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# **Graham Architectural Products**

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## ***Blast Resistant Products*** **Windows, Curtain Wall, & Entry Systems**

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CUSTOM MANUFACTURED ARCHITECTURAL GRADE WINDOWS AND DOORS

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# Blast Mitigation... ...Reducing Risk And Saving Lives

**Despite** our best efforts to prevent acts of terrorism from both home-grown and foreign interests, the reality is that the threat remains. Although terrorist attacks garner the most attention, non-terrorist blast threats are also a serious concern for some building owners. Blast resistant windows are a key factor in mitigating unnecessary injuries in the event of an accidental explosion.

## Reducing Risk

While complete protection from bomb blasts and explosions is not possible, there are steps we can take to mitigate the likelihood of damage. Blast-resistant windows and doors have long been used in a variety of applications where the obvious need



existed, and recent events have created a greater need for expansion of that protection into a wider range of applications.

## Why Use Blast Windows And Entry Systems?

Since the 1995 bombing of the Oklahoma Federal Building, blast-resistant windows for high-profile buildings have become a way of life. As technology improves and we learn more about the wide-ranging effects of bomb blasts, it has become apparent that a larger scope of buildings, in addition to high-profile buildings, and their occupants could benefit from blast and ballistic resistant windows and doors.

## Effects Of Flying Glass From Blast Attacks

The debris generated or the collapse of structures produced during an explosive attack causes the majority of injuries and deaths in a bombing event. As an example, over 5,000 people were injured by flying glass and debris in the bombings of the two American embassies in Africa. The types of injuries that occurred included deep lacerations and eye injuries. Approximately 90 people were blinded in the attack on the U.S. Embassy in Kenya.

When designing window systems to resist blast forces, it is important that the glazing, framing, and anchorage all be designed to withstand the required forces. Generally, the glazing should be the weak link (i.e., it is not desirable for the entire window system to blow into occupied spaces due to frame anchorage failure). This approach is referred to as balanced design.

Today, primarily because of the increased threat of terrorism, all federal buildings require enhanced levels of protection from the hazards of glass. Approximately 75 percent of all damage and injury from bomb blasts can be attributed to flying and falling glass following the explosion. Even high-profile private buildings and places of public assembly are now routinely evaluated for enhanced glazing protection measures. Protective glazing is a key component of "hardened" buildings for which the ultimate goal is to provide security for building occupants and assets.

*-Adapted from a 2005 report from The National Institute of Building Sciences*

## Why Graham?

### ✓ Experience

Graham Architectural Products has been making blast-resistant products and supplying them to government and private customers since shortly after the 9/11 terrorist attacks. Our engineering department has extensive knowledge of government specifications and application processes that ensure proper design for the intended purpose.

### ✓ Quality

Graham Architectural Products is known in the industry for our work supplying custom historic replications that require exacting details and the highest quality standards. We apply those same standards to everything we make. When you specify Graham, you are assured a quality product that's right for the job.

### ✓ Custom Engineered

Each and every job we do is custom engineered at our facility to meet your specifications. From structural design to hardware application, your Graham windows and doors are built for just one customer, you.

### ✓ Testing and Certification

Graham Architectural Products has one of the most complete lines of tested and certified blast-resistant window and door products. We believe that thorough testing and third-party certification is essential in providing a greater assurance that our products will perform as expected in real-world situations.

**Graham features AAMA 510 third-party certified blast-resistant products.**

## Project Showcase

Blast-resistant windows are not just for government installations. This building owner in a major U.S. city decided that its proximity to its high-profile neighbors, along with its own status, was enough to justify specifying Graham blast resistant windows.

What began as a commercial window renovation project turned into a full scale blast-resistant project. Two levels of installed blast-resistant window systems were designed to mitigate collateral damage as a result of a nearby explosion. The key to making this work for the customer was the combination of windows used. Higher pressure-rated windows were installed in the lower floors, while the upper floors were able to use lower pressure-rated windows. This resulted in a more economical installation overall.

### Products Used:

Graham Series 3400 and 3100  
4 psi tested and certified blast-resistant double-hung windows.

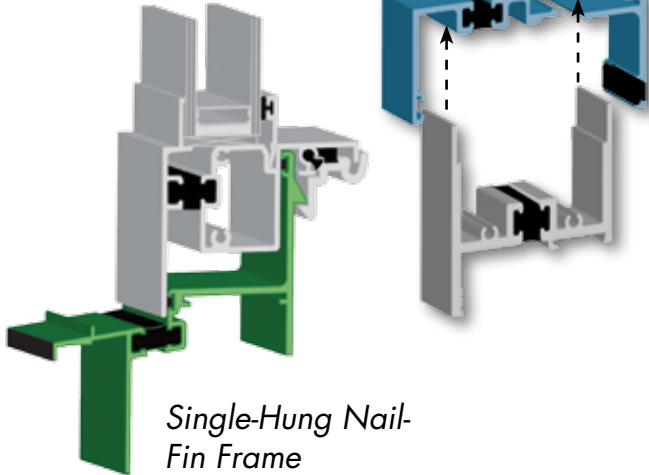


Operable Windows • Fixed Windows • Curtain Wall • Entry Systems • Historical Windows • Sunshades

# Graham Offers An Extensive Line Of Trim And Accessories For Historical Replication Or New Construction

## New Construction

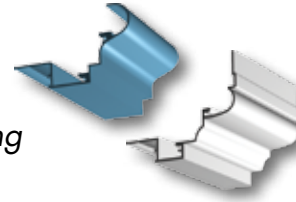
Receptor and Clip



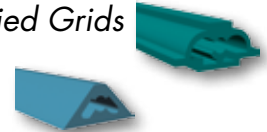
Single-Hung Nail-Fin Frame

## Historical Replication

Panning



Applied Grids



Trim & Accessories

## BLAST-RESISTANT PRODUCT SELECTOR

WINDOW TYPE	FRAME DEPTH (INCHES)	SERIES	DESIGNED BLAST PRESSURE (PSI)	POSITIVE PHASE IMPULSE (PSI-MSEC)	PROTECTION LEVEL
Horizontal Sliding	3¼	B0300	6	46	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Horizontal Sliding	4	B0600	4	32	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Fixed	3¼	B1200	6	41	ASTM "Minimal Hazard" – GSA Condition 3b – UFC 4-010-01
Fixed	4	B1400E	6	42	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Single Hung (Side Load)	3¼	B2000	4	34	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Double Hung (Side Load)	4	B2200E	6	42	ASTM "Minimal Hazard" – GSA Condition 3b – UFC 4-010-01
Double Hung (Tilt)	3¼	B3000	Minimum UFC		UFC 4-010-01
Double Hung (Tilt)	4	B3100	Minimum UFC		UFC 4-010-01
Double Hung (Tilt)	4	B3400	4	33	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Casement/Projected	2¼	B6500	6	48	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Fixed	2¼	B6500	6	48	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Casement/Projected	2¼	B6600	6	48	ASTM "Minimal Hazard" – GSA Condition 3b – UFC 4-010-01
Fixed	2¼	B6600	6	46	ASTM "Minimal Hazard" – GSA Condition 3b – UFC 4-010-01
Fixed	3½	B6800	6	41	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Casement/Projected	3½	B6800	6	42	ASTM "Minimal Hazard" – GSA Condition 2 – UFC 4-010-01
Fixed	3½	B6800HP	10	91	ASTM "No Break Hazard" GSA Condition 1 – UFC 4-010-01
Fixed	3½	B6800HP	24	116	ASTM "No Break Hazard" GSA Condition 1 – UFC 4-010-01
Casement/Projected	3½	B6800HP	11	96	ASTM "Low Hazard" – GSA Condition 3b – UFC 4-010-01
Casement/Projected	3½	B6800HP	24	100	ASTM "Low Hazard" – GSA Condition 3b – UFC 4-010-01
Dual Action	2¼	B7500	6	43	ASTM "Very Low Hazard" GSA Condition 3b – UFC 4-010-01
Sliding Glass Doors	4	B0900	Minimum UFC		UFC 4-010-01
Entry System	6	B7600	Minimum UFC		UFC 4-010-01
Curtain Wall	6	2500C	Minimum UFC		UFC 4-010-01

# *Blast Resistant Products*

CUSTOM MANUFACTURED ARCHITECTURAL GRADE WINDOWS AND DOORS

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*Your Solution For Risk Reduction - Help Protect  
Occupants And Property In The Event Of A Blast*

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**Graham Architectural Products**

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Graham Architectural Products has provided building owners and architects with some of America's highest-quality commercial windows and doors for over 38 years. From new construction and historical reproductions to hurricane-resistant and blast-resistant products, Graham has the product to meet your needs. Graham has casement, hung, dual action, sliding, fixed, projected windows, curtain wall, storefront, and sunshades. Create aesthetically pleasing replications from the industry's best selection of historic panning and trim systems.



Graham is known as the architectural window industry's premier historic preservation specialist, serving discerning building owners and architects across the U.S. Special shapes, operating systems, and accessories faithfully emulate your historic windows and doors.



Graham offers heavy-duty windows and glass doors to withstand the ravages of hurricane-force winds. Graham's impact tested windows conform to the Florida Building code's high velocity wind zones.



Graham has been supplying custom-engineered windows and doors to schools and universities with new and authentically replicated windows for years. Our experience and our extensive inventory of accessories can help reduce initial costs significantly.



Graham has joined the War on Terror with a full line of blast-resistant windows. Federal agencies have mandated that windows in public buildings meet GSA and UFC test criteria for bomb threats up to 33 psi. Blast mitigation for historical projects is our specialty.



Custom doors and storefront systems, including blast-rated storefront systems are available to complement Graham window systems. Single-source procurement simplifies project management and can even reduce the overall cost of the project.



The primary source of noise intrusion, in both homes and buildings, is through the windows. Graham is a leader in the battle against noise pollution in building interiors. Acoustical windows are sound solutions for commercial, institutional, and residential environments.



Graham has curtain wall and pressure wall to suit nearly any application. We custom engineer your project to ensure proper materials are incorporated to do the job right. Our unitized product simplifies installation and is available glazed or unglazed.



Certain projects require special needs from time to time. If your project requires ballistic-resistant windows and doors in certain areas, Graham stands ready to fill your needs. Graham has ballistic-resistant products that are tested and certified to the UL 752 ballistic standard.



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