Designation: E 1792 – 02

An American National Standard

Standard Specification for Wipe Sampling Materials for Lead in Surface Dust[1]

This standard is issued under the fixed designation E 1792; 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. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers requirements for wipe materials that are used to collect settled dusts on surfaces for the subsequent determination of lead.

1.2 *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:*

E 105 Practice for Probability Sampling of Materials[2]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[2,3]

E 1605 Terminology Relating to Abatement of Hazards from Lead-Based Paint in Buildings and Related Structures[4]

E 1613 Test Method for Analysis of Digested Samples for Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption (FAAS), or Graphite Furnace Atomic Absorption (GFAAS) Techniques[4]

E 1644 Practice for Hot Plate Digestion of Dust Wipe Samples for Determination of Lead by Atomic Spectrometry[4]

E 1728 Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques[5]

3. Terminology

3.1 For definitions of terms not listed here, see Terminology E1605.

3.2 *Definitions:*

3.2.1 *wipe, n*—a disposable towellette that is moistened with a wetting agent.

3.2.1.1 *Discussion*—The towellette is used to collect a sample of settled dust on a surface for subsequent lead analysis.

4. Manufacture

4.1 The wipes shall be made from materials using methods that ensure compliance with the requirements of Sections 5 and 7, and shall be clean and free of imperfections that would affect their performance.

5. General Requirements

5.1 Test data must be provided to assure compliance with all the following requirements. Test procedures for each requirement are found in Section 7.

5.1.1 *Background Lead*—The mean background lead concentration per wipe shall be less than 1.0 μg.

5.1.2 *Ruggedness*—Wipes shall be sufficiently rugged so as to be used on a 2000 cm^2 area of a vinyl tile surface without tearing.

5.1.3 *Moisture Content*—Each wipe, when examined, must be fully wetted upon removal from the package. Wipes shall have a moisture content such that the coefficient of variation for a random sampling of the lot of wipes be no greater than 25 %.

5.1.4 *Sizes*—The mean area of wipes shall not be less than 200 cm^2 and shall not be greater than 625 cm^2. The mean length of either side shall not be less than 10 cm or larger than 25 cm.

5.1.5 *Thickness*—The dry wipes shall have a mean thickness of at least 0.005 cm but no greater than 0.05 cm.

5.1.6 *Mass*—The coefficient of variation in mass of dry wipes in a lot shall not exceed 10 %.

5.1.7 *Lead Recoveries*—The mean lead recoveries from wipes spiked with Certified Reference Materials (CRMs) having 20 μg, 100 μg, and 500 μg (±10%) of lead per sample shall be 100 % ± 20 %, 95 % confidence level, of the lead recovery from the CRM alone, that is, *sans* wipe material, as per 7.2(1).

NOTE 1—It is not imperative that the wipe be completely dissolved when extracted in accordance with Practice E 1644 or an equivalent procedure to meet the recovery criterion. However, the solution that is to

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[2] *Annual Book of ASTM Standards*, Vol 14.02.

[3] *ASTM Standards on Precision and Bias for Various Applications*, 5th Ed., ASTM, West Conshohocken, PA, 1997.

[4] *Annual Book of ASTM Standards*, Vol 04.11.

[5] *Annual Book of ASTM Standards*, Vol 04.12.

be analyzed (after extraction) should be free of suspended particulates and gelatinous material. Reference (2) describes a specific procedure and criteria for the evaluation of the extractability of wipe materials.

5.1.8 *Collection Efficiency*—Collection efficiency of an individual wipe, using an initial wipe on a given test surface, shall be determined using aerosolized lead oxide as per Ref (3), or lead-containing CRMs as per Ref (4). The mass of lead-containing material (particulate or dust) loaded per surface area unit to be sampled shall be 0.5 g ± 0.05 g. The minimum collection efficiency of at least 95% of the individual wipe shall be 75 %, as measured against the known mass of lead loaded on the test surface prior to wiping (1000 cm^2 minimum surface area). See Section 7 for procedural details.

6. Significance and Use

6.1 This specification is intended for use by suppliers to evaluate the performance of wipe sampling materials for lead in surface dust.

6.2 This specification may also be employed by users of wipe materials in order to compare the performance of candidate wipes for the sampling of lead in surface dust.

7. Procedure

7.1 Described tests shall be conducted on wipes selected in accordance with the random sampling procedure described in Practice E 105, using wipes sampled after packaging, and representative of each lot.

7.2 *Background and Recovery*—Recoverability of lead from spiked wipes (5.1.7) shall be measured in accordance with Practice E 1644 and Test Method E 1613, or NIOSH Method 7105, or an equivalent procedure. Background lead in unspiked wipes (5.1.1) shall be measured in accordance with the same procedure. A minimum of 7 samples per each concentration level (unspiked, 20 ± 2 µg, 100 ± 10 µg, and 500 ± 50 µg) shall be tested (5.1.1 and 5.1.7), using wipes randomly selected from each lot in accordance with Practice E 105. See Ref (2) for additional guidelines on the spiking, digestion, and analysis procedure.

7.2.1 Compute the mean and coefficient of variation for each set of samples. See Practice E 691 for details regarding statistical computations. Compare with the requirements of 5.1.1 and 5.1.7.

7.3 *Collection Efficiency*—Collection efficiency of lead shall be measured in the following manner (3, 4):

7.3.1 A delineated area of the vinyl tile test surface (minimum area 1000 cm^2[5.1.8]) is loaded with a known mass (0.5 ± 0.05 g) of aerosolized particulate or dust (e.g., lead oxide) and then wiped in accordance with Practice E 1728 or an equivalent procedure.

7.3.2 An equivalent alternative procedure to that described in Ref (3) consists of manually distributing a known amount (mass) of lead-containing CRM uniformly onto the vinyl tile test surface, of 1000 cm^2 minimum area, and then wiping the surface in accordance with E 1728 or an equivalent procedure.

7.3.3 The collection efficiency is determined by comparing the amount of lead collected in the wipe (determined using dust sampling and analytical procedures described in Refs (2), (3), (4)) against the total amount of lead (that is, 0.5 g ± 0.05 g) loaded onto the area of interest on the test surface (as per 7.3.1 or 7.3.2). A minimum of seven wipes, randomly selected from the lot in accordance with Practice E 105, shall be tested for each lead level in this manner.

7.3.4 For the measurement of lead content, the wipes shall be extracted and the lead content determined in accordance with Practice E 1644 and Test Method E 1613, or NIOSH Method 7105, or an equivalent procedure. Determine the collection efficiency for each wipe and compare with the requirements of 5.1.8.

7.4 *Ruggedness*—Using the procedure described in Practice E 1728, wipe the vinyl tile test surface (minimum area 2000 cm^2). Examine the wipe for the presence of tears. Follow this procedure for a minimum of seven wipes, randomly selected from the lot in accordance with Practice E 105. If at least 95 % of the wipes tested reveal no tears, then the ruggedness test is deemed successful.

7.5 *Moisture Content*—Moisture content (5.1.3) of wipes shall be determined by weighing the wipe before and after quantitative drying (to the nearest 0.01 g), and calculating the difference. A minimum of seven wipes, randomly selected from the lot in accordance with Practice E 105, shall be tested. Calculate the coefficient of variation about the mean value for moisture content and compare with requirement of 5.1.6.

7.6 *Dimensions*—Determine the linear dimensions of a minimum of seven individual wipes to the nearest 1 mm and calculate the means and coefficient of variations. Compare with requirements of 5.1.4.

7.7 *Thickness*—Determine the thickness of a minimum of seven individual wipes using a micrometer or other appropriate device to the nearest 25 µm. Calculate the mean and coefficient of variation. Compare with requirements of 5.1.5.

7.8 *Mass*—Determine the mass of a minimum of seven individual wipes to the nearest 0.1 mg. Calculate the mean and coefficient of variation. Compare with requirement of 5.1.6.

8. Retesting

8.1 If any of the requirements (5.1.2-5.1.8) are not met, then retesting is allowed. Complete retesting of each section is required. All data obtained shall be used in determining whether the requirement has been met.

9. Packaging and Package Marking

9.1 Wipes shall be wrapped individually. Wipes shall be wrapped and packaged according to trade custom.

9.2 Each package shall be marked with the supplier's name, date of manufacture, lot number, and recommended shelf life.

9.3 The statement "meets ASTM E 1792" shall be marked on individual packaging. Also, on general packaging, it shall be stated that the material meets the specifications delineated in this specification, and that supporting performance data are available upon request.

10. Recordkeeping

10.1 All supporting data from tests conducted for each lot shall be kept by the supplier for a minimum of ten years. All of this information shall be recorded in bound notebooks (with numbered pages) or on data sampling forms, or both. All test information shall be available for release to users of wipe materials upon request.

11. Keywords

11.1 lead; surface dust; wipe

REFERENCES

(1) NIOSH Method 7105," Lead by HGAAS," *NIOSH Manual of Analytical Methods*, 4th Ed., Cassinelli, M.E. and O'Connor, P.F., eds., National Institute for Occupational Safety and Health, Cincinnati, OH, 1994.

(2) Millson, M., Eller, P. M., and Ashley, K., "Evaluation of Wipe Sampling Materials for Lead in Surface Dust," *American Industrial Hygiene Association Journal*, Vol 55, 1994, pp. 339–342.

(3) Chavalitnitikul, C., and Levin, L., "A Laboratory Evaluation of Wipe Testing Based on Lead Oxide Surface Contamination," *American Industrial Hygiene Association Journal*, Vol 45, 1984, pp. 311–317.

(4) Binstock, D.A., et al, "Preparation and Evaluation of Lead-Contaminated Dust Method Evaluation Materials," in *Lead in Paint, Soil and Dust, ASTM STP 1226*, M. E. Beard and S. D. A. Iske, eds., ASTM, Philadelphia, PA, 1995.

(5) NIOSH Method 9100," Lead in Surface Wipe Samples," *NIOSH Manual of Analytical Methods*, 4th Ed., P. M. Eller and M. E. Cassinelli, eds., National Institute for Occupational Safety and Health, Cincinnati, OH, 1994.

Document Summary

HISTORICAL STANDARD: E1792-02 Standard Specification for Wipe Sa for Lead in Surface Dust

SUPERSEDED

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Index Terms

lead; surface dust; wipe; 71.040.50

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