



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material 93a

#### Borosilicate Glass (12.5% B<sub>2</sub>O<sub>3</sub>)

This Standard Reference Material (SRM) is in the form of wafers 32 mm (1 1/4 in) in diameter and 6 mm (1/4 in) thick for application in checking chemical methods of analysis and for calibration in optical emission and x-ray spectrometric methods of analysis.

<u>Constituent</u>	<u>Percent by Weight</u>
SiO <sub>2</sub>	80.8
B <sub>2</sub> O <sub>3</sub>	12.5 <sub>6</sub> *
Na <sub>2</sub> O	3.9 <sub>8</sub>
Al <sub>2</sub> O <sub>3</sub>	2.2 <sub>8</sub>
Cl	0.06 <sub>0</sub>
ZrO <sub>2</sub>	0.04 <sub>2</sub>
Fe <sub>2</sub> O <sub>3</sub> (total iron as)	0.02 <sub>8</sub>
FeO	0.01 <sub>6</sub>
K <sub>2</sub> O	0.01 <sub>4</sub>
TiO <sub>2</sub>	0.01 <sub>4</sub>
CaO	0.01
MgO	0.00 <sub>5</sub>

\*B<sub>2</sub>O<sub>3</sub> determined by isotopic dilution mass spectrometry at NIST = 12.53 ± 0.06.

B<sub>2</sub>O<sub>3</sub> determined by cooperating laboratories, ASTM Method C169 = 12.60 ± 0.05.

**CERTIFICATION:** The value listed for an element is the best estimate of the "true" value based on the results of the analytical program. The value listed is not expected to deviate from the "true" value by more than 1 in the last significant figure reported; for a subscript figure, the deviation is not expected to be more than ± 5. Based on the results of homogeneity testing, maximum variations within and among samples are estimated to be less than the uncertainty figures given above.

The overall direction and coordination of the round-robin analyses leading to certification of constituents other than FeO were performed by Paul Close, Chairman of ASTM Subcommittee C14.02 on Chemical Analysis of Glass and Glass Products. The overall direction and coordination leading to certification of FeO were performed by Gerald D. Bowling, Chairman of ASTM Subcommittee C14.02, as part of the program of SRM development in ASTM Subcommittee C14.91, H.E. Hagy, Chairman.

The technical and support aspects involved in the original preparation, certification, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by G.W. Cleek and R.E. Michaelis. The technical and support aspects involved in the revised certification were coordinated through the Standard Reference Materials Program by J.S. Kane.

Gaithersburg, MD 20899  
September 10, 1991  
(Revision of certificate dated 8-31-73)

William P. Reed, Chief  
Standard Reference Materials Program

(over)

**PLANNING, PREPARATION, TESTING, ANALYSIS:** This Standard Reference Material is one of several composition glass products important to standardization in the industry. This SRM is issued in solid form at the request of ASTM Committee C14 for optimum use.

The material for this SRM was prepared by Corning Glass Works, Corning, New York.

At NIST, homogeneity testing was carried out simultaneously with the analyses for certification. Selected samples were chosen to observe any composition differences in the glass cane material both longitudinally and transversely. No significant transverse differences were found. Small but acceptable longitudinal differences were observed:  $\text{SiO}_2$  showed a decreasing trend from the leading end to the trailing end;  $\text{ZrO}_2$  showed an increasing trend; and  $\text{B}_2\text{O}_3$  showed a decreasing trend from each end toward the middle. Analyses were performed by the following: E.L. Garner, E.J. Maienthal, and K.M. Sappenfield.

Six laboratories cooperated in the initial ASTM round-robin chemical analyses of this borosilicate glass and five laboratories cooperated in the FeO update round-robin.

Anchor Hocking Corporation, Lancaster, Ohio (a)  
Corning Glass Works, Corning, New York (a)  
Corning, Incorporated, Corning, New York (b)  
Monarch Analytical Laboratories, Inc., Toledo, Ohio (b)  
Owens-Corning Fiberglas Corporation, Technical Center, Granville, Ohio (a,b)  
Owens-Illinois, Inc., Technical Center, Toledo, Ohio (a)  
Owens-Illinois, Inc., Vineland, New Jersey (a,b)  
PPG Industries, Pittsburgh, Pennsylvania (a)  
Schott Glass Technologies, Inc., Duryea, Pennsylvania (b)

- a. original round-robin.
- b. FeO update round-robin.