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^2O_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 strenght 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/m²]	Thickness [mm]	Flow Time[1] [sec]	Absorption-speed[2] [cm]	Retention Characteristics	Gas Collection Efficiency [%, 0.3 µm DOP]
No. 1	Retains large crystaline 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, reatins 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 strenght. No. 4A papers has a high retention efficiency for fine particulates <5 µm, excellent pH and chemical resistance.
No. 5A	This is a double acid washed paper of low ash to retain coarse precipitates (>10 µm) 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 (5-10 µm) precipitates. General purpose paper.
No. 5C	A double washed paper with slow flow rate and high retention efficiency. Recommended for collecting particles <5µm, gravimetric analysis and for collecting precipitates that tend toward colloidal dispersion.
No. 6	High purity, low ash paper for retaining medium fine 2-10 µm 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 (5-10 µm). 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/m²]	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 crystaline particulates (<5 µm). Slow flow rate. High chemical and pH resistance. High wet strenght. 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 µm). 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 (5-10 µm) 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 µ) 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 (2-10 µm), trace and precious metals	103	0.20	300	6.0	Medium-Fine	90
No. 7	Highest purity for retaining medium particles (5-10 µm), 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/m²]	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
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	

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

Qualitative Filter Papers

- Extremely pure filter paper made from almost 100% alpha cotton cellulose.
- Ash content approx. 0.06%.
- Four types with different filtration speed and retention characteristics available.
- Available as plain circles and pre-pleated ready to use.
- Boxes are clearly labeled with colour code, type, grade, filtration characteristics and retention efficiency.

Applications

- Clarify and remove precipitates
- Preparation for qualitative analysis

Specifications

Grade	Retention [µm]	Weight [g/m²]	Thickness [mm]	Filtration speed [sec.]*
204	12-15	80	0.16	10 (fast)
201	8-12	80	0.16	20 (medium/fast)
202	5-8	87	0.16	50 (medium)
205	2-3	80	0.14	180 (slow)

**According to DIN 53137*

Plain circles

Grade 204		Grade 201		Grade 202		Grade 205	
Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.
55	204.055	55	201.055	55	202.055	55	205.055
70	204.070	70	201.070	70	202.070	70	205.070
90	204.090	90	201.090	90	202.090	90	205.090
110	204.110	110	201.110	110	202.110	110	205.110
125	204.125	125	201.125	125	202.125	125	205.125
150	204.150	150	201.150	150	202.150	150	205.150
185	204.185	185	201.185	185	202.185	185	205.185
240	204.240	240	201.240	240	202.240	240	205.240
270	204.270	270	201.270	270	202.270	270	205.270

Packing: 100 pcs. pr. box

Pleated

Grade 204F		Grade 201F		Grade 202F		Grade 205F	
Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.
110	204F.110	110	201F.110	110	202F.110	110	205F.110
125	204F.125	125	201F.125	125	202F.125	125	205F.125
150	204F.150	150	201F.150	150	202F.150	150	205F.150
185	204F.185	185	201F.185	185	202F.185	185	205F.185
240	204F.240	240	201F.240	240	202F.240	240	205F.240
320	204F.320	320	201F.320	320	202F.320	320	205F.320

Packing: 100 pcs. pr. box

Quantitative Filter Papers

- Quantitative (ashless) filter papers are made from 100% cotton linters and are free from impurities since the paper is acid washed and cleaned with ultra pure water.
- The ash content is 0.007%.
- Four types with different filtration speed and retention characteristics.
- Available as plain circles and pre-pleated ready to use.
- Boxes are clearly labeled with colour code, type, grade, filtration characteristics and retention efficiency.

Applications

- Environmental analysis
- Gravimetric analysis

Specifications

Grade	Retention [µm]	Weight [g/m²]	Thickness [mm]	Filtration speed [sec.]*
441	12-15	84	0.18	10 (fast)
442	8-12	84	0.17	20 (medium/fast)
440	5-8	84	0.16	50 (medium)
444	2-3	84	0.14	180 (slow)

**According to DIN 53137*

Plain circles

Grade 441		Grade 442		Grade 440		Grade 444	
Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.
55	441.055	55	442.055	55	440.055	55	444.055
70	441.070	70	442.070	70	440.070	70	444.070
90	441.090	90	442.090	90	440.090	90	444.090
110	441.110	110	442.110	110	440.110	110	444.110
125	441.125	125	442.125	125	440.125	125	444.125
150	441.150	150	442.150	150	440.150	150	444.150
185	441.185	185	442.185	185	440.185	185	444.185
240	441.240	240	442.240	240	440.240	240	444.240
270	441.270	270	442.270	270	440.270	270	444.270

Packing: 100 pcs. pr. box

Pleated

Grade 441F		Grade 442F		Grade 440F		Grade 444F	
Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.	Diam. [mm]	Cat. No.
110	441F.110	110	442F.110	110	440F.110	110	444F.110
125	441F.125	125	442F.125	125	440F.125	125	444F.125
150	441F.150	150	442F.150	150	440F.150	150	444F.150
185	441F.185	185	442F.185	185	440F.185	185	444F.185
240	441F.240	240	442F.240	240	440F.240	240	444F.240
320	441F.320	320	442F.320	320	440F.320	320	444F.320

Packing: 100 pcs. pr. box