



Case Study:

SentryGlas® ionoplast interlayer provides high resistance to temperature and humidity on facade for Sowwah Square Towers in Abu Dhabi

The new attractive-looking façade covering the four Sowwah Square towers in Abu Dhabi provides another stunning example of the functional and structural capabilities of SentryGlas®.

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Constructed by German laminator BGT, the laminate glass panels used for the louvers were decorated with a special silk screen printed, two-colour congruent pattern in order to minimise the G-value. SentryGlas® was selected for its resistance to humidity and high temperatures, as well as its post-breakage behaviour and open edge performance.

Located in the Emirate of Abu Dhabi, Sowwah Square is part of the Sowwah Island project and is located in the new Abu Dhabi Central Business District, a 570,000 square metre development comprising of four luxury high-rise towers incorporating office spaces, a retail area and the new Abu Dhabi Stock Exchange.

Designed by architects Goettsch Partners of Chicago, USA - manufactured and installed by Folcrá Beach Industrial Company W.L.L and J&H Emirates (Jangho) - the façade construction used on the Sowwah Square towers comprises a high performance glazed curtain wall system with external sunshade glass 'louvers'. These louvers comprise two side-supported open edge glass panels, which are installed horizontally in U-shaped fixation systems. The laminate panels each measure 500 mm x 1,000 mm (1,64 x 3.3"), or 300 mm x 1,000 mm (0.98 x 3.3 in) and use 1.52 mm (60 Mil) SentryGlas® ionoplast interlayer.

According to the architect, SentryGlas® was selected for its resistance to humidity and high temperatures, as well as its superior performance compared to PVB-based alternatives in terms of post-breakage behaviour and open edge performance.

Due to the strength of the interlayer, SentryGlas® laminates demonstrate excellent post-glass-breakage

performance. Upon impact, the glass may break, but dangerous fragments will adhere to the SentryGlas® interlayer, reducing the risk of injury to people in the vicinity.

In addition, SentryGlas® is 100 times stiffer and five times stronger than PVB, which meant the architects were also able to design and specify thinner laminate panels and, as a result, significantly lighter than PVB-based alternatives. By deploying laminate panels incorporating SentryGlas®, the architects were able to address a number of important structural and functional demands, one of which was the high daytime temperatures and humidity. The superior performance offered by SentryGlas® (which resists temperatures up to 80 °C or 176 °F) in regions where high temperatures are common made it an ideal candidate for this project.

The building enclosure system was designed and fabricated to allow for thermal expansion and contraction caused by an ambient air temperature range of 5 °C or 41 °F (low) to 54 °C or 129 °F (high), with a nominal temperature of 27 °C or 80,6 °F. Anticipated material surface temperatures due to solar heat gain, or night sky heat loss, were therefore evaluated for selected materials and finish colours and were used in all design calculations.

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As Charles W. Wittleder, Senior Associate at Goettsch Partners states: “Although no specific humidity levels were specified for this project, the effects of humidity on exposed edge laminated glass were considered when specifying the use of SentryGlas® for the sun shade elements.”

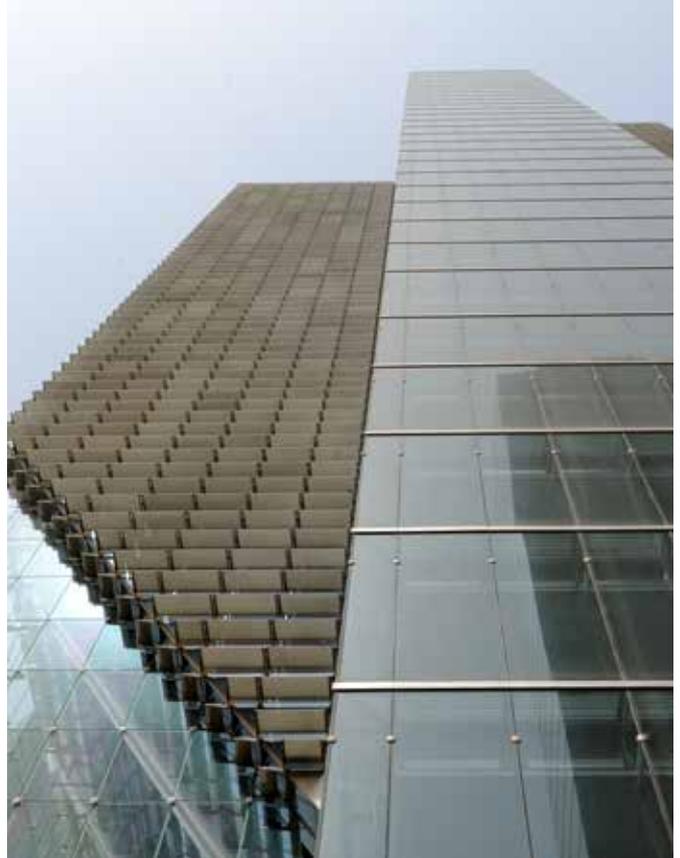
“Specifying SentryGlas® gave us greater design freedom. It allowed us to leave the glass edges exposed and to confidently design a two-edge captured system, with the glass panel spanning between edge clamps.” Designed and manufactured by German laminator Bischoff Glastechnik AG (BGT), the laminate glass panels used for the louvers needed to be decorated with a special two-colour congruent silk-screen printed pattern in order to optimise solar gain and reduce solar glare. As Martin Sulzer of BGT explains: “We were chosen as laminator on this project primarily because of our expertise in silk-screen printing of glass laminates. For the Abu Dhabi Financial Center, the glass louvers have white spots on their outer side glass panels and black spots on their inner side. This two-colour congruent printed decoration minimises the G-value (solar energy transmittance) allowing less sunlight into the building, which keeps employees more comfortable on hot days.”

“The white colour on the outer edges gives a slightly foggy, frosty appearance on the surface of the glass. The black spots on the inner side of the glass enables the human eye to look through the printed pattern on the glass,” adds Sulzer.

As well as its numerous functional advantages, SentryGlas® interlayers provide multiple aesthetic benefits, including high, crystal-clear transparency, virtually universal resistance to yellowing and excellent edge stability; all of which are important to the long-term aesthetic appeal of the building.

Lighter façade panels enable more subtle supporting structures

For decades, interlayers made of polyvinyl butyral (PVB) have been the industry standard when producing laminated safety glass. Architects are well aware of the possibilities and limitations of such glass when used extensively in façade engineering, for roofing and window panels. In contrast, SentryGlas® enables an entirely new approach because the interlayer is over 100 times stiffer and five times stronger than PVB. As a consequence, there is an almost perfect transmission of load between two laminated sheets of glass, even at high temperatures, leading to the excellent flexural behavior of the glass when under load - also under direct sunlight in high summer. Accordingly, laminates with SentryGlas® show less than half the rate of deflection when compared to laminates with PVB, when under the same load, and thus almost the same behavior as monolithic glass of the same thickness.



By deploying laminate panels incorporating SentryGlas®, architects were able to successfully address a number of important structural and functional demands on the Abu Dhabi Financial Center.

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As well as improved strength and stiffness, other benefits of SentryGlas® include:

- **Safety:** In the event of breakage, glass fragments remain firmly bonded to the interlayer, reducing the chance for injury
- **Security:** SentryGlas® can be used in glazing that withstands bullets, hurricane-force winds and even bomb blasts
- **Durability:** SentryGlas® is extremely durable and resistant to clouding, even after years of exposure
- **Design Versatility:** SentryGlas® can be used in glass manufactured flat or curved, including annealed, toughened, heat-strengthened, spandrel, wired, patterned and color tinted glass
- **UV control:** SentryGlas® is available with our without UV transmittance

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