



Designation: D4189 – 23

Standard Test Method for Silt Density Index (SDI) of Water¹

This standard is issued under the fixed designation D4189; 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 This test method covers the determination of the silt density index (SDI) of water. This test method can be used to indicate the quantity of particulate matter in water and is applicable to relatively low (<1.0 NTU) turbidity waters such as well water, filtered water, or clarified effluent samples. Since the size, shape, and nature of particulate matter in water may vary, this test method is not an absolute measurement of the quantity of particulate matter.

1.2 This test method is not applicable for reagent grade water Types I, II, and III of Specification D1193, or effluents from most reverse osmosis and ultrafiltration systems.

1.3 *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.*

1.4 *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

D3370 Practices for Sampling Water from Flowing Process Streams

E1 Specification for ASTM Liquid-in-Glass Thermometers

¹ This test method is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.08 on Membranes and Ion Exchange Materials.

Current edition approved Nov. 1, 2023. Published November 2023. Originally approved in 1982. Last previous edition approved in 2014 as D4189 – 07 (2014) which was withdrawn July 2023 and reinstated in November 2023. DOI: 10.1520/D4189-23.

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.

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D1129.

3.2 *Definitions:*

3.2.1 *silt density index (SDI), n*—an index calculated from the rate of plugging of a $0.45\ \mu\text{m}$ membrane filter.

4. Summary of Test Method

4.1 Water is passed through a $0.45\ \mu\text{m}$ membrane filter at a constant applied gauge pressure of 207 kPa (30 psi), and the rate of plugging of the filter is measured.

4.2 The SDI is calculated from the rate of plugging.

5. Significance and Use

5.1 The SDI can serve as a useful indication of the quantity of particulate matter in water.

5.2 The SDI can be used to determine effectiveness of various processes such as filtration or clarification used to remove particulate matter.

5.3 The SDI has been empirically correlated with the fouling tendency of some water treatment equipment such as reverse osmosis devices.

5.4 The SDI may vary as a function of water temperature, and values obtained at different temperatures may not necessarily be comparable.

5.5 The SDI can vary with the membrane filter manufacturer. Thus, SDI values obtained with filters from different membrane manufacturers might not be comparable.

6. Apparatus

6.1 *SDI Assembly*, as schematically described in Fig. 1. All wetted parts should be made of high-quality stainless steel or plastic to prevent contamination by corrosion products. Do not use reactive materials such as carbon steel or cast iron. Suitable filter holders, designed to withstand an operating gauge pressure of 350 kPa (50 psi) can be obtained from suppliers of membrane filters.

6.2 *Membrane Filter:*

6.2.1 *Membrane*—White hydrophilic, mixed cellulose nitrate (50 % to 75 %) and cellulose acetate (MCE).

6.2.2 *Mean Pore Size*— $0.45\ \mu\text{m}$.