



Standard Test Method for Airborne Asbestos Concentration in Ambient and Indoor Atmospheres as Determined by Transmission Electron Microscopy Direct Transfer (TEM)¹

This standard is issued under the fixed designation D 6281; 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 method² is an analytical procedure using transmission electron microscopy (TEM) for the determination of the concentration of asbestos structures in ambient atmospheres and includes measurement of the dimension of structures and of the asbestos fibers found in the structures from which aspect ratios are calculated.

1.1.1 This test method allows determination of the type(s) of asbestos fibers present.

1.1.2 This test method cannot always discriminate between individual fibers of the asbestos and non-asbestos analogues of the same amphibole mineral.

1.2 This test method is suitable for determination of asbestos in both ambient (outdoor) and building atmospheres.

1.2.1 This test method is defined for polycarbonate capillary-pore filters or cellulose ester (either mixed esters of cellulose or cellulose nitrate) filters through which a known volume of air has been drawn and for blank filters.

1.3 The upper range of concentrations that can be determined by this test method is 7000 s/mm². The air concentration represented by this value is a function of the volume of air sampled.

1.3.1 There is no lower limit to the dimensions of asbestos fibers that can be detected. In practice, microscopists vary in their ability to detect very small asbestos fibers. Therefore, a minimum length of 0.5 μm has been defined as the shortest fiber to be incorporated in the reported results.

1.4 The direct analytical method cannot be used if the general particulate matter loading of the sample collection filter as analyzed exceeds approximately 10 % coverage of the collection filter by particulate matter.

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:³

D 1193 Specification for Reagent Water

D 1356 Terminology Relating to Sampling and Analysis of Atmospheres

D 1357 Practice for Planning the Sampling of the Ambient Atmosphere

2.2 ISO Standard:⁴

ISO 10312 Ambient air - Determination of asbestos fibres - Direct-transfer transmission electron microscopy method

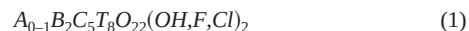
3. Terminology

3.1 For definitions of general terms used in this test method, refer to Terminology D 1356 (see 2.1).

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *acicular*—the shape shown by an extremely slender crystal with cross-sectional dimensions that are small relative to its length, that is, needle-like.

3.2.2 *amphibole*—a group of more than 60 different silicate minerals with similar crystal structures and complex compositions that conform to the nominal formula:



where:

A = K, Na, Ca,

B = Fe²⁺, Mn, Mg, Ca, Na,

C = Al, Cr, Ti, Fe³⁺, Mg, Fe²⁺, Mn, and

T = Si, Al, Cr, Fe³⁺, Ti.

In some varieties of amphibole, these elements can be partially substituted by Li, Pb, Zn, Be, Ba, or Ni. Amphiboles are characterized by a complex monoclinic or orthorhombic structure that includes a double chain of T-O tetrahedra with a

¹ This test method is under the jurisdiction of ASTM Committee D22 on Sampling and Analysis of Atmospheres and is the direct responsibility of Subcommittee D22.07 on Asbestos.

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² This test method was adapted from International Standard ISO 10312 "Air quality - Determination of asbestos fibres - Direct transfer transmission electron microscopy method."

³ 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.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.