

FAZ II Plus, the Powerful Anchor for Highest demands.

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Abstract: FAZ II Plus. The champion among the bolt anchors. Powerful & flexible. The fischer FAZ II Plus is the steel anchor for the highest demands - for heavy loads in cracked concrete. Thanks to the very broad approval and test reports it is very flexible and can be used in a lot of applications in tunnels. The proven expansion clip safely guides the loads into the concrete and enables the highest load-bearing capacity.

Keywords: Tunnelling; Innovation; Safety; Powerful; Flexible; Certified; RWSFire

1 Introduction

Standstills are out of the question for us, as even established products such as our FAZ II Bolt Anchor undergo further development. The tried and tested steel anchor now has a successor, the FAZ II Plus.

The new FAZ II Plus Bolt anchor is: now suitable for dynamic applications, powerful for high loads and maximum performance, particularly versatile for many applications, quick and easy to install without having to clean the drill hole, particularly durable with a service life of 120 years, approved according to RWS Fire Curve.

2 Fewer and smaller anchors are required.

With the new assessment (ETA), the tensile strengths increase decisively. As a result, fewer fixing points and anchors are required success.

3 Dynamic

Dynamic loads, or non-static loads, are particularly used in mechanical engineering and construction. There are assumed to be a very large number of loadchanges (switching between loading and unloading, changes in loading direction or changes in load height) over the service life of the component. These load changes occur at anchorages with plugs, for instance on robots, cranes, and elevators. However, they also occur on trains passing by noise protection walls or trucks in road tunnels, which generate dynamic loads on installations due to the constant interchange between pressure and suction caused by airflow. The FAZ II Plus is the Perfect alternative to injection systems for dynamic stress: The fast installation process of the FAZ II Plus provides an efficient fixing solution for dynamic applications with low load cycles with an immediately loadable fixing point.

4 Seismic applications in earthquake zones

Always on the save side with FAZ II Plus: The FAZ II Plus allows the absorption of high seismic loads of performance category C1 and C2 for diameters M10-M24 with and

without the use of the filling at installation.

5 Service life 120 years.

Always on the safe side with FAZ II Plus: The FAZ II Plus allows the absorption of high seismic loads of performance category C1 and C2 for diameters M10-M24 with and without the use of the filling disc FFD at installation.

6 RWS fire curve for tunnels.

Fire tests were performed with the duplex Versions (1.4362) of the anchor under RWS fire exposure. The fire tests were performed at MPA, University of Stuttgart with the fischer Bolt Anchor FAZ II Plus R using sizes M8, M10 and M12. However, the characteristic fire resistances are valid for all sizes from M8 to M24 as well as for all stainless-steel material versions. Size M6 of the Bolt Anchor was not part of this assessment.

The tests were performed to qualify the anchors and to derive only the steel resistance under RWS fire. The resistances for the other failure modes (where applicable) are calculated according to EAD 330232-01-0601 and EN 1992-4.

The characteristic resistances of the fischer Bolt Anchor FAZ II Plus R anchors are assessed for static and quasi-static loading. Detailed results of the fire tests and Rijkswaterstaat fire curve for tunnels with a temperature up to 1350 °C (RWS) are given in the Test Report Fi 519/01 – 20/12 dated 24.09.2020.

7 Installation without drill hole cleaning.

The partner for fast installations: The ETA covers the use of hollow drills and diamond core bits. An expert opinion regulates the assembly without drill hole cleaning (M8-M24). This simplifies installation and speeds up the process for efficiency on the construction site.

8 Anchor bolt for use in steel fibre concrete

The FAZ II Plus Anchor bolt now also has general design approval (aBG) for anchorages in steel fibre concrete. This

opens up new applications for the classic product, which are increasingly in demand in engineering practice. Included are the versions FAZ II Plus made of galvanised steel, FAZ II Plus R made of stainless steel and FAZ II Plus HCR made of highly corrosion-resistant steel 1.4529 in the diameter sizes M6 to M24. The approval for anchoring in steel fibre concrete was made according to the DAfStb guideline steel fibre concrete (2012-11) with a maximum fibre content of 80 kg/m³.

9 Quick and easy installation of bolt anchors

The FA-ST II bolt anchor setting tool allows for quick and



easy installation of bolt anchors, saving significant installation time in particular during series installation. The projecting thread of the anchor is not damaged during hammering. The bolt anchor setting tool FA-ST II is suitable for commonly available hammer drills (2 - 3 kg) with SDS adapter. Specialised bolt anchors such as the FAZ II Plus, FBN II, FBZ and EXA can be installed using push-through installation more quickly, easily, and safely using the FA-ST II. The setting tool ensures optimal handling, thanks to its low weight.

figure 1: FA-ST II setting tool

10 Conclusions

The FAZ II Plus is the ideal steel anchor for tunnels thanks to the different usage reports like dynamic applications, the service life of 120 years, RWS Fire Curve and the quick and easy installation without cleaning of the borehole.

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