for filtration. Papermaking skills have been developed to the highest level, with the expertise and technology to manufacture innovative multilayer materials.

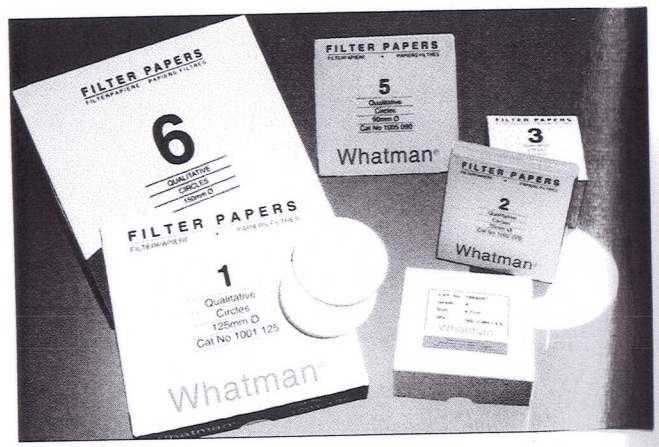
Whatman offers an extensive line of filter papers. The innovative features of these filters make them the optimum choice for many filtering techniques. Whatman maintains a guaranteed quality, reproducibility, and uniformity for all its filters by using only the highest quality raw materials.

The filters are tested for grammage, thickness, air flow, and mechanical strength. In addition, special parameters such as particle retention, wicking rate, filtration performance, and surface characteristics can be measured as needed.

Cellulose Filters

Whatman cellulose filters are manufactured from high-quality cotton linters, which have been treated to achieve a minimum alpha cellulose content of 98%. These cellulose filter papers are used for general filtration and exhibit particle retention levels down to 2.5 µm. Whatman offers a wide choice of retention/flow rate combinations to suit numerous laboratory applications.

The different groups of cellulose filters offer increasing degrees of purity, hardness, and chemical resistance.



Selection – Cellulose Filters: Trace Elements – Typical Values (µg/g Paper)

Grade	1	42	542	Grade	1	42	542
Aluminum	< 0.5	2	1	Iron	5	6	3
Antimony	< 0.02	< 0.02	< 0.02	Lead	0.3	0.2	0.1
Arsenic	< 0.02	< 0.02	< 0.02	Magnesium	7	1.8	0.7
Barium	< 1	< 1	< 1	Manganese	0.06	0.05	0.05
Boron	1	1	2	Mercury	< 0.005	< 0.005	< 0.005
Bromine	1	1	1	Nitrogen	23	12	260
Calcium	185	13	8	Potassium	3	1.5	0.6
Chlorine	130	80	55	Silicon	20	< 2	< 2
Chromium	0.3	0.3	0.7	Sodium	160	33	8
Copper	1.2	0.3	0.2	Sulfur	15	< 5	< 2
Fluorine	0.1	0.2	0.3	Zinc	2.4	0.6	0.3

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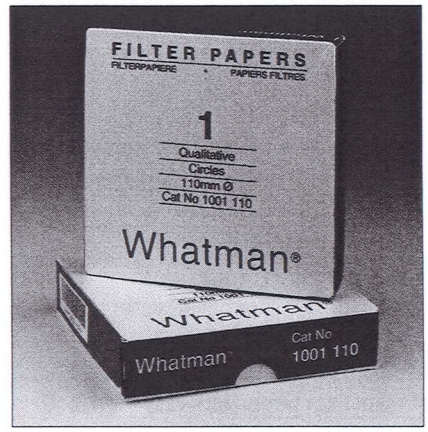
Qualitative Filter Papers



These cellulose filters are used in qualitative analytical techniques to determine and identify materials. Prepleated qualitative filters are also available, which give improved flow rate and increased loading capacity compared to equivalent flat filters.

Qualitative Filter Papers – Standard Grades

Grade 1: 11 µm
The most widely used filter paper for routine applications with medium retention and flow rate. Extended range of sizes includes 10 to 500 mm diameter circles and 460 × 570 mm sheets. This filter is also available in the FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 ml capacity molded from polypropylene with an integral, heat bonded filter (catalog number 1600-001).

This grade covers a wide range of laboratory applications and is frequently used for clarifying liquids. Traditionally, the grade is used in qualitative analytical separations for precipitates such as lead sulfate, calcium oxalate (hot), and calcium carbonate.

In agriculture, it is used for soil analysis and seed testing procedures. In the food industry, Grade 1 is used for numerous routine techniques to separate solid foodstuffs from associated liquid or extracting liquid and is widely used in education for teaching simple qualitative analytical separations.

In air pollution monitoring, using circles or rolls, atmospheric dust is collected from airflow and the stain intensity measured photometrically. For gas detection, the paper is impregnated with a chromogenic reagent and color formation quantified by optical reflectance.

Grade 2: 8 µm
Slightly more retentive than Grade 1 with a corresponding increase in filtration time (i.e., slightly slower filtration speed). More absorbent than Grade 1. In addition to general filtration in the 8 µm particle size range, the extra absorbency is utilized, for example, to hold soil nutrient in plant growth trials. Also used for monitoring specific contaminants in the atmosphere and in soil testing. Also available prepleated as Grade 2V.

Grade 3: 6 µm
Double the thickness of Grade 1 with still finer particle retention and excellent loading capacity; more precipitate can be held without clogging. The extra thickness gives increased wet strength and makes this grade highly suitable for use in Büchner funnels. The high absorbency is particularly valuable when the paper is used as a sample carrier. This filter is also available in the FilterCup. This is a convenient, disposable 70 mm filter funnel with a 250 ml capacity, molded from polypropylene with an integral, heat bonded filter (catalog number 1600-003).

Grade 4: 20-25 µm
Extremely fast filtering with excellent retention of coarse particles and gelatinous precipitates such as ferric hydroxide and aluminum hydroxide. Very useful as a rapid filter for routine clean-up of biological fluids or organic extracts during analysis. Used when high flow rates in air pollution monitoring are required and the collection of fine particles is not critical.

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Grade 5: 2.5 µm
The maximum degree of fine particle filtration in the qualitative range. Capable of retaining the fine precipitates encountered in chemical analysis. Slow flow rate. Excellent clarifying filter for cloudy suspensions and for water and soil analysis. Also available prepleated as Grade 5V.

Grade 6: 3 µm
Twice as fast as Grade 5 with similar fine particle retention. Often specified for boiler water analysis applications.

Grade 591: 7-12 µm
A thick filter paper with very high loading capacity for fast filtration of medium to coarse precipitates. Offers high absorbency and increased wet strength. Also available prepleated as Grade 591 ½.

Grade 595: 4-7 µm
Very popular, thin filter paper, medium-fast with medium to fine particle retention. Used for many routine analytical applications in different industries (e.g., particle separation from food extracts or filtration of solids from digested environmental samples for ICP/AAS analysis). Also available prepleated as Grade 595 ½.

Grade 597: 4-7 µm
A medium fast filter paper with medium to fine particle retention. Used for a wide variety of analytical routine applications in different industries like food testing (e.g., determination of fat content or removal of carbon dioxide and turbidity from beverages (as in beer analysis). Available prepleated as Grade 597 ½.

Grade 598: 8-10 µm
A thick filter paper with high loading capacity. Combines medium retention with medium-fast to fast filtration speed. Also available prepleated as Grade 598 ½.

Grade 602 h: < 2 µm
A dense filter paper for collecting very small particles and removing fine precipitates. Used in sample preparation (e.g., in the beverage industry for residual sugar determination, acidic spectra, refractometric analysis, and HPLC). Available prepleated as Grade 602 h ½.

For qualitative wet strengthened papers see Qualitative Filter Papers – Wet Strengthened Grades

Typical Properties – Qualitative Standard Filter Grades

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed (approx) Herzberg (s)	Air Flow (s/100 ml/in²)	Typical Thickness (µm)	Basis Weight (g/m²)
1	Medium flow	11*	150	10.5	180	88
2	Medium flow	8*	240	21	190	103
3	Medium flow, thick	6*	325	26	390	187
4	Very fast	20-25*	37	3.7	205	96
5	Slow	2.5*	1420	94	200	98
6	Medium to slow	3*	715	35	180	105
591	Medium fast, thick	7-12**	45	5.9	350	161
595	Medium fast, thin	4-7**	80	–	150	68
597	Medium fast	4-7**	70	–	180	85
598	Medium fast, thick	8-10**	50	–	320	140
602 h	Slow, dense	< 2**	750	–	160	84

* *Particle retention rating at 98% efficiency*
** *Approximate values*

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Ordering Information – Qualitative Filter Circles – Standard Grades

Diameter (mm)	Catalog Number Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Quantity/Pack
10	1001-6508	–	–	–	–	–	500
15	1001-0155	–	–	–	–	–	500
18	1001-018	–	–	–	–	–	400
20	1001-020	–	–	–	–	–	400
23	–	–	1003-323	–	–	–	100
25	1001-325	1002-325	–	1004-325	1005-325	–	100
25	1001-025	–	–	–	–	–	400
27	–	–	–	1004-027	–	–	400
30	1001-329	–	–	–	–	–	100
30	1001-030	–	–	–	–	–	400
32	1001-032	–	–	–	–	–	100
42.5	1001-042	1002-042	1003-042	1004-042	1005-042	1006-042	100
47	1001-047	1002-047	–	1004-047	1005-047	–	100
50	–	–	–	1004-050	–	–	–
55	1001-055	1002-055	1003-055	1004-055	1005-055	–	100
70	1001-070	1002-070	1003-070	1004-070	1005-070	1006-070	100
85	1001-085	–	–	–	–	–	100
90	1001-090	1002-090	1003-090	1004-090	1005-090	1006-090	100
94	–	1002-094	–	–	–	–	1000
110	1001-110	1002-110	1003-110	1004-110	1005-110	1006-110	100
125	1001-125	1002-125	1003-125	1004-125	1005-125	1006-125	100
150		1002-147**	–	–	–	–	100
150	1001-150	1002-150	1003-150	1004-150	1005-150	1006-150	100
185	1001-185	1002-185	1003-185	1004-185	1005-185	1006-185	100
240	1001-240	1002-240	1003-240	1004-240	1005-240	1006-240	100
270	1001-270	1002-270	1003-270	1004-270	–	–	100
320	1001-320	1002-320	1003-320	1004-320	1005-320	–	100
385	1001-385	1002-385	–	–	–	–	100
400	1001-400	–	–	1004-400	–	–	100
500	1001-500	1002-500	1003-500	–	1005-550	–	100
FilterCup 70*	1600-001	–	1600-003	–	–	–	25

* *Requires FilterCup stem, catalog number 1600-900*

** *Product is only available in Europe; IP certified*

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Ordering Information – Qualitative Filter Circles – Standard Grades

Diameter (mm)	Catalog Number Grade 595	Grade 597	Grade 598	Grade 602 h	Quantity/Pack
12.7	–	10311862	–	–	1000
42.5	–	10312040	–	–	100
45	–	10311804	–	–	100
55	–	10311807	–	–	100
70	–	10311808	–	–	100
90	–	10311809	10312209	10312609	100
110	10311610	10311810	–	–	100
125	10311611	10311811	–	10312611	100
150	10311612	10311812	-	10312612	100
185	–	10311814	–	10312614	100
240	–	10311820	–	10312620	100
320	–	10311822	–	–	100

Ordering Information – Qualitative Filter Sheets – Standard Grades

Dimensions (mm)	Catalog Number	Quantity/Pack
Grade 1		
26 × 31	1001-813	1000
75 × 100	1001-824	500
460 × 570	1001-917	100
460 × 570	1001-918	500
580 × 680	1001-931	100
580 × 680	1001-932	500
600 × 600	1001-929	100
Grade 2		
430 × 680	1002-6691	500
460 × 570	1002-917	100
580 × 680	1002-931	100
600 × 600	1002-929	100
Grade 3		
305 × 457	1003-433	100
460 × 570	1003-917	100
580 × 580	1003-930	100

Dimensions (mm)	Catalog Number	Quantity/Pack
Grade 4		
130 × 190	1004-912	500
140 × 190	1004-911	500
250 × 355	1004-922	100
460 × 570	1004-917	100
580 × 580	1004-930	100
Grade 591		
580 × 580	10311387	250
Grade 595		
580 × 580	10311687	500
Grade 597		
580 × 580	10311887	500
580 × 580	10311897	100
Grade 598		
580 × 580	10312287	250

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