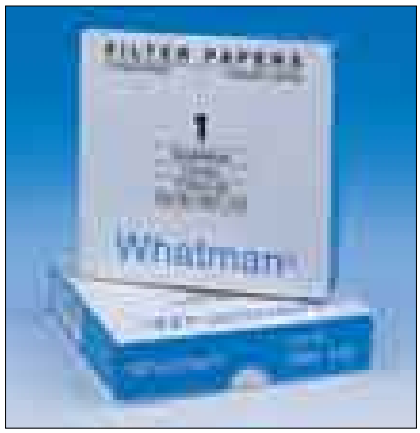
Qualitative Filter Papers



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.

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*

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*

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

Qualitative Filter Papers – Wet Strengthened Grades

These extremely strong filter papers have a high wet strength due to the addition of a small quantity of chemically stable resin. Their use in normal qualitative applications will not introduce any significant impurities into the filtrate. The resins do, however, contain nitrogen so these grades should not be used in Kjeldahl estimations, etc. Some wet strengthened grades are available in folded (prepleated) forms.

Grade 91: 10 µm
A general purpose creped filter for less critical routine analysis. Widely used to assay sucrose in cane sugar and within pharmaceutical laboratories for routine filtration.

Grade 93: 10 µm
This filter paper is intermediate in speed and retention between Grades 1 and 4. Available in a dispenser pack, which can be attached to the wall or bench, placed on a shelf either upright or flat, and used as a normal carton or as a convenient dispenser. The envelopes are released individually for easy one-at-a-time removal. Package and envelopes are clearly marked for size and content.

Grade 113: 30 µm
Ultra high loading capacity with a particle retention — making it ideal for use with coarse or gelatinous precipitates. Fastest flow rate of the qualitative grades. Creped surface. Thickest filter paper in the qualitative range. This filter is also available in the FilterCup, a convenient, disposable 70 mm filter funnel with a 250 ml capacity, molded from polypropylene with an integral, heat bonded filter (catalog number 1600-113). Also available as Grade 113V.

Grade 114: 25 µm
Only half the thickness of Grade 113 and suitable for coarse or gelatinous precipitates. Smooth surface for easy recovery of precipitates. Also available prepleated as Grade 114V.

Grade 588
Fast filter paper. Stated in a number of standards and methods, e.g., Aflatoxin determination in animal feed (BS 5766-7) and Mercury determination in sludge (EPA method 105). Also available prepleated as Grade 588 ½.

Grade 1573: 12-25 µm
A fast filter paper with high wet strength. It has a very smooth surface, making it easy to scrape or wash off precipitate. Resistant against: sulfuric and nitric acid solutions (up to 40% at 50°C), hydrochloric (up to 10% at 100°C, 20% at 60°C, 25% at 20°C) and alkalis (up to 10% at 20°C). Also available prepleated as Grade 1573 ½.

Grade 1575: < 2 µm
Slow filter paper with high wet strength. This paper has the same chemical resistance characteristics as Grade 1573 (see under Grade 1573 above).

See Filter Papers for Technical Use section, for additional wet strengthened filter papers.

Typical Properties – Qualitative Wet Strengthened 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)
91	Creped	10*	70	6.2	205	71
93	Medium	10*	80	7	145	67
113	Fast, creped	30*	28	1.3	420	125
114	Fast, smooth	25*	38	5.3	190	77
588	Fast	–	–	–	205	80
1573	Fast, smooth	12-25**	25	–	170	88
1575	Slow	< 2**	850	–	140	92

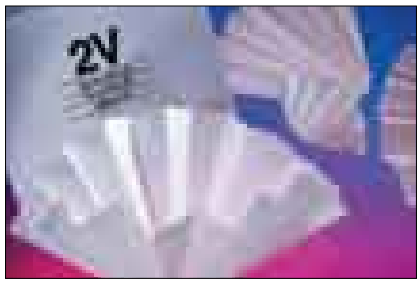
* *Particle retention rating at 98% efficiency*
** *Approximate values*

Ordering Information – Qualitative Filter Papers – Wet Strengthened Grades

Diameter (mm)	Catalog Number Grade 91	Grade 93	Grade 113	Grade 114	Grade 588	Grade 1573	Grade 1575	Quantity/Pack
90	–	–	1113-090	1114-090	–	–	–	100
110	1091-110	–	–	–	–	–	–	4000‡
110	–	1093-110	1113-110	–	–	–	–	100
110	–	1093-111*	–	–	–	–	–	1250
125	1091-125	–	–	–	–	–	–	4000‡
125	–	1093-125	1113-125	1114-125	–	10314711	10314911	100
125	–	1093-126*	–	–	–	–	–	1250
125	–	1093-6212**	–	–	–	–	–	4000‡
150	1091-150	1093-6215**	–	–	–	–	–	1000‡
150	–	–	1113-150	1114-150	–	10314712	10314912	100
165	1091-165	–	–	–	–	–	–	1000‡
185	1091-185	–	–	–	–	–	–	1000‡
185	–	–	1113-185	1114-185	–	10314714	10314914	100
190	1091-190	–	–	–	–	–	–	1000‡
200	-	-	-	-	-	-	10314916	100
240	1091-240	–	–	–	–	–	–	1000‡
240	–	–	1113-240	1114-240	10318220	10314720	–	100
270	–	–	–	1114-270	–	–	–	100
290	-	-	-	-	-	10314726	-	100
320	–	–	1113-320	–	–	–	–	100
400	–	–	–	1114-400	–	–	–	100
500	1091-500	–	1113-500	–	–	–	–	100
400 x 400							10314984	500
1100 x 1100							10314991	100
FilterCup†	–	–	1600-113	–	–	–	–	25

* *Packed 50 envelopes of 25 circles*
** *Packed 10 bags of 100 circles*
† *Requires FilterCup stem, catalog number 1600-900*
‡ *Subdivided into 100*

Qualitative Filter Papers – Folded Prepleated Grades



Time-saving Whatman qualitative grades are offered in this convenient form, which have major advantages over flat circles:

- Savings in time required to quadrant-fold circles to fit conical filter funnels in repetitive or multiple analyses
- Decreased overall filtration time because of the extra surface area exposed; the normal slow down of filtration speed due to the loading of particulate is postponed
- Increased total loading capacity as more filter area is available
- Maintained flow rate due to the reduction in filter paper contact with funnel side and the self-supporting shape of the filter itself
- The prepleating does not significantly affect any of the technical data and the same figures may be used for the flat circles

Grade 2V: 8 µm
Widely used for general purpose filtration. Has excellent particle retention and a good filtration speed and loading capacity. Also available in flat stock form as Grade 2.

Grade 5V: 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 in flat stock form as Grade 5.

Grade 113V: 30 µm
Very thick and strong filter with creped surface for extremely high loading capacity, particularly in folded form. Fastest flow rate of any qualitative grade. Ideal for coarse particles and gelatinous precipitates. Also available in flat stock form as Grade 113.

Grade 114V: 25 µm
Strong filter with very fast flow rate. Ideal for coarse particles and gelatinous precipitates. Smooth surface. Also available in flat stock form as Grade 114.

Grade 287 ½
Kieselguhr paper with a medium to slow flow rate. Additional adsorption effect, e.g., for the separation of very fine semi-colloidal turbidity, for clarifying milk serum, starch solutions, soil suspensions, or sugar-containing solutions prior to polarimetry or refractometry. Also available in flat stock form as Grade 287.

Grade 520 a ½: 15-18 µm
A thin paper with great wet strength and a very high flow rate. Frequently used in technical applications such as the filtration of viscous liquids and emulsions (e.g., sweetened juices, spirits and syrups, resin solutions, oils or plant extracts). Also available in flat stock form as Grade 520 a.

Grade 520 bII ½: 15-19 µm
A thick paper with high wet strength offering a very high flow rate. Also available in flat stock form as Grade 520 bII.

Grade 588 ½
Fast filter paper. Stated in a number of standards and methods, e.g., Aflatoxin determination in animal feed (BS 5766-7) and Mercury determination in sludge (EPA method 105). Also available in flat stock form as Grade 588.

Grade 591 ½: 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 in flat stock form as Grade 591.

Grade 595 ½: 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, e.g., for ICP/AAS analysis). Also available in flat stock form as Grade 595.

Grade 597 ½: 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 (e.g., beer analysis). Also available in flat stock form as Grade 597.

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

Grade 602 h ½: < 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. Also available in flat stock form as Grade 602 h.

Grade 0858 ½: 7-12 µm
Grained, with medium fast flow rate and medium retention. A universal filter paper used for the filtration of extracts, oils, beer, syrups, etc., also applied in filter presses or for the aspiration of liquids. Available in flat stock form as Grade 0858.

Grade 0860 ½: 12 µm
Comparable to Grade 0858 but with a smooth surface, slightly thinner and faster. Also available in flat stock form as Grade 0860.

Grade 0905 ½: 12-25 µm
A creped paper for coarse particles, offers a very high filtration speed. Available in flat stock form as Grade 0905.

Grade 1573 ½: 12-25 µm
A fast filter paper with high wet strength. It has a very smooth surface, making it easy to scrape or wash off precipitate. Resistant against: sulfuric and nitric acid solutions (up to 40% at 50°C), hydrochloric (up to 10% at 100°C, 20% at 60°C, 25% at 20°C), alkalis (up to 10% at 20°C). Also available in flat stock form as Grade 1573.

Grade 1574 ½: 7-12 µm
A medium fast filter paper with high wet strength. This paper has the same chemical resistance characteristics as Grade 1573 (see under Grade 1573 above). Also available in flat stock form as Grade 1574.

Grade 2555 ½
A medium fast filter paper. Used for the filtration of the mash for the determination of the extract in malt and wort and for removing carbon dioxide from beer.

Typical Properties – Qualitative Folded Grades

Grade	Description	Particle Retention in Liquid (µm)	Filtration Speed (approx) Herzberg (s)	Typical Thickness (µm)	Basis Weight (g/m²)
2V	Medium flow	8*	240	190	103
5V	Slow	2.5*	1420	200	98
113V	Fast, creped	30*	28	420	125
114V	Fast, smooth	25*	38	190	77
287 ½	Kieselguhr	–	330	360	154
520 a ½	Very fast, creped, high wet strength	15-18**	17.5	300	90
520 bII ½	Very fast, creped, wet strength, thick	15-19**	15	500	135
588 ½	Fast	–	–	205	80
591 ½	Medium fast, thick	7-12**	45	350	161
595 ½	Medium fast, thin	4-7**	80	150	68
597 ½	Medium fast	4-7**	70	180	85
598 ½	Medium fast, thick	8-10**	50	320	140
602 h ½	Slow, dense	< 2**	750	160	84
0858 ½	Medium fast, grained	7-12**	55	170	75
0860 ½	Medium fast, smooth	7-12**	60	170	75
0905 ½	Very fast, creped	12-25**	20	270	75
1573 ½	Fast, smooth	12-25**	25	170	88
1574 ½	Medium fast, very low fiber release	7-12**	85	160	90
2555 ½	Medium fast	7-12**	55	170	75

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

Ordering Information – Qualitative Filter Papers – Folded (Prepleated Grades)

Diameter (mm)	Catalog Number Grade 2V	Grade 5V	Grade 113V	Grade 114V	Grade 287 ½	Grade 520 a ½	Grade 520 bII ½	Quantity/ Pack
125	–	–	–	–	10310244	–	–	50
125	1202-125	–	1213-125	1214-125	–	–	–	100
150	–	–	–	–	10310245	–	–	50
150	1202-150	–	1213-150	1214-150		–		100
185	–	–	–	–	10310247	–	–	50
185	1202-185	1205-185	1213-185	1214-185		–	–	100
240	–	–	–	–	10310251	–	–	50
240	1202-240	–	1213-240	1214-240	–	10331451	–	100
270	1202-270	–	1213-270	–	–	–	–	100
320	–	–	–	–	10310253	–	10331653	50
320	1202-320	–	1213-320	1214-320		–	–	100
385	1202-385	–	–	–	–	–	–	100
400	1202-400	–	–	–	–	–	–	100
500	1202-500	–	1213-500	–	–	10331456	–	100
700	–	–	–	–	–	10331459	–	100

cont.

Diameter (mm)	Catalog Number						Quantity/Pack
	Grade 588 ½	Grade 591 ½	Grade 595 ½	Grade 597 ½	Grade 598 ½	Grade 602 h ½	
70	–	–	10311641	10311841	–	–	100
90	–	–	10311642	10311842	–	10312642	100
110	–	–	10311643	10311843	–	–	100
125	–	–	–	–	10312244	–	50
125	–	–	10311644	10311844	–	10312644	100
150	–	–	10311645	10311845	–	10312645	100
185	–	10311347	–	–	10312247	–	50
185	–	–	10311647	10311847		10312647	100
210	–	–	10311649	–	–	–	100
240	–	10311351	–	–	10312251	–	50
240	–	–	10311651	10311851	–	10312651	100
270	10319352*	–	10311652	10311852	–	–	100
320	–	–	–	–	–	–	50
320	–	–	10311653	10311853	–	–	100
385	–	–	10311654	10311854	–	–	100
400	–	–	–	–	–	–	100
500	–	–	–	–	10312256	–	50
500	–	–	10311656	10311856	–	–	100
700	–	–	–	–	–	–	100

** Product is only available in the U.S.*

Diameter (mm)	Catalog Number						Quantity/Pack
	Grade 0858 ½	Grade 0860 ½	Grade 0905 ½	Grade 1573 ½	Grade 1574 ½	Grade 2555 ½	
125	–	–	–	10314744	10314844	–	100
150	10334345	–	–	10314745	–	–	100
185	10334347	10334547	–	10314747	10314847	10313947	100
240	10334351	10334551	–	10314751	–	10313951	100
270	10334352	–	–	10314752	–	–	100
320	10334353	10334553	10334953	10314753	–	10313953	100
500	–	–	–	10314756	–	–	100