

General construction technique permit

Zulassungsstelle für Bauprodukte und Bauarten Bautechnisches Prüfamt

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

Mitglied der EOTA, der UEAtc und der WFTAO

Date:

3 June 2019

Reference:

I 26-1.21.2-38/19

Number:

Z-21.2-2092

Applicant:

fischerwerke GmbH & Co. KG

Klaus-Fischer-Straße 1

72178 Waldachtal, Germany

Validity

from: **3 June 2019**

to: **3 June 2024**

Subject of decision:

fischer frame fixing SXRL 10 used as a single anchor in concrete

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

This decision contains five pages and six annexes.

This general construction technique permit replaces general construction technique permit no. Z-21.2-2092 of 19 November 2018. The subject concerned was granted the first general construction technique permit on 19 November 2018.

Translation authorised by DIBt

DIBt

I GENERAL PROVISIONS

- 1 The general construction technique permit (*allgemeine Bauartgenehmigung*) 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 building 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 Deutsches Institut für Bautechnik. 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 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 Deutsches Institut für Bautechnik without delay.
- 8 The general construction technique permit included in this decision also serves as a national technical approval (*allgemeine bauaufsichtliche Zulassung*) for the construction technique.

II SPECIAL PROVISIONS

1 Subject concerned and field of application

This general construction technique permit covers the application of the fischer frame fixing SXRL 10 with $h_{\text{nom}} = 70$ mm in accordance with ETA-07/0121 used as a single anchor in concrete.

The installed anchor is shown in Annex 1.

The anchor may be used for anchorages under static and quasi-static loads in reinforced and unreinforced normal weight concrete with a minimum strength class of C20/25 and a maximum strength class of C50/60 in accordance with DIN EN 206-1:2000, 'Concrete; Properties, production, processing and grade verification'.

The anchor may be used in cracked and uncracked concrete.

The anchor may be used for the following temperature ranges:

Temperature range (a): with a maximum short-term temperature of +50 °C and a maximum long-term temperature of +30 °C, e.g. in interiors of residential buildings.

Temperature range (b): with a maximum short-term temperature of +80 °C and a maximum long-term temperature of +50 °C, e.g. outdoors.

Special screws made of galvanised steel:

The special screw made of galvanised steel shall only be used in members subject to dry internal conditions.

These screws may also be exposed to external atmospheric conditions if the area of the head of the screw is protected against moisture and driving rain after mounting of the fixing unit in such a way that intrusion of moisture into the anchor shaft is prevented. Therefore, an external cladding or a rear-ventilated facade shall be mounted in front of the head of the screw and the head of the screw itself shall be coated with a soft plastic, permanently elastic bitumen-oil-combination coating (e.g. undercoating or body cavity protection for cars).

Special screws made of stainless steel (1.4401, 1.4571, 1.4578 or 1.4362):

The special screw may be used in accordance with its corrosion resistance class CRC III in accordance with DIN EN 1993-1-4:2015-10 in conjunction with DIN EN 1993-1-4/NA:2017-01.

2 Provisions for planning, design and execution

2.1 Planning

The anchorages shall be planned in line with good engineering practice. Verifiable calculations and design drawings shall be prepared in consideration of the loads to be anchored, the dimensions of the member and the tolerances.

2.2 Design

The anchorages shall be designed in accordance with DIN EN 1992-4:2019-04 unless otherwise specified below.

The characteristic anchor values for verification in accordance with design method A are compiled in the tables in Annex 5 and Annex 6. For combined tensile and shear loads, the conservative interaction condition given in DIN EN 1992-4:2019-04, equation (7.56), shall be applied.

The characteristic anchor values for verification in accordance with design method B are compiled in Annex 6. For anchor groups under shear loading conditions at the edge, only the least favourably or the two least favourably situated anchors at the edge of the member or the member corner shall be considered.

For the diameter of the clearance hole in the fixture Annex 3, Table 3, of this decision and not DIN EN 1992-4:2019-04, Table 6.1, shall be decisive.

If the clearance hole specifications cannot be complied with in the member to be connected, special measures shall be taken (e.g. a reinforced washer) because of the danger of pull-through.

The verification of the immediate local transmission of the anchor loads into the concrete member has been provided. The transmission of the loads to be anchored in the member shall be proven.

Additional loads which may arise in the anchor, in the member to be connected or in the member in which the anchor is installed due to restrained deformations (e.g. due to temperature fluctuations) shall be considered.

The displacements to be expected are specified in Annex 5, Table 6, and Annex 6, Table 8. They apply to the associated loads given in the tables.

2.3 Execution

2.3.1 General

The anchor shall only be delivered as a mass-produced fixing unit (pre-assembled or packaged together).

The anchor shall be installed in accordance with the design drawings prepared in accordance with Section 2.1 and the installation instructions of the manufacturer. Prior to installation of the anchor, the concrete strength class shall be determined by means of the building documents or concrete strength testing. The concrete strength class may not be lower than C20/25 and may not exceed C50/60.

2.3.2 Drilling of the holes

For reinforced concrete walls, the position of the drill hole shall be coordinated with the position of the reinforcement in such a way that damage to the reinforcement is avoided.

The hole shall be drilled at a right angle to the surface of the base material with a hard metal hammer drill bit.

The nominal drill bit diameter and the drill bit cutting diameter shall correspond to the values given in Annex 3, Table 3.

The hard metal masonry drill bits shall meet the specifications given in the January 2002 version of the leaflet 'Characteristic values, requirements and tests for masonry drill bits with carbide cutting bodies which are used for the manufacture of drilled holes for anchoring' of DIBt and the Association of the German Tool Industry (*Fachverband Werkzeugindustrie e.V.*). Compliance of the drill bit characteristic values shall be verified in accordance with Section 5 of the leaflet.

The drilling dust shall be removed from the drilled hole.

If a hole is drilled incorrectly, a new hole shall be drilled at a distance of at least twice the depth of the incorrect hole from the incorrect hole. If the anchor is installed closer than twice the depth of the incorrectly drilled hole, the incorrectly drilled hole shall be filled with a high-strength, low-shrinkage mortar and shall not lie in the direction of the shear force.

2.3.3 Installation of the anchor

Tolerances in the base material shall be compensated for in such a way that the installation of the anchor does not cause any undesired loads. The compensation shall be executed such that the compressive forces can be transferred from the fixture to the base material.

If shims are needed for compensation of dimensional inaccuracies in the base material, here as well the anchorage (embedment) depth of the anchor sleeve shall be maintained and the penetration depth of the screw shall be ensured.

The temperature of the base material shall not fall below -20 °C when the screw is being inserted.

The pre-assembled anchor shall be able to be inserted with a light tap with a hand-held hammer into the drilled hole until the anchor collar is resting against the installation object. The screw shall be screwed in tightly up to the collar of the anchor sleeve in such a way that the screw tip penetrates the anchor sleeve.

The anchor is properly installed when the screw has been completely screwed in so that neither the anchor sleeve nor the screw can rotate.

The anchor may only be installed once.

2.3.4 Inspection of execution

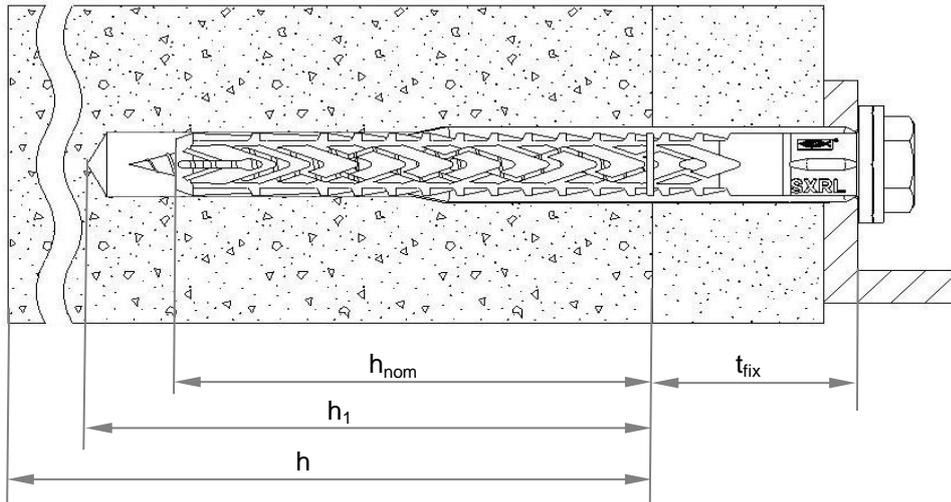
During the installation of the anchors, the contractor commissioned with the installation of the anchors or the site manager assigned by him or her or a competent representative of the site manager shall be present at the construction site. He or she shall ensure that the work is carried out properly.

During the installation of the anchors, records on the verification of the existing concrete strength class and the proper installation of the anchors shall be maintained by the site manager or his or her representative. The records shall be available at the construction site during the construction period and shall be submitted to the inspection supervisor upon request. Like the delivery notes, they shall be kept by the company for a minimum of 5 years after completion of the project.

Beatrix Wittstock
Head of Section

Drawn up by

Installed anchor – SXRL 10



Legend

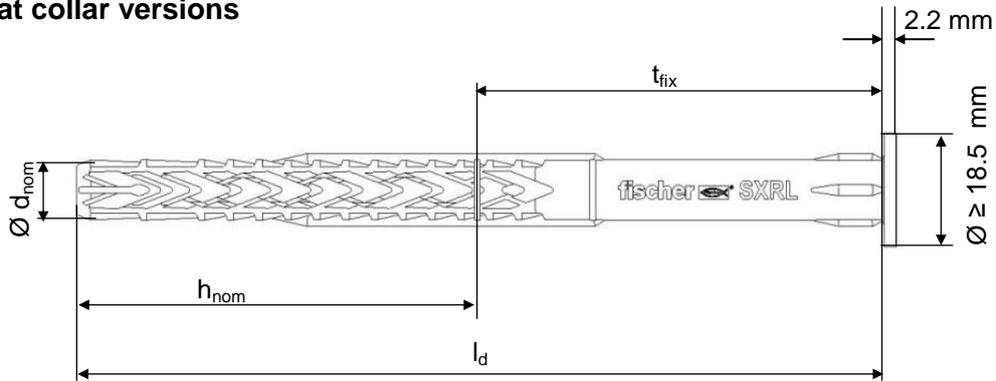
- h_{nom} = overall embedment depth of the plastic anchor in the base material
- h_1 = depth of drill hole to deepest point
- h = thickness of member (wall)
- t_{fix} = thickness of fixture and / or non-load bearing layer

fischer frame fixing SXRL 10 used as a single anchor in concrete

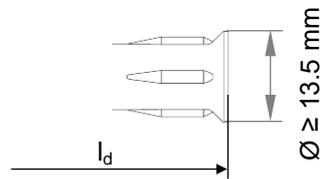
Installed anchor

Annex 1

**Anchor sleeves
 Flat collar versions**

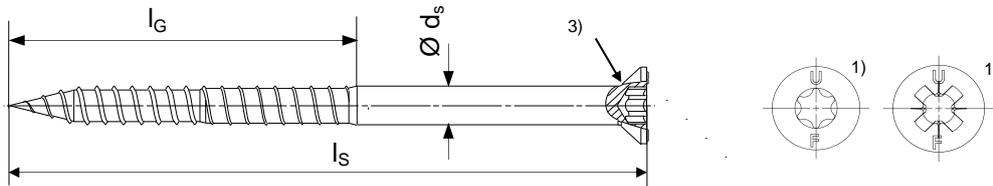


Countersunk sleeve version

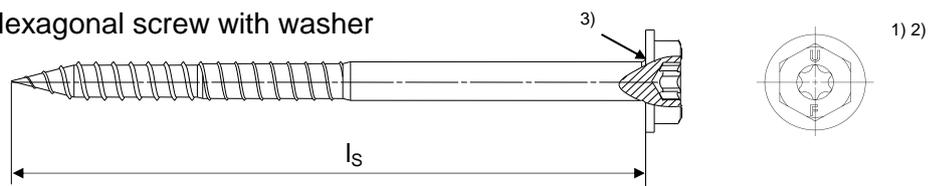


Special screws

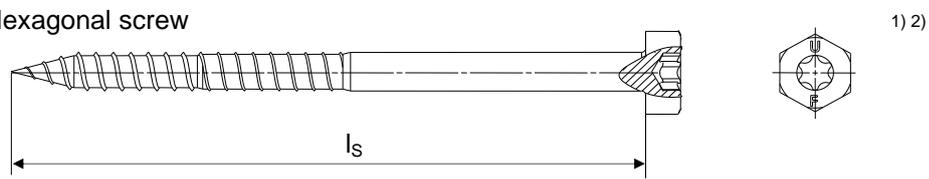
Countersunk screw



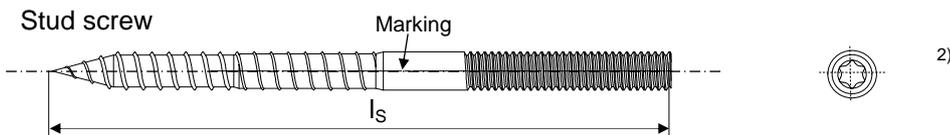
Hexagonal screw with washer



Hexagonal screw



Stud screw



- 1) Additional marking for the special screw, stainless steel version: "e.g. A4".
- 2) Internal driving feature for Torx bit is optional for hexagonal head and for stud screw.
- 3) Optional additional version with underhead ribs.

fischer frame fixing SXRL 10 used as a single anchor in concrete	Annex 2
Anchor types / special screws	

Table 1: Dimensions

Anchor type	Sleeve					Special screw		
	h_{nom} [mm]	$\varnothing d_{nom}$ [mm]	t_{fix} [mm]	min. l_d [mm]	max. l_d [mm]	$\varnothing d_s$ [mm]	l_G [mm]	l_s [mm]
SXRL 10	70	10	≥ 1	71	360	7,0	≥ 77	$\geq l_d + 7$

Table 2: Materials

Designation	Material
Anchor sleeve	Polyamide, PA6 (virgin material), colour grey
Special screw	- Steel gvz A2G or A2F as per DIN EN ISO 4042: 2001-01 <u>or</u> - Steel gvz A2G or A2F as per DIN EN ISO 4042:2001-01 + duplex coating type Delta-Seal in three layers (total layer thickness $\geq 6 \mu\text{m}$) <u>or</u> - Stainless steel e.g. 1.4401, 1.4571, 1.4578, 1.4362

Table 3: Installation parameters

Anchor type	SXRL 10		
Drill hole diameter	$d_0 =$ [mm]	10	
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	10.45	
Overall embedment depth of the plastic anchor in the base material ¹⁾	$h_{nom} \geq$ [mm]	70	
Depth of drill hole to deepest point ¹⁾	$h_1 \geq$ [mm]	80	
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	12.5	
Installation temperature	[°C]	- 20 to + 40	
Service temperature	[°C]	- 40 to + 80	
Temperature range I 30°C/50°C	max. long-term temperature	[°C]	+ 30
	max. short-term temperature	[°C]	+ 50
Temperature range II 50°C/80°C	max. long-term temperature	[°C]	+ 50
	max. short-term temperature	[°C]	+ 80

¹⁾ See Annex 1.

fischer frame fixing SXRL 10 used as a single anchor in concrete	Annex 3
Dimensions and materials Installation parameters	

Installation instructions

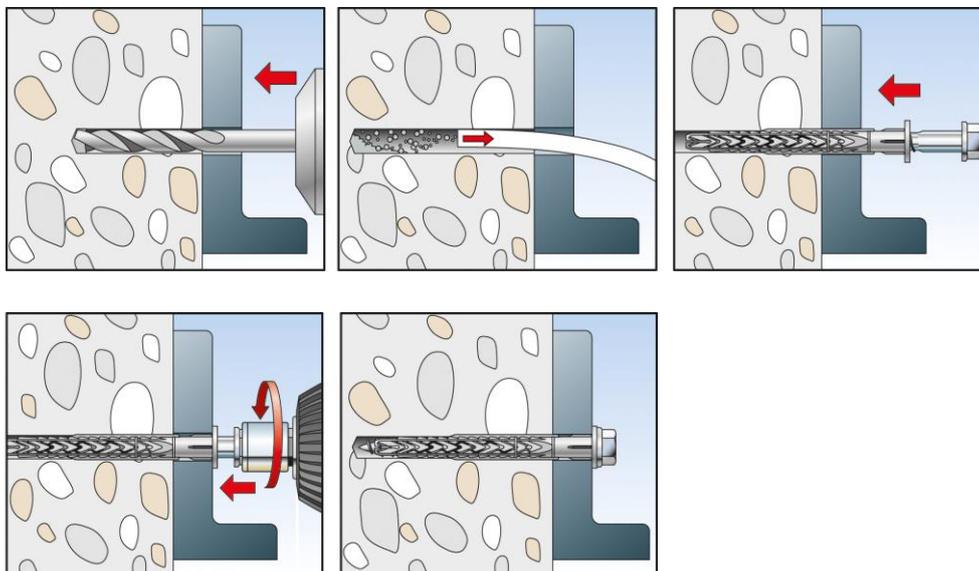


Table 4: Min. member thicknesses, spacings and edge distances in cracked and uncracked concrete

Anchor type SXRL 10	Concrete strength class \geq	Min. thickness of member h_{min} [mm]	Min. spacings s_{min} [mm]	Min. edge distances c_{min} [mm]
Uncracked concrete	C20/25	110	80	80
Cracked concrete		100	50 ¹⁾	100 ¹⁾
			65 ¹⁾	90 ¹⁾
			80 ¹⁾	80 ¹⁾
			95 ¹⁾	70 ¹⁾
			110 ¹⁾	60 ¹⁾
			125 ¹⁾	50 ¹⁾

¹⁾ Linear interpolation is allowed:

$$\geq C20/25: s_{min} = 200 - 1.5 \times c_{min} \quad \text{for } 50 \text{ mm} < s_{min} < 125 \text{ mm}$$

$$c_{min} = 1/3 \times (400 - 2 \times s_{min}) \quad \text{for } 50 \text{ mm} < c_{min} < 100 \text{ mm}$$

fischer frame fixing SXRL 10 used as a single anchor in concrete

Installation instructions
Min. member thicknesses, spacings and edge distances in cracked and uncracked concrete

Annex 4

Characteristic values for design method A

The design of the anchorage shall be carried out in accordance with DIN EN 1992-4:2019-04.

Table 5: Characteristic values of tension load resistance

Anchor type			SXRL 10
Material of the special screw			Galvanised and stainless steel
Steel failure			
Characteristic tension load resistance	$N_{Rk,s}$ [kN]		21.7
Partial safety factor	γ_{Ms} [-]		1.55
Pull-out			
Characteristic load resistance in cracked concrete C20/25 – C50/60			
	Temperature range I 30°C/50°C	$N_{Rk,p}$ [kN]	4.5
	Temperature range II 50°C/80°C	$N_{Rk,p}$ [kN]	3.9
Characteristic load resistance in uncracked concrete C20/25– C50/60			
	Temperature range I 30°C/50°C	$N_{Rk,p}$ [kN]	6.5
	Temperature range II 50°C/80°C	$N_{Rk,p}$ [kN]	6.5
Partial safety factor	γ_{Mp} [-]		1.8 ¹⁾
Concrete failure			
Effective embedment depth	In cracked concrete	h_{ef} [mm]	25 ²⁾
	In uncracked concrete	h_{ef} [mm]	35 ²⁾
Characteristic spacing		$s_{cr,N}$ [mm]	= 3 x h_{ef}
Characteristic edge distance		$c_{cr,N}$ [mm]	= 1.5 x h_{ef}
Partial safety factor	γ_{Mc} [-]		1.8 ¹⁾
Splitting			
Effective embedment depth	In cracked concrete	h_{ef} [mm]	25 ²⁾
	In uncracked concrete	h_{ef} [mm]	35 ²⁾
Characteristic spacing		$s_{cr,sp}$ [mm]	200
Characteristic edge distance		$c_{cr,sp}$ [mm]	100
Partial safety factor	γ_{Msp} [-]		1.8 ¹⁾

¹⁾ The installation safety factor $\gamma_{inst} = 1.0$ is included.

²⁾ Calculated value from $N_{Rk,p}$

Table 6: Displacements under tension load

Anchor type			SXRL 10		
Loading and corresponding short-term and long-term displacement			N [kN]	δ_{No} [mm]	$\delta_{N\infty}$ [mm]
In cracked concrete	Temperature range I	30°C/50°C	1.78	1.20	2.40
	Temperature range II	50°C/80°C	1.55	1.17	2.34
In uncracked concrete	Temperature range I	30°C/50°C	2.58	0.96	1.92
	Temperature range II	50°C/80°C	2.58	0.96	1.92

fischer frame fixing SXRL 10 used as a single anchor in concrete

Design method A
Characteristic values of tension load resistance, displacements under tension load

Annex 5

Characteristic values for design method A				
Table 7: Characteristic values for shear load resistance				
Anchor type		SXRL 10		
Material of the special screw		Galvanised and stainless steel		
Steel failure				
Shear load without lever arm				
Characteristic shear load resistance	$V_{Rk,s}$	[kN]	10.8	
Partial safety factor	γ_{Ms}	[-]	1.29	
Shear load with lever arm				
Characteristic bending moment	$M_{Rk,s}^0$	[Nm]	20.6	
Partial safety factor	γ_{Ms}	[-]	1.29	
Concrete pryout failure				
Factor as per DIN EN 1992-4:2019-04, Clause 7.2.2.4	k_g		2,0	
Partial safety factor	$\gamma_{Mcp}^{1)}$	[-]	1.8	
Concrete edge failure				
Effective anchor length at shear load	l_f	[mm]	70	
Characteristic outside diameter	d_{nom}	[mm]	10	
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1.8	
1) The installation safety factor $\gamma_{inst} = 1.0$ is included.				
Table 8: Displacements under shear load				
Anchor type		SXRL 10		
Loading and corresponding short-term and long-term displacement		V	δ_{v0}	$\delta_{v\infty}$
		[kN]	[mm]	[mm]
In cracked concrete	Temperature range I 30°C/50°C	3.95	4.08	6.12
	Temperature range II 50°C/80°C			
In uncracked concrete	Temperature range I 30°C/50°C	4.29	2.95	4.43
	Temperature range II 50°C/80°C			
Values for design method B				
The design of the anchorage shall be carried out in accordance with DIN EN 1992-4:2019-04.				
Table 9: Design values for design method B				
Anchor type		SXRL 10		
Material of the special screw		Galvanised and stainless steel		
Value of resistance F_{Rd}^0 of one anchor under tension load, shear load and combined shear and tension load at each angle in cracked and uncracked concrete with concrete strength class C20/25 – C50/60				
Temperature range I 30°C/50°C		F_{Rd}^0	[kN]	2.5
Temperature range II 50°C/80°C		F_{Rd}^0	[kN]	2.2
Characteristic spacing		s_{cr}	[mm]	105
Characteristic edge distance		c_{cr}	[mm]	100
Min. member thickness		h_{min}	[mm]	100
Min. spacing		s_{min}	[mm]	50
Min. edge distance		c_{min}	[mm]	100
fischer frame fixing SXRL 10 used as a single anchor in concrete				Annex 6
Design method A - Characteristic values of shear load resistance, displacements under shear load, Design method B – anchor characteristics				