



Designation: D6504 – 11 (Reapproved 2024)

Standard Practice for On-Line Determination of Cation Conductivity in High Purity Water¹

This standard is issued under the fixed designation D6504; 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 practice describes continuous sample conditioning by hydrogen ion exchange and measurement by electrolytic conductivity. It is commonly known as cation conductivity measurement in the power industry although it is actually an indication of anion contamination in high purity water samples. Measurements are typically in a range less than 1 $\mu\text{S}/\text{cm}$.

1.2 The actual conductivity measurements are made using Test Method [D5391](#).

1.3 This practice does not provide for separate determination of dissolved carbon dioxide. Refer to Test Method [D4519](#).

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

1.5 *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.*

1.6 *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](#)

¹ This practice is under the jurisdiction of ASTM Committee [D19](#) on Water and is the direct responsibility of Subcommittee [D19.03](#) on Sampling Water and Water-Formed Deposits, Analysis of Water for Power Generation and Process Use, On-Line Water Analysis, and Surveillance of 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.

[D1125 Test Methods for Electrical Conductivity and Resistivity of Water](#)

[D1129 Terminology Relating to Water](#)

[D1193 Specification for Reagent Water](#)

[D3370 Practices for Sampling Water from Flowing Process Streams](#)

[D3864 Guide for On-Line Monitoring Systems for Water Analysis](#)

[D4519 Test Method for On-Line Determination of Anions and Carbon Dioxide in High Purity Water by Cation Exchange and Degassed Cation Conductivity](#)

[D5391 Test Method for Electrical Conductivity and Resistivity of a Flowing High Purity Water Sample](#)

[D5540 Practice for Flow Control and Temperature Control for On-Line Water Sampling and Analysis](#)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, refer to Test Methods [D1125](#), Terminology [D1129](#), and Guide [D3864](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cation conductivity, n* —the parameter obtained by conditioning a sample by passing it through a hydrogen form cation ion exchange resin column and then measuring its electrolytic conductivity, on-line.

3.2.2 *specific conductivity, n* —direct electrolytic conductivity measurement of a power plant sample, usually dominated by treatment chemicals, such as ammonia or amines.

4. Summary of Practice

4.1 The sample is passed continuously through a small cation exchange column in the hydrogen form, which exchanges all cations for H^+ . In this process, pH adjusting treatment chemicals, such as ammonia and amines are removed.

4.2 Measurement is made continuously on the conditioned sample with a process high purity conductivity analyzer/transmitter.

4.3 Temperature conditioning of the sample and specialized compensation of the measurement are used to minimize