



SUBJECT GLASS THERMAL EXPANSION MATCH TEST
Process Specification

SUPERSEDED DATE 4/13/50

Initially applied to face plates.

In the following test for examining the sealing properties of two glasses, a seal is made, annealed, and the seal boundary examined for residual strain.

1. The specimens are preferably in the form of flat glass, 1/2 to 1" in width, 2 to 4" long, and about 3/8" thick. The two specimens should be as near the same size as possible.
2. The two glasses to be fused are fastened with scotch tape, so that the 1" x 2" faces form the interface of the fusion. Smooth and clean surfaces ensure good adhesion with a minimum of air pockets at the interface. Placing a tiny bit of refractory between the two glasses near the edge also cuts down the possibility of entrapping air at the interface.
3. The taped specimen is placed in the furnace on a refractory slab, with the glass having the higher softening point on the bottom. The rate of heating is not too important, but care must be taken not to crack the glass. In approaching the softening temperature of the top glass, the rate of heating should be slow enough to ensure good adhesion in the center area of the interface. Too rapid heating at that point will cause the edges to soften long before the interior is soft enough to fuse to the bottom glass.
4. After the edges of the top member have rounded off, the furnace is cooled at 2°F. per minute to ensure proper annealing.
5. The two 3/4" x 2" sides of the annealed fusion are ground and polished so that it can be viewed through the one inch path parallel to the interface. If polishing facilities are not available, a smooth ground surface will be sufficient if the fusion is placed between glass cover plates with an oil or water film between the ground surfaces and the cover plates.
6. Alternatively, the specimen may be examined for strain on the smallest path parallel to the interface by immersing it in a suitable liquid matching the index of refraction of the glass, without grinding the edges.
7. The strain is read at the mid point of the interface and expressed as millimicrons per inch of path.

*Note: This test shall be applied to glass face plates as follows:

| <u>Glass to be Tested</u> | <u>Standard</u> | <u>Strain Limits§</u> |
|---------------------------|--|-----------------------|
| BSC-51 | BSC51 Melt S1720 | ±60μ/cm |
| 2886 | 2886 Melt 3-23-48 | ±60μ/cm |
| 3459 | 3459 Melt 12-5-49 | ±60μ/cm |
| 3590 | 3590 Std. (Supplied by Pittsburgh Plate Glass Co.) | ±60μ/cm |
| 3720 | 3590 Std. (Supplied by Pittsburgh Plate Glass Co.) | +100 to +220μ/cm |

§The positive sign is used for strain in seals in which the glass sample is in tension, i.e., has higher thermal expansion than the standard.

ENGINEERING SECTION
STANDARDIZING

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