

US General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings

1. Introduction

This test standard is intended to ensure an adequate measure of standardization and quality assurance in the testing of window systems including but not limited to glazing, sealants, seats and seals, frames, anchorages and all attachments and/or secondary catcher or restraint mechanisms designed to mitigate the hazards from flying glass and debris. This standard is the sole test protocol by which blast resistant windows and related hazard mitigation technology and products shall be evaluated for facilities under the control and responsibility of the US General Services Administration (GSA).¹

4. Terms and Definitions

The following terms and definitions are provided to facilitate the implementation of this test standard.

ANFO – A mixture of Ammonium Nitrate and Fuel Oil designed to produce explosive effects.

Annealed Glass (AG) – This is the most common glass type that is used in construction. It is also the weakest glass type and fails in large hazardous dagger-like fragments.

Heat Strengthened Glass (HSG) – This glass type is partially tempered. It has approximately twice the compressive strength of typical annealed glass. Like AG, HSG fails in large, dangerous shards.

Incident Pressure – The overpressure (i.e., pressure above ambient) produced by an explosion in the absence of a structure or other object. Units are typically psi.

Impulse – The area under a pressure-time waveform. Units are typically psi-msec.

Interlayer – Any material used to bond two lites of glass and/or other glazing material together to form a laminate. For annealed glass the interlayer is normally a 0.030 in. thick polyvinyl butyral (PVB). For thermally tempered glass the interlayer is normally a 0.060 in. thick PVB. Some applications use a thicker interlayer (0.090 in. and 0.120 in. are sometimes used in special applications).

Laminated Glass – Two or more plies of glass bonded together by interlayer(s). When broken, the interlayer tends to retain the glass fragments.

Lexan – Lexan[®] is GE's product name for [polycarbonate](#).

Lite – Another term for a pane of glass.

mil – Unit of measure commonly used for reporting laminate interlayer or security window film thickness. 1 mil = 1/1000th of 1 inch.

Monolithic Glass – A single sheet of glass without any laminations.

Plastic Explosive – Any of a series of plastic demolition explosives with great shattering power. These normally typically contain a high percentage of a high explosive such as RDX combined with a mixture of various oils, waxes, and plasticizers. Upon manipulation these materials consolidate into a rubbery fully plasticized mass that may be kneaded and pressed into any shape. Plastic explosives have excellent mechanical and adhesive properties, and may be stretched into long strands without breakage.

Polycarbonate – Any of a family of thermoplastics

65 89.88 Tm(5910.02 0 0 10.02dP 5924 135.8398 Tm(r50.02 .024.02 0 0 10.02 137.26m3169fd798

wet glazed or mechanically attached to the
window frame. Mechanical attachment nor 0 0 10.02 241.5829 691 Tm10.02 0 0 12chm

Table 1. GSA/ISC Performance Conditions for Window System Response.

Performance Condition	Protection Level	Hazard Level	Description of Window Glazing Response
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manner similar to that used for open-air explosive tests. This enclosed structure shall be designed to

conditions for a particular project, or if performed as a generic test, should be approximately 24 inches off the reaction structure floor. Actual tested conditions shall be recorded and reported.

6.6 Test Measurements

6.6.1 Prior to the Test

Prior to the test, the test conductor shall:

- Record the ambient temperature within 30 minutes of test time.
- Measure and record test specimen dimensions. Measure and report actual glazing thickness.
- Photographically record the pre-test condition of the test specimens, the test frame, and the test site/apparatus configuration. This photographic record shall consist of still photographs and may include motion pictures or video.
- For tests using explosives, measure and record the test charge construction and the standoff distance from the center of the charge to the exterior face of the test specimen(s).
- For shock tube tests, measure and record the blast source construction (compressed gas

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