Designation: E 1792 – 0~~2~~3

An American National Standard

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

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1. Scope

1.1 This specification covers requirements for ~~wipe materials~~ wipes 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.*

[1] This specification 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. Referenced Documents

2.1 *ASTM Standards:* [2]

E 105 Practice for Probability Sampling of Materials

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

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards ~~Vol 14.02.~~ volume information, refer to the standard's Document Summary page on the ASTM website.

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

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

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

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

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

E 1728 Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead ~~Determination by Atomic Spectrometry Techniques[4]~~ Determination

E 2239 Standard Practice for Record Keeping and Record Preservation for Lead Hazard Activities

F 141 Standard Terminology Relating to Resilient Floor Coverings

3. Terminology

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

3.2 *Definitions:*

3.2.1 *lot, n*—a finite quantity of a given product manufactured under production conditions that are considered uniform.

3.2.2 *shelf life, n*—for dust-wiping sampling, the maximum time interval during which a wipe can be stored in an unopened package and remain suitable for sampling of settled dust.

3.2.3 *vinyl-composite tile, n*—a resilient floor covering composed of binder, fillers, and pigments. The binder consists of one or more resins of poly (vinyl chloride) or vinyl cholride copolymers, or both, compounded with suitable plasticizers and stabilizers. Other polymeric resins may be incorporated as part of the binder (See Terminology F 141).

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

3.2.~~1~~4.1 *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~~Significance and ~~7~~, Use

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

4.2 This specification may also be ~~clean and free~~ employed by users of ~~imperfections that would affect their performance.~~ wipes to compare the performance of candidate wipes for the sampling of lead in surface dust.

5. Manufacture

5.1 The wipes shall be made from materials using methods that ensure compliance with the requirements of Sections 6 and 8, and shall be clean and free of imperfections that would affect their performance.

6. General Requirements

~~5.1 Test data must be provided~~

6.1 Wipes shall conform to ~~assure compliance with all~~ the ~~following requirements.~~ requirements in Paragraphs 6.1.1 to 6.1.8. Test procedures for each requirement are found in Section ~~7~~ 8.

~~5~~6.1.1 *Background Lead*—The mean background lead ~~concentration~~ content per un-spiked wipes tested shall be less than 1.0 µg.

~~5~~6.1.2 *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 % of the mean lead recovery from the CRM alone, that is, without a wipe included in the analysis **(1)** [3]. The coefficient of variation of the recoveries of samples with lead levels of 20 µg shall not exceed 25 percent. The coefficients of variation of the recoveries of samples with lead levels of 100 µg and 500 µg shall not exceed 10 percent.

6.1.3 *Collection Efficiency*— The minimum collection efficiency of at least 95% of the wipes tested shall be 75 %.

6.1.4 *Ruggedness*—Wipes shall be sufficiently rugged so as to be used on a ~~2000 cm^2 area~~ smooth surface of a vinyl-composite floor tile ~~surface without tearing.~~

~~5.1.3~~ such that a minimum of 95 % of wipes tested shall reveal no holes or tears.

6.1.5 *Moisture Content*—Each wipe, when examined, must be ~~fully wetted~~ wet both visibly and to the touch upon removal from the package. ~~Wipes shall have a moisture content such that the~~ The coefficient of variation ~~for a random sampling~~ of ~~the lot~~ moisture content of wipes tested shall be no greater than 25 %.

~~5.1.4~~

6.1.6 *Mass*—The coefficient of variation in mass shall not exceed 10 %.

6.1.7 *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~~

6.1.8 *Thickness*—The ~~dry wipes shall have a~~ mean thickness of wipes shall be at least ~~0.005 cm~~ 0.05 mm 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 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. mm.

7. Selection and Handling of Wipes for Testing

7.1 Wipes to be tested shall be from a single lot and be selected in accordance with Practice E 105.

7.2 Wipes shall not be removed from their packages until immediately prior to testing.

8. 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

8.1 *Background and Recovery*—Recoverability—Background lead (6.1.1) of un-spiked wipes and recoverability of lead from spiked wipes (5.1.7) (6.1.2) shall be measured in accordance with Practice E 1644 and Test Method E 1613, or NIOSH Method 7105, or an equivalent procedure. Background E 1613. Recovery of lead from CRM(s) alone, that is without a wipe included in unspiked wipes (5.1.1) the analysis, shall also 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. tested. See Ref **(2)** for additional guidelines on the spiking, digestion, and analysis procedure.

78.21.1 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 6.1.1 and 5.1.7.

7.3 6.1.2.

8.2 *Collection Efficiency*—Collection efficiency of lead (6.1.3) shall be measured in the following manner **(3, 4)**:

7.3.1 A accordance with either 8.2.1 or 8.2.2. A minimum of seven wipes shall be tested using a smooth-surface vinyl-composite floor tile as a test surface.

8.2.1 Load a delineated area of the vinyl tile test surface (minimum area 1000 900 cm^2 [5.1.8]) is loaded) with a known mass (0.5 ± 0.05 g) of aerosolized particulate particles or dust (e.g., lead oxide as described in **(3)**) and then wiped the test surface 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 E 1728.

8.2.2 Alternatively, manually distribute **(4)** a known amount (mass) mass of lead-containing CRM uniformly onto the vinyl tile test surface, of 1000
900 cm^2 minimum area, and then wiping wipe the surface in accordance with E 1728 or an equivalent procedure.

7.3.3 The 1728.

8.2.3 In determining collection efficiency is determined by comparing efficiency, 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 E 1613. Calculate the percent collection efficiency (CE) for each wipe and compare with the requirements of 5.1.8.

7.4 as follows:

$$CE = 100 \times (\text{lead determination in wipe})/(\text{lead deposited on test surface}).$$

8.3 *Ruggedness*—Using the procedure described in Practice E 1728, wipe the vinyl tile—to determine ruggedness (6.1.4), use butted vinyl-composite floor tiles as a test surface (minimum area 2000 (1800 cm^2). Examine the wipe for the presence of tears.

Follow this procedure for minimum area). Subject 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 to 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 test procedures described in accordance with Practice E 105, shall be tested. Calculate the coefficient of variation about the mean value 1728. Examine each wipe for moisture content and compare with requirement of 5.1.6.

7.6 *Dimensions*—Determine the linear dimensions presence 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 holes or other appropriate device to the nearest 25 µm. Calculate the mean and coefficient of variation. Compare with requirements of 5.1.5. tears.

8.4 *Moisture Content*—Determine the mass of each wipe tested before and after quantitative drying (to the nearest 0.01 g). Calculate the percent moisture content (MC) (6.1.5) for each wipe as follows:

$$MC = 100 \times (\text{mass before drying} - \text{mass after drying})/\text{mass before drying}.$$

8.5 *Mass*—DTo determine mass (6.1.7), use the data for dried wipes from 8.4. Calculate the mean mass and the coefficient of variation of all dry wipes.

8.6 *Size*—Determine the linear dimensions (6.1.7) of a minimum of seven individual wipes to the nearest 0.1 mg. 1 mm. Calculate the mean area of the wipes and coefficient the mean lengths of variation. Compare with requirement the shorter and longer sides.

8.7 *Thickness*—Determine the thickness (6.1.8) of 5.1.6.

8. Retesting

8.1 If any a minimum of the requirements (5.1.2-5.1.8) are not met, then retesting is allowed. Complete retesting seven individual dry wipes using a micrometer capable of each section is required. All data obtained shall be used in determining whether reading to the requirement has been met. nearest 0.01 mm. Calculate the mean thickness.

9. Packaging and Package Marking

9.1 Wipes shall be wrapped individually. Wipes shall be wrapped and packaged accordingRetesting

9.1 In cases where wipes fail to trade custom.

9.2 Each package pass one or more requirements of this specification, retesting shall be marked with permitted. Both the supplier's name, date of manufacture, lot number, original data and recommended shelf life.

9.3 The statement "meets ASTM E 1792" the retesting data for each requirement for which retesting was conducted shall be marked on individual packaging. Also, on general packaging, it shall be stated that the material meets the specifications delineated used in this specification, and that supporting performance data are available upon request. determining whether the requirement is met.

10. Recordkeeping

10.1 All supporting data from tests conducted for each lotPackaging and Package Marking

10.1 Wipes shall be kept by wrapped individually. Wipes shall be wrapped and packaged according to trade custom.

10.2 Each package shall be marked with the supplier for a minimum supplier's name, date of ten years. All of this information manufacture, lot number, and recommended shelf life.

10.3 The statement "meets ASTM E 1792" shall be recorded in bound notebooks (with numbered pages) or marked on data sampling forms, or both. All test information 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 for release to users of wipe materials upon request.

11. Recordkeeping

11.1 All supporting data from tests conducted for each lot shall be kept by the supplier in accordance with Practice E 2239.

12. Keywords

112.1 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,"~~ 1995. ~~*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.~~