

General construction technique permit

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamnt

Eine vom Bund und den Ländern
gemeinsam getragene Anstalt des öffentlichen Rechts

Mitglied der EOTA, der UEAtc und der WFTAO

Date:

29 Oct 2020

Reference:

II 71-1.74.8-61/18

Number:

Z-74.8-199

Validity

from: **29 October 2020**

to: **29 October 2025**

Applicant:

fischerwerke GmbH & Co. KG

Otto-Hahn-Straße 15

79211 Denzlingen, Germany

Subject of decision:

fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities

The subject named above is herewith granted a general construction technique permit (*allgemeine Bauartgenehmigung*).

This decision contains eight pages and eight annexes.

Translation authorised by DIBt

DIBt

I GENERAL PROVISIONS

- 1 The general construction technique permit confirms the fitness for application of the subject concerned within the meaning of the Building Codes of the federal states (*Landesbauordnungen*).
- 2 This decision does not replace the permits, approvals and certificates required by law for carrying out construction projects.
- 3 This decision is granted without prejudice to the rights of third parties, in particular private property rights.
- 4 Notwithstanding further provisions in the 'Special Provisions', copies of this decision shall be made available to the installer of the subject concerned. Furthermore, the installer of the subject concerned shall be made aware of the fact that this decision must be made available at the place of application. Upon request, copies of the decision shall be provided to the authorities involved.
- 5 This decision shall be reproduced in full only. Partial publication requires the consent of DIBt. Texts and drawings in promotional material shall not contradict this decision. In the event of a discrepancy between the German original and this authorised translation, the German version shall prevail.
- 6 This decision may be revoked. The provisions contained herein may subsequently be supplemented and amended, in particular if this is required by new technical findings.
- 7 This decision is based on the information and documents provided by the applicant on the subject concerned during the permit process. Alterations to the information on which this general construction technique permit was based are not covered by this decision and shall be notified to DIBt without delay.
- 8 The general construction technique permit included in this decision also serves as a national technical approval for the construction technique.

II SPECIAL PROVISIONS

1 Subject concerned and field of application

(1) The subject of this general construction technique permit is the fixing system 'fischer injection system FIS EM Plus' (hereinafter referred to as the fixing system) for use in collecting trays, collecting rooms and surfaces made of uncoated liquid-tight concrete (FD and FDE concrete) in storage, filling and handling facilities for substances hazardous to water (SFH facilities) as described below.

(2) The fixing system, installed in the uncoated concrete surfaces, shall be deemed to be tight to the substances hazardous to water specified in Annex 1.

(3) The fixing system is covered by European Technical Assessment ETA-17/0979¹. The fixing system is a bonded fastener / injection system for anchoring in concrete. It consists of the mortar cartridge filled with FIS EM Plus and a steel element (fastener).

The following fasteners may be used:

- "fischer anchor rods FIS A" and "fischer anchor rods RG M" with variable anchorage lengths (Annex 2),
- "fischer internal threaded anchor RG MI" (Annex 3) or
- "Rebar anchor FRA" (Annex 3).

Only fasteners made of stainless steel or highly corrosion-resistant steel in accordance with Annex 4 shall be used. Section 2.1(5) shall be taken into account.

(4) The fixing system may be used for pre-positioned and push-through installation with or without a subsequently injected filling disc.

(5) The formulation of the injection mortar is deposited with DIBt. Any changes require the consent of DIBt.

(6) The in-situ concrete in which the fixing system is used shall meet the requirements for liquid-tight concrete (FD or FDE concrete) in accordance with the guideline of the German Committee for Reinforced Concrete (DAfStb) 'Concrete structures when handling substances hazardous to water'² (*Betonbau beim Umgang mit wassergefährdenden Stoffen*). Precast elements shall comply with the relevant national technical approval / general construction technique permit for use in SFH facilities. The use of fasteners in the precast element shall explicitly be permitted pursuant to the national technical approval / general construction technique permit.

(7) The fixing system shall be installed in a defined base material in accordance with ETA-17/0979¹, taking into account the provisions of this general construction technique permit and the installation and processing instructions of the applicant.

(8) The in-service temperature shall correspond to temperature range I given in Annex B1, Table B1.1 of ETA-17/0979¹. In case of media contact, the temperature of the substances hazardous to water shall not exceed +30 °C.

(9) The application of this fixing system on coated or lined concrete surfaces is not permitted.

1	ETA-17/0979	European Technical Assessment ETA-17/0979 of 17 June 2020 for fischer injection system FIS EM PLUS
2	BUmwS	German Committee for Structural Concrete (DAfStb): <i>Betonbau beim Umgang mit wassergefährdenden Stoffen</i> / BUmwS, March 2011

(10) This general construction technique permit also takes into account the water-law requirements applicable to the subject concerned when used and applied in SFH facilities. In accordance with Section 63(4) Point 3 of the German Water Resources Act³ (WHG) the subject concerned is deemed to be fit for use.

(11) This general construction technique permit is granted without prejudice to testing and approval requirements resulting from other legal areas.

2 Provisions for planning, design and execution

2.1 Planning and design

(1) Planning and design shall only be carried out by qualified designers. The water law provisions and regulations as well as the design situation (stresses, loads, attack) shall be taken into account. The designer responsible for the design and planning shall also be experienced in the field of anchoring and reinforced concrete construction.

(2) Reference is made to the planning and design provisions set out in ETA-17/0979¹, e.g., with regard to the qualification of the person responsible for the design, the loads to be transferred, compliance with edge distances, as well as the position of the fastener with regard to the reinforcement. ETA-17/0979¹, Annex B1, Table B1.1, contains an overview of the performance and use parameters to be considered in planning and design.

(3) The position of the fasteners shall be specified in the planning and/or design drawings.

(4) The fasteners may also be subjected to transverse tension.

(5) In the planning stage, steel grades which are resistant to the substances hazardous to water handled in the relevant SFH facilities shall be selected for the fasteners (steel elements). The fasteners shall be selected on a case-by-case basis in light of the specific project, taking into account the BAM list⁴ or DIN EN 12285-1⁵. The choice of materials shall be documented by the designer and included in the construction project files.

2.2 Execution

2.2.1 General

(1) The executing company (in accordance with the AwSV provisions⁶) and its specialised personnel shall be trained and authorised by the applicant to carry out the tasks specified in this general construction technique permit as well as in the installation and processing instructions.

(2) The fixing system shall be installed in accordance with the provisions of this permit, ETA-17/0979¹ and the installation and processing instructions of the applicant. The processing instructions specified in the installation and processing manual shall be followed.

3	WHG	Act on Managing Water Resources (German Water Resources Act – WHG), 31 July 2009 (Federal Law Gazette (BGBl.) I p. 2585), last amended by Article 1 of the Act of 19 June 2020 (BGBl. I p. 1408)
4	BAM list	Resistance assessments of metallic tank materials and polymeric sealing, coating and lining materials (<i>Beständigkeitsbewertungen von metallischen Behälterwerkstoffen und polymeren Dichtungs-, Beschichtungs- und Auskleidungswerkstoffen</i>), BAM, January 2018
5	DIN EN 12285-1:2018-12	Workshop fabricated steel tanks – Part 1: Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and nonflammable water polluting liquids other than for heating and cooling of buildings; German version EN 12285-1:2018
6	AwSV	Ordinance on Facilities for Handling Substances Hazardous to Water (<i>Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen</i>) of 18 April 2017 (BGBl. I p. 905), last amended by Article 256 of the Ordinance of 19 June 2020 (BGBl. I p. 1328)

(3) In order to ensure that the fixing system can be properly installed, the applicant shall draw up installation and processing instructions which shall supplement the provisions of this general construction technique permit and ETA-17/0979¹ by providing detailed descriptions in particular with regard to the following points:

- Storage, transport and packaging for all components
- Preparation and condition of the concrete base material (impurities, evenness, moisture and surface strength)
- Pre-treatment of the concrete base material, e.g. cleaning
- Mandatory reference to the execution requirements of the fixing system in accordance with ETA-17/0979¹
- Processing conditions, such as material and surface temperatures
- Precautions to be taken during processing
- Additional information on preparation of boreholes. Drilling is only permitted with a hammer drill followed by double compressed air, brush and compressed air cleaning or with a hollow drill, also refer to Section 2.2.2 (4); borehole depth corresponding to minimum effective anchorage length or thickness of the concrete member minus 5 cm (the most unfavourable value is decisive).
- Information on the mixing of components
- Work steps required for installing the fixing system
- Information on the steel elements to be installed
- Time until fitness for use is reached (full mechanical and chemical resistance)
- Test of the proper installation of the fixing system

(4) Installation of the fixing system requires several work steps. The information contained in the installation and processing instructions of the applicant shall be observed. The fixing system shall be installed professionally and with due diligence in accordance with the specifications provided by the applicant.

2.2.2 Special information for execution

(1) Before starting the work, the executing company (in accordance with Section 2.2.1(1)) shall verify that the prerequisites for installing the fixing system in accordance with the provisions of this general construction technique permit, ETA-17/0979¹ and the installation and processing instructions drawn up by the applicant are met on site.

(2) The concrete base material for the installation of the fixing system shall be assessed by the executing company in accordance with Section 2.2.1 before the borehole is drilled and shall be greenlighted for the installation of the fixing system. Greenlighting for installation shall be documented and included in the construction project files.

(3) The effective anchorage length required for the specific case shall be marked and adhered to. It shall also be ensured that the depth of the borehole is at least 5 cm less than the thickness of the concrete member in which the fixing system is installed. Drilling is only permitted with a drill depth stop!

(4) Creating the borehole is only permitted with a hammer drill followed by double compressed air, brush and compressed air cleaning or with a hollow drill. The diameter of the drill shall be determined by the diameter of the fastener, taking into account the applicant's specifications.

(5) The installation temperature shall be between -5 °C and 40 °C, with a minimum cartridge temperature of +5 °C.

(6) Incorrect drilling shall be avoided. Any aborted holes due to incorrect drilling shall be closed with an injection system that is covered by a national technical approval / general construction technique permit for use in SFH facilities and is suitable for the specific application.

2.2.3 Checks performed by the executing company

The company in accordance with Section 2.2.1(1) shall perform the following checks prior to, during and/or after the installation of the fixing system.

- Check that the concrete base material meets the requirements given in Section 1(6)
- Check that the fasteners are of the appropriate steel grade
- Check that the fasteners are placed as specified in the construction and design documentation
- Check that the fasteners are oil-free and clean and that the setting depth has been marked
- Check that when hammer drills are used, the borehole has been properly cleaned in accordance with Section 2.2.2(4)
- Measurement of the temperatures and comparison with the specifications
- Check that the borehole has been filled with a sufficient quantity of mortar

2.2.4 Declaration of conformity for the construction technique

(1) The confirmation of conformity of the construction technique for the installed fixing system with the provisions of this general construction technique permit shall be provided by the executing company in accordance with Section 2.2.1(1) by means of a declaration of conformity based on Annex 8.

(2) The declaration of conformity shall be submitted on the basis of the provisions set out in this general construction technique permit, in particular Section 2.1, and the checks in accordance with Section 2.2.3.

(3) The records shall document clearly which materials were used for the fixing system. In particular, the batch numbers of the cartridge with the injection mortar and the steel element used shall be documented.

(4) The declaration of conformity shall be handed to the operator of the facility together with a copy of this general construction technique permit, of ETA-17/0979¹ as well as of the installation and processing instructions of the applicant for this general construction technique permit.

(5) The records shall be kept at the construction site during the construction period. They shall be kept by the executing company for a minimum of five years after completion of the project. Copies of records shall be handed over to the operator for inclusion in the construction project files and presented, upon request, to DIBt, the competent supreme building authority and the expert (in accordance with the AwSV).

3 Provisions for use, maintenance and repair

3.1 General

(1) This general construction technique permit only covers the verification of the properties and utilisation of the fixing system for use and application in SFH facilities of the subject concerned in the field of application, as described in Section 1, and with the configuration described in Section 2.1 as well as Annexes 2 and 3.

(2) The requirements for regular monitoring of the facility by the operator or continuous surveillance of the leak-tightness and the functionality of the facility set out in the AwSV shall be noted. The criteria given in Section 3.2 in conjunction with Section 3.3 shall apply in this regard.

(3) The specifications of the applicant for proper cleaning of the subject concerned shall be observed by the facility operator.

(4) The operator shall organise and define the inspection intervals in the operating instructions for the given facility based on the permitted exposure time in accordance with this general construction technique permit. The results of checks as well as all irregularities with regard to the operating instructions shall be documented. These records shall be presented to the expert (in accordance with the AwSV) upon request.

(5) Handling and filling processes shall be regularly checked for leakages by visual inspection in accordance with the AwSV provisions. Where leakages are detected, action shall be taken to remedy the situation without delay.

(6) In storage facilities for liquids hazardous to water, it shall be ensured that, in case of a leakage, the escaping liquids in accordance with Annex 1 are removed as quickly as possible and within the maximum exposure time.

(7) After each exposure to liquids hazardous to water, the fixing system shall be visually inspected for proper functioning. If necessary, further action shall be taken.

3.2 Checks by experts in accordance with the AwSV

3.2.1 Commissioning inspection

(1) The expert shall be kept continually informed of the progress of work. The expert shall be given the possibility of participating in the checks carried out before, during and after the installation of the fixing system in accordance with Section 2.2.1 and of evaluating the results of the checks.

(2) The checks prior to commissioning or recommissioning shall be carried out in the presence of an expert from the company in accordance with Section 2.2.1(1) and the operator of the facility.

(3) The final check of the condition of the fixing system shall be carried out through a visual inspection of the surface of all areas. The final check may only take place after the required minimum curing time of the injection mortar has elapsed.

(4) It shall be checked whether the provisions of this general construction technique permit, the documents in accordance with Section 2.2.4 and the confirmation of the executing company (see Annex 8) are available. These shall be presented to the expert upon request.

(5) The expert shall verify the inspection intervals defined in the operating instructions by the operator.

3.2.2 Regular checks

(1) The fixing system shall be checked at regular intervals to see whether the conditions for its use are still met.

(2) The check of the fixing system shall consist of a visual inspection.

(3) Within the framework of these regular checks, the fixing system shall be checked and evaluated as follows.

The fixing system and the area around the fixing system shall continue to be considered liquid-tight in accordance with the special provisions set out in Section 2.1 as long as, in particular, none of the deficiencies listed below have been detected:

- mechanical damage / spalling on the surface,
- cracks starting from the installed fixing system or
- cracks / splitting around the installed fixing system.

(4) If damage to the fixing system or the area around the fixing system starting from the fixing system is detected during regular checks, appropriate action in accordance with Sections 3.3 and 3.4 shall be taken to eliminate the defects.

3.3 Elimination of defects

(1) In accordance with the AwSV provisions, defects identified in tests and checks shall be eliminated.

The defects shall be eliminated taking into account the provisions of this general construction technique permit and the installation and processing instructions of the applicant for the fixing system in relation to repair work.

(2) The defects shall be remedied by a company in accordance with Section 2.2.1(1) which is qualified in accordance with the requirements set out in Section 2.2.1. The company shall only use the materials listed in this general construction technique permit in accordance with the installation and processing instructions of the applicant.

(3) Any aborted holes shall be closed by means of a repair system that is covered by a national technical approval / general construction technique permit for use in SFH facilities and is suitable for the specific application. The provisions set out in the before-mentioned decision shall be observed.

(4) Cracks caused by the installation of the fasteners or starting from the installed fasteners shall be closed by means of a crack repair system which is covered by a national technical approval / general construction technique permit for use in SFH facilities and is suitable for the specific application. The provisions set out in the before-mentioned decision shall be observed.

3.4 Restoration of impermeability to liquids in existing facilities

(1) When repairing fixing systems (restoration of impermeability to liquids) in existing facilities, the operator shall, in accordance with the AwSV provisions, arrange for

- the assessment of the actual condition of the damaged area and development of a corresponding repair concept by a qualified designer and
- the verification of the proper condition of the restored area.

The expert shall have the opportunity to peruse the assessment of the condition and the repair concept.

(2) Damaged fixing systems or areas around them with damage starting from the fixing system shall be restored in accordance with Sections 2 and 3 so that they are liquid-tight.

(3) Only companies in accordance with Section 2.2.1(1) shall be commissioned with works for the restoration of impermeability to liquids.

Dr.-Ing. Ullrich Kluge
Head of Section

Drawn up by
Dr.-Ing. Westphal-Kay

List of liquids hazardous to water to which the installed fixing system is resistant

Group no.	Liquids permitted for the facility operating modes ^{*)} storage (L), filling (A) and handling (U) in accordance with the exposure levels low (1), medium (2) and high (3)	Operating mode and level ^{*)}
1	Petrol in accordance with DIN EN 228 with a maximum (bio)ethanol content of 5 vol% in accordance with DIN EN 15376	L2 A3 U2 ^{**)}
1a	Petrol in accordance with DIN EN 228 with the addition of biofuel components in accordance with Directive 2009/28/EC up to a total content of max. 20 vol%	
2	Aviation fuels	
3	- Fuel oils EL in accordance with DIN 51603-1 - unused combustion engine oils - unused vehicle gear oils - mixtures of saturated and aromatic hydrocarbons with an aromatic content of ≤ 20% by mass and a flash point > 60 °C	L2 A3 U2
3b	Diesel fuels in accordance with DIN EN 590 with an addition of biodiesel (FAME) in accordance with DIN EN 14214 up to a total content of max. 20 vol%	L2 A3 U2 ^{**)}
3c	Mixtures of high FAME diesel fuels in accordance with DIN EN 16709 up to a total content of max. 30 vol%	
4	Hydrocarbons and mixes containing benzene with max. 5 vol% benzene, except automotive fuels	L2 A3 U2
4a	Aliphatic and cycloaliphatic hydrocarbons	
4b	Aromatic hydrocarbons	
4c	- used combustion engine oils and - used vehicle gear oils with a flash point > 60 °C	
5	Alcohols and glycol ethers	
5a	Alcohols and glycol ethers other than methanol and mixtures containing methanol	
6b	Aromatic halogenated hydrocarbons	
7	Organic esters, except biodiesel (FAME)	
7a	Biodiesel (FAME) in accordance with DIN EN 14214	L2 A3 U2 ^{**)}
8	Organic ketones	L2 A3 U2
9	Aqueous aliphatic aldehyde solutions up to 40%	
E85	Ethanol fuel E85 in accordance with DIN 51625	L2 A3 U2 ^{**)}
E10	Petrol E10 in accordance with DIN EN 228	

Unless otherwise stated for the liquids listed, the substances concerned are technically pure substances or mixes of technically pure substances of the relevant group, but not mixed with water unless otherwise stated.

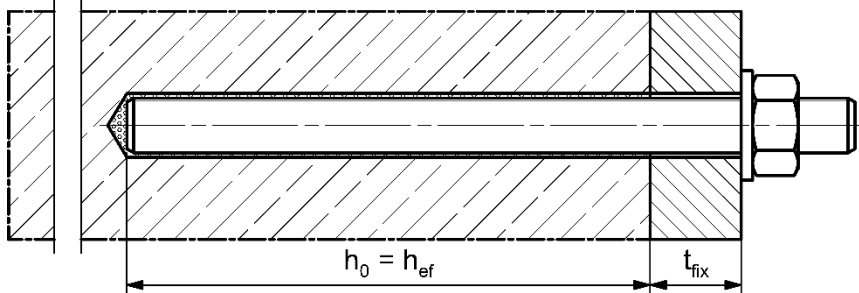
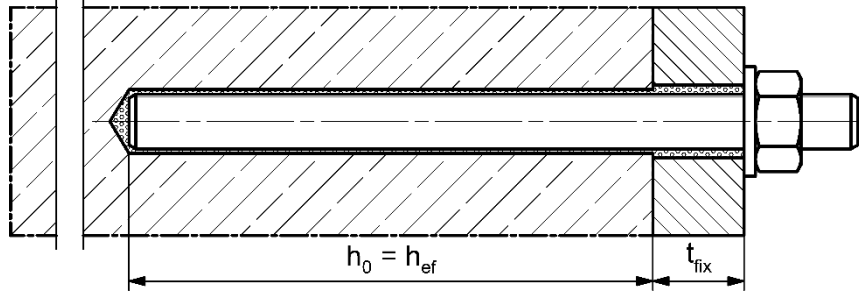
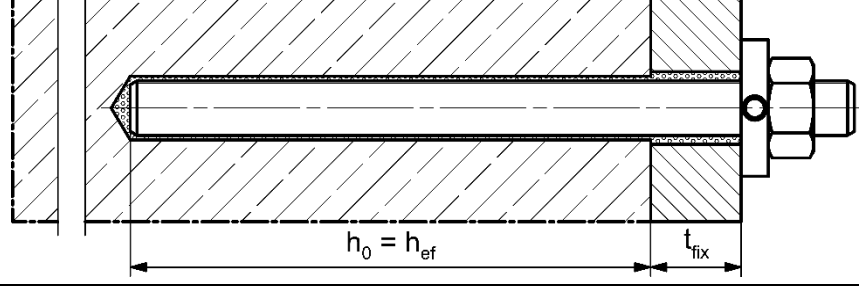
^{*)} Work sheet DWA-A 786:2020-10, Technical Rules for substances hazardous to water (*Technische Regeln wassergefährdender Stoffe / TRwS*), Execution of sealing surfaces (*Ausführung von Dichtflächen*)

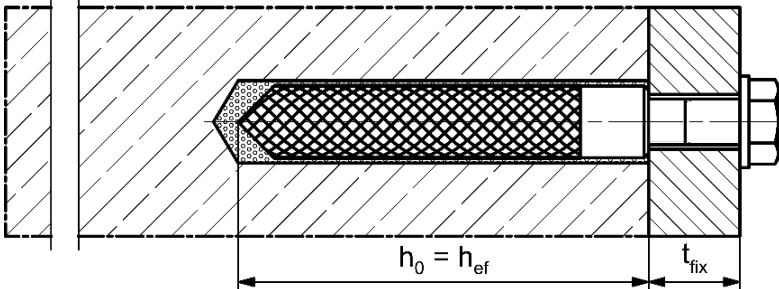
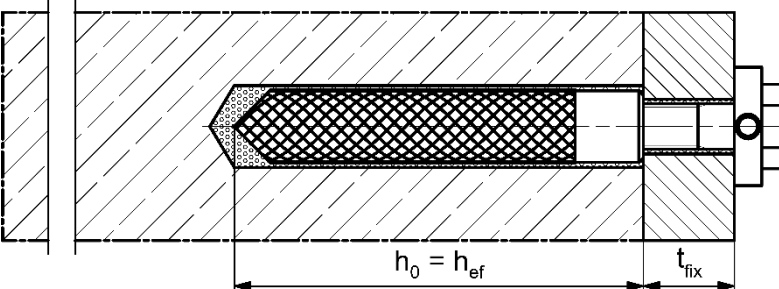
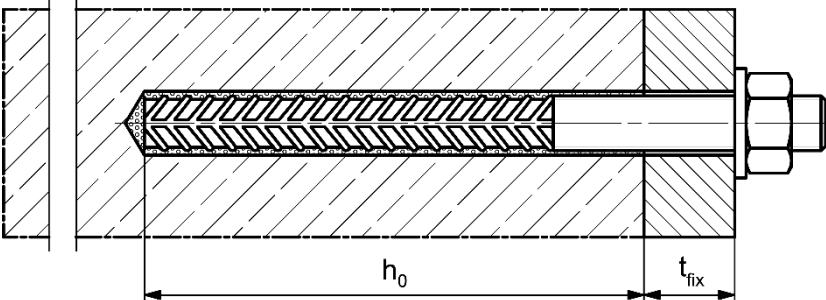
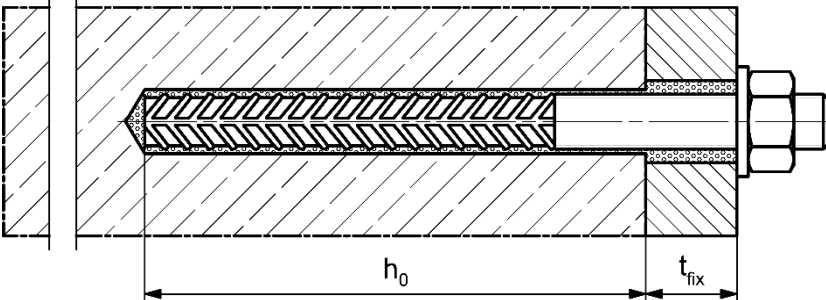
^{**)} Fit for use at filling stations in accordance with TRwS 781 to TRwS 784
Work sheets DWA-A 781:2018-12, with corrections of May 2019, DWA-A 782:2006-05, DWA-A 783:2005-12 and DWA-A 784:2006-04, Technical rules for substances hazardous to water – Filling stations for motor vehicles, rail vehicles, watercraft and aircraft (*Technische Regeln wassergefährdender Stoffe (TRwS) – Tankstellen für Kraft-, Schienen-, Wasser- und Luftfahrzeuge*)

fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities

List of liquids hazardous to water to which the installed fixing system is resistant

Annex 1

fischer anchor rod		
Pre-positioned installation		
Push-through installation (annular gap filled with mortar)		
Pre-positioned and push-through installation with a subsequently injected filling disc (annular gap filled with mortar)		
Figures not to scale		
h_0 = drill hole depth t_{fix} = thickness of fixture h_{ef} = effective embedment depth		
fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities		Annex 2
fischer anchor rod – installed condition		

fischer internal threaded anchor RG MI	
Pre-positioned installation	
Pre-positioned installation with a subsequently injected filling disc (annular gap filled with mortar)	
fischer rebar anchor FRA	
Pre-positioned installation	
Push-through installation (annular gap filled with mortar)	
Figures not to scale h_0 = drill hole depth h_{ef} = effective embedment depth t_{fix} = thickness of fixture	
fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities	
fischer internal threaded anchor RG MI and fischer rebar anchor FRA – installed condition	
Annex 3	

Permitted materials based on ETA-17/0979 of 17 June 2020, Table A6.1

Name	Material	
Injection cartridge	Mortar, hardener, filler	
Steel grade	Stainless steel R	High corrosion-resistant steel HCR
	in acc. with EN 10088-1:2014 of corrosion resistance class CRC III in acc. with EN 1993-1-4:2015	in acc. with EN 10088-1:2014 of corrosion resistance class CRC V in acc. with EN 1993-1-4:2015
Anchor rod	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062, 1.4662, 1.4462; EN 10088-1:2014 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 12\%$ fracture elongation	Property class 50 or 80 EN ISO 3506-1:2009 or strength class 70 with $f_{yk} = 560 \text{ N/mm}^2$ 1.4565; 1.4529; EN 10088-1:2014 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 12\%$ fracture elongation
	Fracture elongation $A_5 > 8\%$, for applications without requirements for seismic performance category C2 ¹⁾	
Washer ISO 7089:2000	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565; 1.4529; EN 10088-1:2014
Hexagon nut	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014
fischer internal threaded anchor RG MI	Property class 70 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529; EN 10088-1:2014
Commercial standard screw or threaded rod for fischer internal threaded anchor RG MI	Property class 70 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014 $A_5 > 8\%$ fracture elongation	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529; EN 10088-1:2014 $A_5 > 8\%$ fracture elongation
fischer filling disc similar to DIN 6319-G	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565; 1.4529; EN 10088-1:2014

¹⁾ see ETA-17/0979; use and performance categories are subject to the provisions of ETA-17/0979, issued on 17 June 2020.

fischer rebar anchor FRA	Rebar part: Bars and de-coiled rods class B or C with f_{yk} and k in accordance with NDP or NCL of EN 1992-1-1:2004 + AC:2010 $f_{uk} = f_{tk} = k \cdot f_{yk}$	Threaded part: Property class 70 or 80 EN ISO 3506-1:2009 1.4401, 1.4404, 1.4571, 1.4578, 1.4439, 1.4362, 1.4062 in acc. with EN 10088-1:2014 of corrosion resistance class CRC III in acc. with EN 1993-1-4:2015 1.4565; 1.4529, in acc. with EN 10088-1:2014 of corrosion resistance class CRC V in acc. with EN 1993-1-4:2015
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fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities

Permitted materials based on ETA-17/0979 of 17 June 2020, Table A6.1

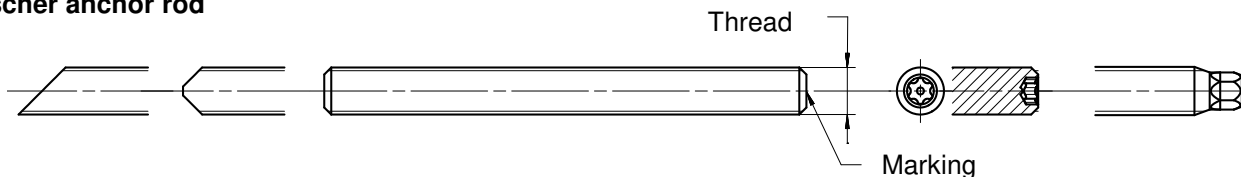
Annex 4

Installation characteristics for **fischer anchor rods** based on ETA-17/0979 of 17 June 2020,
Table B3.1

Anchor rods		Thread	M8	M10	M12	M14	M16	M20	M22	M24	M27	M30
Width across flats	SW	mm	13	17	19	22	24	30	32	36	41	46
Nominal drill hole diameter	d_0		10	12	14	16	18	22 24 ¹⁾	25	28	30	35
Drill hole depth	h_0		$h_0 = h_{ef}$									
Effective embedment depth	$h_{ef, min}$		60	60	70	75	80	90	93	96	108	120
	$h_{ef, max}$		160	200	240	280	320	400	440	480	540	600
Diameter of clearance hole in the fixture	pre-positioned installation d_f		9	12	14	16	18	22	24	26	30	33
	push-through installation d_f		12	14	16	18	20	26	28	30	33	40
Minimum thickness of concrete member	h_{min}	$h_{ef} + 50$ (≥ 100)								$h_{ef} + 2d_0$		
Maximum installation torque	$\max T_{inst}$	Nm	10	20	40	50	60	120	135	150	200	300

¹⁾ Both nominal drill bit diameters are possible

fischer anchor rod



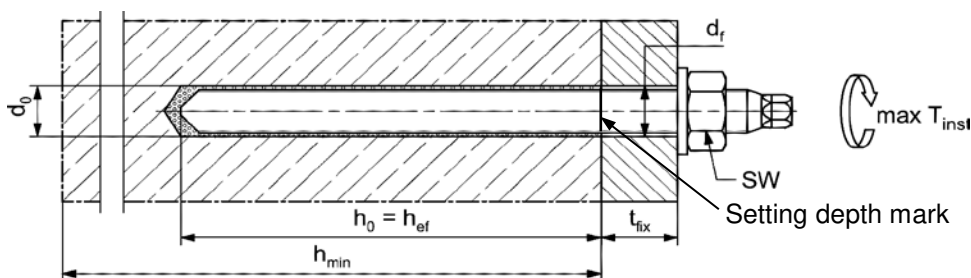
Marking (any location) fischer anchor rod:

High corrosion-resistant steel HCR PC ¹⁾ 50	•	High corrosion-resistant steel HCR PC ¹⁾ 70	–
High corrosion-resistant steel HCR PC 80	(	Stainless steel R PC 50	~
Stainless steel R PC 80	*		

Alternatively: Colour coding in accordance with

¹⁾ PC = property class

Installation conditions:



fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities

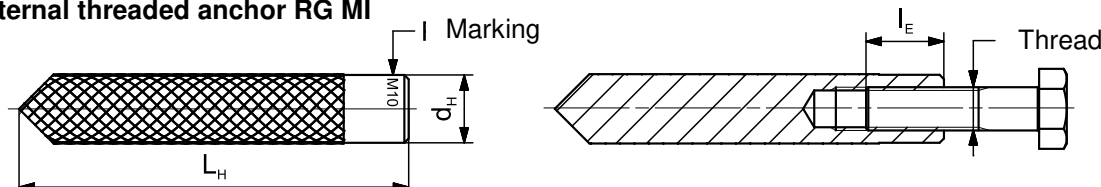
Installation parameters for **fischer anchor rods** based on ETA-17/0979 of 17 June 2020,
Table B3.1

Annex 5

Installation parameters for **fischer internal threaded anchor RG MI** based on ETA-17/0979 of 17 June 2020, Table B6.1

Internal threaded anchor RG MI		Thread	M8	M10	M12	M16	M20
Diameter of anchor	$d_{nom} = d_H$	mm	12	16	18	22	28
Nominal drill hole diameter	d_0		14	18	20	24	32
Drill hole depth	h_0		$h_0 = h_{ef} = L_H$				
Effective embedment depth ($h_{ef} = L_H$)	h_{ef}		90	90	125	160	200
Minimum spacing and minimum edge distance	$s_{min} = c_{min}$		55	65	75	95	125
Diameter of clearance hole in the fixture	d_f		9	12	14	18	22
Minimum thickness of concrete member	h_{min}		140	140	175	210	260
Maximum screw-in depth	$l_{E,max}$		18	23	26	35	45
Minimum embedment depth	$l_{E,min}$		8	10	12	16	20
Maximum installation torque	$\max T_{inst}$	Nm	10	20	40	80	120

fischer internal threaded anchor RG MI



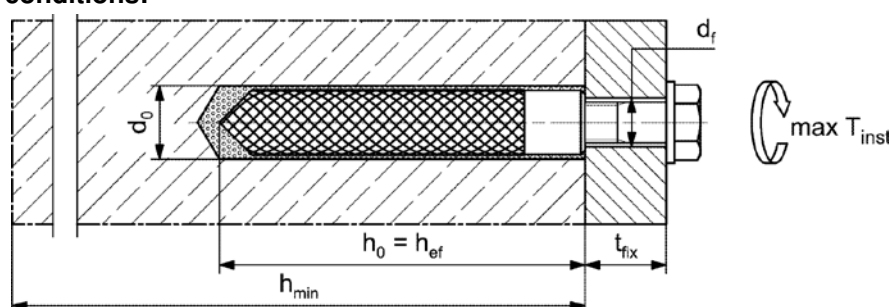
Marking: Anchor size, e.g.: **M10**

Stainless steel → in addition **R**; e.g.: **M10 R**

High corrosion-resistant steel → in addition **HCR**; e.g.: **M10 HCR**

Retaining bolt or threaded rods (including nut and washer) shall comply with the associated materials and strength classes in accordance with **Annex 4**

Installation conditions:



fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities

Installation parameters for **fischer internal threaded anchor RG MI** based on ETA-17/0979 of 17 June 2020, Table B6.1

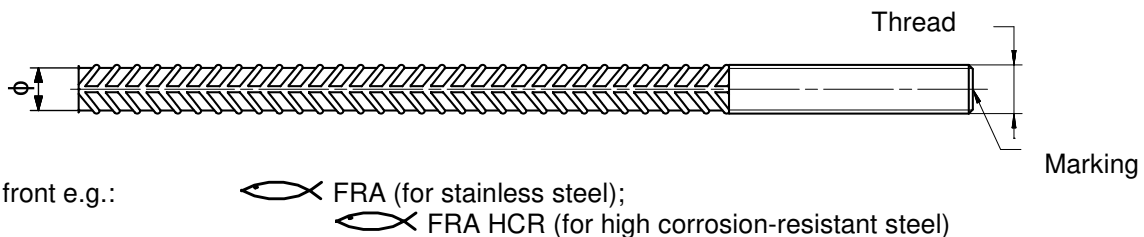
Annex 6

Installation parameters for **fischer rebar anchor FRA** based on ETA-17/0979 of 17 June 2020, Table B8.1

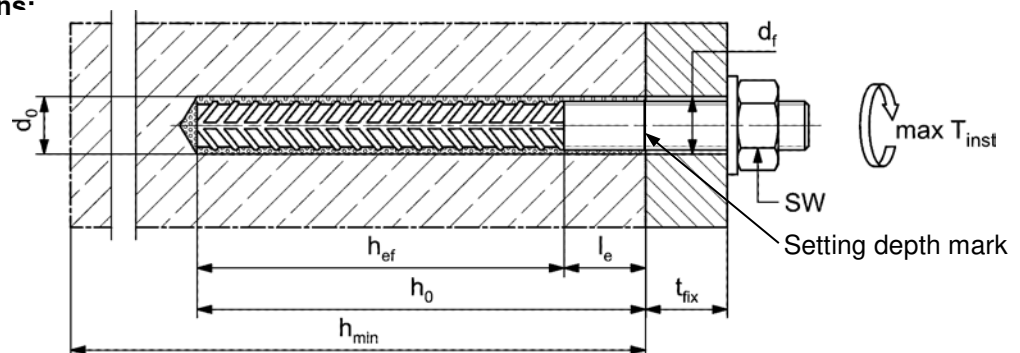
Rebar anchor FRA	Thread		M12 ¹⁾		M16	M20	M24
Nominal diameter of the bar	ϕ	mm	12		16	20	25
Width across flats	SW		19		24	30	36
Nominal drill hole diameter	d ₀		14	16	20	25	30
Drill hole depth	h ₀		h _{ef} + l _e				
Effective embedment depth	h _{ef,min}		70		80	90	96
	h _{ef,max}		140		220	300	380
Distance concrete surface to welded joint	l _e		100				
Minimum spacing and minimum edge distance	s _{min} = c _{min}		55		65	85	105
Diameter of clearance hole in the fixture	pre-positioned installation ≤ d _f		14		18	22	26
	push-through installation ≤ d _f		18		22	26	32
Minimum thickness of concrete member	h _{min}	h ₀ + 50			h ₀ + 2d ₀		
Maximum installation torque	max T _{inst}	Nm	40		60	120	150

¹⁾ Both drill hole diameters can be used.

fischer rebar anchor FRA



Installation conditions



Figures not to scale

fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities

Installation parameters for **fischer rebar anchor FRA** based on ETA-17/0979 of 17 June 2020, Table B8.1

Annex 7

Seq. no.	Confirmation of the executing company																												
1	Project - Name:..... - Size:																												
2	Stored substance(s):																												
3	Fixing system fischer injection system FIS EM Plus for use on uncoated concrete surfaces in SFH facilities																												
4a	Decision (general construction technique permit): Z-74.8-199 of 29 October 2020																												
4b	Batch number and expiration date:																												
5a	Applicant: fischerwerke GmbH & Co. KG Otto-Hahn-Straße 15, 79211 Denzlingen, Germany Telephone: +49 (0) 7443 12-4000																												
5b	Executing company (in acc. with AwSV provisions)																												
5c	Construction period:																												
6	The specialised staff of the executing company have received instruction by the applicant of the above-mentioned decision on proper processing.	Confirmation provided yes / no																											
7	Assessments and checks to be carried out before and during installation of the anchoring system a) Before installation (<i>cross out response that does not apply</i>) <table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">- What fasteners were used?</td> <td style="width: 40%; text-align: right;">(Anchor rod / internal threaded anchor / rebar anchor)</td> </tr> <tr> <td>- Specify steel grade (material number):</td> <td style="text-align: right;">.....</td> </tr> <tr> <td>- Borehole produced with hollow drill (HO) / hammer drill (HA)?</td> <td style="text-align: right;">HO / HA</td> </tr> <tr> <td>- Pre-positioned installation (V) / push-through installation (D)</td> <td style="text-align: right;">V / D</td> </tr> <tr> <td>- Are the fasteners oil-free and clean?</td> <td style="text-align: right;">yes / no</td> </tr> <tr> <td>- Concrete base material complies with requirements and has been greenlighted?</td> <td style="text-align: right;">Requirement met: yes / no</td> </tr> <tr> <td>- Surface temperature / material temperature in °C:</td> <td style="text-align: right;">...../.....</td> </tr> <tr> <td>- System components in accordance with decision:</td> <td style="text-align: right;">yes / no</td> </tr> <tr> <td>- Marking of all components in accordance with decision:</td> <td style="text-align: right;">yes / no</td> </tr> </table> b) During and after installation: <table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">- Have boreholes been cleaned in acc. with Section 2.2.2(4)?</td> <td style="width: 40%; text-align: right;">yes / no</td> </tr> <tr> <td>- Were there any aborted holes?</td> <td style="text-align: right;">yes / no</td> </tr> <tr> <td>- If so, were they sealed properly?</td> <td style="text-align: right;">yes / no</td> </tr> </table> <table style="width: 100%; border: none;"> <tr> <td style="width: 40%;">- Visual inspection: (cross out response that does not apply)</td> <td style="width: 30%; text-align: center; border: 1px solid black; padding: 5px;">Nothing to report</td> <td style="width: 30%; text-align: center; border: 1px solid black; padding: 5px;">Irregularities to report (see remarks)</td> </tr> </table>		- What fasteners were used?	(Anchor rod / internal threaded anchor / rebar anchor)	- Specify steel grade (material number):		- Borehole produced with hollow drill (HO) / hammer drill (HA)?	HO / HA	- Pre-positioned installation (V) / push-through installation (D)	V / D	- Are the fasteners oil-free and clean?	yes / no	- Concrete base material complies with requirements and has been greenlighted?	Requirement met: yes / no	- Surface temperature / material temperature in °C:	/.....	- System components in accordance with decision:	yes / no	- Marking of all components in accordance with decision:	yes / no	- Have boreholes been cleaned in acc. with Section 2.2.2(4)?	yes / no	- Were there any aborted holes?	yes / no	- If so, were they sealed properly?	yes / no	- Visual inspection: (cross out response that does not apply)	Nothing to report	Irregularities to report (see remarks)
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- Are the fasteners oil-free and clean?	yes / no																												
- Concrete base material complies with requirements and has been greenlighted?	Requirement met: yes / no																												
- Surface temperature / material temperature in °C:	/.....																												
- System components in accordance with decision:	yes / no																												
- Marking of all components in accordance with decision:	yes / no																												
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- Were there any aborted holes?	yes / no																												
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- Visual inspection: (cross out response that does not apply)	Nothing to report	Irregularities to report (see remarks)																											
Remarks:																													
Date: Signature / Company stamp																													
fischer injection system FIS EM Plus for use in uncoated liquid-tight sealing systems made of concrete (FD / FDE concrete) in SFH facilities		Annex 8																											
Confirmation of the executing company – template –																													