



Designation: D 4240 - 83 (Reapproved 1989)^{e1}

AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Airborne Asbestos Concentration in Workplace Atmosphere¹

This standard is issued under the fixed designation D 4240; 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 (^e) indicates an editorial change since the last revision or reapproval.

^{e1} NOTE—Sections were rearranged editorially in July 1989.

1. Scope

1.1 This test method covers the quantitative number-count concentration of asbestos fibers (expressed as the number of such fibers per cubic centimeter of air) as a measure of the average exposure applicable in workplaces to such particulate matter when asbestos fibers are known *a priori* to be a major constituent of the airborne dust. Applicable workplaces include those involving the following activities: mining of asbestos ore; milling of asbestos ore; transportation of bulk asbestos and asbestos mixtures; manufacturing primary and secondary processing of asbestos; and product use of asbestos.

1.1.1 In the event that asbestos mineral is a minor constituent of the dust, or its origin or identity is unknown (such as, for example, in an urban ambient air sample or in a formulator's workplace where many mixed mineral dusts may be present) it is the responsibility of the investigator to demonstrate beyond doubt that the asbestiform particulate observed and counted is indeed a member of the class of asbestos minerals subject to regulatory control. Appropriate tests for confirmation of identity are available but are not made a part of this procedure and such methods must be sought elsewhere.

1.2 This test method describes the equipment and procedure for sampling the atmosphere at the breathing zone and for determining the number of asbestos fibers accumulated on a standard filter membrane during the course of an appropriately selected sampling period.

1.3 This test method is generally applicable for the number-count determination of airborne asbestiform particulates ranging from 0.5 to 20 particulates (as defined in 1.4) per cubic centimeter of air.

1.4 Only asbestiform particulates with a length greater than 5 μm , a maximum diameter of 3 μm , and an aspect ratio (length to width ratio) of at least 5:1 are counted.

1.5 This method specifically excludes any application for the quantitative determination of asbestiform particulates in bulk (mineral or dust) samples.

1.6 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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.* For

specific precautionary statements, see Note 6.

2. Referenced Documents

2.1 ASTM Standards:

D 3670 Practice for Determination of Precision and Accuracy of Methods of Committee D-22²

E 849 Practice for Safety and Health Requirements Relating to Occupational Exposure to Asbestos²

2.2 AIA Standard:

Recommended Technical Method No. 1 (RTM 1)³

3. Terminology

3.1 Descriptions of Terms:

3.1.1 *fiber*—an elongated single crystal, or a similarly elongated polycrystalline aggregate, that displays some resemblance to organic fibers (1).⁴

3.1.2 *fibrous*—a mineral that is composed of parallel, radiating, or interlaced aggregates of fibers, from which the fibers are sometimes separable. That is, the crystalline aggregate may be referred to as fibrous even if it is not composed of separable fibers, but has that distinct appearance. The term *fibrous* is used in a general mineralogical way to describe aggregates of grains that crystallize in a needlelike habit and appear to be composed of fibers. *Fibrous* has a much more general meaning than asbestos. While it is correct that all asbestos minerals are fibrous, not all minerals having fibrous habit are asbestos.

3.1.3 *asbestiform*—a special type of fibrous habit in which the fibers are separable into thinner fibers and ultimately into fibrils. This habit accounts for greater flexibility and higher tensile strength than other habits of the same mineral. The increased flexibility and higher tensile strength are, apparently, the most distinct properties of asbestiform fibers.

3.1.4 *fibril*—a single fiber, that cannot be separated into smaller components without losing its fibrous properties or appearances.

3.1.5 *asbestos*—a collective mineralogical term that describes a group of naturally occurring, inorganic, highly fibrous, silicate minerals, which are easily separated into long, thin, flexible fibers when crushed or processed. Included in the definition are the asbestiform varieties of: serpentine (chrysotile); riebeckite (crocidolite); grunerite (grunerite)

¹ This test method is under the jurisdiction of ASTM Committee D-22 on Sampling and Analysis of Atmospheres and is the direct responsibility of Subcommittee D22.04 on Workplace Atmospheres.

Current edition approved June 10, 1983. Published October 1983.

² Annual Book of ASTM Standards, Vol 11.03.

³ Available from Asbestos International Association, 68 Gloucester Place, London, W1H 3HL, England.

⁴ The boldface numbers in parentheses refer to the list of references at the end of the test method.