



Designation: D 6062M – 96
METRIC

Standard Guide for Personal Samplers of Health-Related Aerosol Fractions [Metric]¹

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1. Scope

1.1 This guide defines conventions for personal samplers of specific particle-size-dependent fractions of any given non-fibrous airborne aerosol. Such samplers are used for assessing health effects and in the setting of and testing for compliance with permissible exposure limits in the workplace and ambient environment. The conventions have been adopted by the International Standards Organization (Technical Report ISO TR 7708), the Comité Européen de Normalisation (CEN Standard EN 481), and the American Conference of Governmental Industrial Hygienists (ACGIH) **(1)**.² The conventions were developed **(2)** in part from health-effects studies reviewed **(3)** by the ACGIH and in part as a compromise between definitions proposed by the ACGIH **(3)** and by the British Medical Research Council (BMRC) **(4)**. Conventions are given here for inhalable, thoracic, and respirable fractions.

1.2 This guide is complementary to Test Method D 4532, which describes the performance of a particular instrument, the 10-mm cyclone, and operational procedures for use. The procedures, specifically the optimal flow rate, are still valid although the estimated accuracy differs somewhat from use with previous aerosol fraction definitions. Details on this instrument and also the Higgins-Dewell cyclone have recently been published **(5-7)**.

1.3 Limitations:

1.3.1 The definitions given here were adopted by the agencies listed in 1.1 in part on the basis of expected health effects of the different size fractions, but in part allowing for available sampling equipment. The original adoption by CEN was, in fact, for the eventual setting of common standards by the EC countries while permitting the use of a variety of instrumentation. Deviations of the sampling conventions from health-related effects are as follows:

1.3.1.1 The inhalable fraction actually depends on the specific air speed and direction, on the breathing rate, and on whether breathing is by nose or mouth. The values given in the inhalable convention are for representative values of breathing

rate and represent averages over all wind directions.

1.3.1.2 The respirable and thoracic fractions vary from individual to individual and with the breathing pattern. The conventions are approximations to the average case.

1.3.1.3 Each convention applies strictly to a fraction penetrating to a region, rather than depositing. Therefore, samples collected according to the conventions may only approximate correlations with biological effects. For example, the respirable convention overestimates the fraction of very small particles deposited in the alveolar region of the respiratory system because some of the particles are actually exhaled without being deposited **(8)**. In many workplaces, these very small particles contribute insignificantly to the sampled mass. Furthermore, the large variability between individuals and the details of clearance may be as important as this type of effect.

1.3.1.4 The thoracic convention applies to mouth breathing, for which aerosol collection is greater than during nose breathing.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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:

D 1356 Terminology Relating to Atmospheric Sampling and Analysis³

D 4532 Test Method for Respirable Dust in Workplace Atmospheres³

2.2 International Standards:

ISO TR 7708 Technical Report on Air Quality—Particle Size Fraction Definitions for Health-Related Sampling, Brussels, 1993⁴

CEN EN 481 Standard on Workplace Atmospheres. Size Fraction Definitions for the Measurement of Airborne

¹ This guide 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 Analysis of Workplace Atmospheres.

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² The boldface numbers in parentheses refer to a list of references at the end of this standard.

³ *Annual Book of ASTM Standards*, Vol 11.03.

⁴ Available from International Organization for Standardization, Caisse Postale 56, CH-1211, Geneva 20, Switzerland.