
INCH-POUND

MIL-PRF-47033B
30 August 1996
SUPERSEDING
MIL-G-47033A
5 August 1988

PERFORMANCE SPECIFICATION

GLASS, BOROSILICATE

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of borosilicate glass intended for use where a low coefficient of thermal expansion is desired.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents. (Not applicable to this specification)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commander, U.S. Army Missile Command, ATTN: AMSMI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5270 by using the Standardization Document Improvement Proposal (DD Form 1426), appearing at the end of this document, or by letter.

AMSC N/A

FSC 9340

DISTRIBUTION STATEMENT A. Approved for public release, distribution is unlimited.

MIL-PRF-47033B

Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

American Society for Testing and Materials (ASTM)

ASTM E 438	Glasses in Laboratory Apparatus, Standard Specification for
ASTM C 623	Young's Modulus, Shear Modulus, and Poisson's Ratio for Glass and Glass-Ceramics by Resonance, Standard Test Method for

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When required in the contractor purchase order, a sample shall be subjected to first article inspection (see 4.2 and 6.2).

3.2 Item requirements. The material shall comply with ASTM E 438, Type I, Class A, and the requirements specified herein.

3.3 Physical properties.

3.3.1 Modulus of elasticity. The modulus of elasticity shall be greater than 9.0×10^6 pounds per square inch.

3.3.2 Inclusions. The maximum inclusion diameter shall be 0.5 millimeters (mm). Each cubic centimeter (cc) of glass shall not contain more than one maximum size inclusion. The sum of inclusion diameters over 0.1 mm per cc of glass shall not exceed 0.5 mm.

MIL-PRF-47033B

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2).
- b. Quality conformance inspection (see 4.3).

4.2 First article inspection. A first article sample shall be prepared using the same methods proposed for the preparation of subsequent lots of material. First article inspections shall be conducted on the first article sample and shall consist of all the examinations and tests specified herein. Samples which do not meet all the requirements of this specification shall be rejected. Subsequent quantities will not be considered for acceptance until approval of the first article sample has been obtained.

4.3 Conformance inspection. Conformance inspection shall include all examinations and tests of 4.4

4.4 Test methods. Test methods shall be as specified in 'ASTM E 438, and herein.

4.4.1 Modulus of elasticity. Compliance with the modulus of elasticity specified in 3.3.1 shall be verified in accordance with ASTM C 623 or other equivalent, correlated test method approved by the procuring activity.

4.4.2 Inclusions. Compliance with the inclusion limits specified in 3.3.2 shall be verified using a test set-up similar to figure 1, or other test method approved by the procuring activity. Using the set-up in figure 1, illuminate the sample from the side and view the sample normal to the black background. Inclusions appear as bright specks on a dark field. The sample may require immersion in a refractive index matched cell if the surfaces are not sufficiently polished.

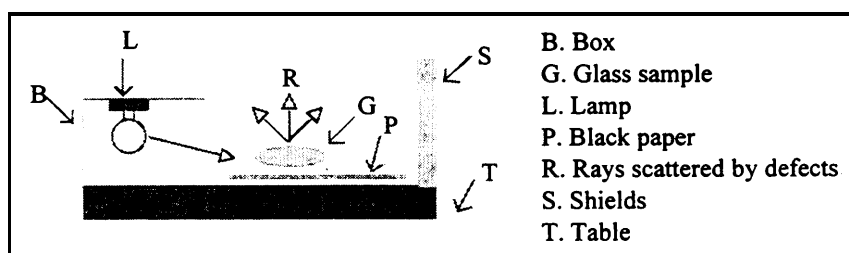


Figure 1. Inclusions inspection set-up.

MIL-PRF-47033B

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that maybe helpful, but is not mandatory.)

6.1 Intended use. The borosilicate glass covered by this specification is intended , for the fabrication of first surface glass substrate mirrors.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.3).
- c. Whether first article inspection is required (see 3.1 and 4.2).
- d. Packaging requirements.

6.3 Typical properties. The material is optically clear, but typically not of "optical" quality. The index of refraction is approximately 1.48.

6.4 Subject term (key word) listing.

Low thermal expansion

MIL-PRF-47033B

6.5 Changes from Previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army - MI

Preparing Activity
Army - MI

(Project 9340-0005)

Review Activities:
Army - AR
DLA - GS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-PRF-47033B	2. DOCUMENT DATE (YYMMDD) 30 August 1996
3. DOCUMENT TITLE Glass, Borosilicate			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	e. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME U.S. Army Missile Command		b. TELEPHONE (Include Area Code) (1) Commercial (205) 876-6994 (2) AUTOVON 746-6994	
c. ADDRESS (Include Zip Code) Commander, U.S. Army Missile Command ATTN: AMSMI-RD-SE-TD-ST Redstone Arsenal, AL 35898-5270		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	