01

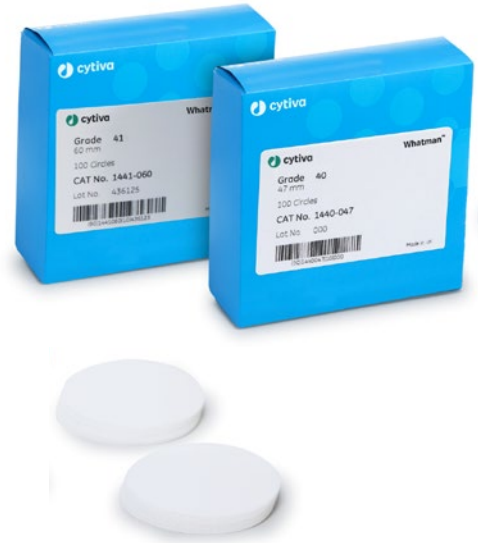
Filter papers

Cytiva's filter papers, including Pall and Whatman ranges, are crafted using the highest-grade raw materials and are subjected to rigorous quality control processes. This commitment makes our filters a trusted choice for laboratories and industries that demand consistent and dependable filtration performance.

Quantitative filter papers: Ashless grades

Whatman quantitative filters are designed for gravimetric analysis and preparation of samples for instrument analysis. They are available in three formats.

- **Ashless:** 0.007% ash nominal for Grades 40 to 44 and a typical nominal ash content of 0.01% for the 589 Grades. These filters are very pure and suitable for a wide range of critical analytical filtration procedures.
- **Hardened low ash:** 0.015% ash nominal, treated with a strong acid to remove trace metals and produce high wet strength and chemical resistance. These filters are particularly suitable for Büchner filtration where the tough, smooth surface of the filter makes it easy to recover precipitates.
- **Hardened ashless:** 0.005% ash nominal, acid hardened to give high wet strength and chemical resistance with extremely low ash content. The tough surface makes these filters suitable for a wide range of critical filtration procedures.



Quantitative filter papers, ashless

Grade 40: (8 µm*)

The classic general purpose ashless filter paper with medium speed and retention. Typical applications include gravimetric analysis for numerous components in cements, clays, iron, and steel products; as a primary filter for separating solid matter from aqueous extracts in general soil analysis; quantitative determination of sediments in milk, and as a pure analytical grade clean-up filter for solutions prior to AA spectrometry. Also used as a high-purity filter in the collection of trace elements and radionuclides from the atmosphere.

Grade 41 (20 µm*)

The fastest ashless filter paper, recommended for analytical procedures involving coarse particles or gelatinous precipitates (e.g., iron or aluminum hydroxides). Also used in quantitative air pollution analysis as a paper tape for impregnation when determining gaseous compounds at high flow rates.

Grade 42 (2.5 µm*)

Used for critical gravimetric analysis with the finest particle retention of all cellulose filter papers. Typical analytical precipitates include barium sulfate, metastannic acid, and finely precipitated calcium carbonate.

Grade 43 (16 µm*)

Intermediate in retention between Grades 40 and 41, and twice as fast as Grade 40. Typical applications include foodstuffs analysis, soil analysis, particle collection in air pollution monitoring for subsequent analysis by XRF techniques, and inorganic analysis in the construction, mining, and steel industries.

Grade 44 (3 µm*)

Thin version of Grade 42 retaining fine particles but with lower ash weight per sample and almost twice the flow rate of Grade 42.

* *Particle retention rating at 98% efficiency.*

Grade 589/1 (12-25 µm*)

Black ribbon filter: Ashless filter paper with high flow rate. Used for quantitative standard methods, especially for gravimetric applications (e.g., determination of the ash content in foodstuffs or for the Blaine test in the cement industry).

Also available fluted as Grade 589/1 ½.

Grade 589/2 (4-12 µm*)

White ribbon filter: Ashless standard filter paper for medium fine precipitates offering medium filtration speed. Applied in a variety of routine methods in quantitative analysis, (e.g., determination of the sand content in foodstuffs, determination of the grade of flour or analysis of aqueous suspensions in the paper industry).

Also available fluted as Grade 589/2 ½.

Grade 589/3 (2 µm*)

Blue ribbon filter: Ashless standard filter paper for fine precipitates. Slow filter paper with highest efficiency for collecting very small particles. Also used for many analytical routine methods in different industries (e.g., determination of the amount of insoluble contaminants in animal and vegetable fats and oils).

* *Particle retention rating at 98% efficiency*

Ashless quantitative filter paper circles

Technical specifications

Quantitative filter papers: Ashless grades

Grade	Typical particle retention in liquid (µm)[1]	Filtration speed (approx) herzberg (s)	Nominal ash content (%)[3]	Nominal thickness (µm)	Nominal basis weight (g/m²)	Typical water flow rate (mL/min)[2]	Nominal air flow rate (s/100 mL/in²)
40	8	–	0.007	210	95	25	21
41	20	–	0.007	215	85	254	4
42	2.5	–	0.007	200	100	5	96
43	16	–	0.007	220	95	62	11
44	3	–	0.007	176	80	11	56
589/1	12–25	25	0.01	190	80	–	–
589/2	4–12	70	0.01	180	85	–	–
589/3	2	375	0.01	160	84	–	–

1 *Particle retention rating at 98% efficiency*
2 *For 9 cm diameter*
3 *Ash is determined by ignition of the cellulose filter at 900°C in air*

Ordering information

Quantitative filter papers: Ashless grades

	Catalog number								
Diameter (mm)	**Grade 40**	**Grade 41**	**Grade 42**	**Grade 43**	**Grade 44**	**Grade 589/1**	**Grade 589/2**	**Grade 589/3**	**Quantity/pack**
Filter circles									
12.7	1440-012	–	–	–	–	–	–	–	400
12.7	–	–	–	–	–	–	10300102	10300263	1000
25	1441-6309	1441- 6309	–	–	–	–	–	–	10000
30	1440-329	–	–	–	–	–	–	–	100
32	1440-032	–	–	–	–	–	–	–	100
40.5	–	–	–	–	–	–	10300103	–	100
42.5	1440-042	1441-042	1442-042	–	–	–	–	–	100
47	1440-047	1441-047	1442-047	–	–	–	–	–	100
50	–	1441-050	–	–	–	–	10300106	–	100
55	1440-055	1441-055	1442-055	–	–	–	10300107	–	100
60	–	1441-060	–	–	–	–	–	–	100
70	1440-070	1441-070	1442-070	–	1444-070	–	10300108	–	100
79	–	–	1442-10055	–	–	–	–	–	100
90	1440-090	1441-090	1442-090	1443-090	1444-090	10300009	10300109	–	100
110	1440-110	1441-110	1442-110	1443-110	1444-110	10300010	10300110	10300210	100
125	1440-125	1441-125	1442-125	1443-125	1444-125	10300011	10300111	10300211	100
142	–	–	–	–	–	–	–	10300213	100
150	1440-150	1441-150	1442-150	1443-150	1444-150	10300012	10300112	10300212	100
185	1440-185	1441-185	1442-185	1443-185	1444-185	10300014	10300114	10300214	100
240	1440-240	1441-240	1442-240	–	1444-240	–	10300120	–	100
320	1440-320	1441-320	1442-320	–	–	–	–		100
450	1440-6168	–	–	–	–	–	–	–	100
500	–	–	–	–	–	–	–	–	100
700	–	–	–	–	–	–	–	–	100
Filter sheets									
25.4 × 90	–	–	1442-6551	–	–	–	–	–	100
203 × 254	–	1441-866	–	–	–	–	–	–	100
460 × 570	1440-917	1441-917	1442-917	–	–	–	–	–	100
Flag shape	–	–	1442-971	–	–	–	–	–	100

Quantitative filter papers: Hardened low ash grades

The maximum ash content of these grades is intermediate between ashless and qualitative grades. They are suitable for Büchner filtrations where it is desirable to recover the precipitate from the filter surface after filtration. Other characteristics include high wet strength and chemical resistance, which are similar to the acid hardened ashless filter papers.

Grade 50 (2.7 µm*)

Retention of fine crystalline precipitates. The thinnest of all filter papers with a slow flow rate, these filters have a hardened and glazed surface, which keeps the paper free from loose surface fibers. Suitable for qualitative or quantitative filtrations requiring vacuum assistance on Büchner or 3-piece filter funnels. Strong when wet and withstands wet handling and precipitate removal by scraping. In the electronics industry, the virtual absence of fiber shedding is utilized in carriers for integrated circuits.

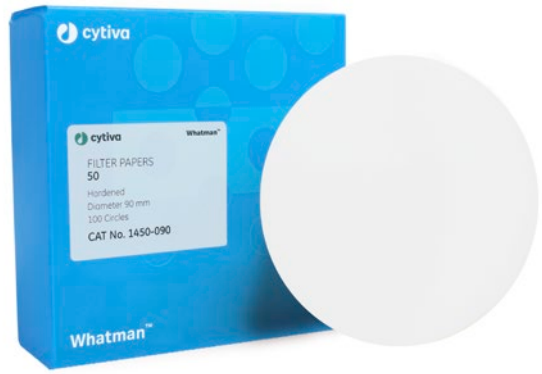
This grade is also available in Smear Tab format for wipe testing (e.g., testing of surfaces for radionuclide contamination).

Grade 52 (7 µm*)

The general purpose hardened filter paper with medium retention and flow rate. Very hard surface.

Grade 54 (22 µm*)

Fast filtration and high wet strength makes this grade suitable for vacuum assisted fast filtration of difficult coarse or gelatinous precipitates.



Hardened low ash quantitative filter papers

* *Particle retention rating at 98% efficiency.*

Technical specifications

Quantitative filter papers: Ashless grades

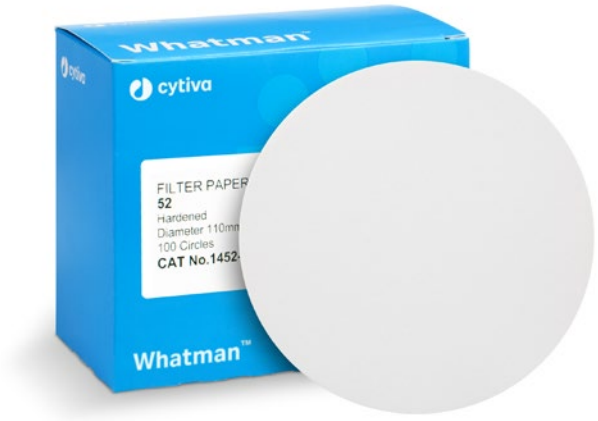
Grade	Typical particle retention in liquid (µm)[1]	Nominal ash content (%)[3]	Nominal thickness (µm)	Nominal basis weight (g/m²)	Typical water flow rate (mL/min)[2]	Nominal air flow rate (s/100 mL/in²)	Nominal air flow rate (s/100 mL/in²)
50	2.7	0.015	115	96	10	144	21
52	7	0.015	175	96	66	15	–
54	22	0.015	185	90	453	3	–

[1] *Particle retention rating at 98% efficiency*
[2] *For 9 cm diameter*
[3] *Ash is determined by ignition of the cellulose filter at 900°C in air*

Ordering information

Quantitative filter papers: Hardened low ash grades

	Catalog number			
Dimensions (mm)	**Grade 50**	**Grade 52**	**Grade 54**	**Quantity/pack**
Filter circles				
42.5	1450-042	–	–	100
55	1450-055	–	1454-055	100
63.5	1450-063	–	–	100
70	1450-070	–	1454-070	100
90	1450-090	1452-090	1454-090	100
110	1450-110	1452-110	1454-110	100
125	1450-125	1452-125	1454-125	100
150	1450-150	1452-150	1454-150	100
185	1450-185	–	1454-185	100
240	1450-240	1452-240	1454-240	100
320	1450-320	–	1454-320	100
500	1450-500	–	1454-500	100
Smear Tab	1450-993	–	–	100
Filter sheets				
150 × 230	1450-916	–	–	100
460 × 570	1450-917	–	1454-917	100

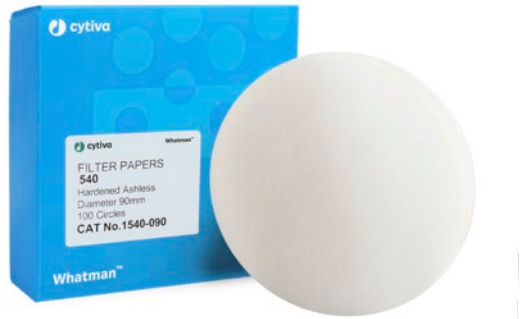


Hardened low ash quantitative filter papers

Quantitative filter papers: Hardened ashless grades

Hardened ashless filter papers are suited for a variety of precipitate sizes. Along with general filtration Grade 540, the range includes Grade 542 for retention of fine precipitates and Grade 541 for fast filtration. All three grades are designed for use in gravimetric analysis.

These filter papers exhibit high wet strength, chemical resistance, and are acid hardened, which reduces ash to an extremely low level. Their tough surfaces make them suitable for a range of critical analytical filtration operations. Each grade offers a convenient combination of filtration speed and particle retention.



Hardened ashless quantitative filter papers, Grade 540

Grade 540 (8 µm*)

A general purpose hardened ashless filter paper with medium retention and flow rate. Pure and strong with a hard surface. High chemical resistance to strong acid and alkali. Frequently used in the gravimetric analysis of metals in acid or alkali solutions and in collecting hydroxides after precipitation by strong alkalis.

Grade 541 (22 µm*)

The general purpose hardened filter paper with medium retention and flow rate. Very hard surface.

Grade 542 (2.7 µm*)

High retention of fine particles under demanding conditions. Slow flow rate. Very hard and strong with excellent chemical resistance. Often used in gravimetric metal determinations.

* *Particle retention rating at 98% efficiency.*

Technical specifications

Quantitative filter papers: Hardened ashless grades

Grade	Typical particle retention in liquid (µm)[1]	Nominal ash content (%)[3]	Nominal thickness (µm)	Nominal basis weight (g/m²)	Typical water flow rate (mL/min)[2]	Nominal air flow rate (s/100 mL/in²)
540	8	0.005	160	85	97	13
541	22	0.005	155	78	359	3
542	2.7	0.005	150	96	13	64

[1] *Particle retention rating at 98% efficiency*
[2] *For 9 cm diameter*
[3] *Ash is determined by ignition of the cellulose filter at 900°C in air*

Ordering information

Quantitative filter papers: Hardened ashless grades

	Catalog number			
Dimensions (mm)	**Grade 540**	**Grade 541**	**Grade 542**	**Quantity/pack**
Filter circles				
21	1540-321	–	–	100
24	1540-324	–	–	100
42.5	1540-042	1541-042	–	100
47	–	1541-047	–	100
55	1540-055	1541-055	1542-055	100
70	–	1541-070	1542-070	100
90	1540-090	1541-090	1542-090	100
110	1540-110	1541-110	1542-110	100
125	1540-125	1541-125	1542-125	100
150	1540-150	1541-150	1542-150	100
185	1540-185	1541-185	1542-185	100
240	1540-240	1541-240	1542-240	100
270	–	1541-270	–	100
320	1540-320	1541-320	–	100
400	–	1541-400	–	100
Filter sheets				
460 × 570	–	1541-917	–	100

Hardened ashless quantitative filter paper circles