Designation: D5907 – 18

Standard Test Methods for Filterable Matter (Total Dissolved Solids) and Nonfilterable Matter (Total Suspended Solids) in Water[1]

This standard is issued under the fixed designation D5907; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 These test methods cover the determination of filterable matter, total dissolved solids (TDS), and nonfilterable matter, total suspended solids (TSS), in drinking, surface, and saline waters, domestic and industrial wastes. The practical range of the determination of nonfilterable particulate matter (TSS) is 4 to 20 000 mg/L. The practical range of the determination of filterable matter (TDS) is 10 mg/L to 150 000 µg/g. Section 20 on Quality Control pertains to these test methods.

1.2 Since the results measured by these test methods are operationally defined, careful attention must be paid to following the procedure as specified.

1.3 The test method for the determination of nonfilterable matter (TSS) must not be used when water samples were collected from open channel flow. For the determination of matter collected in open channel flow use Test Methods D3977.

1.4 The test methods appear in the following order:

Test Method A: Filterable Matter (TDS) and Nonfilterable Matter (TSS), mg/L	Sections 10 – 14
Test Method B: Total Dissolved Solids High Precision Method, µg/g	Sections 15 – 19

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For a specific hazard statement, see Section 8.

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1129 Terminology Relating to Water
D1193 Specification for Reagent Water
D1429 Test Methods for Specific Gravity of Water and Brine
D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water
D3370 Practices for Sampling Water from Closed Conduits
D3856 Guide for Management Systems in Laboratories Engaged in Analysis of Water
D3977 Test Methods for Determining Sediment Concentration in Water Samples
D4411 Guide for Sampling Fluvial Sediment in Motion
D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis
D5905 Practice for the Preparation of Substitute Wastewater
E319 Practice for the Evaluation of Single-Pan Mechanical Balances
E898 Test Method of Testing Top-Loading, Direct-Reading Laboratory Scales and Balances

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this standard, refer to Terminology D1129.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *filterable matter, n*—also commonly referred to as total dissolved solids (TDS).

3.2.1.1 *Discussion*—It is that dissolved matter that is capable of passing through a glass fiber filter and dried to constant weight at 180°C, as determined by following the procedures outlined in this test method.

3.2.2 *nonfilterable matter, n*—also commonly known as total suspended solids (TSS).

[1] These test methods are under the jurisdiction of ASTM Committee D19 on Water and are the direct responsibility of Subcommittee D19.05 on Inorganic Constituents in Water.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

3.2.2.1 *Discussion*—It is that particulate matter that is retained on a glass fiber filter and dried to a constant weight at 103 to 105°C, as determined by following the procedures outlined in these test methods.

4. Significance and Use

4.1 Solids, both as filterable matter (TDS) and nonfilterable matter (TSS), are important in the treating of raw water and wastewater, and in monitoring of streams.

4.2 Waste solids impose a suspended and settleable residue in receiving waters. Suspended and soluble materials provide a matrix for some biological slime and, in sufficient quantity, impair respiration of organisms. These solids may create nuisance slime beds and odors while imposing a long-term biological oxidation load over limited receiving water areas.

4.3 Knowledge of suspended and soluble materials is important in treating raw water supplies. Knowledge of solids loading can aid in determining the type or amount of treatment, or both, necessary to make the water acceptable for use. Such information may also be used to determine acceptability of water after treatment. Too little treatment may not be desirable and excess treatment costs money.

4.4 Stream monitoring is important for environmental reasons, such as compliance with discharge permits. Stream improvements, water pollution monitoring, mass wasting, algal studies, and sediment loads are but a few of the many reasons streams are monitored.

5. Interferences

5.1 For some samples, chemical reactions may cause some materials to change from one phase to another. For example, in some groundwaters, ferrous ions may form insoluble ferric hydroxides. Softened water high in carbonates may precipitate calcium carbonate. In such cases, holding time may have a critical impact upon both the filterable and nonfilterable matter. Such samples may have to be filtered in the field.

5.2 These test methods are not meant to include nonrepresentative particulates such as leaves, sticks, insects, fish, etc. These should be removed before the analysis.

5.3 Certain materials may be measured poorly, or not at all. Some materials may decompose or volatilize at the required temperature. Other substances, such as glycerin or sulfuric acid, will remain liquid at the required temperature, giving variable results. Oils and greases may present similar problems and can end up in either the filterable (TDS) or nonfilterable (TSS) portion.

5.4 Suspended solids samples high in dissolved matter, such as saline waters, brines, and some wastes, may be subject to a positive interference by the retention of dissolved matter, such as salts and sugars, on the filter. Care must be taken in the final rinsing of the filter so as to minimize this potential interferent. Additional washing may be necessary.

5.5 Clogging of the filter with too fine or too much material will prolong the filtering time and retain smaller particles that would normally pass through the filter, thus giving elevated values to nonfilterable matter (TSS) and low values to the filterable matter (TDS). Biological material, such as algae, may also prolong filtration time or plug the filter.

5.6 Some samples may be hygroscopic, requiring prolonged drying, extra careful desiccation, and rapid weighing. For filterable matter (TDS), samples highly mineralized or high in bicarbonate may require careful and possibly prolonged drying. For the bicarbonate, the extended drying may be needed to ensure complete conversion to carbonate.

5.7 Too much material retained on the filter may entrap water, and may also require extended drying time for the suspended solids. For filterable matter (TDS), excessive residue in the dish may cause the formation of a water-trapping crust, giving elevated values.

5.8 For some users, certain biological materials, such as algae, slimes, insects, or other small crustaceans, may be considered to be positive interferences for nonfilterable matter (TSS). Modifications or adjustments may be needed to generate a better value. An example is determining chlorophyll content to estimate the amount of algae present. Such modifications may be beyond the scope of this test method.

6. Apparatus

6.1 *Analytical Balance,* capable of measuring to the nearest 0.1 mg.[3] For the high precision total dissolved solids method, the recommended balance should have a capacity of 200 g and be capable of measuring to the nearest 0.01 mg.

6.2 *Drying Oven,* capable of maintaining a temperature between 103 and 105°C and between 178 and 182°C.

NOTE 1—To prevent dust and sample from being blown around, it is preferred that the oven for the particulate matter (TSS) be of a gravity convection type. If this is not possible, samples should be shielded from the forced air of mechanical convection ovens.

6.3 *Evaporating Dishes,* 70-mL to 250-mL capacity, not to exceed 200 g in weight.

6.4 *Glass Fiber Filters,* without organic binder.[4] 47-mm diameter filters are needed for the high precision TDS method when field filtration is not utilized.

NOTE 2—Although there is no organic binder in these filters, they may contain a wet strength resin that is partially soluble. It is therefore important to adequately prewash the filters as prescribed.

6.5 *Membrane Filter Assembly*—A borosilicate glass, stainless steel, or plastic funnel with a flat, fritted, or grid base so as to provide uniform support and filterable surface. The top section of the funnel shall fit over the edge of the filter to provide a seal. The top should be removable to allow easy access for removing the filter. A Gooch crucible with a fritted bottom may be used in lieu of the funnel. A 47-mm filter assembly is needed for the high precision TDS method when field filtration is not used.

6.6 *Planchet or Pan,* made of aluminum or stainless steel, capable of supporting the filter when it is not on the filter assembly.

[3] The balance prescribed in these test methods should be tested periodically according to Practice E319 or Test Method E898.

[4] Millipore AP-40, Whatman 934-AH, Gelman type A/E, or equivalent, was specified for the round-robin.