

Fire-rated glass reaches *new heights*

By Diana San Diego

Above: The balconies of Sapphire Towers feature fire-rated glass. Without fire-rated glass, the view would have been blocked.

Right: The windows and glass balconies on the 32 floors on the south façade of Sapphire Towers are fire rated.

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anyone who has ever shopped for real estate knows the golden rule: location, location, location. So when Principal-in-Charge Doug Austin and Senior Designer and Associate Pablo Collin of AVRP Studios Inc., San Diego, began the initial design for Sapphire Towers, a luxury high-rise condominium located along downtown San Diego's waterfront, their vision was clear. Together with Centurion Partners, Newport Beach, Calif., the property's developer, they imagined a modern, clean and transparent building with large glazed areas and deep balconies facing the ocean.

This vision was met with a challenge: the building's south facing elevation was in close proximity to the adjacent property. "In order to provide panoramic views of the bay and waterfront, every façade had to have maximum possible window openings," says Tomasz Anielski, managing principal, AVRP. "Due to code regulations, the south façade either had to be solid, which was contrary to our vision, or have openings with a minimum fire protection of 45 minutes." This included the windows and glass balconies on all 32 floors. Anielski was tasked with code analysis, technical documentation and product selection, basically, taking the vision that AVRP and Centurion imagined and making it possible to be built.

Before fire-rated glass, brick or drywall would have been used to meet this requirement. With the invention of technologically advanced clear glazing able to withstand temperatures of more than 1,600 degrees Fahrenheit, designers can now meet the aesthetic and safety requirements of their projects when sacrificing one for the other is not an option. Providing this "best of both worlds" solution was the case for Sapphire Towers.

With glass figuring prominently in the building's exterior, keeping a uniform look was important to designers. The fire-rated glazing on the south-facing elevation had to match the non-rated glazing systems used throughout the building. Starline Windows Inc., Everett, Wash., the glazing contractor, looked to Safti First, San Francisco, to engineer a system that met the uniform design demands and performance requirements of the project, says Jim Green, U.S. sales manager, Starline.

Safti First supplied a complete insulating assembly of 1/4-inch Versalux Blue glass from Zeledyne, Tulsa, for the outboard lite with a 3/4-inch lite of Superlite II-XL 45 minute fire-rated glass with a low-E coating on the No. 3 surface. The assembly uses Saftifire GPX framing with aluminum covers that feature a silver powder

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Sapphire Towers, San Diego

Developer: **Centurion Partners, Newport Beach, Calif.**

Architect: **AVRP Studios Inc., San Diego**

General Contractor: **Swinerton Builders, San Diego**

Glazing Contractor: **Starline Windows Inc., Everett, Wash.**

Glazing Installer: **Capital Glazing Contractors, Oceanside, Calif.**

Fire-rated glass and framing manufacturer:

Safti First Fire-rated Glazing Solutions, San Francisco

Low-E glass supplier: **Zeledyne, Tulsa**

Aluminum finisher: **Akzo Nobel, Amsterdam**



Above: Installers from Capital Glazing installed the modular fire-rated windows with a machine called the Barbaric.

Above right: The fire-rated windows of Sapphire Towers give residents views of the bay from the living areas.

coat finish on the exterior and Akzo Nobel white finish in the interior. The Versalux Blue on the outboard lite and the powder coat finish on the frames matched the rest of the non-rated glazing systems used in the building, making everything appear seamless.

This fire-rated assembly was used for 182 openings on all 32 floors on the south-facing elevation, totaling 10,000 square feet of fire-rated glazing. The opening dimensions range from 48 inches by 90 inches to 82 inches by 130 inches.

Fire-rated glass and framing systems can either be shipped to the job site assembled or knocked-down, depending on the preference of the glazing



contractor. In this case, Starline asked Safti First to deliver the majority of the fire-rated glazing systems as modular units, because they wanted more control and less risk during the installation, Green says.

Swinerton Builders, San Diego, also preferred modular systems for this project. "As the general contractor, we had to coordinate the delivery and material storage of over 50 trades," says Leonard Hayden, senior project manager, Swinerton Builders. "Having most of the fire-rated glazing systems assembled and ready to go into the openings eliminated having a lot of parts and pieces held at the job site." Safti First worked with Swinerton Builders on a tight shipping schedule to make sure that the glass was installed in the opening as soon as it arrived on the job site.

Starline contracted the installation to Capital Glazing Contractors, Oceanside, Calif. The majority of the fire-rated glazing systems used for the punched openings were shop-glazed in

Curtain wall performance

Meeting the building team's design and fire code requirements for Sapphire Towers was only the beginning. Because of the large amount of fire-rated glazing used for the building's envelope, the system also had to meet additional performance requirements that are generally required for curtain wall applications.

Starline needed to demonstrate that the system would not leak and that it was structurally sound to meet inter-story drift requirements. To accomplish this, Starline and Safti First enlisted an independent test lab to subject the fire-rated assembly in to the following test procedures:

- Air infiltration testing per ASTM E 283-04.
- Water penetration resistance testing per ASTM E 547.
- Repeat water penetration resistance testing per ASTM E 331.
- Wind load deflection testing per ASTM 330.
- Structural load testing per ASTM E 330.
- Forced entry testing per ASTM F 588.

In addition, the fire-rated system also had to meet energy performance and sound attenuation requirements, because large amounts of glazing means an abundance of natural light in addition to the potential to have large amounts of heat and noise.

Safti First supplied samples of the fire-rated assembly to Intertek Group PLC, London, where it was tested for thermal transmittance, U-value and solar heat gain. The results were presented to the National Fenestration Rating Council, Greenbelt, Md., that granted NFRC labels for this project with the following results:


- U-value: 0.40
- SHGC: 0.34

For noise abatement, the system had to meet a 38 Sound Transmission Class rating up to the 12th floor, and a 35 STC rating from the 14th floor to the 33rd floor. SuperLite II-XL 45 minute inherently has a 40 STC rating, and with the addition of the low-E glass and 1/4-inch Versulux Blue on the outboard lite the system would be able to meet and exceed the STC requirements for this project.



The property line of Sapphire Towers, on the right, forced architects and owners to use fire-rated glass to meet building codes.

Safti First's factory in Merced, Calif. The bigger openings used in the higher floors were shipped knocked-down and glazed onsite. For the modular units, Capital Glazing used a machine called the Barbaric to place the units in the openings, which proved to be helpful since shop-glazed assemblies weigh more than if the glass and frames were supplied separately. "The installation went smoothly," says Jason Purin, owner, Capital Glazing. "We did not encounter any problems glazing the bigger openings on site, but I do believe that having the majority of the windows shop-glazed and supplied as modular units saved 50 percent of the installation time."

Sapphire Towers opened its doors to residents in the last week of November 2008. 

SOURCES

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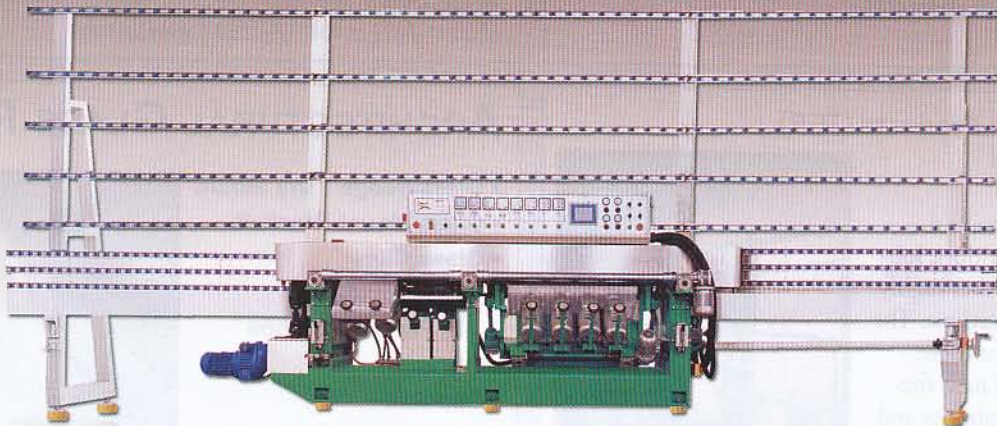
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