



Dow Performance Silicones

Silicone Enables Spectacular Glass Curtain Wall on Icelandic Landmark Concert Hall

DOWSIL™

Case Study: Harpa Reykjavík Concert Hall and Conference Centre



City and Country

Reykjavík, Iceland

Product*

- DOWSIL™ 993N Structural Glazing Sealant

Key Participants

- **Operator and Owner**
Harpa – Portus Group
- **Architects**
Henning Larsen Architects,
Batterið Architects
- **Facade Design**
Olafur Eliasson in collaboration
with Henning Larsen Architects
- **Consultants**
Art Engineering GmbH,
Ramboll, Mannvit Engineers,
Hnit Verkis Consulting Engineers
- **Glass Processor**
Scholl Glas
- **Insulating Glass Manufacturer**
CSG Architectural Glass

*Prior to February 2018, products listed were branded as Dow Corning.

The Project

Officially opened on 4th May 2011, this 28,000 m² concert hall has been constructed on a magnificent seafront location in Reykjavík which is also surrounded by a mountainous terrain. As part of the 100,000 m² city development project of the historic harbour and waterfront, it is an inspirational and memorable landmark and a symbol of the country's renewed vitality.

Harpa is home to the Iceland Symphony Orchestra and the Icelandic Opera and attracts an audience of culture, architecture and art enthusiasts. A major addition to the Icelandic and European cultural scene, it also provides an outstanding venue for a mix of international business and trade events with a unique ability to host both large and more intimate performances or banquets.

The internal layout encompasses an arrival area and foyer which are situated in the front of the building, four main music and conference halls in the centre, (the largest of which can accommodate 1800 people) and a backstage area for rehearsals, dressing rooms and administrative offices at the rear.



DOWSIL™ 993N Structural Glazing Sealant was specified for bonding the highly reflective and complex silicone glazed facade design.

The Challenge

The intricate 14,000 m² glazed facade, which features a crystalline lattice and glass prisms, was constructed using nine different types of glass including highly reflective, non-reflective and dichroic. The combination of these glasses allows natural light to alter the transparency, reflectivity and colours of the facade as the weather and seasons change.

This multifaceted curtain wall was constructed from insulating glass units, assembled using 12 mm laminated glass on the exterior, a 16 mm spacer and 12 mm heat soaked tempered safety glass. These units were also filled with argon gas to contribute toward energy efficiency of the structure.

Silicone was the material of choice for the secondary bonding of these insulating glass units as this technology excels in its durability and longevity, particularly under UV exposure and/or extreme weather. The insulating glass unit design included an aluminium U-channel to be embedded into the secondary edge sealant, which is installed for the purpose of attaching the glass panes to the curtain wall via a clip system. It was this feature that led to concerns relating to long term retention of the argon gas due to a potential loss of integrity in the secondary sealant.

Secondly, special architectural design elements demanded that the curtain wall units and insulating glass units should be produced in China, so an ability to provide global technical support and on-site assistance during the manufacturing process was also a mandatory requirement.

The Solution

The insulating glass unit edge design underwent a thorough project review at Dow laboratories which was coupled with technical communication with Scholl Glas and CSG Architectural Glass to solve the specific manufacturing concerns. The inclusion of the discontinuous aluminium U-channel is particularly difficult to control during the production process due to the challenges of controlling the position of the channel within the edge sealant and ensuring that there is good adhesion with the silicone sealant. Following extensive testing, DOWSIL™ 993N Structural Glazing Sealant was specified for use in this application due to its excellent green strength, durability, high modulus and outstanding adhesion capability, which is proven as part of its ETAG002 certification.

Dow also provided on-site assistance to build a quality procedure which ensured that the U-channel installation process was properly controlled, thereby achieving the right edge position and good adhesion to the sealant.

With global expertise and local site support, Dow was perfectly positioned to provide quality and design solutions to enable the construction of this dramatic facade and co-operate with different members of the construction value chain to meet architectural demands of this project.

Andreas Fried, Managing Director of Scholl Glas commented, 'The Harpa Concert Hall was an extremely challenging project due to the complexity of design and the requirement to work with international suppliers. It was largely due to Dow's experience and global presence that technical solutions and quality procedures for this project could be effectively resolved and managed'.



DOWSIL™ 993N Structural Glazing Sealant

Developed for the structural bonding of glass and metal, DOWSIL™ 993N Structural Glazing Sealant meets the European standard ETAG002. It exhibits excellent weathering properties and has high resistance to ultraviolet radiation, heat and humidity once cured.

Contact Us

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Dow has sales offices, manufacturing sites and science and technology laboratories around the globe. Find local contact information at **consumer.dow.com/ContactUs**.

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