



Standard Practice for Controlling and Characterizing Errors in Weighing Collected Aerosols¹

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1. Scope

1.1 Assessment of airborne aerosol hazards in the occupational setting entails sampling onto a collection medium followed by analysis of the collected material. The result is generally an estimated concentration of a possibly hazardous material in the air. The accuracy of such estimates depends on several factors, one of which relates to the specific type of analysis employed. The most commonly applied method for analysis of aerosols is the weighing of the sampled material. Gravimetric analysis, though apparently simple, is subject to errors from instability in the mass of the sampling medium and other elements that must be weighed. An example is provided by aerosol samplers designed to collect particles so as to agree with the inhalable aerosol sampling convention (see ISO TR 7708, Guide D 6062M, and EN 481). For some sampler types, filter and cassette are weighed together to make estimates. Therefore, if the cassette, for example, absorbs or loses water between the weighings required for a concentration estimation, then errors may arise. This practice covers such potential errors and provides solutions for their minimization.

1.2 The values given in SI units are to be regarded as the standard.

1.3 *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 1356 Terminology Relating to Sampling and Analysis of Atmospheres²

D 4096 Test Method for Determination of Total Suspended Particulate Matter in the Atmosphere (High-Volume Sampler Method)²

D 4532 Test Method for Respirable Dust in Workplace Atmospheres²

D 6062M Guide for Personal Samplers of Health-Related Aerosol Fractions (Metric)²

2.2 International Standards:³

EN 481 Workplace Atmospheres—Size Fraction Definitions for Measurement of Airborne Particles in the Workplace

EN 482 Workplace Atmospheres—General Requirements for Performance of Procedures for the Measurement of Chemical Agents

prEN 13205 Workplace Atmospheres—Assessment of Performance of Instruments for Measurement of Airborne Particle Concentrations

2.3 ISO Standards:⁴

ISO TR 7708 Air Quality—Particle Size Fraction Definitions for Health-related Sampling

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this practice, refer to Terminology D 1356.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *blank substrate*—a collection medium or substrate coming from the same batch as the sampling medium, but unexposed.

3.2.2 *equilibration time*—For the purposes of this practice, a time constant (seconds) characterizing an approximate exponentially damped approach of the mass of an aerosol collection medium to a constant value. The constant can be defined as the mean difference of the mass from equilibrium per mean mass loss or gain rate as measured over a finite time interval.

3.2.2.1 *Discussion*—There may be important instances in which several time constants are required to describe the approach to equilibrium.

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 D22.04 on Workplace Atmospheres.

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² *Annual Book of ASTM Standards*, Vol 11.03.

³ Available from CEN Central Secretariat: rue de Stassart 36, B-1050 Brussels, Belgium.

⁴ Available from American National Standards Institute, 11 W 42nd Street, 13th Floor, New York, NY 10017.

