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Standard Specification for Glasses in Laboratory Apparatus¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the glasses commonly used to manufacture laboratory glass apparatus.

2. Referenced Documents

2.1 *ASTM Standards*:²

[C225 Test Methods for Resistance of Glass Containers to Chemical Attack](#)

[C338 Test Method for Softening Point of Glass](#)

[C598 Test Method for Annealing Point and Strain Point of Glass by Beam Bending](#)

[C729 Test Method for Density of Glass by the Sink-Float Comparator](#)

[E228 Test Method for Linear Thermal Expansion of Solid Materials With a Push-Rod Dilatometer](#)

3. Classification

3.1 Three types are included, as follows:

3.1.1 *Type I, Class A*—A low-expansion borosilicate glass.

3.1.2 *Type I, Class B*—An alumino-borosilicate glass.

3.1.3 *Type II*—A soda-lime glass.

4. Chemical Requirements

4.1 The Type I, Class A and B glasses shall have the major constituents and comply with the restrictions on trace constituents given in [Table 1](#). The major constituents will be varied to maintain the physical requirements as shown.

4.2 Suitable Type II glasses may vary somewhat in chemical composition and still meet essential physical requirements. Two such compositions are shown in [Table 2](#); both are readily available and are used for laboratory apparatus.

¹ This specification is under the jurisdiction of ASTM Committee E41 on Laboratory Apparatus and is the direct responsibility of Subcommittee E41.01 on Apparatus.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Chemical Requirements of Type I Glasses

	Type I, Class A, weight %	Type I, Class B, weight %
Major constituents, approximate:		
SiO ₂	81	73
B ₂ O ₃	13	10
Al ₂ O ₃	2	7
BaO	see below	0–2
CaO	see below	1
Na ₂ O	4	6
K ₂ O	see below	1
Trace constituents, max:		
As ₂ O ₃ plus Sb ₂ O ₃	0.005	0.1
PbO	0.1	0.1
MgO	0.1	0.3
ZnO	0.1	0.1
CaO	0.1	see above
K ₂ O	0.75 ^A	see above
All other constituents, max	0.2	1.0

^A Each manufacturer must publish the maximum percentage in his glass because certain limited applications require a level under 0.1 %.

5. Physical Requirements

5.1 The physical requirements for glasses shall be as prescribed in [Table 3](#). The tolerances listed in [Table 3](#) must be on the published values of the manufacturer's specific glass compositions.

6. Keywords

6.1 glasses; laboratory

TABLE 2 Chemical Requirements of Type II Glasses

	Composition A, weight %	Composition B, weight %
Major constituents, approximate:		
SiO ₂	68	72
B ₂ O ₃	2	...
Al ₂ O ₃	3	2
BaO	2	...
CaO	5	5
MgO	4	4
Na ₂ O	15	16
K ₂ O	1	1
Trace constituents, max:		
As ₂ O ₃ + Sb ₂ O ₃	0.1	0.1
PbO	0.1	0.1
All other constituents, max	1.0	1.0