


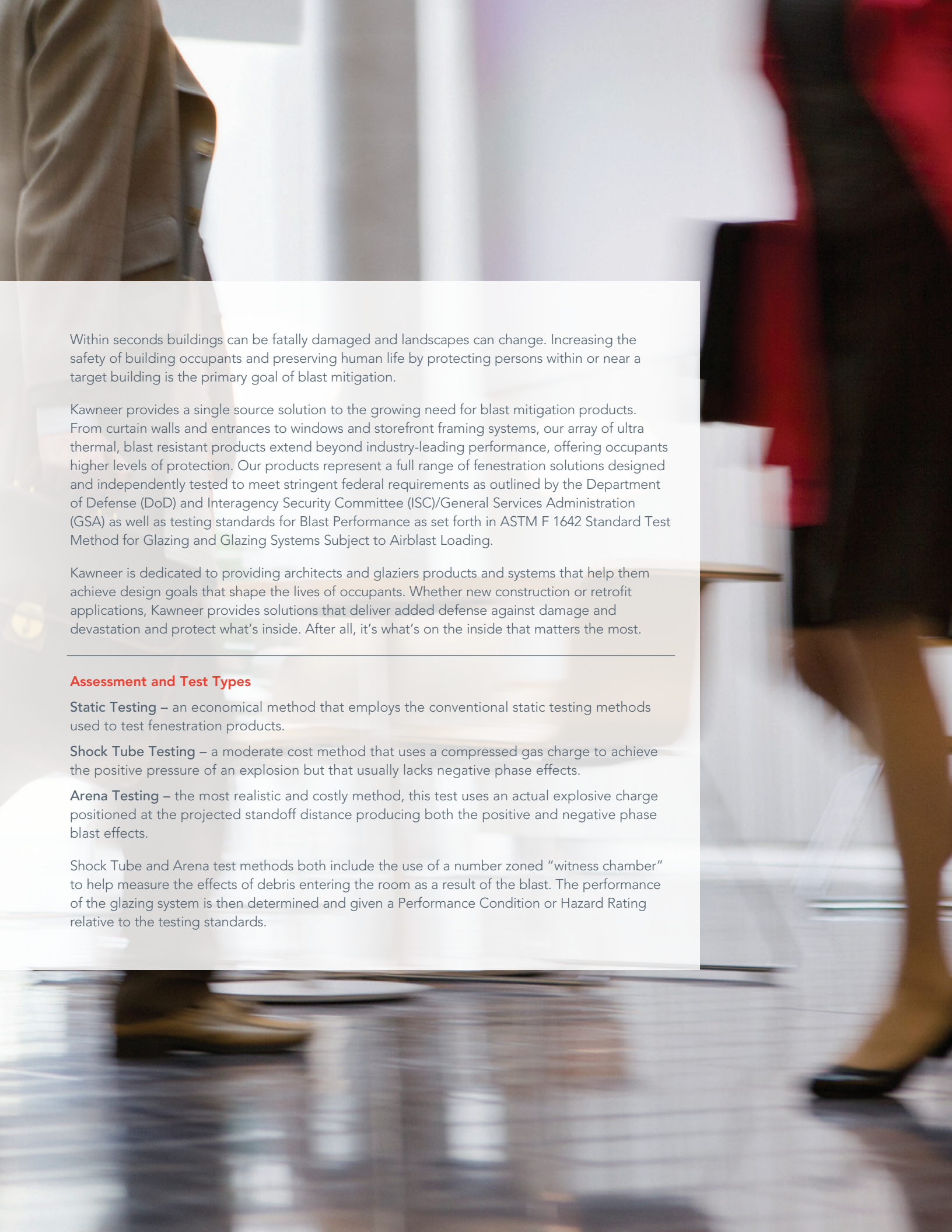
ULTRA THERMAL / BLAST RESISTANT

protect  
what's inside.

 KAWNEER

A blurred photograph of a modern office hallway with large windows and people walking. The text is overlaid in the center in a red, sans-serif font.

Threats against our  
national security –  
people and property –  
are ever-present in  
today's global society.  
As architects, you have  
the unique ability to  
safeguard human lives.



Within seconds buildings can be fatally damaged and landscapes can change. Increasing the safety of building occupants and preserving human life by protecting persons within or near a target building is the primary goal of blast mitigation.

Kawneer provides a single source solution to the growing need for blast mitigation products. From curtain walls and entrances to windows and storefront framing systems, our array of ultra thermal, blast resistant products extend beyond industry-leading performance, offering occupants higher levels of protection. Our products represent a full range of fenestration solutions designed and independently tested to meet stringent federal requirements as outlined by the Department of Defense (DoD) and Interagency Security Committee (ISC)/General Services Administration (GSA) as well as testing standards for Blast Performance as set forth in ASTM F 1642 Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading.

Kawneer is dedicated to providing architects and glaziers products and systems that help them achieve design goals that shape the lives of occupants. Whether new construction or retrofit applications, Kawneer provides solutions that deliver added defense against damage and devastation and protect what's inside. After all, it's what's on the inside that matters the most.

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### **Assessment and Test Types**

**Static Testing** – an economical method that employs the conventional static testing methods used to test fenestration products.

**Shock Tube Testing** – a moderate cost method that uses a compressed gas charge to achieve the positive pressure of an explosion but that usually lacks negative phase effects.

**Arena Testing** – the most realistic and costly method, this test uses an actual explosive charge positioned at the projected standoff distance producing both the positive and negative phase blast effects.

Shock Tube and Arena test methods both include the use of a number zoned “witness chamber” to help measure the effects of debris entering the room as a result of the blast. The performance of the glazing system is then determined and given a Performance Condition or Hazard Rating relative to the testing standards.

Developing high-performing blast mitigation solutions involves several interdependent steps to ensure the effectiveness of the products and how they will safeguard the people in and near the buildings they are used for.

**Threat Assessment** is used to determine the estimated size and nature of the potential explosive device as well as the “standoff distance,” or the distance from the anticipated detonation point to the buildings. This is the first step to any blast mitigation project and is evaluated by a third party consultant. During the process questions like, “what is the likelihood of an attack?” or “how close can a vehicle or carrier get to the building?” are asked. Risk analysis software, site surveys and blast consultants often provide the answers to those questions and more. However the method, it is critical for this step to be carried out and communicated to the design team as this lays the foundation for the project design.

After the initial Threat Assessment, **Blast Resistance** can be measured by several test methods designed to simulate the effects of an explosion.

Building blast resistance requirements, known as Blast Mitigation Standard (BMS), are driven by the size of the explosive device and distance to the target. The BMS is typically expressed in pounds per square inch of reflected pressure and psi-msec of impulse. Barring these elements, the BMS is incomplete and the building is likely to be inadequately protected. During this process, the **Building and Wall Assessment/Reinforcement** is evaluated, addressing design and product options as well as the blast resistance of the products, attachment methods. The evaluation and assessment

must look at the products as a system and examine how the various elements work together. Key points to consider include:

- The glass can break but cannot send flying shards into the room.
- The glass lite must stay in the frame along with all interior window components.
- The frame must remain anchored to the wall.
- The wall must resist the load and retain the frame.

Depending on building construction methods, materials and construction, a variety of wall anchoring options are offered:

- Basic Trim and Clip – usually suitable for low blast load applications.
- Expansion anchors and adhesive anchors.
- High performance CINTEC™\* grout-filled anchors, which are particularly effective in retrofit applications where the need to tie together unrelated construction elements or deep anchoring is necessary to support high blast loads.

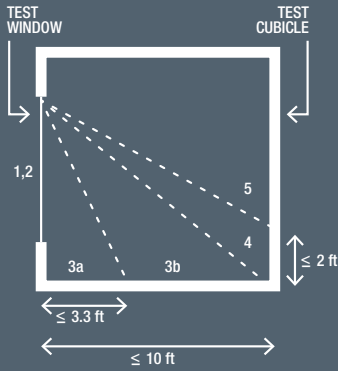
Highly skilled glazing contractors and window installers are paramount to the overall process and are critical to assuring proper anchorage and craftsmanship. These teams work closely with project designers, consultants and engineers to create safe spaces that help protect building occupants and those nearby.

Kawneer is committed to working with architects, building owners, structural engineers, consultants and/or general contractors to evaluate blast resistant projects and works to ensure that our range of products and systems meet or exceed security criteria and federal regulations.

Products are developed and tested to meet specific criteria as outlined by the Interagency Security Committee (ISC) Security Criteria and General Services Administration (GSA) as well as ASTM International Standards.

**INTERAGENCY SECURITY COMMITTEE SECURITY CRITERIA AND THE GENERAL SERVICES ADMINISTRATION**

Initially established to address glazing in all federal buildings after the 1995 bombing of the A.P. Murrah Federal Building in Oklahoma City, the GSA Security Criteria resulted in the increased use of blast resistant fenestration products in federal courthouses and similar government buildings. Taking it further, the ISC developed its Security Criteria, which was approved for use in all GSA new buildings and major renovation projects. This criterion requires that windows be designed to mitigate the hazard from flying glass fragments in the case of an explosion. This criterion is intended to reduce, though not necessarily eliminate, potential hazards with the understanding that not all fenestration products, such as windows, will survive a blast.



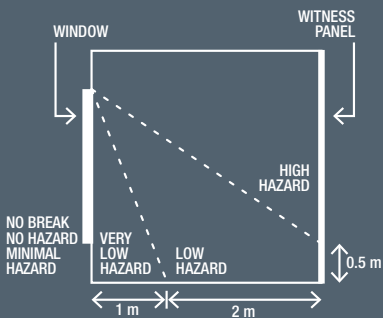
Test window should be in the design position or centered on the wall.

Cross-section through test structure illustrating performance conditions

Performance Condition	Protection Level	Hazard Level	Window Glazing Response
1	Safe	None	Glazing does not break. No visible damage to glazing or frame
2	Very High	None	Glazing cracks but is retained by the frame. Dusting or very small fragments near sill or on floor acceptable.
3a	High	Very Low	Glazing cracks. Fragments enter space and land on floor no further than 3.3 ft. from the window.
3b	High	Low	Glazing cracks. Fragments enter space and land on floor no further than 10 ft. from the window.
4	Medium	Medium	Glazing cracks. Fragments enter space and land on floor and impact a vertical witness panel at a distance of no more than 10 ft. from the window at a height no greater than 2 ft. above the floor.
5	Low	High	Glazing cracks and window system fails catastrophically. Fragments enter space impacting a vertical witness panel at a distance of no more than 10 ft. from the window at a height greater than 2 ft. above the floor.

**ASTM INTERNATIONAL STANDARDS**

Similar to the ISC/GSA performance, ASTM International’s ASTM F 1642-04 “Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading” establishes a testing method that evaluates levels of protection. These criteria require that glazed window products meet performance levels that correspond to specific levels of protection.



Cross-section through witness area per ASTM 1642-04: Glazing and Glazing Systems Subject to Airblast Loading

Hazard Rating	Description	Fragments	
		1m to 3m	Witness Panel
No Break	Glazing is allowed to break and there is no visible damage to the framing system	None	None
No Hazard	Glazing fractures but is fully retained in the facility test frame or glazing system frame and the rear surface is unbroken	None	None
Minimal Hazard	Glazing fractures and the total length of tears in the glazing plus the total length of pullout from the edge of the frame is less than 20% of the glazing sight perimeter	< 10 in. unified dimension	Three or less perforations from glazing slivers and no fragment indents
Very Low Hazard	Glazing fractures and is located within one (1) meter of the original location	< 10 in. unified dimension	Three or less perforations from glazing slivers and no fragment indents
Low Hazard	Glazing fractures	Glazing fragments generally fall between one (1) meter and three (3) meters	< 10 perforations 50 cm below the bottom of the specimen and none of the perforations penetrate through the full thickness of the witness panel
High Hazard	Glazing fractures	One (1) meter and three (3) meters	> 10 perforations in the area of the witness panel and one or more fragments penetrate fully through the witness panel

**ULTRA THERMAL  
BLAST RESISTANT**

Curtain Walls  
Storefront Framing  
Windows  
Entrances

**CURTAIN WALLS**

With versatile features, proven performance and a range of fabrication options, Kawneer's ultra thermal and non-thermal curtain walls set the standards.

**STOREFRONT FRAMING**

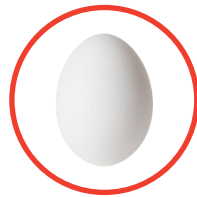
Delivering the ultimate in occupant safety and comfort, our versatile, ultra thermal storefront framing systems have options for single span storefronts, low- to mid-rise ribbon window and punched openings, and are ideal for a range of applications.

**WINDOWS**

Available in a range of configurations for increased design flexibility. Options include Fixed and Operable, Single Hung, Casement, Projected and Sliding.

**ENTRANCES**

Providing extra strength for high traffic applications where codes require impact resistance, blast mitigation protection or high thermal performance.



Enhanced by our vertically integrated manufacturing process, Kawneer offers a single source for blast resistant windows, entrances, curtain walls and framing – both non-thermal and thermally broken.

Our comprehensive offering of solutions, allow architects to design for the whole building. Our products conform to the range of government standards and beyond:

DoD, ISC/GSA and DOS criteria as well as custom blast mitigation standards.

Blast resistant products are comprised of laminated glass infill within standard or ultra thermal aluminum frames anchored to the surrounding building. Air blast pressures, impulses, and/or durations often vary project-to-project.

The products also meet applicable North American performance standards for air, structural, condensation, thermal and sound transmission.



## It's what's on the inside that matters most.

Excellence in innovation, world-class engineering, proven quality and performance combined with the most comprehensive portfolio of products have established Kawneer and Traco as leading manufacturers of aluminum products and systems for commercial applications. We believe that buildings can influence their occupants and strive to help designers not only achieve their creative goals, but make buildings that are healthy and safe. Protecting what's inside is critical and with the highest level of protection – blast and thermal – Kawneer's blast mitigation products stand ready to accomplish this objective.



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