fischer fixing compass

Cracked concrete.

360°
fischer

fischer
innovative solutions

Fixing solutions for a strong hold in cracked concrete.

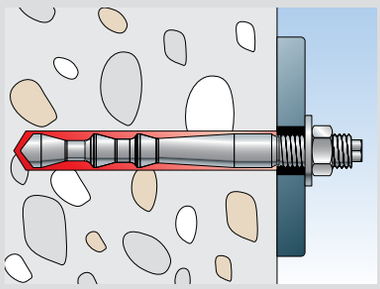
Highbond system FHB II

Our strongest solution for cracked concrete.

Relative tension load level: **100 %**

fischer Highbond system FHB II – the adhesive binds the conical anchor rod securely in the cracked concrete and allows for the highest loads

- Highest loads thanks to bonding technology and cone shape of the Highbond anchor rods
- Free choice between cartridge and injection mortar
- Up to 4 anchorage depths available per anchor diameter
- Push-through installation possible as with steel anchors – drill bit diameter = thread diameter
- No drill hole cleaning required for use with mortar cartridge – high installation safety factor
- Fully load-bearing after mortar curing time – *HIGH SPEED* capsule after just 2 minutes



Type

FHB II A-S the standard variant with a low anchorage depth

FHB II A-L the powerful variant with a larger anchorage depth

Type of installation

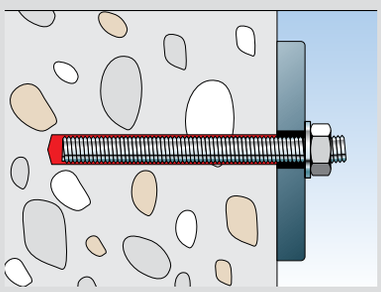
Superbond system FSB

The concrete all-rounder.

Relative tension load level: **approx. 85 %**

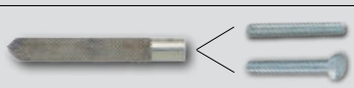
fischer Superbond system FSB – the adhesive binds the steel part securely in the cracked concrete and allows for the highest loads

- High loads through bonding technology with standard anchor rods
- Free choice between reaction capsules and injection mortar with the same load level
- Variable anchorage depths from 60 – 600 mm for anchor rods
- Approved for installation up to -30 °C (reaction capsule) or -15 °C (Superbond mortar)
- Fully load-bearing after mortar curing time – *HIGH SPEED* mortar after just 15 minutes



Type

Metric **anchor rod FIS A**



Metric **internal thread anchor RG MI** for use with metric screws and anchor rods

Metric **anchor rod RG M** especially for reaction capsule RSB

Type of installation

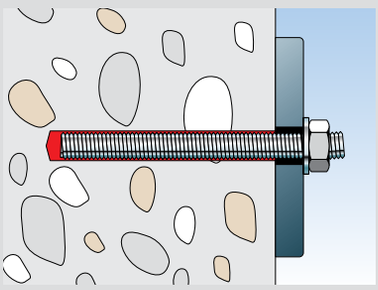
Injection system FIS V

The universal mortar –
now available for cracked concrete too.

Relative tension load level: **approx. 75 %**

fischer high-performance anchor FIS V – bonded anchor for cracked concrete, rebar connection and masonry

- High loads through bonding technology with standard anchor rods
- Variable anchorage depths from 60 – 600 mm for anchor rods
- Approved for installation up to -10 °C
- Universal use – also approved for rebar connections, solid and perforated masonry and aircrete
- Fully load-bearing after mortar curing time – *HIGH SPEED* mortar after just 30 minutes



Type

Metric **anchor rod FIS A**

Type of installation

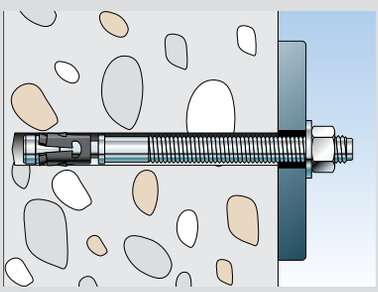
Anchor bolt FAZ II

The solution for a quick and easy installation.

Relative tension load level: **approx. 75 %**

fischer anchor bolt FAZ II – two anchorage depths and the tried and tested expansion clip allow for a quick and easy installation in cracked concrete

- Medium loads through expansion and optimum pressure distribution
- Two anchorage depths for M10 - M16:
  - High load with standard anchorage depth
  - Less installation effort and smaller component thickness with reduced anchorage depth possible
- Quick, easy and secure push-through installation with a hammer and torque wrench
- Can be loaded immediately after installation



Designs

FAZ II the anchor bolt with a long thread and two anchorage depths

FAZ II K the short variant with reduced anchorage depth for minimum drilling work

FAZ II GS with large washer especially for long holes

FAZ II HBS with an extra large U-washer in line with wood construction standard DIN 1052

Type of installation

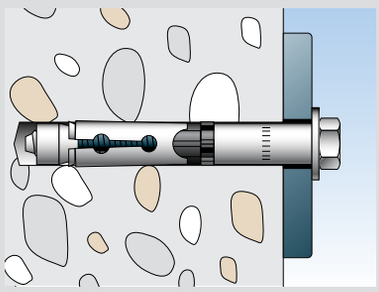
High performance anchor FH II

The sleeve anchor with different head shapes for a sophisticated design.

Relative tension load level: **approx. 70 %**

fischer high-performance anchor FH II – lots of variants ensure great design freedom in planning and execution

- Medium loads through expansion of the anchor sleeve against the drill hole wall
- Anchor design allows for different head shapes and an internal thread anchor design – for applications that are the focus of the architecture
- The design of the sleeve anchor allows for a surface-flush removal for temporary fixings
- Low setting energy – for an easy installation
- Can be loaded immediately after installation



Designs

FH II-S with hexagonal head
for fixings with a simple, subtle character

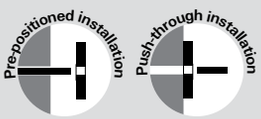
FH II-B with threaded bolt
for fixings with a technical character

FH II-H with cover nut for fixing points with a large projection of the screw head

FH II-SK with countersunk head for subtle fixings and a low risk of injury

FH II-I with internal thread
for metric screws and anchor rods

Type of installation



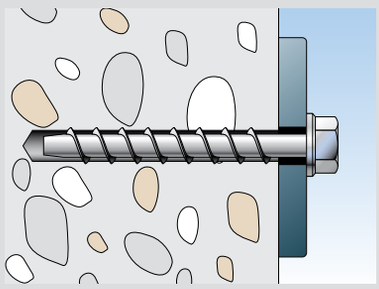
Concrete screw FBS

The simple screw anchor for removable fixings.

Relative tension load level: **approx. 75 %**

fischer concrete screw FBS – the deep cutting into the cracked concrete offers security and a good load-bearing capacity

- Medium loads thanks to the deep cutting in of the thread
- Fully removable – for temporary fixings
- Quick and easy push-through installation
- Can be loaded immediately after installation



Designs

FBS with hexagonal head and integrated washer

Type of installation

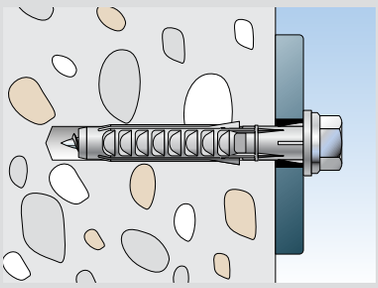
Frame fixing SXS

The economical plastic anchor with approval for single fixings in cracked concrete.

Relative tension load level: **approx. 20 %**

fischer frame fixing SXS – the plastic anchor with 4-way expansion and a good load level in cracked concrete

- Good load-bearing capacity thanks to CO-NA screw (conical expansion) and expansion in four directions
- The T-design screw head allows for recessed installation in wooden components and enables full removal
- Pre-assembled set comprising fixing sleeve and CO-NA screw
- Quick and easy push-through installation
- Approved for the anchorage of façade sub-structures in addition to approval for cracked concrete
- Can be loaded immediately after installation



Designs

Frame fixing SXS-T
for timber constructions

Frame fixing SXS-FUS
for metal constructions

Type of installation

The right fixing for every application.

Designation	fischer injection technique			fischer anchor bolt	fischer high performance anchor	fischer concrete screw	fischer long-shaft fixing
	FHB II	FSB	FIS V	FAZ II	FH II	FBS	SXS 10
Illustration							
Relative tension load level for same anchorage depth and same diameter	100 %	approx. 80 - 90 %	approx. 75 %	approx. 75 %	approx. 70 %	approx. 75 %	approx. 20 %
Maximum possible, permissible tension load	52.2 kN	188.4 kN (with FIS SB mortar)	107.7 kN	24.0 kN	31.5 kN	17.1 kN	1.65 kN
Thread size / Diameter	M8 - M24	M8 - M30	M10 - M30	M8 - M24	10 - 32	8 - 14	10
Anchorage depth	60 - 210 mm	60 - 600 mm	60 - 600 mm	40 - 125 mm	40 - 150 mm	51 - 100 mm	50 mm
Type of connection	External thread	External and internal thread, concrete steel bar	External thread, concrete steel bar	External thread	Various head shapes	Hexagonal screw with integrated washer	Safety screw
Usage length (conditional)	up to 165 mm	Anchor rod length	Anchor rod length	up to 300 mm	up to 100 mm	up to 175 mm	up to 130 mm
Functionality	Bonded	Bonded	Bonded	Expansion	Expansion	Interlocking	Expansion
Pre-positioned installation	Yes	Yes	Yes	Yes	Only FH II-I	No	No
Push-through installation	Yes, FHB II-A L only with FIS HB Injection mortar	Yes, only with FIS SB injection mortar	Yes	Yes	Yes	Yes	Yes
Stand-off installation	Yes	Yes	Yes	Yes	No	No	No
Cleaning the drill hole	No (with capsule) /blow out and brush (with mortar)	Blow out (with capsule)/blow out and brush (with mortar)	Blow out and brush	Remove drilling dust	Remove drilling dust	Remove drilling dust	Remove drilling dust
Approval for diamond drilling	No, but survey	Yes, with capsule	No	No	No	No	No
Water-filled drill holes	Yes, with capsule	Yes, with capsule	No	Yes	Yes	Yes	Yes
Fire inspection	Yes	Yes	No	Yes	Yes	Yes	No
Use under earthquake loading	No	Yes	No	Yes	Yes	No	No
Component temperature during installation	up to -5 °C	up to -30 °C With capsule	up to -10 °C	up to -5 °C	up to -5 °C	up to -5 °C	up to 0 °C
Installation torque required	Yes	No	No	Yes	Yes, expect for FH II-I	No	No
Please note:							
Loading capacity	Note curing time	Note curing time	Note curing time	Instantly load-bearing	Instantly load-bearing	Instantly load-bearing	Instantly load-bearing
Installation	Sophisticated installation, accessories required	Sophisticated installation, accessories required	Sophisticated installation, accessories required	Simple installation – torque wrench required	Simple installation – torque wrench required (except with FH II-I)	Simple installation – tangential impact wrench required	Simple and quick installation.
Removal	No	Surface-flush removal with internal thread anchor	No	No	Surface-flush removal	Yes	Yes
Application examples							
	- Railings - Consoles - Support anchors - Machines - Containers - High racks - Heavy façade sub-structures			- Railings - Canopies - Consoles - Façade sub-structures - Awnings - Wooden barriers/beams - Pipeline routes - Cable routes	- Railings - Machines - Support anchorings	- Railings - Wooden barriers/ wooden beams - Consoles - Support anchorings - Formwork props - Cable routes - Pipeline routes	- Suspended ceilings - Façade sub-structures - Cupboards - Other lightweight constructions

Loads

Load tables (most common sizes)

Permissible loads[1,2] for a single anchor in normal weight cracked concrete (concrete tensile zone) strength C20/25[3] (≈ B25); type galvanised steel (with concrete screw FBS zinc lamella coated)

Type	Effective anchorage depth h_{ef} [5] [mm]	Installation torque T_{inst} [Nm]	Permissible tension load N_{app} [4] [kN]	Permissible shear load V_{app} [4] [kN]	Required edge distance (at one edge) for: Max. tension load c [mm]	Required edge distance (at one edge) for: Max. shear load c [mm]	Required spacing for max. tension load without effect of edges s_{cr} [mm]	Minimum component thickness h_{min} [mm]	Minimum distances with simultaneous reduction in load: Min. axial spacing s_{min} [6] [mm]	Minimum distances with simultaneous reduction in load: Min. edge distance c_{min} [6] [mm]
Highbond system FHB II (ETA-05/0164)										
FHB II-A S M10 x 60	h_{ef} = 60	15	8.0[7]	11.3	90	245	180	100	40	40
FHB II-A S M10 x 75	h_{ef} = 75	15	11.1	11.3	113	215	225	120	40	40
FHB II-A S M12 x 75	h_{ef} = 75	30	11.1	15.6	113	305	225	120	40	40
FHB II-A S M16 x 95	h_{ef} = 95	50	15.9	29.0	143	510	285	150	50	50
FHB II-A L M8 x 60	h_{ef} = 60	15	8.0[7]	7.8	90	165	180	100	40	40
FHB II-A L M10 x 95	h_{ef} = 95	20	15.9	11.9	143	200	285	140	40	40
FHB II-A L M12 x 100	h_{ef} = 100	40	17.1	17.3	150	300	300	140	50	50
FHB II-A L M12 x 120	h_{ef} = 120	40	22.5	17.3	180	260	360	170	50	50
FHB II-A L M16 x 125	h_{ef} = 125	60	24.0	32.2	188	505	375	170	55	55
FHB II-A L M16 x 145	h_{ef} = 145	60	29.9	32.2	218	465	435	190	60	60
FHB II-A L M16 x 160	h_{ef} = 160	60	34.7	32.2	240	420	480	220	70	70
Superbond system FSB (ETA-12/0258)										
FSB M8 (8.8)	$h_{ef,min}$ = 60	≤ 10	4.3	8.6	90	190	180	100	40	40
	$h_{ef,max}$ = 160	≤ 10	11.5	8.6	105	115	480	190	40	40
FSB M10 (8.8)	$h_{ef,min}$ = 60	≤ 20	5.8	11.6	90	255	180	100	45	45
	$h_{ef,max}$ = 200	≤ 20	19.4	13.1	130	150	600	230	45	45
FSB M12 (8.8)	$h_{ef,min}$ = 70	≤ 40	9.4	18.9	105	420	210	100	55	55
	$h_{ef,max}$ = 240	≤ 40	32.2	19.4	155	200	720	270	55	55
FSB M16 (8.8)	$h_{ef,min}$ = 80	≤ 60	12.3	24.5	120	495	240	116	65	65
	$h_{ef,max}$ = 320	≤ 60	57.4	36.0	215	320	960	356	65	65
Injection system FIS V (ETA-02/0024)										
FIS V M10 (8.8)	$h_{ef,min}$ = 60	≤ 20	5.3	10.7	90	235	180	100	45	45
	$h_{ef,max}$ = 200	≤ 20	17.9	13.1	125	150	600	230	45	45
FIS V M12 (8.8)	$h_{ef,min}$ = 70	≤ 40	7.5	15.0	105	325	210	100	55	55
	$h_{ef,max}$ = 240	≤ 40	25.8	19.4	145	200	720	270	55	55
FIS V M16 (8.8)	$h_{ef,min}$ = 80	≤ 60	11.4	22.9	120	460	240	116	65	65
	$h_{ef,max}$ = 320	≤ 60	45.9	36.0	185	320	960	356	65	65
Anchor bolt FAZ II (ETA-05/0069)										
FAZ II 8	h_{ef} = 45	20	2.4	6.9	40	170	140	80	35	40
FAZ II 10	$h_{ef,red}$ = 40	45	4.3	8.7	60	220	120	80	40	45
	$h_{ef,sta}$ = 60	45	4.3	11.4	60	250	180	100	40	60
FAZ II 12	$h_{ef,red}$ = 50	60	6.1	13.9	75	315	150	100	50	55
	$h_{ef,sta}$ = 70	60	7.6	16.9	75	335	210	120	50	60
FAZ II 16	$h_{ef,red}$ = 65	110	9.0	20.7	100	380	195	140	65	65
	$h_{ef,sta}$ = 85	110	13.4	31.4	130	585	260	140	80	65
Concrete screw FBS (ETA-11/0095)										
FBS 8	h_{nom} = 65	-	4.3	6.2	50	120	153	120	50	50
FBS 10	h_{nom} = 85	-	7.6	16.2	75	315	204	130	70	70
FBS 12	h_{nom} = 100	-	12.3	20.0	120	355	240	150	80	80
FBS 14	h_{nom} = 125	-	17.1	30.5	150	460	300	200	100	100
Sleeve anchor FH II (ETA-07/0025)										
FH II 10	h_{ef} = 40	10[8]	3.6	4.3	60	100	120	80	40	40
FH II 12	h_{ef} = 60	17.5[8]	5.7	15.4	90	310	180	120	50	50
FH II 15	h_{ef} = 70	40[8]	7.6	20.1	105	365	210	140	60	60
FH II 18	h_{ef} = 80	80[8]	11.9	24.5	120	410	240	160	70	70
Frame fixing SXS (Z-21.2-1734)										
SXS 10	h_{ef} = 50	-	1.65	2.98	50	75	105	100	55	50

When dimensioning, observe the approvals ETA-05/0164, ETA-12/0258, ETA-02/0024, ETA-05/0069, ETA-11/0095, ETA-07/0025 and Z-21.2-1734 in their entirety. This is just an extract from the relevant approvals.

1) The partial safety factors of the resistances and a partial safety factor of the effect of γ_F = 1.4, which are regulated in the approval, are considered. A single anchor could be, for example, an anchor with an axial distance $s \geq 3 \times h_{ef}$.

2) The stated loads are valid for anchoring in dry and moist concrete for the respectively lowest temperature range specified in the respective approval in the base material (in hardened condition). Drilling of the hole in the hammer drilling procedure and drill hole cleaning in line with respective approval. See respective approval for other conditions.

3) With higher concrete strengths up to C50/60, higher permitted loads are possible. See respective approval. The concrete is assumed to be reinforced normally. A split reinforcement, which limits the width of the crack, taking the split force into account, to $w_k \approx 0.3$ mm is a pre-requisite.

4) With combinations of tension and shear loads, or with shear loads with a lever (bending), and with reduced edge and axial distances (anchor groups), a detailed measurement of the anchor, e.g. with our measurement programme C-FIX, is required. For the various possible steel grades, the loads are always valid when using the best-possible steel grade in line with the respective approval – e.g. 8.8. See the respective approval for use with stainless steel anchor rods or screws.

5) For concrete screw h_{nom} = screw-in depth. For FSB and FIS V, the anchorage depth h_{ef} can be chosen freely between the values of $h_{ef,\,min}$ and $h_{ef,\,max}$ according to the static requirements. When using the RSB capsules, only fixed anchorage depths are possible – see approval. RSB capsules only in combination with anchor rod RG M. Application of smooth tapped anchor rods FIS A only with mortar FIS SB or FIS V.

6) For FAZ II, FH II and SXS 10, the associated value c must be taken from the approval for s_{min}, and the associated value s for c_{min}.

7) Valid for injection mortar FIS HB. When using the resin capsule FHB II-P or FHB II-PF, see approval FHB II.

8) Various different installation torques may apply to different head shapes – see FH II approval.

Cracks in reinforced concrete components

Cracks can occur anywhere in concrete at any time:
Factors involved in this are loads such as **dead load, traffic or wind loads,** shrinkage and creeping of the concrete or external influences like earthquakes or ground motions that result in tensions, deformations and thus crack formation. The numerous cracks are hardly visible with the naked eye (generally max. 0.4 mm wide)

Fixings suitable for cracks
With fixings in concrete, it is almost always assumed that **cracks** can be present in the anchoring area that influence the **load-bearing capacity of the fixings**. It is almost impossible to prove that the concrete is not cracked. For **safety reasons**, the **use of fixings suitable for cracks is fundamentally recommended** to designers and tradesmen. Fixings with approval in line with ETAG 001 for cracked concrete have proven their suitability through tests in cracks, and, as such, can be used in both cracked and non-cracked concrete.

Our all-round service for you.

We are a reliable partner, one that will stand by your side and address your individual requirements with advice and action:

- Our products range from chemical systems and steel anchors to plastic anchors.
- Competence and innovation through own research and development.
- Global presence and active sales service in more than 100 countries.
- Qualified application-specific advice for economic installation solutions that are compliant with directives. If need be we are there for you – even at the construction site.
- Training measures (some with certification) at your premises or at the fischer ACADEMY.
- Construction and design software for challenging fixings.

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