



Sealing and Elastic Bonding

Sika[®] Solutions for Structural Glazing

International Case Studies



Sika® Solutions for Structural Glazing

Monument «Matrimandir», Auroville, India

Project

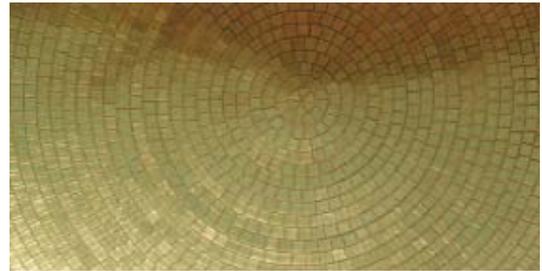
Auroville is an experiment to create a futuristic city for 50'000 inhabitants on a 25'000 km² area near the Gulf of Bengal in southern India. European "culture" and Indian "spirituality" come together in the form of the Matrimandir at the city's centre - the world's biggest completely gilded building. The unique reinforced concrete building has a diameter of 36 metres and approximately 1'450 concave and convex stainless steel disks mounted on stalks cover the building. These disks are covered with a total of 2.3 million small fine gold tiles, which were each made by specially hand for the Matrimandir, which give the building its unique characteristics and appearance.

Requirements

The French architect Roger Anger began with the vision of Mira Alfassa, the city's founder, in 1972. Matrimandir's color is from genuine gold leaf. To fix the gold tiles the only solution was to use a high quality silicone adhesive. Silicones have a molecular structure resembling quartz, and therefore not only do they bond extremely well, but they are also extremely durable. Silicone adhesives are also highly elastic, they can compensate for the different expansion of glass and steel during the extreme temperature fluctuations over the course of a day. The gilded tiles must also permanently withstand up to 100% atmospheric humidity, monsoon rains and high winds.

Sika Solution

To ensure lasting protection of the precious metal gilding, a special high vacuum production process was developed and patented, in this process wafer thin gold leaf is sandwiched in glass and sealed. These gold tiles are then bonded to the stainless steel discs with the extremely strong and durable **ELASTOSIL® SG-500** silicone sealant. An artificial simulation study confirmed that this adhesive is not anticipated to lose its elasticity even after 100 years. **ELASTOSIL® SG-500** exhibits practically no aging at all.



One Marina Boulevard (NTUC Centre), Singapore

Project

The construction of this 32 storey building (Architect: DP Architects Private Limited) was formally begun with the groundbreaking ceremony held on the 28th of February, 2002. This was the first site opened up for development in the New Downtown area after the Singapore Labour Foundation Management was allocated the site by the government. The National Trades Union Congress (NTUC) occupies floors 11 to 14 in what is now also known as the "NTUC Centre". Amongst the amenities in this centre are numerous meeting and training rooms, a customer service centre and a prestige 600 seat auditorium.

Requirements

The consultants Hyder Consulting of Bangkok and Cornell Wagner of Australia, insisted on the use of proven, high quality silicone sealants for the structural glazing of the façade and selected Sika Sealants for the first time. This was Sika's first major glazing cooperation with these two leading structural designers.

Sika Solution

The Structural Glazing silicone adhesives **ELASTOSIL® SG-500**, **ELASTOSIL® SG-20**, and the waterproofing silicone sealant **ELASTOSIL®-305**, more than achieved the consultants stringent requirements for the façade glazing. This building was also the first project for Sika in cooperation with the façade's producer - Compact Metal. Sika provided full technical support to the project, starting in the design phase of the curtain walling, through the necessary project testing and also including full operative training with the advanced adhesive sealant dispensing machines.



ING Group Headquarters, Amsterdam, Netherlands

Project

Integration was a key design feature in the new company headquarters of the Dutch bank ING.

Art, natural materials, plants and light are incorporated into an energy efficient building. During its construction, new ground was broken in many different areas, from its sophisticated design and imaginative dimensioning, up to the development of an innovative system for fastening the glass skin onto the completed steel structure. A part of this pioneering work was distinguished by the Dutch Glazing Association with their "Glass Award 2002", which went to the ING Bank supervisory board for the Project.

Requirements

The 10,000 m² glazed surround, supported by polished stainless steel fastening sections, encloses the raised building like a second skin. To insulate the glass façades against noise and fumes from the nearby orbital motorway, four sided weather sealing was required for all of the glass elements. The building is ventilated through the eastern and southern façades, which are also of bonded construction. Fresh air is taken in on each floor through movable glass fins and it is then distributed to the whole façade. With 30,000 m³ of air per hour, the north side is automatically ventilated by pressure and counter pressure. The sealants and adhesives selected had to withstand these high air pressures in addition to the UV radiation and the salt water atmosphere on the coast.

Sika Solution

With the proven Sika Structural Glazing sealants **ELASTOSIL® SG-18** and **ELASTOSIL®-305**, all of the requirements could be met or exceeded to the clients' complete satisfaction.



Highlight Towers, Munich, Germany

Project

The project had initially been planned as two separate towers by Prof. Auer with Weber + Partner architects. The design was then changed in mid 2001 in favour of an alternative from Murphy/Jahn architects, who designed a twin tower, with the taller part reaching 126 m and the smaller part reaching 113 m (352ft). Unusually small "ground footprints" of the towers result in maximum daylight penetration, creating bright, light filled modern offices. The elevator shafts are set partially outside of the building, which ensures spectacular views over the city from the elevators. The two towers are connected by glazed steel sky bridges linking the 9th, 10th, and 20th floors. These can be disconnected and reattached to the towers whenever necessary. The towers' façades (produced by Schmidlin, Switzerland) are designed in a very innovative way, with operable windows to give the occupants individual ventilation in each area, and the perforated stainless steel panels contain wind, rain and soundproofing details. The towers' sharp contours are also highlighted and illuminated by a striking lighting scheme at night.

Requirements

One of the greatest challenges of this development were the stringent requirements of Germany's energy regulations which could only be achieved by using Argon filled insulated glass units.

Sika Solution

The result is the first Structural Glazing façade using with Argon filled insulated glass units and these are sealed with Sika's UV resistant, ultra high modulus silicone sealant **ELASTOSIL® IG-25 HM**. With the low gas loss rates measured, a service life of more than 30 years can be expected for these units. The chemically sensitive Thermo Plastic Spacer (TPS) which was used in the IG units containing the Argon gas, necessitated a special sealing solution which was also achieved using Sika **ELASTOSIL®** waterproof sealants.



Sika® Solutions for Structural Glazing

Deutsche Post Building, Bonn, Germany

Project

The building was designed by Murphy/Jahn Architects and consists of a pair of twin towers connected through glazed bridges. On every 9th floor there is a roof garden where the glass bridges span the entire width of the building forming individual 32 metre high atriums. The structure is built on a reinforced concrete slab supported by 60 piles. The outer cladding is a double skinned curtain wall. The inner skin of each individual tower, consists of jointed panels with automatic opening vents. The outer skin is of stainless steel connected to the inner skin using clamped glass and with automatic vents for natural ventilation. It is now the tallest office building in North Rhine Westphalia.

The Moiré Stair Tower, the vertical main stairwell is integrated into the base of the building and was designed by James Carpenter, this provides a central focal point and acts as a visual guide for the building's pedestrian circulation both to and from the adjacent river. The tower's three large external walls are comprised of custom laminated glass panels with a rectangular screen pattern, creating a luminous and "animated" surface in the light.

Requirements

The double skinned façade (by Josef Gartner, Germany) was designed as a structural glazing system, and therefore the requirements of the adhesive sealants were for excellent adhesion and large movement capability, and also for high UV light and weathering resistance.

Sika Solution

The well proven Sika silicone sealants **ELASTOSIL® SG-500** and **ELASTOSIL® weather sealants** more than met these high requirements in the façades. The glass stairs in the Moiré Stair Tower were elastically bonded with high modulus **ELASTOSIL® SG-20** due to its optimised mechanical properties.



State Department Complex, Berlin, Germany

Project

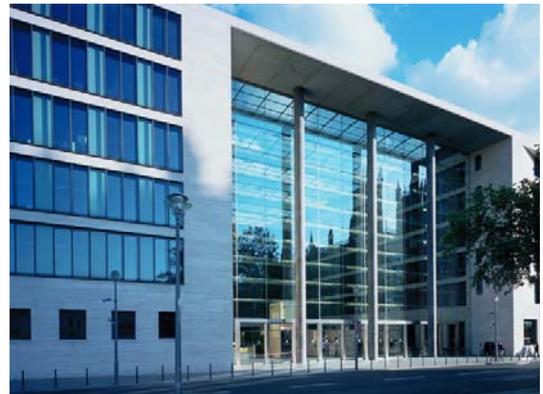
An extension to the State Department Complex - with three large courtyards open on one side, dominate the expanded development. The entrance area, a roofed courtyard accessible to the public always amazes visitors with its magnificent combination of light and glass (designed by James Carpenter, New York, built by Mero, Germany).

Requirements

Coated glass panes are attached to the inside of the 22 m high and 32 m wide glass façade of the courtyard, which splits up the light into its different coloured fractions. The coating only lets part of the received light through, and reflects the rest. This creates colored reflections and continually changing lighting effects throughout the courtyard, the colors vary widely according to the time of day and the seasons.

Sika Solution

To avoid having to use visible screwed connections, a special fastening system was developed to hold the glass panes securely in their projecting fixtures, and also to enable them to accommodate vibration and movement within the glazed façade. To install the fastening system the glass was bonded to the stainless steel clamps with **ELASTOSIL® SG-500**, and the assembled units were then mounted into the façade on the construction site.



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