



Designation: D8526 – 23

Standard Test Method for Analytical Procedure Using Transmission Electron Microscopy for the Determination of the Concentration of Carbon Nanotubes and Carbon Nanotube-containing Particles in Ambient Atmospheres¹

This standard is issued under the fixed designation D8526; 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 an analytical procedure using transmission electron microscopy (TEM) for the determination of the concentration of carbon nanotubes and carbon nanotube-containing particles in ambient atmospheres.

1.1.1 This test method is suitable for determination of carbon nanotubes in both ambient (outdoor) and building atmospheres.

1.2 This test method is defined for polycarbonate capillary pore filters through which a known volume of air has been drawn and for blank filters.

1.3 The direct analytical method cannot be used if the general particulate matter loading of the sample collection filter as analyzed exceeds approximately 25 % coverage of the collection filter by particulate matter.

1.4 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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.*

¹ This test method is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.07 on Sampling, Analysis, Management of Asbestos, and Other Microscopic Particles.

Current edition approved Sept. 1, 2023. Published September 2023. DOI: 10.1520/D8526-23.

2. Referenced Documents

2.1 ASTM Standards:²

D1193 Specification for Reagent Water

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D1357 Practice for Planning the Sampling of the Ambient Atmosphere

D5337 Practice for Setting and Verifying the Flow Rate of Personal Sampling Pumps

D6281 Test Method for Airborne Asbestos Concentration in Ambient and Indoor Atmospheres as Determined by Transmission Electron Microscopy Direct Transfer (TEM)

D7712 Terminology for Sampling and Analysis of Asbestos

E2456 Terminology Relating to Nanotechnology

2.2 NIOSH Standards:³

NIOSH 7400 Asbestos and Other Fibers by PCM

NIOSH 7402 Asbestos by TEM

3. Terminology

3.1 *Definitions*—For definitions of general terms used in this test method, refer to Terminologies D1356, D7712, and E2456.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *analytical sensitivity, n*—the calculated airborne nanotube structure concentration in nanotube structures per liter, equivalent to the counting of one nanotube structure in the analysis.

3.2.2 *carbon nanotube, n*—an allotrope of carbon structurally defined by a size of less than 100 nm in two or more

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 Available from National Institute for Occupational Health and Safety (NIOSH), 400 7th Street S.W., Suite 5W, Washington, D.C. 20024, <https://www.cdc.gov/niosh/index.htm>.