



Designation: C1377 – 97(Reapproved 2009)

Standard Test Method for Calibration of Surface/Stress Measuring Devices¹

This standard is issued under the fixed designation C1377; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers calibration or verification of calibration, or both, of surface-stress measuring devices used to measure stress in annealed and heat-strengthened or tempered glass using polariscopic or refractometry based principles.

1.2 This test method is nondestructive.

1.3 This test method uses transmitted light, and therefore, is applicable to light-transmitting glasses.

1.4 This test method is not applicable to chemically tempered glass.

1.5 Using the procedure described, surface stresses can be measured only on the “tin” side of float glass.

1.6 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

C158 Test Methods for Strength of Glass by Flexure (Determination of Modulus of Rupture)

C162 Terminology of Glass and Glass Products

C770 Test Method for Measurement of Glass Stress—Optical Coefficient

C1048 Specification for Heat-Strengthened and Fully Tempered Flat Glass

C1279 Test Method for Non-Destructive Photoelastic Mea-

surement of Edge and Surface Stresses in Annealed, Heat-Strengthened, and Fully Tempered Flat Glass

3. Terminology

3.1 *Definitions*—For terminology used in this test method, refer to Terminology C162.

4. Summary of Test Method

4.1 In this test method, a test bar is subjected to bending using deadweights or calibrated load-cells to introduce surface stresses that can be calculated from the specimen geometry and forces applied. At a point in which the stresses are calculated, those same stresses also are measured using the instrument to be calibrated or verified. Since both the specimen dimension and the applied forces can be established accurately using traceable (primary) standards, the method permits a fully traceable calibration of the stress-measuring instrument.

5. Significance and Use

5.1 The strength and performance of heat-strengthened and fully tempered glass is greatly affected by the surface and edge stress induced during the heat-treating process.

5.2 The edge and surface stress levels are specified in Specification C1048, in the Engineering Standards Manual of GANA³, and in foreign specifications.

5.3 Surface stresses can be measured nondestructively using methods, such as Test Method C1279. The calibration of surface measuring devices used in those procedures and periodic verification of calibration are needed. This test method offers a convenient way to accomplish this task.

6. Principle of Operation

6.1 The instrument to be calibrated is placed on the surface of the calibration specimen. Stresses at a point where the instrument is placed are calculated using expressions shown in Section 9. To increase the precision of measurement, several levels of stress are produced by applying forces incrementally. Measurement of stress using the instrument to be calibrated is repeated for each stress level and these measurements are used to calibrate the instrument.

¹ This test method is under the jurisdiction of ASTM Committee C14 on Glass and Glass Products and is the direct responsibility of Subcommittee C14.08 on Flat Glass.

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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.

³ Available from GANA, Glass Association of North America, 3310 SW Harrison St., Topeka, KS 66611–2279.