



Standard Test Method for Determination of Lead in Workplace Air Using Flame or Graphite Furnace Atomic Absorption Spectrometry¹

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1. Scope

1.1 This standard specifies flame and graphite furnace atomic absorption spectrometric methods for the determination of the time-weighted average mass concentration of particulate lead and lead compounds in workplace air.

1.2 The method is applicable to personal sampling of the inhalable fraction of airborne particles, as defined in ISO 7708, and to static (area) sampling.

1.3 The sample dissolution procedure specifies hot plate or microwave digestion, or ultrasonic extraction (11.2). The sample dissolution procedure is not effective for all lead compounds (see Section 5). The use of an alternative, more vigorous dissolution procedure is necessary when it is desired to extract lead from compounds present in the test atmosphere that are insoluble using the dissolution procedures described herein. For example if it is desired to determine silicate lead, a hydrofluoric acid dissolution procedure is required.

1.4 The flame atomic absorption method is applicable to the determination of masses of approximately 1 to 200 µg of lead per sample, without dilution (1).² The graphite furnace atomic absorption method is applicable to the determination of masses of approximately 0.01 to 0.5 µg of lead per sample, without dilution (1).

1.5 The ultrasonic extraction procedure has been validated for the determination of masses of approximately 20 to 100 µg of lead per sample, for laboratory-generated lead fume air filter samples (2).

1.6 The concentration range for lead in air for which this procedure is applicable is determined in part by the sampling procedure selected by the user (see Section 10).

1.7 Anions that form precipitates with lead may interfere, but this potential interference is overcome by the addition of the disodium salt of ethylenediamine tetraacetic acid (EDTA) when necessary.

1.8 *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 4840 Guide for Sample Chain-of-Custody Procedures³

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory⁴

E 1370 Guide for Air Sampling Strategies for Worker and Workplace Protection⁵

2.2 Other Standards:⁶

ISO 648:1977, Laboratory Glassware—One-Mark Pipettes

ISO 1042:1983, Laboratory Glassware—One-Mark Volumetric Flasks

ISO 3585:1991, Glass Plant, Pipelines and Fittings—Properties of Borosilicate Glass 3.3

ISO 3696:1987, Water for Laboratory Use—Specifications and Test Methods

ISO 6879:1983, Air Quality—Performance Characteristics and Related Concepts For Air Quality Methods

ISO 6955:1982, Analytical Spectroscopic Methods—Flame Emission, Atomic Absorption, and Atomic Fluorescence—Vocabulary

ISO 7708:1995, Particle Size Definitions for Health Related Sampling

ISO 15202-2: 2001, Workplace Air—Determination of Metals and Metalloids in Airborne Particulate Matter by Inductively Coupled Plasma Atomic Emission Spectrometry—Part 2: Sample Preparation

EN 689:1995, Workplace Atmospheres—Guidance for the Assessment of Exposure to Chemical Agents for Comparison with Limit Values and Measurement Strategy

EN 1232:1997, Workplace Atmospheres—Pumps for Personal Sampling of Chemical Agents—Requirements and Test Methods

EN 1540:1998, Workplace Atmospheres—Terminology

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

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 03.05.

⁵ *Annual Book of ASTM Standards*, Vol 11.03.

⁶ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

