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An American National Standard

Standard Test Method for Structural Performance of Glass in Windows, Curtain Walls, and Doors Under the Influence of Uniform Static Loads by Nondestructive Method[1]

This standard is issued under the fixed designation E 998; 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 in windows, curtain walls, and doors subjected to uniform static loads. A procedure is provided for using this stress information to estimate the probability of failure 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, insulated, 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 inch-pound units are to be regarded as 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 6.

2. Terminology

2.1 *aspect ratio*—a ratio of long side to short side of glass plate.

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, etc. 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.

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.

2.4 *equivalent design load*—a magnitude of a 60-s duration uniform load selected by specifying authority to represent design loads.

2.5 *glass specimen*—the glass to be tested, for example, a single pane, an insulating glass unit, laminated glass, etc. (does not include test frame).

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

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

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

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

2.10 *probability of failure*—the probability that a glass specimen fails when tested at a given equivalent design load. General industry practice to express probability as lights per 1000 lights.

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

2.12 *specifying authority*—the professional or professionals responsible for determining and furnishing the information required to perform this test method as described in Section 9.

3. Summary of Test Method

3.1 This test method consists of:

3.1.1 Glazing the test specimen into a test frame that is mounted on or against a test chamber.

3.1.2 Supplying or exhausting air from the chamber at a rate required to maintain test-pressure difference across the test specimen.

3.1.3 Measuring and observing deflections, deformations, specimen strains, and the nature of any failures.

3.1.4 Recording the results in an orderly manner.

3.2 Methods of loading to nondestructive levels are provided.

3.3 Test data are used to predict glass structural performance characteristics.

[1] This test method is under the jurisdiction of ASTM Committee E-6 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Component Performance of Windows, Curtain Walls, and Doors.

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