U. S. Department of Commerce
Frederick B. Dent
Secretary
National Bureau of Standards
Richard W. Roberts, Director

National Bureau of Standards Certificate

Standard Reference Material 709

Extra Dense Lead Glass

This Standard Reference Material is in the form of rectangular blocks 4 x 4 x 5 cm. It is designed for use in the calibration of equipment for the determination of the physical properties of glass, particularly softening, annealing, and strain points, and the relative stress optical coefficient.

Softening, Annealing and Strain Points

	Temperature °C			
	Laboratories			
	A	B	C	Average
Softening Point[1]	385	384	384	384
Annealing Point[2]	330	328	326	328
Strain Point[2]	312	312	309	311
Softening Point[3]	--	--	383	--
Annealing Point[4]	--	--	325	--
Strain Point[4]	--	--	307	--

Relative Stress–Optical Coefficient[5] at $\lambda = 546.1$ nm

$C = -1.359$ Brewsters (1 Brewster $= 10^{-12}$ m^2/N)

Participating Laboratories: Corning Glass Works, Corning, N. Y. (E. H. Fontana); National Bureau of Standards, Washington, D. C. (A. Napolitano and R. M. Waxler); and Owens-Illinois Inc., Toledo, Ohio (R. W. Beiswenger).

The overall direction and coordination of the technical measurements at NBS leading to the certification were performed under the direction of W. Haller, A. Napolitano, R. M. Waxler, and G. W. Cleek, Inorganic Materials Division.

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. E. Michaelis.

Washington, D.C. 20234
June 5, 1974

J. Paul Cali, Chief
Office of Standard Reference Materials

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SUPPLEMENTAL INFORMATION

Type of Glass: The glass is an extra dense lead glass having average index of refraction[a], after fine annealing, of N_D = 1.96985 and a Nu value, ν, of 19.7. The glass was manufactured by Schott Optical Glass, Inc., Duryea, Pa.

Composition of Glass: The nominal composition[b] of this glass is as follows:

PbO	82%
SiO_2	5
B_2O_3	10
Al_2O_3	3

a. Index of refraction measured on only four samples selected from lot.

b. This glass is not intended as a standard for chemical analysis. The above composition is offered only for information purposes.

REFERENCES

1. ASTM Designation C338-57 (1968), "Standard Method of Test for Softening Point of Glass," ASTM Book of Standards, Part 13, 1973.

2. ASTM Designation C336-71, "Standard Method of Test for Annealing Point and Strain Point of Glass," ASTM Book of Standards, Part 13, 1973.

3. "A Versatile Parallel Plate Viscometer for Glass Viscosity Measurements to 1000 °C," E. H. Fontana, Amer. Ceram. Soc. Bull., 49, No. 6, 594-597 (1970).

4. ASTM Designation C598-72, "Tentative Method of Test for Annealing Point and Strain Point of Glass by Beam Bending," ASTM Book of Standards, Part 13, 1973. Also, "Experimental Evaluation of Beam Bending Method of Determining Glass Viscosities in the Range 10^8 to 10^{15} Poises," H. E. Hagy, J. Amer. Ceram. Soc., 46, No. 2, 93-97 (1963).

5. "Relative Stress-Optical Coefficients of Some National Bureau of Standards Optical Glasses," R. M. Waxler and A. Napolitano, J. Res. Nat. Bur. Stand. (U.S.), 59, No. 2, 121-125 (Aug. 1957) RP 2779.