

## Case study

### **Attractive architecture with passive house design quality**

**The concrete sandwich façade at the new Karlsruhe tax office building is thermally insulated with Schöck Isolink**

**A striking façade grid made of exposed concrete characterizes the compact structure of the new Karlsruhe tax office building. Creating the special façade structure was a major challenge for the planners: How do you stably reinforce the cantilevered double-shell precast concrete components? The construction contractor finally found a solution in Schöck Isolink, since it could act as a load-bearing component while connecting the outer shell panel and the load-bearing shell panel in a way that is energy efficient. The façade anchor is made of the Combar fiberglass composite material, which makes it extremely tensile and has extremely low thermal conductivity.**

From 2018 to 2020, the State of Baden-Württemberg, as represented by the Karlsruhe Office of Vermögen und Bau Baden-Württemberg, built the administrative building for the Karlsruhe City Tax Office, which offers office space for around 300 employees. The new building was built on the site of the former Wolff & Sohn perfume and toilet soap factory, and it blends harmoniously with the classic factory architecture of the existing historic buildings. Prof. Jens Wittfoht of the Wittfoht Architekten architecture firm, which is responsible for the design, clarified: "We kept the building compact in order to keep the energy footprint as small as possible and to preserve a lot of the open and green spaces that were available in the courtyard."

Accordingly, the solution by the Stuttgart architects reflects urban design, environmental, and species conservation concerns.

### **An eye-catching façade grid with high quality exposed concrete**

In the interior, the aim was to create a functional and flexible layout that allows, for example, for the configuration of various office spaces using connecting partitions: from single and open-plan offices to combination zones and meeting areas. These interior space requirements in turn required a certain modularity for the façade. There were several reasons for designing the façade from precast concrete components. Jan Akkermann, KREBS+KIEFER Ingenieure Karlsruhe, explained: “We didn't want any large glass surfaces, so the façade needed to have a small-scale character. So it made sense to combine the exposed façade with the load-bearing shell panel.”

The façade is made up of 350 precast concrete parts. The individual components feature different designs with two to four shafts and, when they are assembled together, they constitute a façade unit. In order to obtain such an organized and maximally precise façade, the highest quality exposed concrete was needed, allowing for each element to be exactly the same as all the others. Each of the precast components, which are over four meters long and three meters high, was therefore sandblasted in the precast plant. This allowed for the creation of a special texture on the surface with an extremely uniform overall surface appearance.

### **The static challenge of large overhangs**

The fact that concrete could offer good physical properties for the indoor spaces as well as high durability for the outdoor surfaces also spoke in favor of concrete sandwich façade construction with integrated core insulation. The inner surface of the façade structure was designed as a load-bearing panel and insulated with mineral wool. The window geometry with deep reveals required the use of insulation panels that were 35 centimeters thick. The large overhangs had to be taken into account in the reinforcement. As Jan Akkermann explained: “The major static and structural challenge in securing the outer shell panel was selecting an

anchor system that could handle the flow of forces, that is, so that the weight of the façade could be relieved by the thick insulation panels of the underlying supporting structure.” The construction contractor finally found a solution in Schöck Isolink type C, since it provided a force transmitting connection of the outer shell panel to the inner concrete shell panel and, at the same time, ensured the thermal decoupling of the concrete façade. The insulated connecting component Isolink, which is approved by DIBt, consists of Combar, a fiberglass composite material developed by Schöck, which is characterized by a particularly high tensile strength and therefore a high load capacity.

### **Schöck Isolink: powerful and energy efficient**

The large overhang of the insulation panel required the use of an optimized number of fasteners to make the solution as economical as possible. The slim geometry of the supports that the façade was to be mounted to, however, offered little space for such fasteners. Jan Akkermann added: “Isolink was the right solution, since it used the fewest fasteners per square meter and did not require any spacers. And that also meant: less material, fewer costs, and less effort spent on installation.”

In addition to its good static properties, Isolink is a certified passive house component and thus excels in its thermal insulating properties: With a thermal conductivity of  $\lambda_{eq} 0.7 \text{ W}/(\text{m}^*\text{K})$ , Combar conducts almost no heat (compare it to the thermal conductivity of stainless steel, for example:  $\lambda_{eq} 15 \text{ W}/(\text{m}^*\text{K})$ ). Therefore, it can keep thermal bridges and the resulting risks of heat loss and structural damage to a minimum. In addition to providing secure fastening, Isolink also ensures that the installed façade elements on the new Karlsruhe tax office building do not act as thermal bridges and are highly energy efficient.

**Construction site****Construction period:** 2018 – 2020**Developer and project management:** Vermögen und Bau Baden-Württemberg, Karlsruhe Office**Architect:** Wittfoht Architekten, Stuttgart**Structural engineer:** KREBS+KIEFER Ingenieure, Karlsruhe**Precast plant:** Fa. Dreßler Bau GmbH, Stockstadt am Main**Construction company:** Leonhard Weiss GmbH & Co. KG, Satteldorf**Schöck products:** Schöck Isolink type C-SH, Schöck Isolink type C-SD, Schöck Isokorb T/XT type SK/SQ, Schöck Tronsole

## Image captions

### [Schoeck Tax Office Karlsruhe 1]



*The new Karlsruhe tax office building features high-quality and identical exposed concrete façade components.  
Photo: Schöck Bauteile GmbH*

### [Schoeck Tax Office Karlsruhe 2]



*Every façade component was sandblasted at the precast plant.  
Photo: Schöck Bauteile GmbH*

**[Schoeck Tax Office Karlsruhe 3]**



*The appearance is quite striking: The façade grid features narrow windows and deep reveals.*

*Photo: Schöck Bauteile GmbH*

**[Schoeck Tax Office Karlsruhe 4]**



*The façade is made up of more than 350 precast concrete components, with variously designed individual elements with two to four shafts.*

*Photo: Schöck Bauteile GmbH*

**[Schöck Tax Office Karlsruhe 5]**



*The insulation panels in the concrete sandwich facade are up to 35 centimeters thick.*

*Photo: Schöck Bauteile GmbH*

**[Schöck Tax Office Karlsruhe 6]**



*Schöck Isolink was able to guarantee the stable reinforcement of the cantilevered double-shell precast concrete components.*

*Photo: Schöck Bauteile GmbH*

**[Schöck Tax Office Karlsruhe 7]**



*The Schöck Isolink type C façade fastening for core-insulated concrete walls consists of the Schöck Combar fiberglass composite material.*

*Photo: Schöck Bauteile GmbH*

**About Schöck:**

Schöck Bauteile GmbH is a subsidiary of the multinational Schöck Group with 14 international sales offices and approximately 1,000 employees. The company's success story started in 1962 in Baden-Baden at the edge of the Black Forest. The company's founder Eberhard Schöck applied his knowledge and construction site experience to develop products that streamlined construction and solved complex problems in building engineering. This mission has formed the foundation of the company's philosophy to this day. It has made Schöck into one of the leading providers of reliable and innovative solutions to reduce thermal bridges and impact sounds and to create thermally insulating and secure facade fasteners and reinforcement technology. Schöck products make smart construction methods possible and ensure consistent construction quality. Addressing building engineering and energy efficiency needs are the company's top priorities. To meet the construction needs of tomorrow, Schöck is driving the adoption of digital technologies in all areas, from workflows and planning to the construction site.