



SIKA AT WORK

ELBPHILHARMONIE CONCERT
HALL IN HAMBURG, GERMANY

BUILDING TRUST



COMPOSITION FOR A SYNTHESIS OF THE ARTS

From foundation to roof: Numerous products and system solutions were supplied by various Sika business units for Hamburg's new landmark building.



A SITE WITH HISTORY

Though a controversial talking point during construction, it has become a magnificent new landmark for the Hanseatic city of northern Germany since completion. The Elbphilharmonie concert hall is an architectural and cultural beacon that shines far beyond Hamburg's city limits.

DESIGNED BY HERZOG & DE MEURON, THE BOLDLY CURVILINEAR ROOF HAS ADDED AN ENCHANTING AND UNMISTAKABLE SILHOUETTE TO HAMBURG'S HARBOR SKYLINE



The site in Hamburg's redeveloped harbor area is rich in history. In 1875, it housed what was then the city's largest warehouse, complete with neogothic bell tower. After this building had been destroyed during the Second World War, a new warehouse, the "Kaispeicher A", was built on the same spot. The plain brick building was used to store tobacco, cocoa and tea. As containers came to be increasingly used for sea freight shipments, both the warehouse and the old general cargo dock became obsolete. As a result, from the 1990s until now, the warehouse largely stood vacant. After a string of redevelopment proposals, the charming brick building was finally enlisted to serve as a massive podium for the Elbphilharmonie concert hall.

The spectacular design for the "Hamburg Philharmonic" was crafted by Swiss architects Jacques Herzog and Pierre de Meuron. The visionary idea of a wavy outline sitting atop the quayside warehouse quickly sparked enthusiasm. The boldly curvilinear roof, as the Elbphilharmonie's signature feature, has now added an enchanting and unmistakable silhouette to Hamburg's harbor skyline. The foundation-stone-laying ceremony in April 2007 marked the start of an elaborate work program that lasted almost ten years. An important contribution to the success of Hamburg's new showpiece building was made by the many construction chemical products and system solutions of Sika Germany that were specified by construction group HOCHTIEF.

STRIP-OUT AND REFURBISHMENT OF EXISTING WAREHOUSE

The first step involved stripping back the existing warehouse to its historic landmark brick facade. To carry the total weight of the Elbphilharmonie, almost 200,000 tons, the warehouse foundations needed strengthening by adding 650 more reinforced-concrete piles to the 1,000-plus existing piles. The warehouse levels now accommodate parking areas and several restaurants as well as rehearsal and storage spaces for the concert hall. Forming the interface between restored warehouse and new-build component is the approx. 3,100 m² plaza, which offers a stunning 360° panorama. This public viewing deck is accessed via an extraordinary, 82 m-long escalator, which leads from the eastern entrance portal through the entire building to the western front, where it reaches a height of 37 m. The journey through the white, illuminated tunnel vault is, in itself, a remarkable experience.

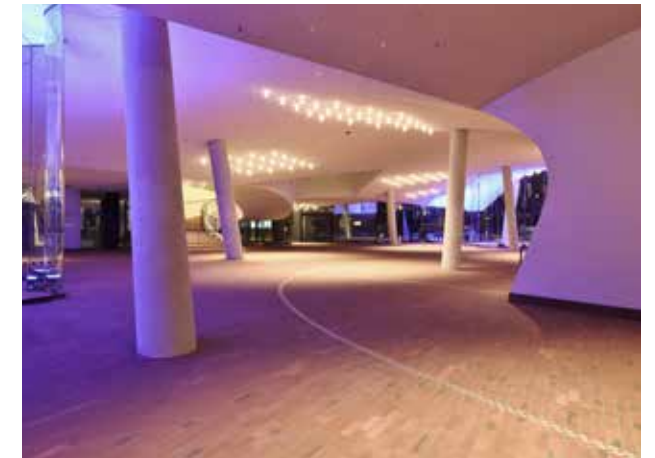
SIKA CONCRETE TECHNOLOGIES



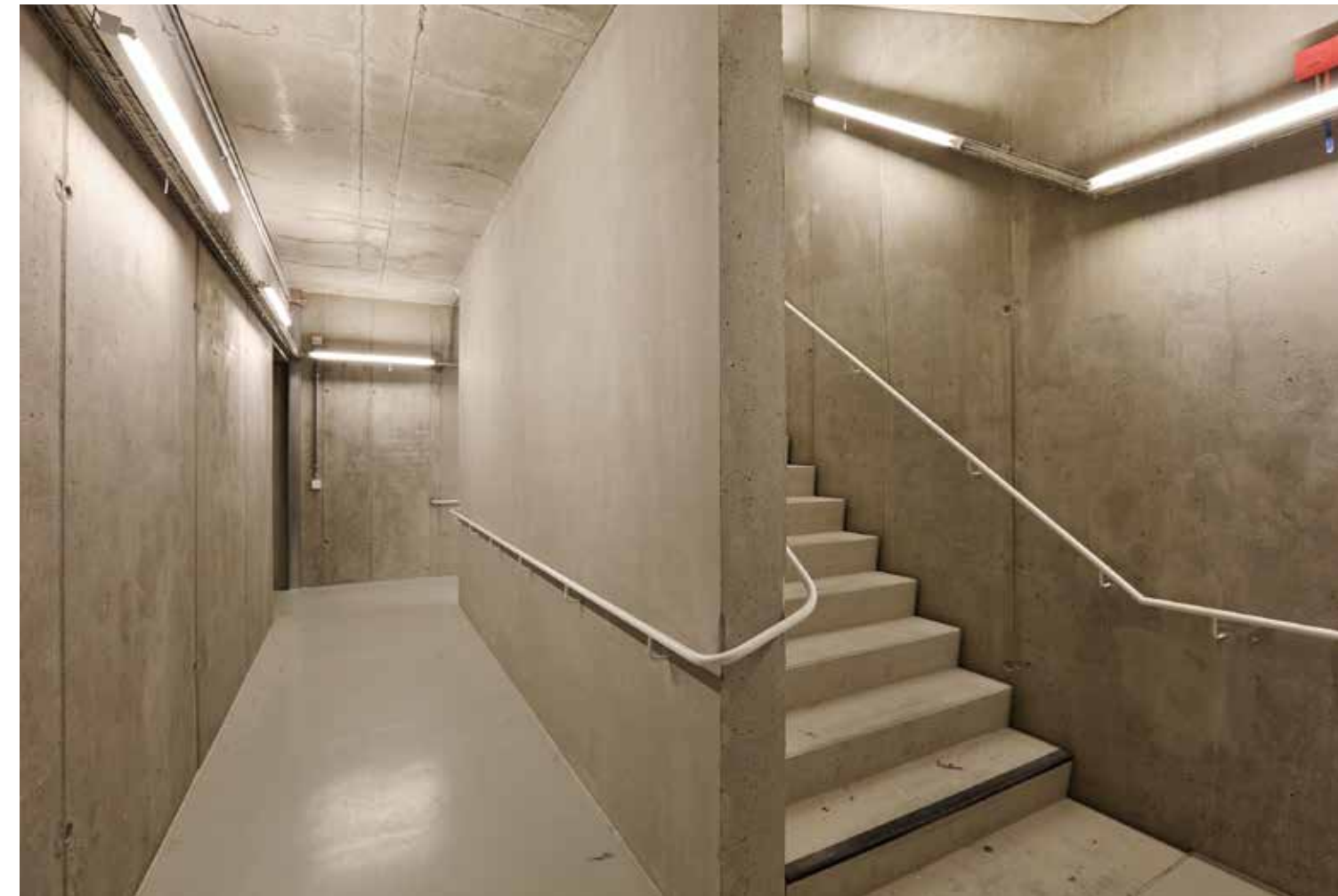
ADMIXTURES FOR CHALLENGING CONCRETE STRUCTURES

The spacious plaza foyer is dominated by large ceiling vaults and inclined concrete columns. Due to the magnitude of the loads permanently supported by the freestanding columns, these are made from C80/95-grade high-strength concrete. To optimize concrete strength and durability, Sika supplied a total of 40 tons of ultra-fine pozzolanic concrete additive Sika® Silicoll SL.

The most stringent (class 4) requirements were placed on the fair-faced concrete in the stairwells and elevator shafts. The universal Sika® Viscocrete® ready-mix concrete superplasticizer was specified for many of the complex concreting operations. Used for over 63,000 m³ of material, it improved flow properties and extended workability, even at higher concrete temperatures, while also increasing concrete strength.



Sika supplied 40 tons of concrete admixtures to increase the strength and durability of the concrete.



SIKA CORROSION PROTECTION



ROBUST STEEL PROTECTION FOR STAIRWAYS AND LOADING HATCHES

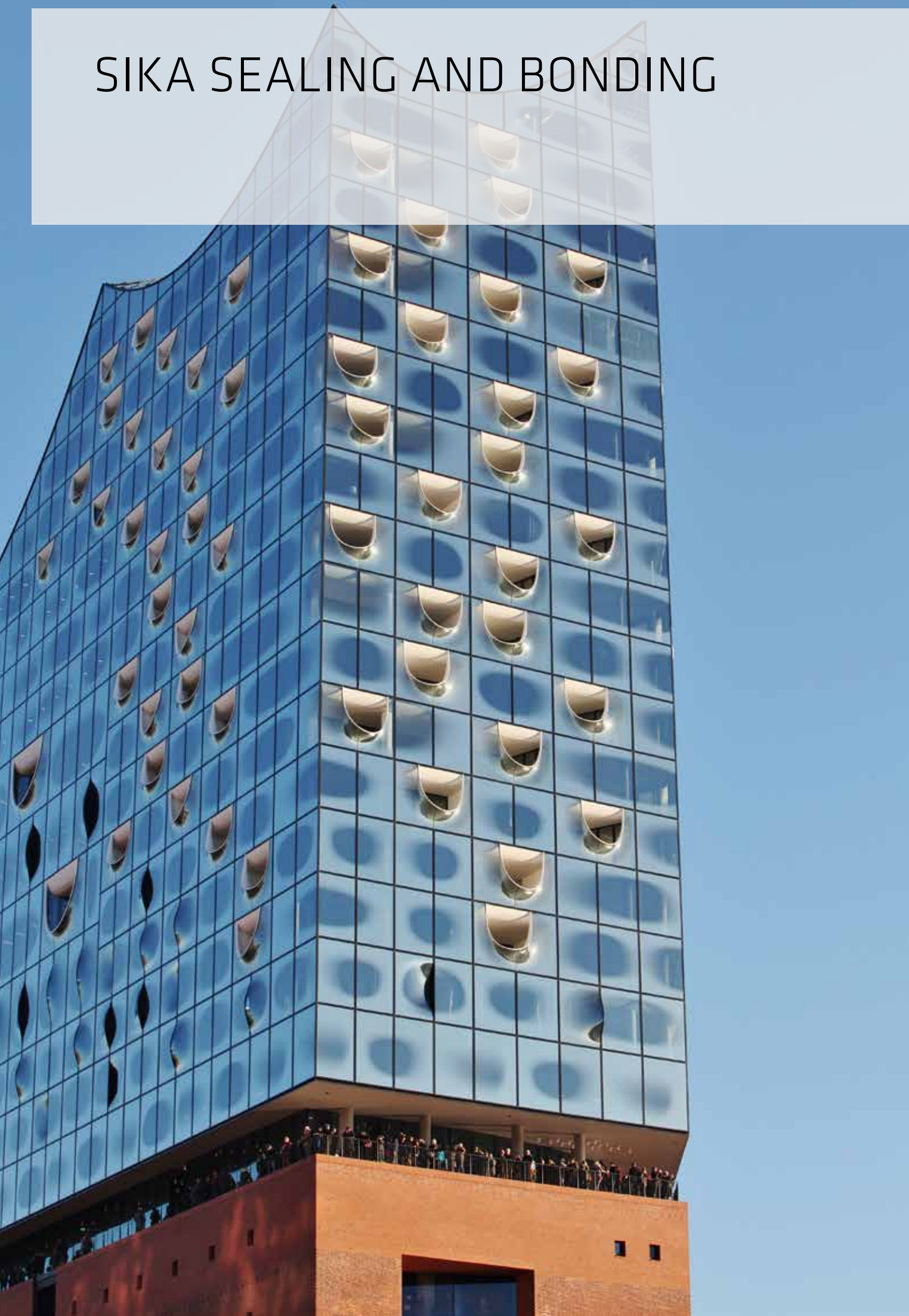
Curved sculptural stairways opening off the plaza lead to the centerpiece of the Elbphilharmonie – one of the acoustically best concert auditoria in the world. Required to offer long-term abrasion and impact resistance, the steel stair balustrades were provided with a robust anti-corrosive finish using the SikaCor® EG system. The combination of two-pack priming and intermediate coats based on epoxy resin/micaceous iron oxide and polyurethane top coat ensures high chalking resistance and color retention. In the event that the coating initially applied to the balustrade had corroded within a short amount of time, Sika turned up right on time with the ideal solution.

Photo to the left:

Sika's anti-corrosion solutions provided the loading hatches of the former Kaispeicher warehouse and the stair balustrades with a hardwearing protective finish.



SIKA SEALING AND BONDING



SCINTILLATING PLAY OF LIGHT ON GLASS FACADE

The over 70 m high glass assembly fronting the Elbphilharmonie is reminiscent of a giant, shimmering, blue crystal. Sporting 1,100 window units, the glass facade covers a total area of around 20,500 m². The elaborately curved, one-off windows are fitted with special reflectors that deliver an ever-changing choreography of mirrored sunlight, sky hues and harbor lights. The reflective function also prevents the incident solar radiation from heating up the building. Some of the windows between the 12th and 17th stories feature large recesses shaped like gigantic tuning forks.

The adhesives and sealants used for the glazing are exposed to the typically harsh Hamburg climate of alternating sunshine, rain, storms and gale-force winds. The project team thus opted for the use of Sikasil® SG-500 two-part structural silicone adhesive and Sikasil® IG-25 HM Plus two-part silicone sealant for fabrication of the individual glass units. In addition to the adhesives and sealants for the glass facade, Sika also supplied sealant solutions for the floor joints in the break rooms and stairwells.



Sika adhesives and sealants were used in the manufacture of the one-off window units for the imposing glass facade.



SIKA ROOFING SYSTEMS



Apart from the Sarnafil® TS 77-20 FPO polymeric membrane, the building also incorporated other products from the Sika Sarnafil system range.

800 TONS OF ELEGANCE

Structurally, the Elbphilharmonie's column-free grand hall takes the form of an intricate steel frame with steel nodes. This construction, comprising a star-shaped arrangement of 11 steel truss units each up to 25 m wide and weighing up to 40 tons, is concealed by the curved lines and pointed tips of the roof. The 6,200 m² roof area is made up of eight concave surfaces resting on approximately 1,000 individually bent steel beams. These create the wavy geometry and lend the roof silhouette its sweeping elegance. The lowest point in the roofscape is 74 m above ground up to the highest point some 110 m above ground level. Trapezoidal steel sheeting, installed at angles of up to 55°, spans the steel beams.

To ensure absolutely trouble-free and durable performance, the waterproofing solution for the imposing roof assembly was required to meet the most stringent demands. The waves and tips of the roof and the "paillette" covering installed as the final step posed an awkward challenge that was successfully mastered through the use of Sika Germany's system solutions. The steeply sloping trapezoidal steel sheeting was covered with Sarnavap® 5000 E self-adhesive vapor barriers. These, in turn, were overlaid by double-layer mineral-fiber insulation with a total thickness of 190 mm. Due to the extremely steep roof angles in some places, the design team opted to use the 2



SIKA ROOFING SYSTEMS

mm thick Sarnafil® TS 77-20 E multi-layer polymeric membrane, based on flexible polyolefin. This is particularly suitable for mechanically fastened roofs with pitches exceeding 20° while offering enhanced fire protection. The individual membrane sheets were mechanically spot-fixed at the overlaps using the Sika® Sarnafast system, purpose-developed for fastening to trapezoidal steel profiles. Special washers were used in conjunction with the Sarnafast SF 4.8 self-drilling, hardened carbon steel fasteners.

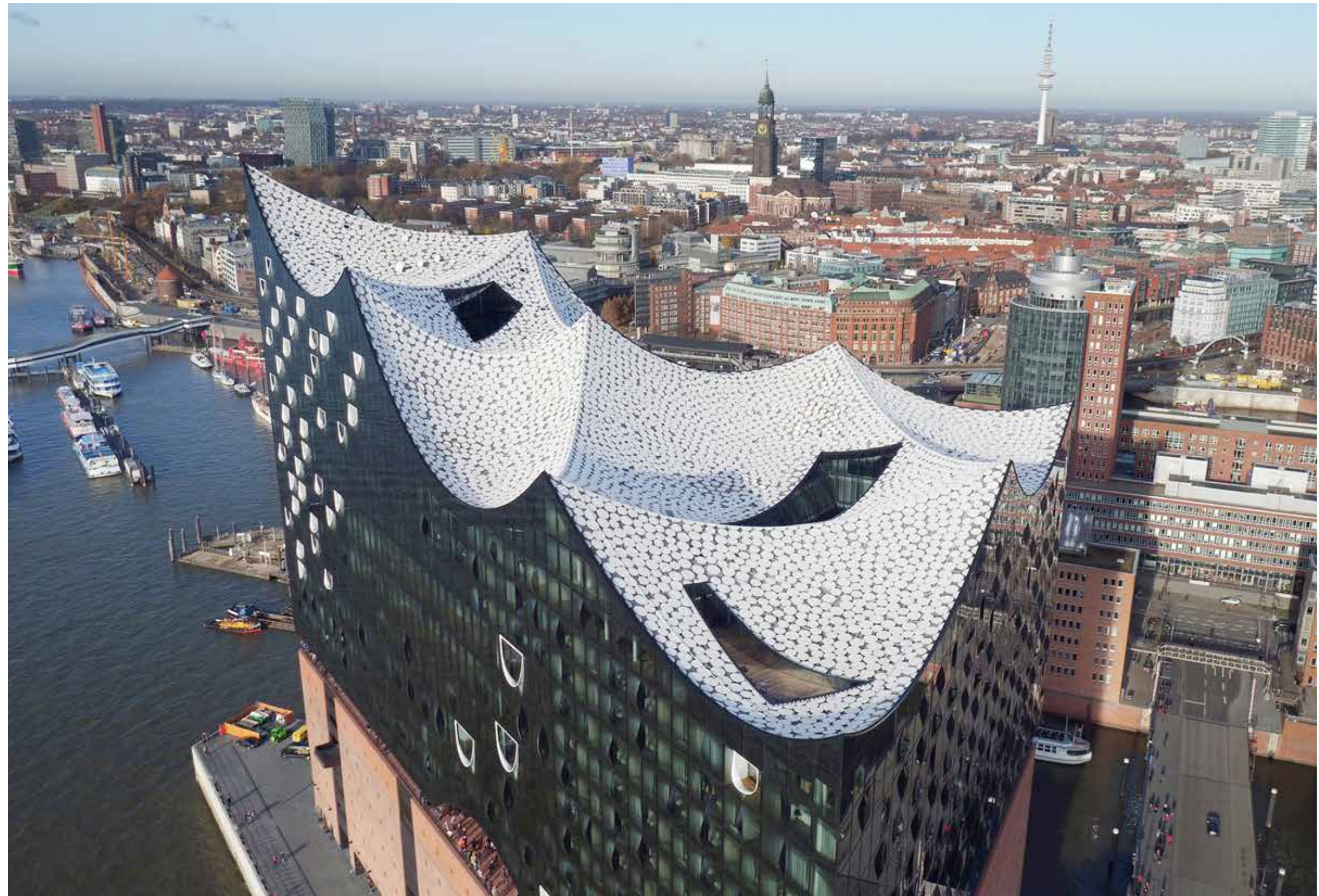
This roof assembly served as the base for tubular supports to carry the 5,800 white-coated, round, perforated aluminum-sheet "paillettes". Up to 110 cm in diameter, these fulfil a purely aesthetic purpose. During installation of the roof membrane, provision thus had to be made for several thousand penetrations. The resulting junctions were formed with Sarnafil® T galvanized-steel flashings. The upper faces of these units are laminated with Sarnafil® TG 66-18 FPO membranes, thereby allowing homogeneous welding with the TS 77-20 E roof membrane.

With the underlying roof membrane no longer accessible after fixing and sealing of the paillettes, it was essential for the installed materials to guarantee absolute watertightness and durability. Hence the need for wide-ranging tests, which included a leakage test and a fire test specifically for the action of fireworks, a vacuum box test and manual wind suction resistance certification for 600 kg/m².

In selecting materials, specific site factors had to be considered. These included the emissions from cruise ships in the harbor and the fluctuating weather conditions. Continuous seam inspections were required and even the welding equipment needed optimizing for use with the existing roof angles. The total length of the weld seams incorporated on the Elbphilharmonie roof nearly reaches 15 km.

On this prestigious project, the in-depth technical expertise offered by Sika Germany, as a single-source provider of products and systems solutions in many fields of construction, was complemented by comprehensive consultancy services. After all, the Elbphilharmonie is no ordinary building, but a «Gesamtkunstwerk», a total work of art, that poses exceptional architectural, design and construction challenges. Both the client and construction teams were duly impressed by the convincing solutions delivered by Sika, as construction chemicals specialist, for all required applications.

The Elbphilharmonie's spectacular roof construction required an absolutely trouble-free and, above all, durable waterproofing solution. The project team opted to use a Sika system solution.





PROJECT PARTICIPANTS

Architects: Herzog & de Meuron, Basel

Client: Elbphilharmonie Hamburg Bau GmbH
& Co. KG, represented by ReGe Hamburg
Projekt-Realisierungsgesellschaft mbH

Lead designer: Design consortium comprising Herzog / de
Meuron, Höhler + Partner Architekten Ingenieure and Hochtief
Solutions AG

Construction: Hochtief Solutions AG, special-purpose company
ADAMANTA Grundstücks-Vermietungsgesellschaft mbH & Co.,
Objekt Elbphilharmonie KG, a company of Commerz Real AG

SIKA SOLUTIONS

Concrete technologies:

- Sika® ViscoCrete®-1051
- Sika® Silicol SL

Corrosion protection:

- Sika Poicolor® Primer HE New
- SikaCor® EG-System

Sealing and bonding:

- Sikasil® SG 500
- Sikasil® IG 25 HM Plus
- Sikaflex Sealants

Roofing systems:

- Sarnavap 5000 E
- Sarnafil® TS 77-20 E RAL 7040
- Sarnafast®-System
- Sarnafil® TG 66-18
- Sarnafil® accessories

Construction timeframe: 2007 - 2016

Our most current General Sales Conditions shall apply. Please
consult the most current local Product Data Sheet prior to any use.



SIKA SERVICES AG
Tueffenwies 16
CH-8048 Zurich
Switzerland

Contact
Phone +41 58 436 40 40
www.sika.ch

