



Standard Specification for Beaded Process Glass Pipe and Fittings¹

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1. Scope

1.1 This specification covers chemically resistant, low expansion Type-I borosilicate glass, Class A, (see Specification E438) used to manufacture beaded end flanged-glass pipe and fittings for pressure and vacuum applications.

2. Referenced Documents

2.1 *ASTM Standards*:²

C162 Terminology of Glass and Glass Products

C600 Test Method of Thermal Shock Test on Glass Pipe

C601 Test Method for Pressure Test on Glass Pipe

C623 Test Method for Young's Modulus, Shear Modulus, and Poisson's Ratio for Glass and Glass-Ceramics by Resonance

C693 Test Method for Density of Glass by Buoyancy

E438 Specification for Glasses in Laboratory Apparatus

3. Terminology

3.1 For definitions of terms used in this specification, refer to Terminology C162.

4. Materials and Manufacture

4.1 The glass shall be reasonably free of surface defects, such as open blisters or airlines and scratches, and shall be completely free of chips and checks. This is applicable to both the inside and outside surfaces. It shall represent good workmanship as consistent with standard glass process capabilities.

4.2 *Heat Treatment or Annealing*—Pipe and fittings may be suitably heat treated (tempered) or annealed as specified by the manufacturer.

5. Chemical Requirements

5.1 The chemical requirements shall be in accordance with Specification E438.

¹ This specification is under the jurisdiction of ASTM Committee C14 on Glass and Glass Products and is the direct responsibility of Subcommittee C14.05 on Glass Pipe.

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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.

6. Physical Requirements

6.1 The physical requirements shall be as described in Specification E438.

6.2 Refer also to Annex A1 for additional physical requirements.

7. Operating Temperatures

7.1 *Minimum Operating Temperature*—The minimum rated operating temperature for all sizes shall be 0°F (–18°C) provided that the temperature of the material being conveyed is above the freezing point.

7.2 *Maximum Operating Temperature*—The maximum rated operating temperature for all sizes shall be 350°F (177°C).

7.3 *Thermal Shock Resistance*—The maximum allowable sudden temperature differential for properly installed systems shall be in accordance with Table 1 for the various pipe sizes.

7.3.1 Maximum temperature differential refers to an almost instantaneous temperature change, such as low-pressure steam followed directly by a flush of ice cold water, or the reverse. Maximum temperature differential pertains to inside and outside surfaces, exclusive of sign.

7.3.2 The test method for thermal shock is not ordinarily performed, but in those cases where thermal shock resistance may be questioned, it may be performed in accordance with Method C600. Acceptance of this test shall be that all tested ware shall pass. If one or more failures do occur, a second sampling twice the population of the first, shall be tested. If any failures occur in the second sampling, the entire shipment shall be rejected.

8. Pressure Rating

8.1 Maximum recommended working pressure for beaded glass process pipe and fittings shall be in accordance with Table 2, when the pipe is installed in accordance with manufacturer's recommendations, and when operated within the maximum temperature differential and temperature limit. See 8.3 for vacuum service.

8.2 *Acceptance Pressure Test*—Individual lengths of beaded process pipe or fittings shall withstand an internal hydrostatic pressure test when tested in accordance with Method C601. Acceptance of this test shall be that all tested ware shall pass.