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A Sense of Security

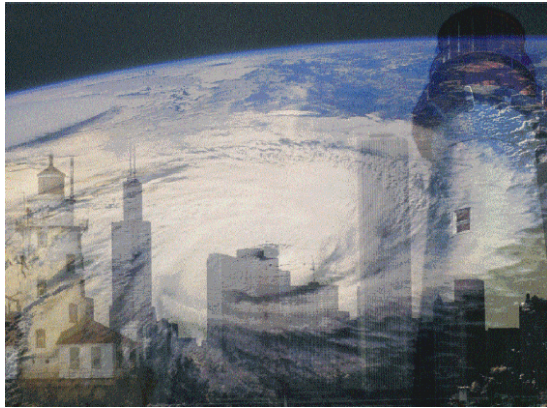
Protective Glazing Ensures Safety, Security and Peace of Mind

By Mike Sebold

In the building community, the words safety, security and peace of mind have greater impact today than ever before. In the wake of destructive hurricanes and terrorist bombings, building designers, code organizations and federal agencies have increased their demand for window systems that will mitigate property damage and injury from windborne debris and flying glass. This protection consciousness is spreading along the coastline from Texas to New England as new standards are adopted. In places such as Oklahoma City, blast-resistant systems are now incorporated in new building design.

As we all have seen, the world is an unpredictable place. Consider the weather. The United States gets more tornadoes than any country in the world. On average, there are 1,000 tornadoes and 100,000 storms each year in this country, and they can happen in any state. When storms reach 74 miles per hour they are classified as a hurricane. Each minute of a hurricane has been described as equal to the force of a hydrogen bomb in destructive power.

The sight of a wooden 2x4 fully impaled in a palm tree after Hurricane Andrew dramatically illustrated the force of flying debris, and the collapse of many buildings has resulted in stringent testing to ensure the ability to withstand the most severe conditions. The building window is the single most vulnerable point of penetration and offers the greatest potential for personal injury. If the envelope of the building is broken as flying debris hits the window, the cyclic positive and negative pressure within the structure can lead to rapid collapse of the entire building.



Just as unpredictable, however, are the unexpected threats that place us all at risk. Who would have thought that Oklahoma City would be a target? Yet, damage from flying glass after the 1995 bombing of the Murrah Federal Building was recorded for 23 blocks surrounding the target, injuring occupants and bystanders. Building owners today face the question “how much protection is

appropriate?” It is no longer simply a question of building to code requirements, but a life-safety issue.

Glazing Systems: A Key Factor

Protective glazing is critical to providing protection against injury. It is designed to hold the glass in the glazing pocket so shards do not fly into the building and occupied space. Protective glazing materials are only effective, however, when designed as a complete and unified system, including the frame, the glass and the glazing components, i.e., the structural silicone, gaskets, tapes, blocks and other ancillary elements. There is no one set of standards or codes to determine the appropriate glazing system for the hazard protection specified; this underscores the importance of using a qualified glazing supplier. In addition, selection of the appropriate system must include consideration of the envelope design concept, fenestration style, cost, threat assessment, vulnerability and a host of other factors. The type of protective glazing may also vary within a building, depending on location of the window or the building itself, size of the glazed opening and the functions and missions with the facility.

The glass bite, which is the depth the glass is glazed into the frame, is critical to the design of the system. The structural sealant bite is determined based on the performance requirements to respond to the threat/vulnerability assessment or code and the type/size of the glass. The depth of the silicone penetration into the frame bite is key for proper performance.

Compatible spacer gaskets must be specified to absorb the design pressure and hold the glazed pane in place. A well-designed system will offer the

security of a positive, long-lasting seal. Incompatible components, such as glazing gaskets and spacers, may result in not only staining, but also may cause a loss of silicone adhesion to the glass and metal surfaces.

The first set of standards for windborne debris was adopted in 1994 in Florida's Dade and Broward Counties and many others have followed. There are a variety of code variations that have been developed and adopted by code bodies and propagated by industry organizations.

For all those involved in the design and construction of buildings, standards add a complexity that can lead to potential disaster for budgets and schedules if steps are not followed to eliminate the possibility of a disaster during testing. A disaster during testing can add up to six months and \$100,000 to the cost of the project. The risk of a disaster in the process of preparation is a liability few should be willing to accept.

To avoid the risk of failure during mockup testing, the following tips may help ensure a smooth path to the installation of an effective protective glazing system:

- Select a qualified supplier that is up-to-date with the continually growing list of performance standards and understands how to meet those standards;
- Locate a supplier that can provide a comprehensive shop drawing review. This step is critical to ensuring a properly designed glazing system in compliance with GANA, AAMA, PGC, ASTM and other industry standards. It will also ensure single-source responsibility for the glazing materials. Without review by a single supplier, your liability increases since component suppliers will only accept responsibility for their individual part; and
- Have the contractor and the fabricator submit samples of the aluminum and glass, as well as details of the glazing pocket, to a glazing systems supplier to ensure adhesion and compatibility of all components.

Defining Hazards

Today, building owners, specifiers, architects, contractors and window and wall manufacturers are faced with providing protection from both natural and man-made disasters. The challenge is to provide solidly constructed structures that can withstand tremendous forces. A window system, for example, may pass a 4-psi bomb blast but may not be acceptable for a hurricane application. Performance depends upon the flexibility as well as the strength of the entire system, including the laminate interlayer/film, structural silicone sealant, framing system, gaskets and any other components within the glazing pocket. The glazing components cannot be designed without a thorough understanding of the strength and flexibility of the entire window or curtain wall system.

There is no way to absolutely protect a building and its occupants from the worst that nature or man can deliver, but effectively designed window or wall systems can provide peace of mind that the safety and security within structures built with protective glazing systems is at a level never before seen in our world.

Mike Sebold is the Business Manager of Tremco Sealant/Weatherproofing Division's Commercial Glazing Systems business which designs and manufactures all of the components comprising the glazing system including the gaskets and glazing tapes as well as the structural silicone sealants. Through his involvement with major curtainwall, window manufacturers and consultants, Tremco products have been used on the most demanding projects in the world including the Hong Kong Airport, the largest airport under one roof; Burj Al Arab (pictured on the cover) and the Bellagio Hotel in Las Vegas, one of only two hotels on the strip with a five-diamond rating from AAA. He is an active member of the Protective Glazing Council, GANA and AAMA.