



Designation: **E1792–03 (Reapproved 2016) E1792 – 20**

Standard Specification for Wipe Sampling Materials for Lead in Surface Dust¹

This standard is issued under the fixed designation E1792; 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 wipes that are used to collect settled dusts on surfaces for the subsequent determination of lead.

1.2 For wipe materials used for the determination of beryllium in surface dust refer to Specification **D7707**. This is mentioned to insure that users of wipes recognize that there is some relationship between the analytical backgrounds found in wipes and the analyte of interest.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

[D1356 Terminology Relating to Sampling and Analysis of Atmospheres](#)

[D7707 Specification for Wipe Sampling Materials for Beryllium in Surface Dust](#)

[E105 Practice for Probability Sampling of Materials](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

[E1605 Terminology Relating to Lead in Buildings](#)

[E1613 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 \(GFAAS\) Techniques](#)

[E1644 Practice for Hot Plate Digestion of Dust Wipe Samples for the Determination of Lead](#)

[E1728 Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination](#)

[E2239 Practice for Record Keeping and Record Preservation for Lead Hazard Activities](#)

[E3193 Test Method for Measurement of Lead \(Pb\) in Dust by Wipe, Paint, and Soil by Flame Atomic Absorption Spectrophotometry \(FAAS\)](#)

¹ This specification is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.12 on Sampling and Analysis of Lead, Lead for Exposure and Risk Assessment.

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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 volume information, refer to the standard's Document Summary page on the ASTM website.

[E3203 Test Method for Determination of Lead in Dried Paint, Soil, and Wipe Samples by Inductively Coupled Plasma-Optical Emission Spectroscopy \(ICP-OES\)](#)
[F141 Terminology Relating to Resilient Floor Coverings](#)

3. Terminology

3.1 *Definitions*—For definitions of terms not listed here, see Terminology Terminologies [D1356](#) and [E1605](#).

3.2 *Definitions: Definitions of Terms Specific to This Standard:*

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 ethylene dichloride copolymers, or both, compounded with suitable plasticizers and stabilizers. Other polymeric resins may be incorporated as part of the binder (See Terminology [F141](#)).

3.2.4 *wipe, n*—a disposable ~~towel~~towelette that is moistened with a wetting agent.

3.2.4.1 *Discussion*—

The ~~towel~~towelette is used to collect a sample of settled dust on a surface for subsequent lead analysis.

4. Significance and 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 employed by users of 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

6.1 Wipes shall conform to the requirements in Paragraphs [6.1.1](#) to [6.1.8](#). Test procedures for each requirement are found in Section [8](#).

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

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 ($\pm 10\%$) of lead per sample shall be $100\% \pm 20\%$ 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 %. The coefficients of variation of the recoveries of samples with lead levels of 100 µg and 500 µg shall not exceed 10 %.

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 smooth surface of a vinyl-composite floor tile 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 wet both visibly and to the touch upon removal from the package. The coefficient of variation of moisture content of wipes tested shall be no greater than 25 %.

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

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

6.1.7 *Sizes—Dimensions*—The mean area of ~~wipes~~ the wipe shall not be less than 200 cm² and shall not be greater than 625 cm². The mean length of either side shall not be less than 10 cm or larger than 25 cm.

(1) No smaller than 200 cm² and no larger than 400 cm² with the mean dimension of a side or diameter no smaller than 10 cm or larger than 20 cm (referred to as the “large wipe”), or

(2) No smaller than 16 cm² and no larger than 38 cm² with the mean dimension of a side or diameter no smaller than 4.0 cm or larger than 8.0 cm (referred to as the “small wipe”).

NOTE 1—Large wipes are intended for use on larger areas. Small wipes are intended for use on smaller areas and when the bulk of the large wipe is of concern.

6.1.8 *Thickness*—The mean thickness of wipes shall be at least 0.05 mm but no greater than 0.5 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 E105.

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

8. Procedure

8.1 *Background and Recovery*—Background lead (6.1.1) of un-spiked wipes and recoverability of lead from spiked wipes (6.1.2) shall be measured in accordance with Practice Practice E1644 and Test Method Methods E1613, E3193, or E3203. Recovery of lead from CRM(s) alone, that is without a wipe included in the analysis, shall also be measured in accordance with the same procedure. A minimum of seven samples per each level (unspiked, 20 ± 2 µg, 100 ± 10 µg, and 500 ± 50 µg) 20 µg ± 2 µg, 100 µg ± 10 µg, and 500 µg ± 50 µg) shall be tested. See Ref (2) for additional guidelines on the spiking, digestion, and analysis procedure.

8.1.1 Compute the mean and coefficient of variation for each set of samples. See Practice E691 for details regarding statistical computations. Compare with the requirements of 6.1.1 and 6.1.2.

8.2 *Collection Efficiency*—Collection efficiency (6.1.3) shall be measured in 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 test surface (minimum area 900 cm²) with a known mass (0.5 ± 0.05 g) (0.5 g ± 0.05 g) of aerosolized particles or dust (for example, lead oxide as described in (3)) and then wipe the test surface in accordance with Practice E1728.

8.2.2 Alternatively, manually distribute (4) a known mass of lead-containing CRM uniformly onto the test surface, of 900 cm² minimum area, and then wipe the surface in accordance with Practice E1728.

8.2.3 In determining collection efficiency, the wipes shall be extracted and the lead content determined in accordance with Practice E1644 and Test Method Methods E1613, E3193, or E3203. Calculate the percent collection efficiency (CE) for each wipe as follows:

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

8.3 *Ruggedness*—To determine ruggedness (6.1.4), use butted vinyl-composite floor tiles as a test surface (1800 cm² minimum area). Subject a minimum of seven wipes to the wipe test procedures described in Practice E1728. Examine each wipe for the presence of holes or 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:

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