

National Bureau of Standards

Certificate

Standard Reference Material 114n

Portland Cement Fineness Standard

This Standard Reference Material (SRM) is intended for use in calibrating fineness testing equipment: the Wagner Turbidimeter, the Blaine Air Permeability Apparatus, and the 2-inch diameter 45- μm (No. 325 mesh) sieve.

Certified Values

Surface Area as determined with the Wagner Turbidimeter (ASTM Standard Test Method C115-79a)	2020* \pm 30 cm^2/g (202.0 \pm 3.0 m^2/kg)
Surface Area as determined with the Blaine Air Permeability Apparatus (ASTM Standard Test Method C204-79)	3460* \pm 34 cm^2/g (346.0 \pm 3.4 m^2/kg)
Residue on a 45- μm electroformed sieve (ASTM Standard Test Method C 430-78)	8.3 \pm 0.2 percent

*This value is based on the assumption that the density of this cement is 3.15 g/cm^3 .

The stated uncertainties are based on judgment and represent evaluations of the combined effects of measurement imprecision and material variability.

The homogeneity of this SRM was tested by measuring the surface area of about 100 samples by the air permeability method. The material variability is within the certified uncertainty.

The preparation of this material and the coordination of technical measurements leading to certification were performed under the direction of Howard M. Kanare of the Chemical/Physical Research Department, Portland Cement Association (PCA), Skokie, Illinois. Homogeneity and fineness tests at PCA were performed by Howard Kanare, Ernst LaBonde, and Hugh Love. Laboratories at the following companies participated in the certification testing program: Ash Grove Cement Company; Atlantic Cement Company, Inc.; California Portland Cement Company; Giant Portland and Masonry Cement Company; Ideal Basic Industries, Cement Division; Kaiser Cement Corporation; Lehigh Portland Cement Company; Lone Star Industries, Inc.; Missouri Portland Cement Company; Portland Cement Association; and Southwestern Portland Cement Company.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. Keith Kirby.

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George A. Uriano, Chief
Office of Standard Reference Materials

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Nathan R. Greening of PCA and Andrew Kolan of Martin Marietta assisted in the selection of the Type II Portland Cement used for this SRM which was donated by the Giant Portland & Masonry Cement Company in Harleyville, SC. It has the following approximate composition:

CaO	(65) % by wt.	K ₂ O	(0.3) % by wt.
SiO ₂	(22)	TiO ₂	(0.2)
Al ₂ O ₃	(4.3)	P ₂ O ₅	(0.1)
Fe ₂ O ₃	(3.7)	Na ₂ O	(0.1)
SO ₃	(2.3)	Ign. Loss	(0.7)
MgO	(1.3)		

To open a vial of this SRM, make a deep scratch with a file about 1/4 inch from the bottom. Invert the vial and press a red hot file point against the scratch to cause a circumferential crack to form. Carefully remove the end of the vial and any glass fragments which may fall into the cement.

The specific surface area of cement changes on being exposed to the moisture in air. Therefore, this cement should be used as soon as possible after opening a vial. If not used immediately, it should be protected from atmospheric moisture by placing the opened vial in a desiccator.

Before any fineness test, this cement should be fluffed in a 4 to 6-ounce bottle as described in Section 4.3 of ASTM Method C 204.

The following additional information on the fineness of SRM 114n is not certified:

1. A specific surface area of $3740 \pm 30 \text{ cm}^2/\text{g}$ was determined with the Lea and Nurse air permeability method by T. P. Lees of the Cement and Concrete Association, Wexham Springs, UK. In this method, which was run according to the British Standard (BS 4550), the measured values of density (3.21 g/cm^3) and porosity (0.475) were used.
2. The results that were obtained on 23 samples of SRM 114n with an automated sedimentation apparatus are indicated in the figure. These results are in excellent agreement with the value certified for the residue remaining on a $45\text{-}\mu\text{m}$ electroformed sieve.