Designation: D888 – 18 (Reapproved 2026)

Standard Test Methods for Dissolved Oxygen in Water[1]

This standard is issued under the fixed designation D888; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 These test methods cover the determination of dissolved oxygen in water. Three test methods are given as follows:

	Range, mg/L	Sections
Test Method A—Titrimetric Procedure–High Level	>1.0	8 – 15
Test Method B—Instrumental Probe Procedure—Electrochemical	0.05 to 20	16 – 25
Test Method C—Instrumental Probe Procedure—Luminescence-Based Sensor	0.05 to 20	26 – 31

1.2 The precision of Test Methods A and B was carried out using a saturated sample of reagent water. It is the user's responsibility to ensure the validity of the test methods for waters of untested matrices.

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

1.4 *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 precautionary statements, see 7.1 and Note 17.

1.5 *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]

D1066 Practice for Sampling Steam

D1129 Terminology Relating to Water

D1193 Specification for Reagent Water

D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

D3370 Practices for Sampling Water from Flowing Process Streams

D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis

E200 Practice for Preparation, Standardization, and Storage of Standard and Reagent Solutions for Chemical Analysis

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 *amperometric systems, n*—those instrumental probes that involve the generation of an electrical current from which the final measurement is derived.

3.2.2 *instrumental probes, n*—devices used to penetrate and examine a system for the purpose of relaying information on its properties or composition.

3.2.2.1 *Discussion*—The term probe is used in these test methods to signify the entire sensor assembly, including electrodes, electrolyte, membrane, materials of fabrications, and so on.

3.2.3 *potentiometric systems, n*—those instrumental probes in which an electrical potential is generated and from which the final measurement is derived.

4. Significance and Use

4.1 Dissolved oxygen is required for the survival and growth of many aquatic organisms, including fish. The concentration of dissolved oxygen may also be associated with corrosivity and photosynthetic activity. The absence of oxygen may permit anaerobic decay of organic matter and the production of toxic and undesirable esthetic materials in the water.

5. Purity of Reagents

5.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that

[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.

Current edition approved May 1, 2026. Published May 2026. Originally approved in 1946. Last previous edition approved in 2018 as D888 – 18. DOI: 10.1520/D0888-18R26.

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

all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society.[3] Other grades may be used if it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.1.1 Reagent grade chemicals, as defined in Practice E200, shall be used unless otherwise indicated. It is intended that all reagents conform to this standard.

5.2 Unless otherwise indicated, reference to water shall be understood to mean reagent water conforming to Specification D1193, Type I. Other reagent water types may be used provided it is first ascertained that the water is of sufficiently high purity to permit its use without adversely affecting the bias and precision of the test method. Type II water was specified at the time of round robin testing of this test method.

6. Sampling

6.1 Collect the samples in accordance with Practices D1066 and D3370.

6.2 For higher concentration of dissolved oxygen, collect the samples in narrow mouth glass-stoppered bottles of 300 mL capacity, taking care to prevent entrainment or solution of atmospheric oxygen.

6.3 With water under pressure, connect a tube of inert material to the inlet and extend the tube outlet to the bottom of the sample bottle. Use stainless steel, Type 304 or 316, or glass tubing with short neoprene connections. Do not use copper tubing, long sections of neoprene tubing, or other types of polymeric materials. The sample line shall contain a suitable cooling coil if the water being sampled is above room temperature, in which case cool the sample 16 °C to 18 °C. When a cooling coil is used, the valve for cooling water adjustment shall be at the inlet to the cooling coil, and the overflow shall be to a point of lower elevation. The valve for adjusting the flow of sample shall be at the outlet from the cooling coil. The sample flow shall be adjusted to a rate that will fill the sampling vessel or vessels in 40 s to 60 s and flow long enough to provide a minimum of ten changes of water in the sample vessel. If the sampling line is used intermittently, flush the sample line and cooling coil adequately before using.

6.4 Where samples are collected at varying depths from the surface, a special sample bottle holder or weighted sampler with a removable air tight cover should be used. This unit may be designed to collect several 250 mL or 300 mL samples at the same time. Inlet tubes extending to the bottom of each bottle and the water after passing through the sample bottle or bottles displaces air from the container. When bubbles stop rising from the sampler, the unit is filled. Water temperature is measured in the excess water in the sampler.

6.5 For depths greater than 2 m, use a Kemmerer-type sampler. Bleed the sample from the bottom of the sampler through a tube extending to the bottom of a 250 mL to 300 mL biological oxygen demand (BOD) bottle. Fill the bottle to overflowing and prevent turbulence and the formation of bubbles while filling the bottle.

7. Preservation of Samples

7.1 Do not delay the determination of dissolved oxygen. Samples for Test Method A may be preserved 4 h to 8 h by adding 0.7 mL of concentrated sulfuric acid (sp gr 1.84) and 1.0 mL of sodium azide solution (20 g/L) to the bottle containing the sample in which dissolved oxygen is to be determined. Biological activity will be inhibited and the dissolved oxygen retained by storing at the temperature of collection or by water sealing (inverting bottle in water) and maintaining at a temperature of 10 °C to 20 °C. Complete the determination as soon as possible, using the appropriate procedure for determining the concentration of dissolved oxygen. (**Warning—**Sodium azide is highly toxic and multagenic. Follow manufacturer's instruction for handling and storage.)

TEST METHOD A
TITRIMETRIC PROCEDURE—HIGH LEVEL

8. Scope

8.1 This test method is applicable to waters containing more than 1000 µg/L of dissolved oxygen such as stream and sewage samples. It is the user's responsibility to ensure the validity of the test method for waters of untested matrices.

8.2 This test method, with the appropriate agent, is usable with a wide variety of interferences. It is a combination of the Winkler Method, the Alsterberg (Azide) Procedure, the Rideal-Stewart (permanganate) modification, and the Pomeroy-Kirshman-Alsterberg modification.

8.3 The precision of the test method was carried out using a saturated sample of reagent water.

9. Interferences

9.1 Nitrite interferences are eliminated by routine use of sodium azide. Ferric iron interferes unless 1 mL of potassium fluoride solution is used, in which case 100 mg/L to 200 mg/L can be tolerated. Ferrous iron interferes, but that interference is eliminated by the use of potassium permanganate solution. High levels of organic material or dissolved oxygen can be accommodated by use of the concentrated iodide-azide solution.

10. Apparatus

10.1 *Sample Bottles,* 250 mL or 300 mL capacity with tapered ground-glass stoppers. Special bottles with pointed stoppers and flared mouths are available from supply houses, but regular types (tall or low form) are satisfactory.

10.2 *Pipettes,* 10 mL capacity, graduated in 0.1 mL divisions for adding all reagents except sulfuric acid. These pipettes should have elongated tips of approximately 10 mm for adding reagents well below the surface in the sample bottle. Only the sulfuric acid used in the final step is allowed to run down the neck of the bottle into the sample.

[3] *ACS Reagent Chemicals, Specifications and Procedures for Reagents and Standard-Grade Reference Materials*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.