Press release

Waldachtal, May 13, 2019

fischer fixings in the Metro Cityringen

On the safe track through Copenhagen

fischerwerke GmbH & Co. KG
Corporate Communications

Klaus-Fischer-Straße 1
72178 Waldachtal

The Danish capital city of Copenhagen is currently expanding its metro system in order to improve the infrastructure and development of the metropolitan area. The Cityringen is a central component alongside metro lines to Nordhavn and Sydhavn. Modern fixing technology is increasing the safety of the underground express train system.

Almost 65 million passengers are already using the Copenhagen metro network every year, according to the owner and operator Metroselskabet I/S. Meanwhile, there is a high influx of new inhabitants to the Danish capital. Construction of the Cityingen began in 2011 and it is set to be opened by the end of 2019. The underground express train system will connect the Danish Parliament, the City Hall, important national monuments, the central train station and other central areas of the city. There will also be an option to change over to the existing M1 and M2 lines as well as the S-train and regional train. The Cityringen will serve 17 new metro station on the M3 line.

The owner Metroselskabet I/S awarded the construction contract to the Copenhagen Metro Team, a joint venture between the three Italian firms Tecnimont Civil Construction, Salini S.p.a. and Seli. Salini and Impregilo merged into one group in 2014 and now owns 99.9% of the shares of the Copenhagen Metro Team. The drilling operations for the twin-tube tunnel system have already been completed. Two tunnels each with a

diameter of 5.78 m and a length of 15.5 km were drilled through the Copenhagen sandstone at a depth of 25 m beneath the surface through EPB-TBM excavation.

With over 300 subcontractors the Cityringen is one of Europe's largest metro construction projects. The fischer Group of Companies is also involved in the project, supplying numerous product solutions for both temporary and permanent fixings and installations while providing support during their on-site installation. The tunnel construction consists of concrete and reinforced concrete as well as prefabricated segments as the load-bearing structure.

The used fixing and installation systems have been tested in accordance with European and international standards and for the most part have an ETA (European Technical Approval) as well as a UL and ICC approval for the USA and countries in the Far East. The fixing and installation systems are made of high-grade materials such as stainless and non-corrosive steel and are resistant against fire, seismic influences as well as dynamic and impact loads. Marco Cannone, Project Manager for international construction projects at fischer Italy, is heavily involved in the project. "We convinced the contracting authority with our suitable solutions and special developments that were required for the construction of the tunnel", he is convinced.

Temporary channels, cables and pipes for ventilation, lighting and the supply and disposal of water in the Cityringen were installed using the fischer nail anchor FNA II and the concrete screw FBS in accordance with the corresponding load requirements. Both products allow dismantling. The FNA II is additionally used to prevent the drainage pipe from lifting up through the pre-drilled metal brackets on the tunnel floor. This prevents the drainage pipe from moving from its original position when filling

the section with cement. The FNA II was also used to install fire protection plates and to attach reinforcement nets for the die cast fire protection plaster in combination with washers und spacers.

The stainless steel FBN II variant also presses on the waterproofing sheets of the tunnel segments in the area of the stations' wall ducts, making them water-resistant. The fischer bolt anchor FAZ II and FBN II and the nail anchor FNA II were used for the long-term safe electrical installations in the Cityringen. A fischer channel fixing system is being used in order to install tracks to railway sleepers. The fischer injection mortar FIS EM is being used in combination with the threaded rod FIS A to attach the conductor rail (3rd rail), safely transferring the high loads into the fixing substrate even if the drill hole is shallow. Undercut anchors and substructures by fischer ACT are being used in order to mount the facade cladding in the stations with natural stone and hand-made bricks. The system is suitable for claddings made out of any type of material. It transfer the loads in a form-fit and completely expansion-free manner. Corrosion-resistant and fire tested fischer installation systems affix the pipes and cables for the supply and disposal of electricity and water to the tunnel as well as for its ventilation. The entire fischer Firestop System was also used. The wide range of solutions for passive fire protection helps minimise the spread of fire, smoke and toxic gasses.

A total of 42 kilometres of tunnel along with 24 modern metro stations will be built under Copenhagen under the direction of Metroselskabet. Including above-ground stops, more than 50 metro and city stations are set to be opened between 2019 – 2024.

Image captions:

Image 1

Numerous solutions by the fixing specialist fischer were used for both temporary and permanent fixings and installations in the Cityringen's twin-tube tunnel system.

Image: fischer

Image 2

Undercut anchors and substructures by fischer ACT are being used in order to mount the facade cladding made of natural stone and hand-made bricks in the stations.

Image: fischer

Image 3

Interior view of a station with facade cladding.

Image: fischer

Image 4

Once the Cityringen is opened the driverless underground trains will transport up to 240,000 passengers around the clock every day at an average speed of 40 km/h.

Image: Adobe stock / Peter Kirillov

Image 5

Copenhagen Central Station (pictured) will be connected to the city's metro network for the first time through the circle line.

Image: audriusmerfeldas / 123rf

Image 6

All aboard: The Cityringen metro passes below Copenhagen in 15.5 km-long tunnels, shortening trips to central work, education and tourist facilities in the Danish capital. fischer's fixing, installation and facade systems provide a firm hold to numerous temporary and permanent attachments.

Image: fischer

Image 7

Two tunnels each with a diameter of 5.78 m and a length of 15.5 km were drilled through the Copenhagen sandstone at a depth of 25 m beneath the surface through EPB-TBM excavation.
Image: CMT / Salini Impregilo

Image 8

fischer installation systems fasten service ducts for the supply and disposal of electricity and water to the tunnel as well as for its ventilation.
Image: fischer

Image 9

Various fischer fixing and installation systems were used for permanent and temporary service duct fixtures. These included the fischer nail anchor FNA II, the concrete screw FBS, the fischer bolt anchor FAZ II und FBN II as well as fischer installation systems.
Image: CMT / Salini Impregilo

Image 10

The Cityringen has been under construction since 2011 and is set to be completed by the end of 2019. The underground express train system is a mega-project that will connect central parts of the city.
Image: CMT / Salini Impregilo

Image 11

The Cityringen will serve 17 new metro station on the M3 line upon completion.
Image: CMT / Salini Impregilo

The fischer Group of Companies

The fischer Group of Companies, headquartered in Waldachtal in Germany's Northern Black Forest, generated sales of 864 million Euros in 2018 with a worldwide staff of 5,200 employees. The family-owned enterprise operates 47 of its companies in 35 countries and exports to more than 100 countries. It includes the five divisions: fischer fixing systems, fischer automotive systems, fischertechnik, fischer consulting and LNT Automation.

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

fischer automotive systems manufactures high-quality parts for car interiors. The company is highly competent in the plastics processing segment and is an important partner for the automotive industry. fischer automotive systems produces air vents, cup holders, trays and multi-function components.

fischertechnik is active both in the construction kit and in the educational toy sector. As one of the last toy makers, fischertechnik develops and produces exclusively in Germany.

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

LNT Automation develops and manufactures custom electronic solutions. The company also develops, produces and distributes custom and capacitive touch systems such as multi-touch solutions made of glass and the corresponding controller units. All electronics are manufactured in-house.

www.fischer.group

Contact partner

Katharina Maria Siegel
Corporate Communications
Telephone: +49 7443 12 – 4217
E-mail: Katharinamaria.Siegel@fischer.de