

Standard Reference Material® 2579a

Lead Paint Films for Building Surfaces

(SRM 2570 through SRM 2575)

CERTIFICATE OF ANALYSIS

Purpose: The certified values delivered by this Standard Reference Material (SRM) are intended for validating results from portable, hand-held, X-ray fluorescence analyzers when testing for lead in paint coatings on interior and exterior building surfaces

Description: A unit of SRM 2579a consists of a set of six coated polyester sheets, approximately 7.6 cm wide and 10.2 cm long. Five of the six sheets, SRM 2571 through SRM 2575, are coated with a single, uniform paint layer. The units are color coded, and each color indicates a different lead areic mass. The sixth sheet, SRM 2570, is coated with a lead-free, lacquer layer of the same thickness as a lead paint layer and is intended as a blank. All sheets are over-coated with a clear, thin, plastic laminate to protect the surface from abrasion.

Certified Values: The measurand is the total lead areic mass in cured paint for each level listed below [1]. A NIST certified value is a value for which NIST has the highest confidence in its accuracy, in that all known or suspected sources of bias have been investigated or taken into account [2]. Value assignment categories are based on the definitions of terms and modes used at NIST for certification of chemical reference materials [2]. The certified value is based on measurements by isotope dilution inductively coupled plasma mass spectrometry (ID-ICP-MS).

Level	Color	Lead Areic Mass (mg/cm ²)
SRM 2570	White (blank)	<0.001
SRM 2571	Yellow	3.58 ± 0.39
SRM 2572	Orange	1.527 ± 0.091
SRM 2573	Red	1.040 ± 0.064
SRM 2574	Gold	0.714 ± 0.083
SRM 2575	Green	0.307 ± 0.021

The uncertainty associated with each certified value is an expanded uncertainty, U , and was evaluated in accordance with the ISO/JCGM Guides [3,4]. Because of variability in the paint film between different sheets of each SRM, the uncertainties are 95 % prediction intervals. The expanded uncertainty is calculated as $U = ku_c$, where u_c is intended to represent, at the level of one standard deviation, the combined uncertainty due to material variability and measurement uncertainty. The coverage factor, k , is determined from the Student's t -distribution corresponding to the calculated effective degrees of freedom and 95 % level of confidence. Metrological traceability is to the SI units for mass and length (expressed as milligrams per centimeter-squared).

Period of Validity: The certified values delivered by **SRM 2579a** are valid within the measurement uncertainty specified until **01 July 2029**. The certified values are nullified if the material is stored or used improperly, damaged, contaminated, or otherwise modified.

Maintenance of Certified Values: NIST will monitor this SRM over the period of its validity. If substantive technical changes occur that affect the certification, NIST will issue an amended certificate through the NIST SRM website (<https://www.nist.gov/srm>). Before making use of any of the values delivered by this material, users should verify they have the most recent version of this documentation, available through the NIST SRM website (<https://www.nist.gov/srm>).

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Safety: SRM 2579a is a manufactured item containing lead as lead chromate, which is toxic and a suspected carcinogen to the lungs and kidneys. Under normal conditions of use, this SRM does not release this hazardous chemical. SRM 2579a must be handled with care and disposed of according to the U.S. Environmental Protection Agency (EPA) practices and procedures. No lead was intentionally added to SRM 2570. Consult the Safety Data Sheet (SDS) exemption letter for more information.

Storage: Store the SRM in the plastic sleeve provided. It is recommended that this SRM be stored indoors at ambient room temperature (nominally $22\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$) and away from direct sunlight when not in use.

Use: The SRM sheet must first be removed from the plastic sleeve in which it is stored. Position the sheet so that the side labeled with the NIST logo and SRM number faces the X-ray source. Additional layers of material placed between the sheet and the measurement instrument may bias the measurements by absorbing radiation impinging on the sheet and fluorescent X-rays emanating from lead in the paint. For best results, the X-ray beam should irradiate an area of the SRM that is at least 2.5 cm in diameter and is centered on the sheet. Care must be exercised not to compromise the protective plastic laminate that prevents scratching or chipping of the painted surface and the potential release of dust containing lead (See "Preparation and Analysis").

Preparation and Analysis: The paint-coated, polyester sheets were prepared by an automated coating process at a commercial facility under contract to NIST. Known concentrations of lead chromate were dispersed in a commercial paint vehicle to prepare the lead paints. A lead-free, organic tint was added to each paint mixture to give the desired color. A thin, protective overlay of plastic laminate was applied to each paint film. The paint layer and white polyester sheet are approximately 0.04 mm and 0.2 mm thick, respectively. The attenuation of lead $L_{3\text{-}M_{4,5}}$ ($L\alpha_{1,2}$) X-rays due to the protective overlay does not exceed 2 % relative, while attenuation of $K\text{-}L_{2,3}$ ($K\alpha_{1,2}$) X-rays is negligible.

REFERENCES

- [1] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Units (SI)*; NIST Special Publication 811; U.S. Government Printing Office: Washington, DC (2008); available at <https://www.nist.gov/pml/special-publication-811> (accessed Jul 2026).
- [2] Beauchamp, C.R.; Camara, J.E.; Carney, J.; Choquette, S.J.; Cole, K.D.; DeRose, P.C.; Duewer, D.L.; Epstein, M.S.; Kline, M.C.; Lippa, K.A.; Lucon, E.; Molloy, J.; Nelson, M.A.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sander, L.C.; Schiel, J.E.; Sharpless, K.E.; Toman, B.; Winchester, M.R.; Windover, D.; *Metrological Tools for the Reference Materials and Reference Instruments of the NIST Material Measurement Laboratory*; NIST Special Publication (NIST SP) 260-136, 2021 edition; U.S. Government Printing Office: Washington, DC (2021); available at <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2021.pdf> (accessed Jul 2026).
- [3] JCGM 100:2008; *Evaluation of Measurement Data — Guide to the Expression of Uncertainty in Measurement*; Joint Committee for Guides in Metrology (JCGM) (2008); available at <https://www.bipm.org/en/committees/jc/jcgm/publications> (accessed Jul 2026); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at <https://www.nist.gov/pml/nist-technical-note-1297> (accessed Jul 2026).
- [4] Hahn, G.J.; Meeker, W.Q.; *Statistical Intervals: A Guide for Practitioners*; John Wiley & Sons, Inc.: New York, NY (1991).

Certificate Revision History: 10 July 2026 (Editorial changes; format update); 16 March 2026 (Change of expiration date; editorial changes); 14 April 2016 (Change of expiration date; editorial changes); 24 March 2009 (Extension of certification period); 29 November 1999 (Original certificate date).

Certain commercial equipment, instruments, or materials may be identified in this Certificate of Analysis to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, MD 20899-2300; telephone (301) 975-2200; e-mail srminfo@nist.gov; or the Internet at <https://www.nist.gov/srm>.

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