



Standard Practice for the Determination of Lead in Paint, Settled Dust, Soil and Air Particulate by Field-Portable Electroanalysis¹

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1. Scope

1.1 This practice covers the analysis of extracts of environmental samples for lead content using field-portable electroanalytical devices.

1.2 Matrices of concern in this practice include paint, settled dust, soil, and air particulate.

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 1193 Specification for Reagent Water²

D 5438 Practice for Collection of Floor Dust for Chemical Analysis³

E 1553 Practice for Collection of Airborne Particulate Lead During Abatement and Construction Activities³

E 1605 Terminology Relating to Lead in Buildings⁴

E 1613 Standard Test Method for Determination of Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), or Graphite Furnace Atomic Absorption Spectrometry (GFAAS) Techniques⁴

E 1644 Practice for Hot Plate Digestion of Dust Wipe Samples for the Determination of Lead⁴

E 1645 Practice for Preparation of Dried Paint Samples by Hotplate or Microwave Digestion for Subsequent Lead Analysis⁴

E 1726 Practice for Preparation of Soil Samples by Hotplate Digestion for Subsequent Lead Analysis⁴

E 1727 Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques⁴

E 1728 Practice for Field Collection of Settled Dust

Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques⁴

E 1729 Practice for Field Collection of Dried Paint Samples for Lead Determination by Atomic Spectrometry Techniques⁴

E 1741 Practice for Preparation of Airborne Particulate Lead Samples Collected During Abatement and Construction Activities for Subsequent Analysis by Atomic Spectrometry⁴

E 1775 Guide for Evaluating the Performance of On-Site Extraction and Field-Portable Electrochemical or Spectrophotometric Analysis for Lead⁴

E 1973 Practice for Collection of Surface Dust by Air Sampling Pump Vacuum Technique for Subsequent Lead Determination⁴

2.2 Federal Standard:

Title 40, CFR Part 261, Appendix II—Method 1311, Toxic Characteristic Leaching Procedure (TCLP)⁵

3. Terminology

3.1 *Definitions*—For definitions of terms relating to this practice that do not appear in this section, refer to Terminology E 1605.

3.1.1 *anodic stripping voltammetry (ASV)*—an electroanalytical technique in which the concentration of analyte metal species dissolved in solution is determined in the following manner. The analyte is first deposited (preconcentrated) electrochemically by reducing the dissolved metal ion in solution to immobilized discharged metal species at a mercury electrode surface, for instance, $\text{Pb}^{2+}(\text{solution}) \rightarrow \text{Pb}^0(\text{electrode})$. The metal is deposited in the form of an amalgam (with Hg) at an applied potential (voltage) that is negative of the standard oxidation potential of the metal/ion redox couple. After deposition for a given time period, the preconcentrated metal species is then “stripped” from the mercury electrode surface by applying a positive potential sweep, which causes anodic oxidation of the analyte metal species to dissolved ion; for example, $\text{Pb}^0(\text{Hg}) \rightarrow \text{Pb}^{2+}(\text{soln})$. During the stripping step, the current associated with this reoxidation is measured. The peak current arising from the reoxidation of discharged,

¹ This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.23 on Lead Paint Abatement.

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² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 11.03.

⁴ Annual Book of ASTM Standards, Vol 04.11.

⁵ Available from U.S. Government Printing Office, Washington D.C.