



Standard Test Method for MASS CONCENTRATION OF PARTICULATE MATTER IN THE ATMOSPHERE (CONTINUOUS-MEASUREMENT LIGHT-SCATTERING METHOD)¹

This Standard is issued under the fixed designation D 1899; 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.

The committee responsible for this standard has voted its withdrawal. In the absence of substantial reasons that it should be continued, the Society will approve withdrawal from publication in November 1977.

1. Scope

1.1 This method covers the continuous recording of the mass concentration of particulate matter in the atmosphere in the size range of about 0.05 to 40 μm in diameter. Measurement is based on the light-scattering property of microscopic-size solid or liquid particles dispersed in a gaseous medium.

1.2 The maximum range of concentration measured by means of this method is equivalent to 1 to 100,000 μg of particulate matter per cubic meter of air. Calibration within closer concentration limits will permit full-scale readings covering more narrow concentration ranges, thereby increasing the sensitivity of the test over the specific range being measured. The full range of concentration measurable by this method is equivalent to an estimated atmospheric visibility range from 900 miles to 50 ft. (1448 km to 15 m).

1.3 The mass concentration is strictly proportional to the scattered light intensity only when the particle size, shape, etc. remain constant. (See Note 10.) For information relative to meteorological and topographical factors affecting the application of this method, refer to ASTM Recommended Practice D 1357, Planning the Sampling of the Atmosphere.²

2. Summary of Method

2.1 The mass concentration corresponding to a reading of the instrument depends on the type of particulate matter in the atmosphere. The atmosphere under test is screened to

remove particles greater than approximately 40 μm in diameter. The screened air passes through a dark-field illuminated smoke chamber and then through a weighed filter to collect the particulate matter, and finally is expelled. The dark-field illumination is arranged so that only small-angle, forward-scattered light from the aerosol strikes a photomultiplier tube, and the current generated is amplified, metered, and recorded. The particulate matter collected during the test period is weighed to obtain the average mass concentration corresponding to the average recorded reading. The calibration curve of the instrument is then used to obtain the variations of mass concentration of this particulate matter during the sampling period. The readings of different instruments are compared by standardization with refrigerant-12 gas or a standard aerosol.

3. Definitions

3.1 *mass concentration of particulate matter*—the mass of particulate matter per unit volume of gas expressed in micrograms per cubic meter.

3.2 For definitions of other terms used in this method, refer to ASTM Definitions D 1356, Terms Relating to Atmospheric Sampling and Analysis.²

¹ This method is under the jurisdiction of ASTM Committee D-22 on Sampling and Analysis of Atmospheres. Current edition effective May 7, 1968. Originally issued 1961. Replaces D 1899 - 61 T.

² *Annual Book of ASTM Standards*, Part 26.