



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.

^{ε1} NOTE—Editorial corrections were made throughout in February 2016.

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 μS/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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

[D1066](#) Practice for Sampling Steam

[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 Closed Conduits

[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 temperature effects on the performance of the ion exchange resin and the measurement.

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.