



Standard Test Method for Structural Performance of Glass in Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Nondestructive Method¹

This standard is issued under the fixed designation E998; 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 is a nondestructive test procedure to establish the nature of stresses induced in glass subjected to uniform static loads. A procedure is provided for using this stress information to estimate the probability of breakage of the glass.

1.2 This test method is applicable to glass of various degrees of temper; for example, annealed, heat-strengthened, fully tempered, laminated, insulating, and combinations thereof.

1.3 This test method describes a process of applying specific test loads to glass. The test may be conducted using the standard test frame specified herein or a test frame of the user's design.

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

1.5 *This standard does not purport to address all of the safety problems, 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.* For specific precautionary statements see Section 7.

2. Referenced Documents

2.1 *ASTM Standards*:²

E631 Terminology of Building Constructions

3. Terminology

3.1 Definitions:

¹ This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Performance of Windows, Doors, Skylights and Curtain Walls.

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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.

3.1.1 For definitions of general terms related to building construction used in this test method refer to Terminology E631.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *aspect ratio*—a ratio of long side to short side of the glass lite.

3.2.2 *average breaking stress (ABS)*—the average maximum principal tensile stress (MPTS) at failure, representative of the glass under test. The ABS is dependent on a number of factors including geometry, time history of load, surface condition, and so forth. Glasses with residual surface stresses, such as heat-strengthened or fully tempered, must have their residual stresses added to the state of stress at the specified load. As defined for use in the standard, the ABS is for annealed glass.

3.2.3 *coefficient of variation*—the ratio (decimal fraction) of the standard deviation of the maximum principal tensile stress (MPTS) at failure to the ABS.

3.2.4 *equivalent design load*—a magnitude of a uniform load and the load duration selected by the specifying authority to represent design loads.

3.2.5 *glass specimen*—the glass to be tested, for example, a single lite, an insulating glass unit, laminated glass, and so forth (does not include test frame).

3.2.6 *maximum principal tensile stress (MPTS)*—a maximum calculated tensile stress based on strain gage measurements.

3.2.7 *negative load*—a load that results in the indoor side of a glass specimen being the high-pressure side.

3.2.8 *permanent set of test frame*—a load-induced permanent displacement from an original position of the test frame.

3.2.9 *positive load*—a load that results in the outdoor side of a glass specimen being the high-pressure side.

3.2.10 *probability of breakage*—the probability that a glass specimen breaks when tested at a given equivalent design load. General industry practice to express probability as lites per 1000 lites.

3.2.11 *residual stress*—an initial, state of stress on unloaded, unglazed glass resulting from the manufacturing process (heat-strengthening, tempering).