

AHLSTROM



Laboratory Applications
of Filter Paper:
Environmental



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Environmental Laboratory Applications of Filter Paper



ASTM – American Standard Test Methods

ASTM D425-88 Test Method for Centrifuge Moisture Equivalent of Soils

The moisture content of soil is determined with this test. The wicking of water from the sample is obtained by using **Grade 909**.

ASTM D4767-11 Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils

The strength and stress-strain relationship of a cylindrical specimen of a saturated cohesive soil is tested with this method. **Grade 55** is used both for a pre-filter before the porous disc and as strips on the side of the specimen that expedite the test.

ASTM D5084-10 Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

This method applies to measuring the hydraulic conductivity, or coefficient of permeability, when a one-dimensional, laminar flow of water moves through porous materials such as soil or rock. **Grade 55** is typically used.

ASTM E1963-09.A2 Standard Guide for Conducting Terrestrial Plant Toxicity Tests: Root Elongation

Seeds are incubated under controlled conditions in petri dishes with filter paper, such as **Grade 601**, prior to measuring the root length to determine if a potentially toxic substance has affected the growth rate.

STM – Standard Test Methods for the Examination of Water and Waste Water, 22nd Edition

STM 2530 Particulate Floatables

Standard process to measure the quantity of particles that have a density less than that of the surrounding water, such as oil and grease, via gravity separation. **Grade 131** has the fine porosity needed for this test.

STM 2540 Total, Dissolved, Suspended, Fixed and Volatile Solids

Test method for the measurement of matter suspended or dissolved in water or wastewater. These solids analyses are important for the control of biological and physical wastewater treatment processes and for assessing compliance with regulatory agency effluent requirements. **Grade 161** is our traditional recommendation and continues to be effective, particularly for TSS testing. **Grade 169** is a newer grade designed specifically for gravimetric analysis and resistance to the higher temperatures needed for VSS testing. It has an improved ability to maintain the same weight before and after the drying procedure and is Ahlstrom's current preferred recommendation for this test. **Grade 169** is also available in a pre-washed and pre-weighed format for ease and efficiency of use.

STM 2710.B,D,E Tests on Sludges: Oxygen-Consumption Rate, Sludge Volume Index, Zone Settling Rate

Each of these tests requires the suspended solids concentration to calculate the property of interest. This value is determined via STM 2540, which calls for **Grade 161** or **169**.

STM 2710.G Tests on Sludges: Capillary Suction Time

This test measures the rate at which water will be released from sludge. The results help determine any necessary treatments needed to assist in the dewatering process of the sludge. **Grade 243** has the absorption characteristics needed for this application.

STM 2710.H Tests on Sludges: Time-to-Filter

This simpler measurement correlates with the capillary suction time measured in STM 2710.G. Either **Grade 601** or **642** may be used.

STM 3500-Fe Iron Detection: Phenanthroline Method

During digestion of samples containing organic interferences, the solution may need to be filtered through a glass fiber filter such as **Grade 161**.

STM 3500-Li Lithium Detection: Flame Emission Photometric Method

During sample preparation, the liquid may be filtered through a medium-porosity paper, such as **Grade 74**, to suppress ionization.

STM 3500-PB Lead Detection: Dithizone Method

Preparation of the dithizone includes filtering through a paper, such as **Grade 94**. During the sample digestion the sample is filtered through a lead-free filter paper, such as **Grade 55**.

STM 3500-Se Selenium Detection: Colorimetric Method

Grade 94 is used in preparing the DAN solution that is a reagent in the method. It can also be used in the general analytical scheme for determining which species of selenium are in the sample.

STM 3500-V Vanadium Detection: Gallic Acid Method

Grade 94 is used for preparation of the gallic acid solution required for each sample set.



STM 4500-P.C Phosphorus in Water: Vanadomolybdophosphoric Acid Colorimetric Method

During sample preparation a glass fiber filter may be used as a pre-filter before the membrane filter. **Grade 161** is suitable. Activated carbon is mixed into the test solution to remove interfering elements. The carbon is then filtered out using **Grade 94**, which will not impart any contaminants to the filtrate and will retain all the activated carbon.

STM 5510B Aquatic Humic Substances: Diethylaminoethyl (DEAE) Method

Humic substances are a major portion of organic matter within soil. In this method they are concentrated through column chromatography on DEAE cellulose prior to measurement. The filter used for the preparation of the DEAE is **Grade 601**.

STM 5520.B-D Oil and Grease: Partition- Gravimetric Method, Partition-Infrared Method, Soxhlet Extraction Method

During the separation process of the partition methods, the sample is filtered through **Grade 74**. This grade is also used in the Soxhlet method to collect the oil and grease prior to extraction.

STM 5910 UV-Absorbing Organic Constituents

This method to indicate the total level of organic compounds of various types in a sample of water calls for Ahlstrom **Grade 161**.

STM 6651 Glyphosate Herbicide

If suspended matter is present, then the sample is filtered through **Grade 601** before being tested for the presence of the herbicide glyphosate.

STM 7110.C Gross Alpha and Gross Beta Radioactivity: Coprecipitation Method

A glass fiber filter, such as **Grade 161**, is used to collect the precipitate formed in this test so that the radioactive count can be measured.

STM 7500-Ra Radium Detection: Precipitation Method

The precipitate is collected on a glass fiber filter, such as **Grade 169**, to measure its weight and radioactivity.

STM 7500-Sr Strontium Detection: Precipitation Method

The precipitate is collected on a paper filter, such as **Grade 94**, or a glass fiber filter, such as **Grade 169**, to measure its weight and radioactivity.

STM 8111 Biostimulation (Algal Productivity)

During separation of unialgal test species, the sample is filtered through a glass fiber pre-filter, such as **Grade 161**, and a membrane filter.

STM 8310.D Ciliated Protozoa: Growth Inhibition Test

Ciliates can be used to evaluate water and soil quality. **Grade 601** is used while preparing the culture.

STM 9213 Recreational Waters

The tests for *Staphylococcus aureus* and *Escherichia coli* follow the membrane filter technique described in STM 9222. A **ReliaDisc™** gridded membrane filter can be used in combination with the **Grade 222** as a filter pad.

STM 9222 Membrane Filter Technique for Members of the Coliform Group

A water sample is filtered through a gridded membrane, and the membrane is placed in a petri dish containing agar and an absorbent pad. The Ahlstrom **ReliaDisc™** product family includes sterile cellulose nitrate membranes with grid lines for this application. **Grade 222** is suitable for the absorbent pad. It is high purity cotton and is free of contaminants that would inhibit bacterial growth.

CFR – Code of Federal Register

40CFR60 App A Method 5 – Determination of Particulate Matter Emissions from Stationary Sources

Air emissions are sampled over a set amount of time through a glass microfiber filter, such as **Grade 161**, maintained at a temperature of 120°C. The mass of particulate matter deposited on the filter is then analyzed gravimetrically. The low mineral content, high reflectance, chemical resistance, loading capacity and heat resistance makes this the ideal media for this test. A quartz microfiber filter, such as **Grade MK360**, can also be used if a lower background concentration of metals is required.

40CFR60 App A Method 17 – Determination of Particulate Matter Emissions from Stationary Sources

This method is used instead of Method 5 when the amount of particulate matter is considered independent of temperature. With the thermal requirement eliminated, **Grade 111** becomes the better recommendation because it has a higher throughput than **Grade 161** while maintaining the necessary low mineral content and chemical resistance. Ahlstrom also offers glass microfiber thimbles, **Grade ET/MG160**.

40CFR62 Method 201 – Determination of PM₁₀ Emissions (Exhaust Gas Recycle Procedure)

This method for analyzing air emissions is used when the particulate matter of interest is 10 microns or less. A cyclone collector separates the particles and the fine ones are captured by **Grade 161** and the mass determined by gravimetric analysis. **Grade MK360**, a quartz microfiber filter, can also be used for a lower background concentration of metals.

40CFR SW-846 Method 1311 – Toxicity Characteristic Leaching Procedure (TCLP), Sludge

The propensity of sludge to leach potentially hazardous material into the ground water is analyzed with this method. **Grade 151** meets the specified retention and chemical inertness requirements. **Grade 193** or **Grade 26** can also be used for this method where filters with lower metals concentrations are required. **Grade 193** has inherently lower levels of barium and zinc. **Grade 26** is pre-treated and rinsed with deionized water as per the protocol within Method 1311.

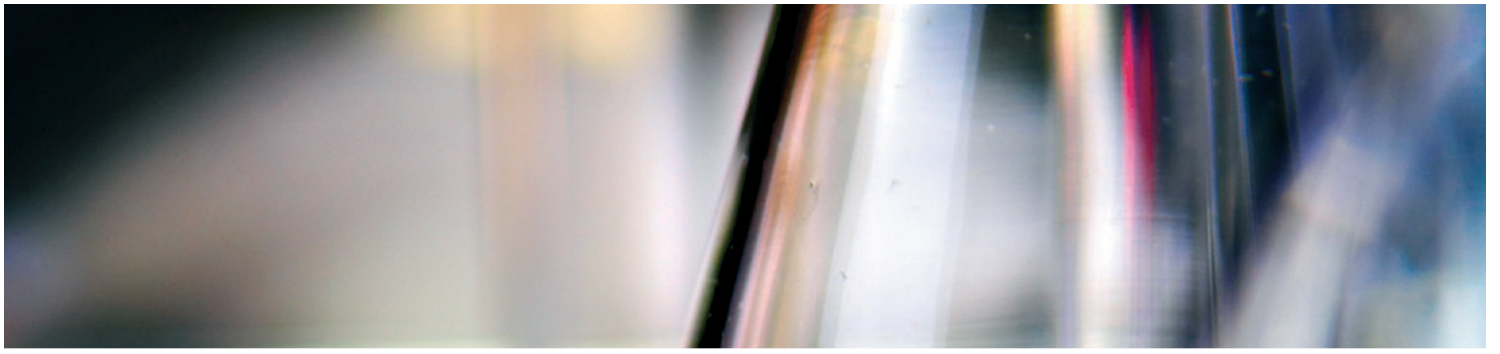
Brand Cross Reference

Ahlstrom	Media Type	Whatman	S&S	Advantec	Albet
55	Quantitative	54	1505		FP1505
74	Quantitative	40	589/2	3, 5B	FP589/2
94	Quantitative	42	589/3	5C	FP589/3
111	Microfiber Glass	GF/A	GF52	GA-55	FPGF50
131	Microfiber Glass	GF/C			FPGF52
151	Microfiber Glass	GF/F	GF55	GF-75	
161	Microfiber Glass	934AH	GF50		
222	Absorbent		470		
243	Absorbent		2668		
601	Qualitative	1	597	2	2043A
642	Qualitative	2		131, 232	2043B
909	Qualitative Wet-Strengthened	91	0860, 1574, 3003		

The grade recommendations presented are made based on the methods as described in the standard, which may include suggestions of filter type, or on knowledge of current usage. The comparative data included herein is based on publicly available information and/or Ahlstrom's analysis and the comparative grades are not represented or warranted to be exact functional or performance equivalents. All users must make their own determinations and comparisons as to the suitability of any products for their intended end-use.

Test Methods

Standard	Test Method	Title	Recommended Grade	Application
ASTM	D425-88	Test Method for Centrifuge Moisture Equivalent of Soils	909	Soil
ASTM	D4767-11	Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils	55	Soil
ASTM	D5084-10	Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter	55	Soil
ASTM	E1963-09	Standard Guide for Conducting Terrestrial Plant Toxicity Tests: Root Elongation	601	Soil, Water
STM	2530	Particulate Floatables	131	Water
STM	2540.C	Total Dissolved, Suspended, Fixed and Volatile Solids	161 or 169	Water
STM	2710.B,D,E	Tests on Sludges: Oxygen Consumption Rate, Sludge Volume Index, Zone Settling Rate	161 or 169	Sludge
STM	2710.G	Tests on Sludges: Capillary Suction Time	243	Sludge
STM	2710.H	Tests on Sludges: Time-to-Filter	601 or 642	Sludge
STM	3500-Fe	Iron detection: Phenanthroline Method	161	Water
STM	3500-Li	Lithium Detection: Flame Emission Photometric Method	74	Water
STM	3500-Pb	Lead Detection: Dithizone Method	94 and 55	Water
STM	3500-Se	Selenium Detection: Colorimetric Method	94	Water
STM	3500-V	Vanadium Detection: Gallic Acid Method	94	Water
STM	4500-P.C	Phosphorus in Water: Colorimetric Method	164 and 94	Water
STM	5510.B	Aquatic Humic Substances DEAE Method	601	Soil
STM	5520.B,C,D	Oil and Grease: Partition-Gravimetric, Partition-Infrared, and Soxhlet Extraction Methods	74	Water
STM	5910	UV-Absorbing Organic Constituents	161	Water
STM	6651	Glyphosate Herbicide	601	Water
STM	7110.C	Gross Alpha and Gross Beta Radioactivity	161	Water
STM	7500-Ra	Radium Detection: Precipitation Method	169	Water
STM	7500-Sr	Strontium Detection: Precipitation Method	94 or 169	Water
STM	8111.D	Biostimulation (Algal Productivity)	161	Water
STM	8310.D	Ciliated Protozoa: Growth Inhibition Test	601	Water
STM	9213	Recreational Waters	222, ReliaDisc™ cellulose nitrate membranes	Water
STM	9222	Membrane Filter Technique for Members of the Coliform Group	222, ReliaDisc™ cellulose nitrate membranes	Water
40CFR60 App A	Method 5	Determination of Particulate Matter Emissions from Stationary Sources	161, MK360	Air emissions
40CFR60 App A	Method 17	Determination of Particulate Matter Emissions from Stationary Sources	111, ET/MG160	Air emissions
40CFR62 App A	Method 201	Determination of PM10 Emissions (Exhaust Gas Recycle Procedure)	161, MK360	Air emissions
40CFR SW-846	Method 1311	Toxicity Characteristic Leaching Procedure	151, 193, 26	Sludge



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Ahlstrom is a high performance fiber-based materials company, partnering with leading businesses around the world to help them stay ahead. We aim to grow with a product offering for clean and healthy environment. Our materials are used in everyday applications such as filters, medical fabrics, life science and diagnostics, wallcoverings and food packaging. In 2014, Ahlstrom's net sales from the continuing operations amounted to EUR 1 billion. Ahlstrom's share is quoted on the NASDAQ OMX Helsinki. More information available at www.ahlstrom.com.

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