

fischer fixing compass

Redundant fixings in concrete.



What are redundant systems?

Difference between individual and redundant fixing/multiple fixing.

Individual fixings are defined by the fact that all occurring loads are securely anchored with one connection point, e.g. an anchoring plate. The failure of an anchor or the failure of an entire anchor group can result in a total failure of the connection. To prevent this securely, special requirements are applicable for the anchors that are used for these applications. The qualification of the anchors will be proven through an approval or assessment (ETA).

Examples include bearers or supports, which are used as part of the support structure.

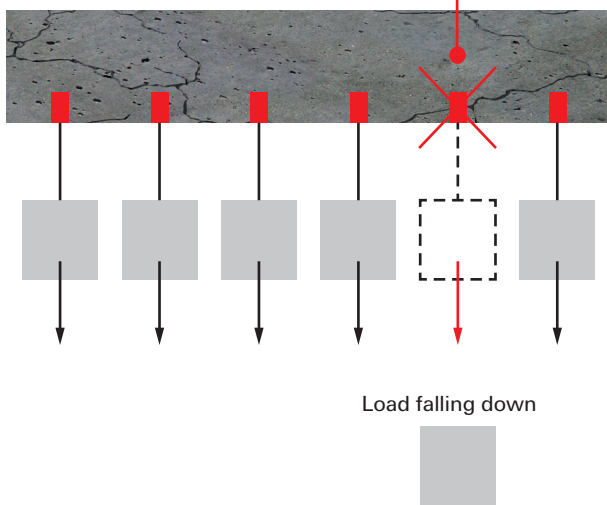
When using a redundant fixing/multiple fixing it is assumed that a load transfer is performed to the adjacent fixing points if one anchor or a fixing point fails. This assumes an adequate number of fixing points (at least 3) and a construction that is capable of transferring the loads to the adjacent fixing points. This construction must continue to function even if one fixing point fails.

Therefore, the construction must be adequately load bearing and significantly large deformations must not occur even if one bearing should fail. Examples for non-supporting constructions are suspended ceilings or non bearing facades.

Boundary conditions, such as the number of fixing points as well as load limits for each fixing point, are listed in the respective set of rules (ETAG 001 T6 / ETAG 020) and the approvals for the anchors.

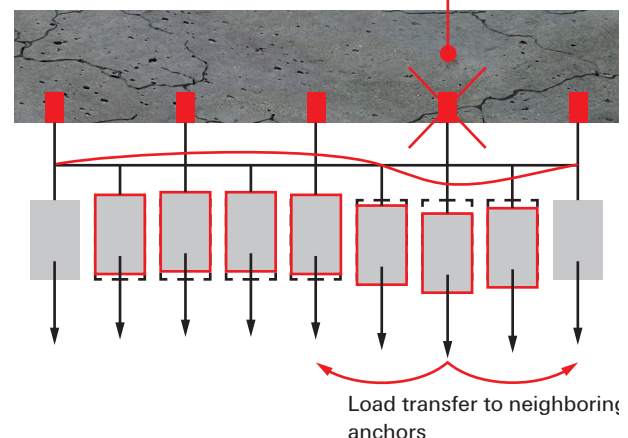
Individual Fixing

Failure of the fixing



Redundant / Multiple Fixing

When failure or greater displacement of the anchor



 Original Position

 Position after Loadtransfer

Fixing solutions for a secure hold when fixing redundant systems.

Nail anchor FNA II

The strong solution for highest tensile force capability for a minimum anchoring depth.

Maximum tensile force capability in concrete **2.4 kN (240 kg)**



fischer nail anchor FNA II – the installation friendly hammer-set anchor

- Medium loads through strutting against the drill hole wall
- A small drilling diameter of 6 mm ensures a low drilling effort and fast drilling progress
- Simple and fast impact installation – slight hammer hits on the large nail head and the FNA II holds securely
- Well qualified for all attachment part variants
- Large usage lengths up to 120 mm – pressure resistant, non-supporting layers can be bridged without problems

Designs



FNA II with nail head in zinc-plated steel A4 and C-steel



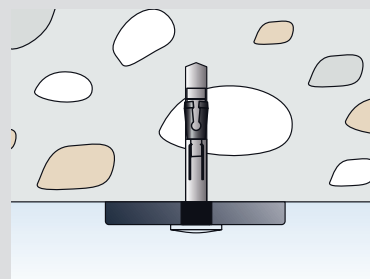
FNA II M6 with thread and flange nut in zinc-plated steel A4 and C-steel



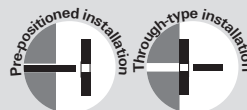
FNA II-H with hook, zinc-plated steel



FNA II-H with eye, zinc-plated steel



Installation type



Ceiling nail FDN

The cost effective push-through anchor

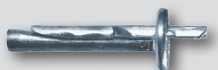
Maximum tensile force capability in concrete **2.4 kN (240 kg)**



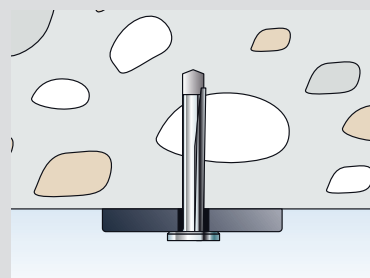
fischer ceiling nail FDN – the cost effective push-through anchor with minimum displacement

- Medium loads through expansion against the drill hole wall
- A small drilling diameter of 6 mm ensures a low drilling effort and fast drilling progress
- Impact installation – targeted hits on the punching pin guarantee a secure hold
- Reliable setting control through a flush sitting punching pin
- Optimally qualified for hard mounting parts
- Usage lengths of up to 35 mm permit a bridging of thin plaster layers

Designs



Ceiling nail FDN made of zinc-plated steel for applications in the interior area



Installation type



Concrete screw FBS 6

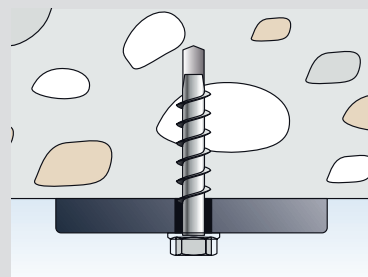
The versatile screw solutions for a fast and simple installation.

Maximum tensile force capability in concrete **3.6 kN (360 kg)**



fischer concrete screw FBS 6 – secure hold through form fit in concrete

- High loads due to deep cutting of the threads into the concrete
- Two anchoring depths for maximum flexibility
- Also approved for reinforced concrete hollow plate ceilings
- A small drill diameter of 6 mm ensures minimum drilling efforts and a fast drilling progress
- Can be completely dismantled – for temporary fixings
- Simple and fast push-through installation with tangential impact screw driver



Designs



FBS-P with panhead



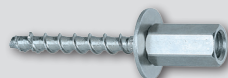
FBS-SK with countersunk head



FBS-US hexagon head with integral washer



FBS-M8 with outside diameter M8



FBS-M8/M10 with internal thread M8/M10

Installation type



Hammerset anchor EA II

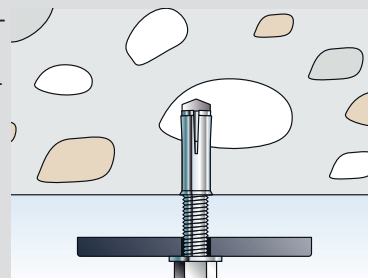
The internally threaded anchor for simple hammerset installation

Maximum tensile force capability in concrete **4.3 kN (430 kg)**

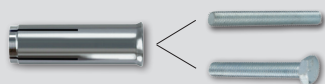


fischer hammerset anchor EA II – with internal thread for even more flexibility

- Highest loads through massive outside diameter of 8 - 15 mm and by expansion against the drill hole wall
- Short version with only 25 mm anchoring depth – also approved for reinforced concrete hollow plate ceilings
- Hammerset installation with setting tool – forceful hits on the setting device for secure hold
- Designed as internal threaded anchor permits suspensions with very large distance
- Mounted part detachable and removable - anchor can be re-used at a later time



Designs



Punching anchor EA II and EA II as short version with internal thread for interior and exterior applications with metric screws and threaded rods.

Installation type



Frame fixing SXR

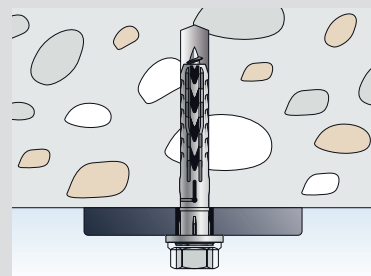
The all-round solution with short drill hole depth.

Maximum tensile force capability in concrete **1.79 kN (179 kg)**



fischer frame fixing SXR – the cost effective plastic anchor for multiple fixings

- Good holding values through expansion of the anchor sleeve against the drill hole wall
- Simple and fast screw installation using a battery screwdriver
- Optimally qualified for wooden substructures – the countersunk head anchor version can be installed flush
- Large usage lengths up to 210 mm – pressure resistant, non-supporting layers can be bridged without problems
- Also approved for the anchoring of facade substructures in aerated concrete, solid and perforated brick



Designs



Frame fixing SXR-T
for wood constructions



Frame fixing SXR-FUS
for metal constructions

Installation type



The appropriate fastening for each application.

Designation	fischer Nail anchor FNA II	fischer Ceiling nail FDN	fischer Hammerset anchor EA II	fischer Concrete screw FBS 6	fischer Frame fixing anchor SXR	
					8	10
Type						
Max. possible loads per anchor in concrete	2.40 kN 	2.40 kN 	4.30 kN 	3.60 kN / 3.30 kN ²⁾ 	1.19 kN / 4.23 kN ²⁾ 	1.79 kN / 5.98 kN ²⁾
Max. possible loads per anchor in reinforce concrete hollow plates	-	-	1.90 kN	1.20 kN	-	
Approval	Multiple fixing	Multiple fixing	Individual fixing option 7 Multiple fixing	Multiple fixing	Multiple fixing	
Operating principle	Strutting apart	Strutting apart	Strutting apart	Form fit	Strutting apart	
Exterior application	Yes, with nail anchor A4	No	Yes, with hammer set anchor A4	Yes, with concrete screw A4	Yes, with security screw A4 ⁵⁾	
Pre-positioned installation	Yes (thread)	No	Yes	Yes	No	
Push-through installation	Yes	Yes	No	Yes	Yes	
Distance installation	No	No	Yes ⁴⁾	Yes ^{4a)}	No	
Connection type/ head shape	Nail head Outside thread M6 - M8 Eye Hook ¹⁾	Nail head	Internal thread M6 - M12	Hexagonal head with attached washer Outside thread M8 Internal thread M8/M10 Countersunk head Pan head	Countersunk head Hexagonal head with attached washer	
Usable length (dependent)	Up to 120 mm	Up to 35 mm	Anchor bar length	Up to 65 mm	Up to 70 mm	Up to 210 mm
Anchoring depth galvanized (size dependent)	25 / 30 mm	32 mm	25 / 30 / 40 / 50 mm	35 / 55 mm	50 mm	
Anchoring depth A4 (size dependent)	30 mm	-	30 / 40 / 50 mm	40 / 55 mm	50 mm	

Special notes:

Installation	Easy and fast installation with slight hits, setting device possible	Easy installation with targeted hits	Easy installation with forceful hits, setting device required	Easy screw installation, tangential impact screw driver required	Easy and fast screw installation using the battery screwdriver
Fulfills VdS guideline sprinkler systems	Yes	No	Yes	Yes	No
Dismantling	No	No	Surface-flush dismantling	Yes	Surface-flush dismantling

Application examples

	<ul style="list-style-type: none"> - Suspended ceilings - Cable trays - Pipe line suspensions - Facades - Nonius suspension
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1) Not permissible

2) Separate load values perm. N/perm. Q

3) Max. load per fastening point for 3 fastenings points: perm N = 1.40 kN, for 4 fastenings points perm N = 2.1 kN

3a) Max. load per fastening point for 3 fastenings points: perm N = 2.10 kN, for 4 fastenings points perm N = 3.2 kN

4) With threaded bar

4a) With threaded bar and internal thread design

5) For zinc plated screw with additional sealing in accordance with approval

Loads

Load table

Permissible loads of an individual anchor.in kN.

Redundant fixing in cracked concrete and non-cracked concrete of the strength class C20/25

(Values for lower concrete strengths, please refer to the respective approval)

Type	Material	Eff. Anchor depth	Min. member thickness ⁶⁾	Max. torque moment max. T_{inst} [Nm]	Perm. load F_{zul} [kN]	Req. Axis distance for max. load s_{cr}	Req. Edge distance for max. load c_{cr}	Min. spacing distance $s_{min}^{1)}$ [mm]	Min. edge distance ⁶⁾ $c_{min}^{1)}$ [mm]
		h_{ef} [mm]	h_{min} [mm]						

Hammerset anchor EA II (ETA-07/0142)

EA II M 6 x 25	galvanized	25	80	4	1.0	75	-	30	60
EA II M 6 x 30	galvanized/A4	30	80 (100)	4	1.2	90	-	70 (65)	150 (115)
EA II M 8 x 25	galvanized	25	80 (100)	8	1.4	75	-	70 (50)	100 (100)
EA II M 8 x 30	galvanized/A4	30	80 (100)	8	2.0 ³⁾	90	-	110 ²⁾ (70)	150 (115)
EA II M 8 x 40	galvanized/A4	40	80 (100)	8	2.0 ³⁾	120	-	200 ²⁾ (70)	150 (115)
EA II M 10 x 25	galvanized	25	80 (100)	15	1.9 ³⁾	75	-	80 ²⁾ (60)	120 (100)
EA II M 10 x 30	galvanized/A4	30	80 (120)	15	2.0 ³⁾	90	-	200 ²⁾ (85)	150 (140)
EA II M 10 x 40	galvanized/A4	40	80 (120)	15	3.0 ³⁾	200	-	200 ²⁾ (95)	150 (150)
EA II M 12 x 25	galvanized	25	80 (100)	35	1.9 ³⁾	75	-	100 ²⁾ (100)	130 (110)
EA II M 12 x 50	galvanized/A4	50	100 (120)	35	4.3 ³⁾	300	-	200 (145)	200 (200)

Concrete screw FBS 6 (ETA-11/0093)

FBS 6	galvanized	35	80	-	0.6 (2.4) ³⁾	81	35 (75)	35	35
	A4	40			0.6 (3.1) ³⁾	96	35 (95)		
FBS 6	galvanized/A4	55	100	-	3.6 (3.3) ³⁾	132	50 (70)	40	40

Nail anchor FNA II (ETA-06/0175)

FNA II 6x25	galvanized	25	80	-	1.4	100 (s ≥ 200)	100 (c ≥ 200)	40	40
FNA II 6x30	galvanized/A4/C	30			2.4				
FNA II 6x25 M6	galvanized	25			1.4				
FNA II 6x30 M6	galvanized/A4/C	30		4	2.4				
FNA II 6x30 M8	galvanized	30			2.4				
FNA II 6x25 OE	galvanized	25		-	0.7				

Ceiling nail FDN (ETA-07/0144)

FDN 6	galvanized	32	80	-	2.4	200	150	200	150
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Redundant fixing in cracked concrete and non-cracked concrete of the strength class ≥ C12/15

Frame fixing SXR (ETA-07/0121)

SXR 8 (C12/15)	galvanized	50	100	-	1.00 (4.23) ⁵⁾	70	70	70	70
SXR 8 (≥C16/20)	galvanized				1.19 (4.23) ⁵⁾				
SXR 8 (C12/15)	A4				1.00 (3.43) ⁵⁾	65	50	50	50
SXR 8 (≥C16/20)	A4				1.19 (4.23) ⁵⁾				
SXR 10 (C12/15)	galvanized				1.79 (5.98) ⁵⁾	100	140	70	85
SXR 10 (≥C16/20)	galvanized				1.79 (5.98) ⁵⁾				
SXR 10 (C12/15)	A4				1.79 (5.98) ⁵⁾	90	100	50	60
SXR 10 (≥C16/20)	A4				1.79 (5.98) ⁵⁾				

Redundant fastening in reinforced concrete hollow plate ceilings

Punching anchor EA II (ETA-07/0142)

EA II M 6 x 25	galvanized	25	≥ 35	4	1.0	200	150	200	150
EA II M 8 x 25				8	1.4				
EA II M 10 x 25				15	1.9 ³⁾				
EA II M 12x 25				35	1.9				

Concrete screw FBS 6 (ETA-11/0093)

FBS 6	galvanized	35	≥ 25	-	0.4	100	100	100	100
			≥ 30		0.8				
			≥ 35		1.2				

1) For the simultaneous reduction of the permissible load

2) Without simultaneous reduction of the permissible load

3) Max. load per fixing point for 3 fixing points: perm N = 1.40kN, for 4 fixing points perm N = 2.1kN

4) For combination, interaction in accordance with approval required

5) Max. load per fixing point for 3 fixing points: perm N = 2.10kN, for 4 fixing points perm N = 3.2kN

6) The values in brackets for min s/min c are valid for the component thickness placed in brackets

Crack in reinforced concrete components



Cracks can develop anywhere and at any time:

This is supported by loads such as own weight, traffic and wind loads, shrinkage and creeping of the concrete. Or other external influences such as earthquakes or tremors that result in tensions, deformations and therefore crack developments. The many cracks are almost not visible to the naked eye (normally max. 0.4 mm wide).

Crack-capable anchors

When anchoring in concrete it must almost always be assumed that there are cracks in the anchoring area, that **influence the carrying capacity of the anchors**. It is almost impossible to provide proof that the concrete is not cracked. For security reasons it is recommended that planners and craftsmen always use crack compatible anchors. Anchors with approval in accordance with ETAG 001 for cracked concrete have proven their qualification through tests in cracks and can therefore be used in cracked as well as in non-cracked concrete.

Our 360° service for you.



As a reliable partner, we are available at any time for your individual requirements with words and deeds.

- Our product spectrum includes chemical systems, steel anchors as well as plastic screw anchors.
- Competence and innovation through in house research and development.
- Worldwide presence and active sales service in more than 100 countries.
- Qualified technical application consultations for cost effective and guideline oriented fastening solutions. If required, also at the construction site.
- Trainings, partly with certification, at your place on-site or at the fischer AKADEMIE.
- Design and dimensioning software for demanding fastenings.