Press release

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fischer heavy-duty anchors in the thyssenkrupp elevator test tower in Rottweil

Elevated technology

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It towers above every other building in Baden-Württemberg and contains Germany's highest observation deck: the elevator test tower of thyssenkrupp Elevator AG in the Swabian town of Rottweil. A 17,000 m² envelope made of a polymer-coated glass fibre fabric spirals its way around the main body, serving as the facade's cladding. Heavy-duty fixings by fischer were used to anchor this membrane. The lantern gear rails of the installation shuttle were also partially anchored with fischer systems. A total of approximately 22,000 fischer products were used on the project.

The thyssenkrupp Test Tower is literally a new pinnacle of Baden-Württemberg designed by renowned architects Professor Werner Sobek and Helmut Jahn. The visitor's platform at 232 m offers a 360-degree panoramic view from Rottweil to the Swabian Alps, even ranging as far as the Swiss Alps on a clear day. With a height of 246 m it is taller than every other building in Baden-Württemberg.

The tower weighs in at 40,000 t – as much as 8,000 fully grown African elephants. Clad in a spiralling glass fibre fabric sleeve that becomes increasingly transparent towards the top, the behemoth nevertheless has a light and delicate appearance. Depending on the time of day and year, the membrane changes the tower's appearance and interior lighting. It is also self-

cleaning and provides protection against wind, intense sun exposure and cool temperatures.

Tayio Europe GmbH was responsible for carrying out the facade. A steel structure consisting of steel pipes, ropes, A-racks and anchor plates connects the facade cladding with the concrete wall. The planners opted for the approved heavy-duty fixings by fischer in order to securely fasten this structure to the subsoil. “One of fischer’s key advantages is its seamless support of planners, surveyors and installers throughout the entire construction process. This was an important factor in being assigned the contract”, emphasises Stephan Gießer, Project Manager at fischer. The engineer supported Taiyo Europe GmbH during the planning and installation of the tower’s facade. “If there are any on-site deviations from regulations then we participate in finding solutions for suitable adaptations, including creating design and calculation details, models to simulate effective implementation or other kinds of support”. “In addition to the products, the professional technical advice and support received before and during the planning stage was very impressive”, confirms Stefan Dunkel, Project Lead at Taiyo Europe GmbH.

The fischer systems differ between the various tower sections according to the on-site conditions and static calculations. fischer developed and supplied a large number of custom solutions tailored to the project. Zones 1 (0–63 m) and 2 (63–110 m) have a wall thickness of 40 cm. The tower is offset at a height of 110 m, where the wall thickness in sections 3 (110–207 m) and 4 (207–243 m) is reduced to 25 cm. The concrete grade in Zone 1 is C50/60 and C40/50 in the rest of the tower. The fact that not all parts of the anchor base construction complied with current fastening technology regulations resulted in significant challenges.

The fischer heavy-duty fixings used on the project enable the highest load-bearing capacity and are approved for cracked concrete in accordance with ETAG 001/EOTA-TR029. The selected systems are economic while offering a high degree of power, reliability and user friendliness. FIS A anchor rods M20x320 made of stainless steel (A4) were inserted flush with the fabric using the load-bearing FIS EM 390 S epoxy resin mortar in Zone 1 between 0–27 m.

In the area between 27–63 m and the subsequent Zone 2, the fischer Powerbond bonded anchor system was used with a diameter of M16 in A4. System components included anchor rods (FIS A M16x250 A4) with anchoring depths of mostly 180 mm as well as FIS PS Power Sleeves which were inserted with the FIS HB 345 S Highbond special mortar. The solution provides multiple benefits such as short curing times and extremely high tensile strength with a comparatively low anchoring depth.

The RSB 16 mini (resin capsule) variant of the Superbond bonded anchor system was used in combination with RG M 16x300 A4 anchor rods in Zone 3 (110–207 m). Decisive factors included its very short curing times and installation despite extremely low temperatures of up to -30°C in concrete. The anchor rods were equipped with stainless steel (A4) washers in accordance with DIN 7349 as a special item. Additional systems such as the FIS EM 390 S with FIS A M16x270 A4 and the FIS H 22x1000 L injection anchor sleeve were also used for this purpose. According to assessments by the Stuttgart IEA Eligehausen-Asmus-Hofmann engineering firm, this solution is suitable for the anchor base that deviates from current regulations. Almost all systems used on the project are approved for diamond drilled drill holes with comparable results to hammer drilled

holes. This allowed drill holes to be drilled quickly even in concrete sections that were often reinforced.

A specialist mobile installation platform (shuttle) was developed to allow the facade specialists to scale the external tower wall together with the membrane and materials. This ring-shaped structure moved vertically via three lantern gear rails powered by nine motors. fischer was also heavily involved in designing the anchorages for the lantern gear rails. The manufacturer supplied the Superbond mortar FIS SB 390 S with the FIS A M30x325 (8.8) anchor rod and M30 flat nuts according to ISO 4035, strength class 05.

The tower has a diameter of 21 m in which elevator innovations by thyssenkrupp Elevator AG are tested and certified in twelve shafts with elevators moving at speeds of up to 18 m per second. This has turned Rottweil into a key research and development site for vertical passenger transportation with significance to the cities of the future which are always reaching new heights.

Image captions :

Image 1:

The thyssenkrupp Elevator AG Test Tower in Rottweil is a construction of epic proportions that towers over every other building in Baden-Württemberg with a height of 246 m.

Image 2 and 3:

The shape of the thyssenkrupp Test Tower corresponds to Rottweil's medieval church towers and keeps and blends into the surrounding landscape. Its architecture serves as a modern addition to the historic townscape.

Image 4:

Reaching new heights with fischer – around 22,000 fischer products were used during the completion of the thyssenkrupp tower in Rottweil to anchor the facade cladding and lantern gear rails of the installation shuttle.

Image 5 and 6:

A steel structure connects the external membrane to the concrete walls at the thyssenkrupp Test Tower in Rottweil. The facade specialists anchored this construction to the subsoil using fischer's heavy-duty fixings.

Images: fischer

The fischer Group of Companies, headquartered in Waldachtal in Germany's northern Black Forest, generated sales of 872 million euro in 2020 with a worldwide staff of 5,200 employees. The family-owned company operates 50 subsidiaries in 38 countries and exports to more than 120 countries. It includes the five divisions: fischer fixing systems, fischer Automotive, fischertechnik, fischer Consulting and LNT Automation

fischer fixing systems is the technological market leader in key areas of fixing technology. fischer offers products that deliver technical perfection to a wide range of customers, from do-it-yourselfers to tradespeople to key account partners.

fischer Automotive manufactures high-quality parts for vehicle interiors. The company is highly competent in the plastics processing segment and is an important partner for the automotive industry. Its range of products includes air vents, cup holders, trays and multi-function components.

With its construction kits, fischertechnik is active in both the toymaking and the educational sector. fischertechnik is one of the last remaining toy makers to exclusively develop and produce in Germany.

fischer Consulting evolved from the competence developed in the company itself, which includes the fischer ProcessSystem with its central aim of permanent improvement for the ultimate benefit of the customer. fischer Consulting advises small and medium-sized businesses, government agencies and major companies on their path towards lean and efficient processes.

fischer Electronic Solutions develops and manufactures electronic solutions including product and system developments based on the latest technology as well as custom production orders processed in the company's own production facilities. As an experienced provider of development and production services for custom systems such as multi-touch solutions made of glass and the corresponding controller units, fischer Electronic Solutions forms the perfect link between the customer and the final product.

www.fischer.group

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