



Qualitative and Quantitative Filter Papers

- Qualitative Filter Papers are manufactured from 100% alpha cotton cellulose.
- Primarily used for clarifying and removing precipitates, these papers are ideal for filtrations that do not require low ash.
- Six types of qualitative papers are available. Choice of paper is usually based on the size of precipitates to be retained and the flow rate. Papers are available in both circles and sheets.
- Quantitative Filter Papers are made from the highest quality alpha cotton cellulose. One critical step in the manufacture of these filter papers is acid washing. Papers are double acid washed in hydrochloric then hydrofluoric acid to further reduce levels of SiO_2 , CaO and Fe^{2}O_3 . Following the acid wash, all papers are rinsed with ultrapure water to neutralize them.

Qualitative Filter Papers

Characteristics

- 100% alpha cotton cellulose
- pH tolerant 0 to 12
- Temperature Maximum 120°C
- Wide selection – six types
- Higher ash than quantitative

Applications

- Clarify and remove precipitates
- Preparation for qualitative analysis



Descriptions

- No.1** Produced for general filtrations with a fast flow rate. This paper will retain coarse and gelatinous precipitates (>10 µm). Smooth paper of normal hardness.
- No.2** This paper is thicker than No. 1 paper and will retain medium sized precipitates (5-10 µm). Smooth paper of normal hardness.
- No. 131** This paper has highest retention efficiency of qualitative papers (<5 µm) and slower flow rates. This paper has a higher wet strength and will withstand suction.
- No. 231** This paper is thin and slightly more retentive (8 µm) than No. 1. General purpose.
- No. 232** This thin retentive paper (5 µm) has a slow initial flow rate.
- No. 235** A smooth, dense paper, the No. 235 will retain very fine crystalline precipitates. Smooth normal hardness.

Specifications

Type	Applications/Characteristics	Weight [g/m ²]	Thickness [mm]	Flow Time ¹ [sec]	Absorption-speed ² [cm]	Retention Characteristics	Gas Collection Efficiency [%; 0.3 µm DOP]
No. 1	Retains large crystalline particles and gelatinous precipitates. Fast flow rate, smooth surface, normal hardness.	90	0.20	45	9.0	Coarse	65
No. 2	Retains medium crystalline precipitates, fast flow rate, smooth surface, normal hardness.	125	0.26	80	8.0	Medium	80
No. 131	High retention efficiency for fine crystalline precipitates like barium sulfate, slow flow rate, smooth surface, normal hardness.	140	0.25	240	6.0	Medium-Fine	90
No. 231	Retains crystalline precipitates, moderate flow rate, smooth surface, normal hardness.	95	0.18	130	7.5	Medium	-
No. 232	Retains medium to medium-fine particulates, slow flow rate, smooth, normal hardness.	90	0.18	250	5.0	Medium-Medium-Fine	-
No. 235	Highest retention efficiency, retains very fine particulates, very slow flow rate, smooth.	95	0.17	1200	4.0	Very fine	-

1. Flow time is the time in seconds required to filter 100 ml of distilled water at 20°C under pressure supplied by a 10 cm water column through a 10 cm² section of filter paper.

2. Absorption speed is the distance in cm that water will travel in an upright strip of filter paper in 10 minutes at 20°C.

Comparison Table, see page 41

Qualitative Filter Papers

Ordering Information

Grade No. 1

Diameter [mm]	Packing	Cat. No.
55	100	1.055
70	100	1.070
90	100	1.090
110	100	1.110
125	100	1.125
150	100	1.150
185	100	1.185
240	100	1.240
285	100	1.285
300	100	1.300
330	100	1.330
360	100	1.360
400	100	1.400
500	100	1.500
600	100	1.600
Sheets, size		
485 x 560	100	1.485560
600 x 600	100	1.600600

Grade No. 2

Diameter [mm]	Packing	Cat. No.
55	100	2.055
70	100	2.070
90	100	2.090
110	100	2.110
125	100	2.125
150	100	2.150
185	100	2.185
240	100	2.240
285	100	2.285
300	100	2.300
330	100	2.330
360	100	2.360
400	100	2.400
500	100	2.500
600	100	2.600
Sheets, size		
485 x 560	100	2.485560
600 x 600	100	2.600600

Grade No. 131

Diameter [mm]	Packing	Cat. No.
55	100	131.055
70	100	131.070
90	100	131.090
110	100	131.110
125	100	131.125
150	100	131.150
185	100	131.185
240	100	131.240
285	100	131.285
300	100	131.300
330	100	131.330
360	100	131.360
400	100	131.400
500	100	131.500
600	100	131.600
Sheets, size		
485 x 560	100	131.485560
600 x 600	100	131.600600

Grade No. 231

Diameter [mm]	Packing	Cat. No.
55	100	231.055
70	100	231.070
90	100	231.090
110	100	231.110
125	100	231.125
150	100	231.150
185	100	231.185
Sheets, size		
485 x 560	100	231.485560

Qualitative Filter Papers

› Ordering Information

Grade No. 232

Diameter [mm]	Packing	Cat. No.
55	100	232.055
70	100	232.070
90	100	232.090
110	100	232.110
125	100	232.125
150	100	232.150
185	100	232.185
Sheets, size		
485 x 560	100	232.485560

Grade No. 235

Diameter [mm]	Packing	Cat. No.
55	100	235.055
70	100	235.070
90	100	235.090
110	100	235.110
125	100	235.125
150	100	235.150
185	100	235.185
Sheets, size		
485 x 560	100	235.485560

Quantitative Filter Papers

Characteristics

- **Highest quality** alpha cotton cellulose
- **Low ash** content
- **Acid washed:** Double acid washed in hydrochloric then hydrofluoric acid, then rinsed with ultrapure water to neutralize. No. 4A is further treated with nitric acid before washing

Applications

- Gravimetric analysis
- Environmental monitoring

Descriptions



- No. 4A** This acid washed paper is further treated with nitric acid to harden the paper for superior wet strength. No. 4A papers has a high retention efficiency for fine particulates $<5\ \mu\text{m}$, excellent pH and chemical resistance.
- No. 5A** This is a double acid washed paper of low ash to retain coarse precipitates ($>10\ \mu\text{m}$) with high flow rates. Recommended for filtering hydroxides, metallic aerosols and determining silica content in steel.
- No. 5B** This is a double acid washed paper for retaining medium size ($5\text{--}10\ \mu\text{m}$) precipitates. General purpose paper.
- No. 5C** A double washed paper with slow flow rate and high retention efficiency. Recommended for collecting particles $<5\ \mu\text{m}$, gravimetric analysis and for collecting precipitates that tend toward colloidal dispersion.
- No. 6** High purity, low ash paper for retaining medium fine $2\text{--}10\ \mu\text{m}$ particulates. Uses are primarily precision analyses of trace and precious metals, beverages, water etc.
- No. 7** This is the highest purity quantitative paper available with fast flow rate for retaining medium size particles ($5\text{--}10\ \mu\text{m}$). Recommended for gravimetric analyses of minute trace and precious metals and for research labs where precision is a high priority.

Specifications

Type	Applications/ Characteristics	Weight [g/m ²]	Thickness [mm]	Flow Time ¹ [sec]	Absorption- speed ² [cm]	Retention Characteristics	Gas Collection Efficiency [%; 0.3 μm DOP]
No. 4A	High retention efficiency, hardened ashless for retaining fine crystalline particulates ($<5\ \mu\text{m}$). Slow flow rate. High chemical and pH resistance. High wet strength. This filter is suitable for use under pressure.	96	0.12	915	4.0	Very Fine	90
No. 5A	Fast flow rate, retains coarse particulates and gelatinous precipitates ($>10\ \mu\text{m}$). Filter hydroxides and metallic aerosols, environmental monitoring, determine silica content in steel.	97	0.22	60	9.5	Coarse and gelatinous	75
No. 5B	Retains medium particles ($5\text{--}10\ \mu\text{m}$) such as CaCO_3 , PbSO_4 , CaCO_4 , MnCO_3 , ZnCO_3 , ZnS , AgCl	108	0.21	195	7.0	Medium	90
No. 5C	Collect fine precipitates ($<5\ \mu$) such as SrSO_4 , BaSO_4 , HgCrO_4 and colloidal dispersions, gravimetric analysis	118	0.22	570	6.0	Fine	93
No. 6	Retains medium-fine particulates ($2\text{--}10\ \mu\text{m}$), trace and precious metals	103	0.20	300	6.0	Medium-Fine	90
No. 7	Highest purity for retaining medium particles ($5\text{--}10\ \mu\text{m}$), precise gravimetric analysis	87	0.18	200	7.0	Medium	85

1. Flow time is the time in seconds required to filter 100 ml of distilled water at 20°C under pressure supplied by a 10 cm water column through a 10 cm² section of filter paper.

2. Absorption speed is the distance in cm that water will travel in an upright strip of filter paper in 10 minutes at 20°C.

Comparison Table and Ash Content table, see page 41

Quantitative Filter Papers

Ordering Information

Grade No. 4A

Diameter [mm]	Packing	Cat. No.
55	100	4A.055
70	100	4A.070
90	100	4A.090
110	100	4A.110
125	100	4A.125
150	100	4A.150
185	100	4A.185
240	100	4A.240
285	100	4A.285
300	100	4A.300
330	100	4A.330
360	100	4A.360
400	100	4A.400
500	100	4A.500
Sheets, size		
485 x 560	100	4A.485560

Grade No. 5A

Diameter [mm]	Packing	Cat. No.
55	100	5A.055
70	100	5A.070
90	100	5A.090
110	100	5A.110
125	100	5A.125
150	100	5A.150
185	100	5A.185
240	100	5A.240
285	100	5A.285
300	100	5A.300
330	100	5A.330
360	100	5A.360
400	100	5A.400
500	100	5A.500
Sheets, size		
485 x 560	100	5A.485560

Grade No. 5B

Diameter [mm]	Packing	Cat. No.
55	100	5B.055
70	100	5B.070
90	100	5B.090
110	100	5B.110
125	100	5B.125
150	100	5B.150
185	100	5B.185
240	100	5B.240
285	100	5B.285
300	100	5B.300
330	100	5B.330
360	100	5B.360
400	100	5B.400
500	100	5B.500
Sheets, size		
485 x 560	100	5B.485560

Grade No. 5C

Diameter [mm]	Packing	Cat. No.
55	100	5C.055
70	100	5C.070
90	100	5C.090
110	100	5C.110
125	100	5C.125
150	100	5C.150
185	100	5C.185
240	100	5C.240
285	100	5C.285
300	100	5C.300
330	100	5C.330
360	100	5C.360
400	100	5C.400
500	100	5C.500
Sheets, size		
485 x 560	100	5C.485560

Quantitative Filter Papers

Ordering Information

Grade No. 6

Diameter [mm]	Packing	Cat. No.
55	100	6.055
70	100	6.070
90	100	6.090
110	100	6.110
125	100	6.125
150	100	6.150
185	100	6.185
240	100	6.240
285	100	6.285
300	100	6.300
330	100	6.330
360	100	6.360
400	100	6.400
500	100	6.500
Sheets, size		
485 x 560	100	6.485560

Grade No. 7

Diameter [mm]	Packing	Cat. No.
55	100	7.055
70	100	7.070
90	100	7.090
110	100	7.110
125	100	7.125
150	100	7.150
185	100	7.185
240	100	7.240
285	100	7.285
300	100	7.300
330	100	7.330
360	100	7.360
400	100	7.400
500	100	7.500
Sheets, size		
485 x 560	100	7.485560

Phase Separating Filters

Characteristics

- **Silicone treated** cellulose paper
- **Separate** aqueous and non-aqueous phases of mixtures
- **Hydrophobic filters** retain aqueous phase while non-aqueous phase passes through



Specifications

Grade Code	Material	Weight [g/m ²]	Thickness [mm]	Particle Retention [μm]
2S	Silicone treated cellulose	120	0.26	5

Ordering Information

Diameter [mm]	Packing	Cat. No.
55	100	2S.055
70	100	2S.070
90	100	2S.090
110	100	2S.110
125	100	2S.125
150	100	2S.150
185	100	2S.185

Comparison Table, see page 41



Qualitative & Quantitative Filter Papers

Comparison Table

Advantec	Whatman	Former S&S	Munktell	Macherey-Nagel	Filtrak	ALBET-Hahnemuehle
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Qualitative Filter Papers

1	4	-	3	617	288	FP604
2	1	595	1F	615	289	FP597
131	3 or 6	598	106	618	290	FP602H
231	1	595	1F	615	289	FP595
232	2	-	150	616md	292	FP593
235	5	602h	120H	619de	291	FP602eh

Quantitative Filter Papers

4A	50	1575	4/N	1674	1291	-
5A	41	589 ¹	OOR	640w	388	FP589/1
5B	40	589 ²	OOA or OOK ¹⁾	640m	392	FP589/2
5C	42	-	OOH	640d	391	FP589/5
6	44	589 ³	OOA or OOK ¹⁾	640dd	390	FP589/3
7	43	-	OOM	640m	389	FP589/6

Phase Separating Filters

2S	1PS	-	124	616WA	480
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1) Munktell OOA and OOK are very similar

Note:

This table should be considered as alternatives rather than equivalents.

When comparing depth filters like filter papers it is impossible to obtain an exact equivalent.

The comparison is based on papers made of the same type of raw material giving similar filtration properties. Filtration speed can differ between types with the same retention efficiency because of the thickness of the filter. Thin filters filter faster than thick filters.

Ash Content of Quantitative Filter Papers

[mg per circle (up to diameter 185 mm)]

Circle diameter	No. 5A	No. 5B	No. 5C	No. 6	No. 7
55	0.02	0.02	0.02	0.02	0.02
70	0.03	0.04	0.04	0.03	0.03
90	0.06	0.06	0.06	0.05	0.04
11	0.09	0.10	0.10	0.08	0.07
125	0.11	0.12	0.12	0.10	0.09
150	0.16	0.18	0.18	0.15	0.12
185	0.24	0.27	0.27	0.23	0.19