



Designation: **D3087 – 91 (Reapproved 2009) D3087 – 17**

## Standard Test Method for Operating Performance of Anion-Exchange Materials for Strong Acid Removal<sup>1</sup>

This standard is issued under the fixed designation D3087; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the determination of the operating capacity of anion-exchange materials when used for the removal of hydrochloric and sulfuric acid from water. It is designed to simulate operating conditions for strong acid removal and is intended for use in testing both new and used materials.

1.2 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

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 and health 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:*<sup>2</sup>

[D1067 Test Methods for Acidity or Alkalinity of Water](#)

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

[D1129 Terminology Relating to Water](#)

[D1193 Specification for Reagent Water](#)

[D2687 Practices for Sampling Particulate Ion-Exchange Materials](#)

[ASTM D3087-17](#)

<https://standards.iteh.ai/catalog/standards/sist/a26f68cf-fcc1-4374-8872-bac9c34a5ca8/astm-d3087-17>

<sup>1</sup> 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.

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

D5391 Test Method for Electrical Conductivity and Resistivity of a Flowing High Purity Water Sample

**3. Terminology**

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

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**4. Summary of Test Method**

4.1 The test method consists of repeated cycles of backwash, base regeneration, rinse, and exhaustion of the sample in the form of a bed in a transparent column. The exhaustion medium used is an ion-exchange test water.

**5. Significance and Use**

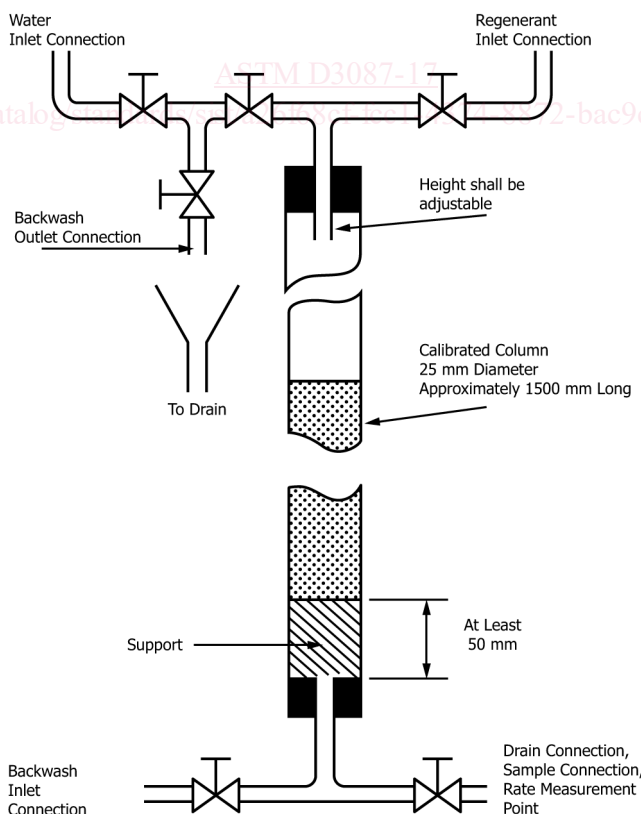
5.1 This test method can be used for evaluating performance of commercially available anion-exchange materials regardless of the basic strength of the ion exchange groups. When previous operating history is known, a good interpretation of resin fouling or malfunction can be obtained by comparison against a reference sample of unused ion-exchange material evaluated in the same way.

5.2 While resistivity has been chosen as the preferred analytical method for defining the exhaustion end point, with titration as the alternative, it is understood that observation of pH during rinse and the service run can yield useful information. The variations in pH observed with an ion exchange material suspected of having degraded, can be helpful in interpretation of performance when compared with similar data for a reference sample of unused material exhausted in the same way.

**6. Apparatus**

6.1 *Test Assembly* (see **Fig. 1**), consisting of the following:

6.1.1 *Column*, transparent, vertically supported,  $25.4 \pm 2.5$ -mm ( $1.0 \pm 0.1$ -in.) inside diameter and approximately 1.5 m (60 in.) long. The bottom of the column shall be closed and provided with an outlet of approximately 6-mm ( $1/4$ -in.) inside diameter. Connections shall be provided at the top and bottom for the admission and removal of the solutions described in Section 7. Adequate means for measuring and regulating the flow shall also be provided. The column shall be calibrated in such a manner that the volume readings required by the method can be made (see Section 9). All measurements shall be made at  $25 \pm 5^\circ\text{C}$ .



**FIG. 1 Typical Arrangement of Apparatus for Performance Testing of Ion-Exchange Materials**