

National Bureau of Standards

Certificate

Standard Reference Material 774

Lead-Silica Glass for Dielectric

Constant and ac Loss Characteristics

M. J. Cellarosi

This Standard Reference Material is intended for use in checking test methods used to determine the dielectric constant and associated dissipation factor of insulating materials. It is in the form of a block approximately 5 cm square by 2.5 cm thick from which several specimens can be cut.

The certified values for the dielectric constants and associated dissipation factors, (loss tangents) at room temperature and relative humidity not exceeding 55 percent are:

<u>Frequency</u>	<u>Dielectric Constant</u>	<u>Dissipation Factor</u>
60 Hz	(7.47)*	(940)* $\times 10^{-6}$
100	7.47	675
400	7.47	643
1000	7.46	622
10000	7.45	570

*Because of the lack of agreement between the cooperating laboratories, this value is not certified but is for information only.

The uncertainties of the dielectric constants and the dissipation factors (each expressed as the standard deviation, 1s) are 0.05 and 31, respectively. Included in these uncertainties are possible specimen inhomogeneities, preparation of specimens, and measurement errors.

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.K. Kirby.

Washington, D.C. 20234
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George A. Uriano, Chief
Office of Standard Reference Materials

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SUPPLEMENTARY INFORMATION

The interlaboratory comparison measurements leading to certification were performed under the auspices of ASTM Subcommittee C-14.04 on Physical and Mechanical Properties of Glass, H.E. Hagy, Chairman. The laboratories that cooperated in these measurements are:

Corning Glass Works, Corning, NY; H.E. Hagy
National Bureau of Standards, Washington, D.C.; M.J. Cellarosi
Owens-Corning Fiberglas Corp., Granville, OH; J.R. Gonterman
Owens-Illinois, Inc., Toledo, OH; R.W. Beiswenger
Rensselaer Polytechnic Institute, Troy, NY; M. Tomozawa

The test specimens measured at NBS were nominally 40 mm in diameter and 1 mm thick. The opposite faces were optically polished to be parallel to $5\ \mu\text{m}$. Gold was vacuum deposited to form the electrodes. The three-terminal (guarded) method was used in which the diameter of the guarded electrode was 25 mm and the gap was 1 mm resulting in a capacitance of about 33 pF. Measurements were made with a low-voltage Schering bridge in accordance with ASTM D150. Standard Test Methods for A-C Loss Characteristics and Dielectric Constant (Permittivity) of Solid Electrical Insulating Materials.

The nominal composition and index of refraction for the sodium D line of this SRM are offered for information only:

<u>Constituent</u>	<u>Content</u>
SiO ₂	(46.0) wt %
PbO	(45.3)
K ₂ O	(5.6)
Na ₂ O	(2.5)
B ₂ O ₃	(0.6)
<u>Index of Refraction</u>	
n _D = (1.618)	