



Designation: D3803 – 91 (Reapproved 2022)

Standard Test Method for Nuclear-Grade Activated Carbon¹

This standard is issued under the fixed designation D3803; 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 is a very stringent procedure for establishing the capability of new and used activated carbon to remove radio-labeled methyl iodide from air and gas streams. The single test method described is for application to both new and used carbons, and should give test results comparable to those obtained from similar tests required and performed throughout the world. The conditions employed were selected to approximate operating or accident conditions of a nuclear reactor which would severely reduce the performance of activated carbons. Increasing the temperature at which this test is performed generally increases the removal efficiency of the carbon by increasing the rate of chemical and physical absorption and isotopic exchange, that is, increasing the kinetics of the radioiodine removal mechanisms. Decreasing the relative humidity of the test generally increases the efficiency of methyl iodide removal by activated carbon. The water vapor competes with the methyl iodide for adsorption sites on the carbon, and as the amount of water vapor decreases with lower specified relative humidities, the easier it is for the methyl iodide to be adsorbed. Therefore, this test method is a very stringent test of nuclear-grade activated carbon because of the low temperature and high relative humidity specified. This test method is recommended for the qualification of new carbons and the quantification of the degradation of used carbons.

1.1.1 Guidance for testing new and used carbons using conditions different from this test method is offered in **Annex A1**.

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

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 This test method is under the jurisdiction of ASTM Committee D28 on Activated Carbon and is the direct responsibility of Subcommittee D28.04 on Gas Phase Evaluation Tests.

Current edition approved Sept. 1, 2022. Published October 2022. Originally approved in 1979. Last previous edition approved in 2014 as D3803 – 91 (2014). DOI: 10.1520/D3803-91R22.

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

D1193 Specification for Reagent Water

D2652 Terminology Relating to Activated Carbon

D2854 Test Method for Apparent Density of Activated Carbon

E300 Practice for Sampling Industrial Chemicals

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 Code of Federal Regulations:

CFR Title 49, Section 173.34, “Qualification, Maintenance, and Use of Cylinders”³

CFR Title 49, Part 178, Subpart C, “Specifications for Cylinders”³

2.3 Military Standards:

MIL-F-51068D Filter, Particulate High Efficiency, Fire Resistant⁴

MIL-F-51079A Filter, Medium Fire Resistant, High Efficiency⁴

MIL-STD-45662 Calibration Systems Requirements⁴

2.4 Other Standards:

ANSI/ASME N45.2.6 Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants⁵

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

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 Published by the General Service Administration, 18th and “F” St., N. W., Washington, DC 20405.

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.