

**Designation: D 1704M – 95**
METRIC

AMERICAN SOCIETY FOR TESTING AND MATERIALS

1916 Race St. Philadelphia, Pa 19103

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Standard Test Method for Determining the Amount of Particulate Matter in the Atmosphere by Measurement of the Light Absorbance of a Filter Sample [Metric]¹

This standard is issued under the fixed designation D 1704M; 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 measures a function of the concentration of suspended particulate matter in the ambient atmospheres quickly and inexpensively. Hourly repetitive samples are taken automatically.

1.2 This test method does not provide results in mass/volume units but in a method-defined unit, dust coefficient per km (D_c/km), which is directly related to the soiling effect of the sampled atmosphere when drawn through filter paper. Relations between D_c/km and mass concentration measurements are dependent on the nature, size distribution, shape, and refractive index of the particulate matter. When these factors are constant at one site, a useful relationship between D_c/km and mass concentration values can often be developed.

1.3 The test method can accommodate low and high concentrations of suspended particulate matter by alteration of the sample volume via flow rate or sampling time changes.

1.4 The test method is not applicable when fog or mist are present in the sampled atmosphere because wet filter paper has a flow resistance so high that the sample pump will not be able to draw sample air through the paper.

1.5 The transfer of the sample from the atmosphere to the instrument will precipitate some of the particulate matter on the walls of the tubing used. Guidelines to minimize this effect are included below, but the test method is limited to situations in which a short sampling line, that is, less than 5 m, can be provided.

1.6 The accuracy, reproducibility, and usefulness of this and other test methods for measurements of suspended particulate matter in the ambient atmosphere are limited severely by the absence of primary calibration standards ("standard dirty air"), and by the characterization of a complex and variable material, suspended particulate matter, by a single property (soiling effect, mass per volume, etc.). These limitations should be borne in mind constantly when a test method is selected and results from it are evaluated.

1.7 This test method is not designed to be used for industrial hygiene monitoring in the absence of other more specific monitoring test methods.

1.8 A complete ft-lb companion to Test Method

D 1704M has been developed, D 1704. See Annex A1 for conversion of data from one test method to the other.

1.9 *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:

D 1071 Test Methods for Volumetric Measurement of Gaseous Fuel Samples²

D 1356 Terminology Relating to Sampling and Analysis of Atmospheres³

D 1357 Practice for Planning the Sampling of the Ambient Atmosphere³

D 3631 Test Methods for Measuring Surface Atmospheric Pressure³

D 4096 Test Method for Determination of Total Suspended Particulate Matter in the Atmosphere (High-Volume Sampler Method)³

E 1 Specification for ASTM Thermometers⁴

E 11 Specification for Wire-Cloth Sieves for Testing Purposes⁵

E 131 Terminology Relating to Molecular Spectroscopy⁶

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminologies D 1356 and E 131.

3.2 Descriptions of Terms Specific to This Standard:

3.2.1 *absorbance*—the logarithm (to base ten) of the ratio of the intensities of light passing through clean filter paper to the same filter paper upon which a spot of particulate matter has been collected. The term is then used to refer to the absorbance of the spot.

3.2.2 *dust coefficient per km (D_c/km)*—the absorbance, multiplied by 100, of a spot of particulate material collected by filtration from the atmosphere on filter paper, normalized to the length, in km, of a right cylinder of air having a volume equal to that of the air sampled and a cross-section equal in area to the spot.

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 D22.03 on Ambient Atmospheres and Source Emissions.

Current edition approved Jan. 15, 1995. Published March 1995. Originally published as D 1704M – 93. Last previous edition D 1704M – 94.

² Annual Book of ASTM Standards, Vol 05.05.

³ Annual Book of ASTM Standards, Vol 11.03.

⁴ Annual Book of ASTM Standards, Vol 14.03.

⁵ Annual Book of ASTM Standards, Vol 14.02.

⁶ Annual Book of ASTM Standards, Vol 03.06.